# Rethinking the Role of Agriculture and Agro-Industry in the Economic Development of Thailand: Input-Output and CGE Analyses (Ph.D. Dissertation)

Thaiprasert, Nalitra

Graduate School of International Development, Nagoya University, Japan

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# Rethinking the Role of Agriculture and Agro-Industry in the Economic Development of Thailand: Input-Output and CGE Analyses

by

**Nalitra THAIPRASERT**

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**Approved by the Dissertation Committee:**

**Shigeru OTSUBO (Chairperson)** ________________________
Signature

**Mitsuo EZAKI** ________________________
Signature

**Hiroshi OSADA** ________________________
Signature

**Approved by the GSID Committee: April 19, 2006**

**To Mom and Dad**

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"The hardest thing in life is to learn which bridge to cross and which to burn."

Lawrence J. Peter

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"The reward of a thing well done is to have done it."

Ralph Waldo Emerson

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# Chapter I—Introduction

***Chapter Outline***



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## 1.1 Statement of Problems

Thailand is referred to in many studies as one of the successful cases in economic development. It has experienced high economic growth rates over two decades. Its export-oriented strategy has proved to be successful. It has recovered quickly from the Asian economic and financial crises in 1997. Its national income has been on the rise and its internal and external balances are currently well maintained. Its domestic demand is growing because of the higher national income and welfare. And it is becoming more and more industrialized. However, these statements only represent half of the truth. The other half of Thailand is still overshadowed by several problems. The major ones are problems of inequality between urban and rural areas, and between agricultural and non-agricultural sectors, not only in terms of income, but also attention, promotions, and investments received. The fast-growing urban-manufacturing industrial sectors have long been the receivers of net capital inflows, investments, and government's attention more than the slower growing rural-agricultural sectors. These problems make Thailand a country with a record of high inequality.

The structural transformation is happening in Thailand quite smoothly on the production and export sides as the production and export of manufacturing sectors have gained their shares over those of the agricultural sectors. However, the transformation on the employment side is happening quite slowly since there are not enough jobs available in the manufacturing industrial sectors both in urban and rural areas to pull labors out of primary agriculture. The inability of non-agricultural sectors pulling labor out of the agricultural sectors has resulted in a widening gap of real wages between primary agriculture and other sectors, while not much capital is allocated to the former sector. Moreover, the Thai agricultural sector and its people have long been discriminated against by biased government development policies. The problems of unequal development and unequal income distribution have been the main obstacles that hinder the process of Thailand's structural transformation.

Problems also occur in the manufacturing industrial sectors as Thai manufacturing production and exports are not based on advanced technology, complexity in interindustrial linkages, or ability to achieve significant sectoral rates of TFP growth. Thai manufacturing industrial sectors alone are not able to finance the balance of trade deficits because of their high dependency on imported materials. The persistence of unproductive manufacturing industrial sectors could, therefore, hinder Thailand's economic growth in the future.

In addition, structural transformation in Thailand has caused many difficulties for the development of Thai agriculture, which is closely related to the welfare of the poor in the rural areas. Therefore, giving farmers new opportunities is a way to directly tackle income distribution problems.

These three issues, labor allocation; inequality; and problems in potential of the manufacturing industrial sectors, are the main focus of this dissertation. The objective of the study is set as below.

### 1.2 Objective of the Study

In order to tackle the inequality problems, smoothen the employment transformation, and at the same time maintain the same speed of GDP growth for Thailand, a more appropriate development strategy for Thailand should be considered. As past development has shown that Thai manufacturing industrial sectors have limits in fulfilling this role, the country should reconsider which sectors have more potential to tackle inequality problems, to smoothen employment transformation, to generate high growth and induce high output production, and to act as a bridge connecting Thai primary agriculture with modern sectors.

### 1.3 Research Hypothesis

Hypothesis: Thai agro-industry and high value-added agricultural sectors should be promoted and set as key sectors to achieve more equality, smoothen employment transformation, and at the same time maintain high GDP growth rate. It is hypothesized that these sectors have better intersectoral linkages and are able to generate better income distribution compared to Thai non-agricultural manufacturing industrial sectors and other nontradable sectors. Agro-industry should be promoted in the rural areas for closer input locations, to pull agricultural labor out of primary agriculture, to improve the real wage of farmers, and to prevent extensive urban migration. In the short-run, agricultural development is needed to tackle rural poverty. As in the long-run, Thailand aims to be an industrialized country, agro-industry can be a bridge connecting these two phases.

### 1.4 Methodology of the Study

A qualitative analysis and an input-output analysis are used in Chapter II when discussing the structural transformation of Thailand. The input-output analysis is used for the demand-side decomposition of the Thai economy over 25 years (1975-2000). In Chapter III, a qualitative analysis is used in discussing the effects of structural transformation on Thai agriculture. In Chapter IV, a qualitative analysis is first used to discuss the potential of Thai agricultural sector and agro-industry. Then, an input-output analysis is used to prove the hypothesis that Thai agro-industry and high value-added agricultural sectors have better intersectoral linkages and are key sectors which have the best backward and forward linkages. In addition, both a social accounting matrix (SAM) analysis and an input-output analysis are used to find out each sector's multiplier effects, and effects on income distribution in case of the SAM analysis. In Chapter V, a computable general equilibrium (CGE) analysis is used to conduct simulations on labor allocation movements from primary agriculture to agro-industry, in comparison with the move to other industries, and conduct other kinds of policy simulations related to the proposed new development strategy to find out impacts on economic growth, factor input adjustments, real wages, capital rents, prices, quantities, household incomes, and income distributions.

### 1.5 Organization of the Dissertation

Chapter II gives a general idea of Thailand's economic development and the country's structural transformation before dealing with the specific issue of Thai agriculture in the next chapter. The main discussion of this chapter is on the problems resulting from economic development and structural transformation of Thailand. Before reaching into the main discussion in Section 2.3, an overview of the meanings of structural transformation and the empirical studies on patterns of structural change are illustrated in Section 2.1. After that the features of structural transformation of Thailand are presented in Section 2.2 with the support of an input-output analysis on the decomposition of the factors of growth in the Thai economy.

Chapter III focuses on effects of structural transformation on Thai agriculture. In order to understand this analysis, an overview of Thai agriculture and its role in economic development are first illustrated. The former is presented in Section 3.1, followed by discussion of structural transformation and Thai agriculture in Section 3.2. In Section 3.2.3, we then discuss the effects of this structural transformation on Thai agriculture. The discussion notes to the negative effects that Thai agriculture has to face as a result of the industrialization process.

Chapter IV focuses on the potential of Thai agricultural sector and food industry (agro-industry) in economic development of Thailand. Section 4.1 first discusses all the major points of potential, which include potential in terms of world food demand issues and the ability of Thailand to export agricultural and food produce, the ability of Thailand to improve technology related to agricultural and agro-industrial sectors, and the potential from the strong intersectoral linkage and multiplier effects of agricultural and agro-industrial sectors. Analyses of intersectoral linkage effects and multiplier effects are the main objectives of this chapter, which are elaborated in Section 4.2 and 4.3, respectively. The linkage effect analysis is done using an input-output analysis in order to find out the key sectors for the Thai economy which have strong backward and forward linkages. The multiplier effect analysis is done to find out which sector gives the highest output multiplier effects using an input-output analysis, with a reference to previous study using a SAM analysis.

Chapter V proposes a new development strategy to reallocate primary agricultural labor to agro-industry. Since the structural transformation in terms of employment and income distribution in Thailand is happening quite slowly, the objective of this strategy is to improve the real wage of agricultural workers by channeling them into other productive sectors. Agro-industry is selected as the destination sector because it has the best intersectoral linkages as tested in the previous chapter. By imposing this strategy, the real wage in primary agriculture should increase due to the higher productivity of labor when it becomes less abundant. The wage rate in the recipient sector is projected to decline but not excessively. Since agro-industry's production is close to agriculture, it should be easy to allocate primary agricultural labor into this recipient sector. Moreover, since agro-industry has strong interindustrial linkages, at least the same speed of growth should be maintained when applying this labor allocation strategy. This labor allocation strategy will be tested using a CGE analysis. Other kinds of policy simulations related to the new development strategy will also be experimented under the same model, such as simulations on capital allocation, tax and subsidy incentives, protective policies, government expenditures and transfers, price movements in rest-of-world, exchange rate policies, and improvements in production technology. The reason the CGE analysis is used to test this new strategy is elaborated in Section 5.1. Section 5.2 discusses previous CGE models of Thailand. Section 5.3 elaborates features of the CGE model of Thailand used in this study and explains the simulations design and simulation results. Section 5.4 summarizes the distributional impacts on labor demand, wage rate in primary agriculture, and household incomes of all simulations. The last section will conclude the analysis of this strategy.

Chapter VI presents conclusion and policy implications for the Government of Thailand.

## Chapter II—Structural Transformation of Thailand: 1960 to 2005

***Chapter Outline***

2.2.4.4 Institutional Development

2.3 Problems in Economic Development and Structural Transformation of Thailand

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This chapter gives a general idea of Thailand's economic development and the country's structural transformation before dealing with the specific issue of Thai agriculture in the next chapter. The main discussion of this chapter is on the problems resulting from economic development and structural transformation of Thailand. Before we reach into the main discussion in Section 2.3, an overview of the meanings of structural transformation and the empirical results on patterns of structural change are given in Section 2.1. After that the features of the structural transformation of Thailand are presented in Section 2.2 with the support of an input-output analysis on the decomposition of the factors of growth in the Thai economy.

## 2.1 Background—Theoretical Arguments and Empirical Research Regarding Structural Transformation

Structural transformation is closely related to development economics dealing with developing countries. Syrquin (1988: 208) stated that "an obvious reason for studying structural change is that it is at the center of modern economic growth. It is, therefore, an essential ingredient for describing the process and for the construction of any comprehensive theory of development. More important is the hypothesis that growth and structural change are strongly interrelated. Most writers recognize their interdependence, and some emphasize the necessity of structural changes for growth." Section 2.1 is divided into two parts. Section 2.1.1 discusses briefly the theoretical arguments of structural transformation. Section 2.1.2 shows the results of empirical research on structural transformation.

### 2.1.1 Theoretical Arguments Regarding Structural Transformation

Economists have two basic approaches to analysis of structure, micro approach and macro approach. The first is concerned with the functioning of economies, their markets, institutions, mechanisms for allocating resources, income generation and its distribution, etc., anchored in economic theory (Syrquin 1988: 205). The second sees economic development as an interrelated set of long-run processes of structural transformation that accompany growth. The central features of this approach are economy-wide phenomena such as industrialization, urbanization, and agricultural transformation, regarded as elements of what Kuznets identified as "modern economic growth" (Syrquin 1988: 205). This chapter focuses mostly on such long-run processes with a concern for the income distribution issue.

Syrquin (1988) gathers and summarizes the concepts of structural change used in economics into the five main aspects listed below. The interrelated processes of structural change that accompany economic development are jointly referred to as *structural transformation*.

1. Increase in the rate of physical and human capital accumulation (Rostow, Lewis)
2. Shift in sectoral composition of economic activity (industrialization)
    a. Production (demand and trade) and factor use (Kuznets, Chenery)
    b. The allocation of employment (Fisher, Clark)
3. Change in location of economic activity (urbanization)
4. Change in other concomitant aspects of industrialization (demographic transition, income distribution)

5. Change in institutions (Kuznets, Adelman, Morris)

The accumulation of physical and human capital and shifts in the composition of demand, trade, production, and employment are described (following Chenery (1986)) as the economic core of the transformation, while the related socio-economic processes are identified as peripheral (Syrquin 1988: 206). These two components (accumulation and sectoral composition) will be our main focus in this and the next chapters.

The accumulation of physical capital was referred to as physical capital in commodity production and infrastructure in the 1950s. Capital appeared as the critical factor in the Harrod-Domar model. Rostow (1960) emphasized the sharp increase in the rate of investment during the take-off stage. A doubling in the investment rate was also seen as indispensable by Arthur Lewis (1954), and the shift of resources to the modern sector increased the profit share in income and thus raised the saving rate. Two important early developments can be seen as attempts to specify the role of capital. For the closed economy, Mahalanobis (1953) argued that with non-shiftable capital, the key planning problem is the allocation of investment between sectors producing consumption and production goods, or how many machines to use in making machines. For the open economy, Chenery and Bruno (1962), and Chenery and Strout (1966) introduced foreign exchange requirements as an additional constraint on growth besides the limitation imposed by savings. The main message of these studies and of the latter emphasis on human resources is that a sustained increase in rates of accumulation, while not sufficient, is a necessary requirement for long-run growth and transformation (Syrquin 1988: 212).

The sectoral shifts in the composition of economic activities were also stressed in 1950s. In Lewis's model, sectoral differences appear as traditional versus modern sectors, and in Nurkse (1953) and Rosenstein-Rodan (1943, 1961) as a requirement for balanced growth. These approaches shared some views of the functioning of less developed economies: labor surplus in agriculture, low mobility of factors, price-inelastic demands, export pessimism, and a general distrust of market. On the empirical side, studies of long-run transformation are best represented by Kuznets' synthesis of modern economic growth in a series of seminar papers.[1] Kuznets established the stylized facts of structural transformation, but was reluctant to offer a theory of development. He saw his analysis as an essential building block towards such a theory. His essays on modern economic growth are a compendium of ideas on growth, transformation, distribution, ideology, institutions, and their interrelations. General Equilibrium modelers can find in these essays a rich source for ideas, a guide to specification, and to the long-run relations against which to calibrate their models. The amount of information assembled by Kuznets was enormous, but he did not use formal statistical techniques in its analysis. This task was later taken up by Chenery (1960). His 1960 "Patterns of Industrial Growth" fit well in this approach as an attempt to determine the "normal" transformation in the structure of production as income grows. Both Kuznets and Chenery emphasized much on the importance of the comparative study to find common features and patterns among nations (Syrquin 1988: 213-214). Their ideas will be elaborated in the next section on empirical research.

Fisher (1935, 1939) and Clark (1940) dealt with sectoral shift in the composition of the labor force. They were probably the first to deal with the process of reallocation during the epoch of modern economic growth, and to use the form of sectoral division: primary-secondary-tertiary (Syrquin 1988: 213-214). The main message of these studies is that change in relative importance of sectors is defined as a structural change. The reallocation of resources to sectors of higher productivity contributes to growth if it leads to a fuller or better utilization of resources.

[1] "Quantitative Aspects of the Economic Growth of Nations" (1956-67). More compact statements are the 1966 monograph and the Nobel lecture (1973).

### 2.1.2 Empirical Research on Structural Transformation[2]

Economists performed analyses on the comparative experience of nations varying in size, location, and historical heritage to establish common features and patterns and to identify divergences from such pattern. They expect to find some uniform patterns of structural transformation.

Kuznets addressed the importance of this comparative study of structure and growth that "the rationale is conditioned on the existence of common, transnational factors, and a mechanism of interaction among nations that will produce some systematic order in the way modern economic growth can be expected to spread around the world" (Kuznets 1959: 170, Syrquin 1988, 216). These *transnational factors* discussed by Kuznets[3] are "those potentially common to the world," which are (1) the industrial system;[4] (2) a community of human wants and aspirations;[5] (3) organization of the world into nation-states. The way the transnational factors affect the pattern of growth is conditioned by *national factors* such as size, location, natural resources, and historical heritage. The consideration of the national elements thus leads directly to an emphasis on the distinctive structure and on the differences in growth pattern. Finally, there are *international factors* relating to the various channels of interdependence among the different nations. The crucial point stressed by Kuznets[6] is that "if there were no substantial transnational factors, there would be no common features of significance in the economic growth of nations and comparative study would be hardly warranted."

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[2] This section draws heavily from Syrquin (1988).
[3] Kuznets (1959: 166), cited from Syrquin (1988: 216-217).
[4] That is, the system of production based on the application on the technological potential afforded by modern science. Some of the requirements of the system are some minimum level of literacy, a non-familial, impersonal type of organization, and a high degree of urbanization.
[5] This is illustrated by the relatively weak resistance to the spread of modern technology in reduction in death rates, by the generality of Engel's law, and by the widespread desire for higher standard of economic performance and levels of living.
[6] Kuznets (1959: 167), cited from Syrquin (1988: 217).

The same idea appears in different form in Chenery (1960: 626). *Universal factors*, of which he lists five: (1) common technological knowledge; (2) similar human wants; (3) access to the same markets for imports and exports; (4) the accumulation of capital as the level of income increases; (5) the increase of skills, broadly defined, as income increases, lead us to expect uniform patterns of development, while *particular factors* and policy are behind divergences from a common path. In the analysis of development, the sources of diversity are no less important than those leading to uniformity (Syrquin 1988: 217).

The presence of transnational (or universal) factors is the basis for expecting uniformities in the growth process. But national (or particular) factors recognized from the output make clear the inevitability of differences at some level. The comparative approach thus suggests uniformities at a broad (macro) level of analysis or aggregation, but allows for variations at a lower (micro) level (Syrquin 1988: 217).

#### 2.1.2.1 The concept

Analyses on structural transformation usually focus on the concept of a transition from an agricultural to an industrial economy, which allows for differences in many dimensions, such as industrial composition, timing or sequencing of changes during the process, and sources of financing of capital accumulation (Syrquin 1988: 217). There is, however, more than one way to make this transition. Some even go beyond the question of whether or not countries need to industrialize, but focus on the problem of when and in what manner it will take place, which is also a focus of this dissertation. Instead of searching for a unique pattern, attention was turned to the determination of average patterns over time, and to an exploration of the relation between time-series and cross-section patterns (Syrquin 1988: 222).

### 2.1.2.2 The Methodology of Comparative Analyses

The methodology of comparative analyses in Sections 2.1.2.3 and 2.1.2.4 is a statistical approach which focuses on the search for uniform features of development ("stylized facts") and the main sources of growth and change. It sources of information are long historical series from developed countries, shorter time series from developing countries, and cross-country comparisons. This approach is subject to some limitations on policy implications and causality. The cross-section analysis does not take into account technological innovations, changes in consumer tastes, the dynamic effects, and changes in the international environment (Syrquin 1988: 221-222). It is also unrealistic to expect identical time-series relations across countries. At best we can expect a high degree of uniformity in the nature of the relations reflecting the operation of common universal factors and discrepancies that can be interpreted (Syrquin 1988: 222). In contrasting cross-section and time-series results, it is customary to interpret the former as reflecting long-term adjustment, and the latter as short-term or partial adjustments to changes in exogenous variables. The cross-section approach was originally intended as a response to the limited data in developing countries. Comparisons of economic structure across countries are now regarded as useful in their own right (Syrquin 1988: 222-223).

### 2.1.2.3 Patterns of Growth and Accumulation

#### *A. Growth Pattern*

The process of economic growth can be formally described as the result of the expansion in productive resources and the increase in the efficiency of their use. During the transition (or in the epoch of modern economic growth) the growth of inputs—labor and capital—also accelerates, but by far the most important element accounting for output growth in developed countries, has been the growth of total factor productivity (TFP). However, it would be wrong to deduce from this result that capital accumulation is not an important factor for development.

The reasons are that, first, studies of productivity growth in developing countries have shown that factor inputs account for a much higher proportion of growth than in advanced countries. This is due in part to the observation that the share of value added imputed to labor is higher in rich countries than in poor (one of Taylor's (1986) stylized facts). Other reasons are the role of capital accumulation as a carrier of technological change, and its status as a necessary factor for intersectoral resource shifts. In addition to embodiment effects, a high rate of investment may be required to sustain aggregate demand and prevent idle capacity from arising. These observations point to a limitation of sources-of-growth analysis. The sources considered are usually assumed to act independently from each other, usually ignoring links and interactions among them. The missing link in this case, is the relation between measured productivity growth and capital accumulation.

Evidence from micro studies (Pack 1988) suggests another reason for the low measured growth of factor productivity in various developing countries: the resources deployed are used inefficiently relative to both international best practice and the best domestic firms.

The very large contribution of productivity growth to output expansion in developed countries is a relatively recent phenomenon. In most of the countries for which long-term records are available, factor productivity growth accelerated over time to a larger extent than output growth, thereby raising its relative contribution.

At the sectoral level most evidence indicates faster TFP growth in the industrial-modern sector than in agriculture. However, the high rate of productivity growth has been pervasive, encompassing all major production sectors, As Kuznets (1966: 491) pointed out in relation to the experience in developed countries, even if the rise in output per unit of input in agriculture was lower than that in industry, it was still so large compared with premodern levels that one can speak of an agricultural as well as of an industrial revolution. Recent studies have also identified strong 'country' and 'period' effects. Rates of labor and total factor productivity growth tend to be uniformly higher across sectors in countries with good average performance as well as within countries in periods of rapid growth of aggregate productivity. This finding suggests that the overall economic environment, which includes general macroeconomic and trade policies, is an important factor in explaining differences in productivity growth (Syrquin 1988: 224-225).

### *B. Accumulation*

Accumulation refers to the use of resources to increase the productive capacity of an economy. Indicators of accumulation include rates of saving; investment in physical capital, in research and development, and in the development of human resources (health, education); and investment in other public services which augment productivity. This section focuses on aggregate saving and investment patterns.

Saving and investment have critical role in income growth. During the epoch of modern economic growth, and over the transition range, there is a significant rise in the share of saving and investment in GDP.

Kuznets (1961, 1966) analyzed long-term trends in capital formation proportions in ten countries. In most countries he found a significant secular rise in capital formation proportions.[7] Crafts (1984) pooled time-series and cross-section date for 17 countries in nineteenth century Europe and found a significant income effect for the investment ratio.

Cross-country studies for the post-World War II period reveal significant income effects for saving and investment, both among countries and over time within countries. Syrquin and

[7] Except in the United Kingdom and the United States.

Chenery (1986) report estimates of development patterns for samples of over 100 countries during 1950-83. The expected total change over the transition derived from the pooled regression, is about 8 percentage points of GDP for the investment share and about 11 percentage points for the saving proportion. This difference between the changes in saving and investment reflects the tendency for the inflow of foreign capital (measured by the current account deficit) to decline over the transition. A similar secular decline took place in advanced countries (Kuznets 1961).

The average income and effects on investment and saving in the time series are positive and significantly larger than the implied effects across countries. That is, whatever the initial shares were, they tended to go up since 1950 (Syrquin 1988: 227).

The increase in overall accumulation rates at a faster pace than population or employment, results in changes in factor proportions and in comparative advantage with implications for the sectoral allocation of economic activity (Syrquin 1988: 228).

#### 2.1.2.4 Changes in Sector Proportions

Changes in the sectoral composition of production are the most prominent feature of structural transformation. Associated with income growth are shifts in demand, trade, and factor use. These interact with the pattern of productivity growth, the availability of natural resources, and government policies, to determine the pace and nature of industrialization.

***A. Final Demand***

Among the most uniform changes in demand affecting industrialization, are the decline in the share of food in consumption and the rise in the share of resources allocated to investment (Engel's Law). At low income levels, food consumption accounts for as much as 40 percent of

GDP and total private consumption for about 75 percent. Over the whole transition both shares decline; food consumption by more than 20 percentage points (of GDP) and total consumption by somewhat less. The rise in the shares of non-food consumption and investment imply a shift in demand away from agricultural goods and to industrial commodities and nontradables (Syrquin 1988: 231).

### *B. Intermediate Demand*

The largest element in gross output of one sector is used as intermediate products, which in the aggregate accounts for over 40 percent of total gross output in most countries. During the process of development, the total use of intermediates relative to total gross output tends to rise, while varying its composition. The relative use of primary products as intermediates declines, while the uses of intermediates from heavy industry and services go up. Most of the overall rise in intermediate use is not due to changes in the composition of output but rather to increases in the density of the input-output matrices. These trends reflect the evolution to a more complex system with a higher degree of fabrication, and the shift from handicrafts to factory production. The latter can also be observed in the change in the distribution of firms by size. The increase in the use of intermediate services is indicative of the dependence of industrial growth on a parallel expansion of modern services. This relation provides an additional explanation to those based on income elasticities, government expansion, and productivity growth, for the rising shares of services in employment and output.

The preceding results referred to the use of a sector's output as an intermediate input (a row measure). Looking at total intermediate purchases by a sector (a column measure) a systematic trend has been observed in agriculture. The share of intermediate inputs in the total value of output increases significantly with the level of income. Technical change in the sector and a rising relative price of labor, induce a more mechanized structure of production and a more intensive use of inputs from outside the sector—fuels, fertilizers and capital goods. During the course of the transformation the value-added ratio in agriculture (the counterpart of the ratio of intermediates purchased to gross output) typically goes down from close to 80 percent to less than 55 percent of the value of output (Chenery and Syrquin 1986, Syrquin 1988: 231-232).

### *C. Trade*

In small countries, the shares of trade and capital inflows in GDP are relatively high, domestic markets relatively small, and the production structure, therefore, tends to be more specialized than in larger countries. The commodity composition of trade and the type of specialization are largely determined by the availability of natural resources, by traditional factor proportions, and by policy. In practice, the evolution of comparative advantage and commercial policies have combined to create an export pattern that reinforces the shift from primary goods to industry, implicit in the pattern of domestic demand. The strength and timing of the reorientation of exports have not been the same across countries; small countries lacking a broad base of natural resources, had to develop manufactured exports at an earlier stage than resource-rich countries, where specialization in primary exports persists to a much later stage of development. Large countries have shifted away from the specialization in primary products through import substitution. These countries have been prone to adopt inward-oriented policies, which appear more feasible for them than for small countries.

Chenery and Syrquin (1986) analyzed trade patterns for four groups of countries: large-primary oriented (LP), large-manufactured oriented (LM), small-primary (SP), and small-manufacturing (SM). They found the large-country (those with populations of more than 15 million in 1970) pattern has less than half the share of exports of the pooled regression, and the shift from primary to manufactured exports takes place at a lower income level. Among small countries, in the SM group manufactured exports overtake primary exports quite early in the transition. The typical SP economy, on the other hand, maintains a strong comparative advantage in primary exports throughout the transformation.

Natural resources and size influence the timing of the shift from primary to manufactured exports and the commodity composition of trade in manufactures. The expectation of the shift itself is based on predictions from trade theories as to the likely evolution of comparative advantage. The more rapid growth of all types of capital, relative to natural resources and unskilled labor, facilitates the development of manufactured exports and the replacement of manufactured imports by domestic production. An increase in the relative importance of manufactures in total exports took place in the historical experience of the industrial countries (Maizels 1963).

Low income countries depend heavily on industrial imports. The common experience has been an early substitution of imports in light industry in most countries. Large countries have then proceeded to institute import substitution in heavy industry and machinery to a greater extent than small countries.

When a country begins to export manufactures, these usually come from light industry, except for simple processed products on natural resources (metals). At a later stage (often much later), exports of heavy industry become feasible, and then tend to rapidly increase their share in industrial exports. In resource-poor countries (the SM pattern), light industry exports become important at an early stage. In resource-rich economies (the SP pattern) the need to develop manufactured exports is less apparent. When the shift to manufactured exports takes place at higher income levels, wages are relatively high and often preclude the fast growth of light industry exports. Heavy industries on the whole tend to be more capital and skill intensive, enjoy faster productivity growth, and are more prone to exhibit increasing returns to scale (ECE 1977, Balassa 1979, Syrquin 1988: 232-235).

### *D. Employment*

Syrquin (1986) conducted a regression analysis for the structures of output and employment of about 100 countries with data for parts or whole of the period 1950-83. The results show a decline in the share of employment in agriculture follows the decline in value-added but with a lag. Since initially the share of employment exceeds the share in output, labor productivity in agriculture declines. In the upper-middle income group, relative labor productivity in agriculture often improves. It is interesting to note the large size of the income slope of agriculture employment is in industrial countries. Results from this analysis suggest that the association of growth with a reallocation of economic activity away from agriculture is among the most robust of the stylized facts of development (Syrquin 1988: 241).

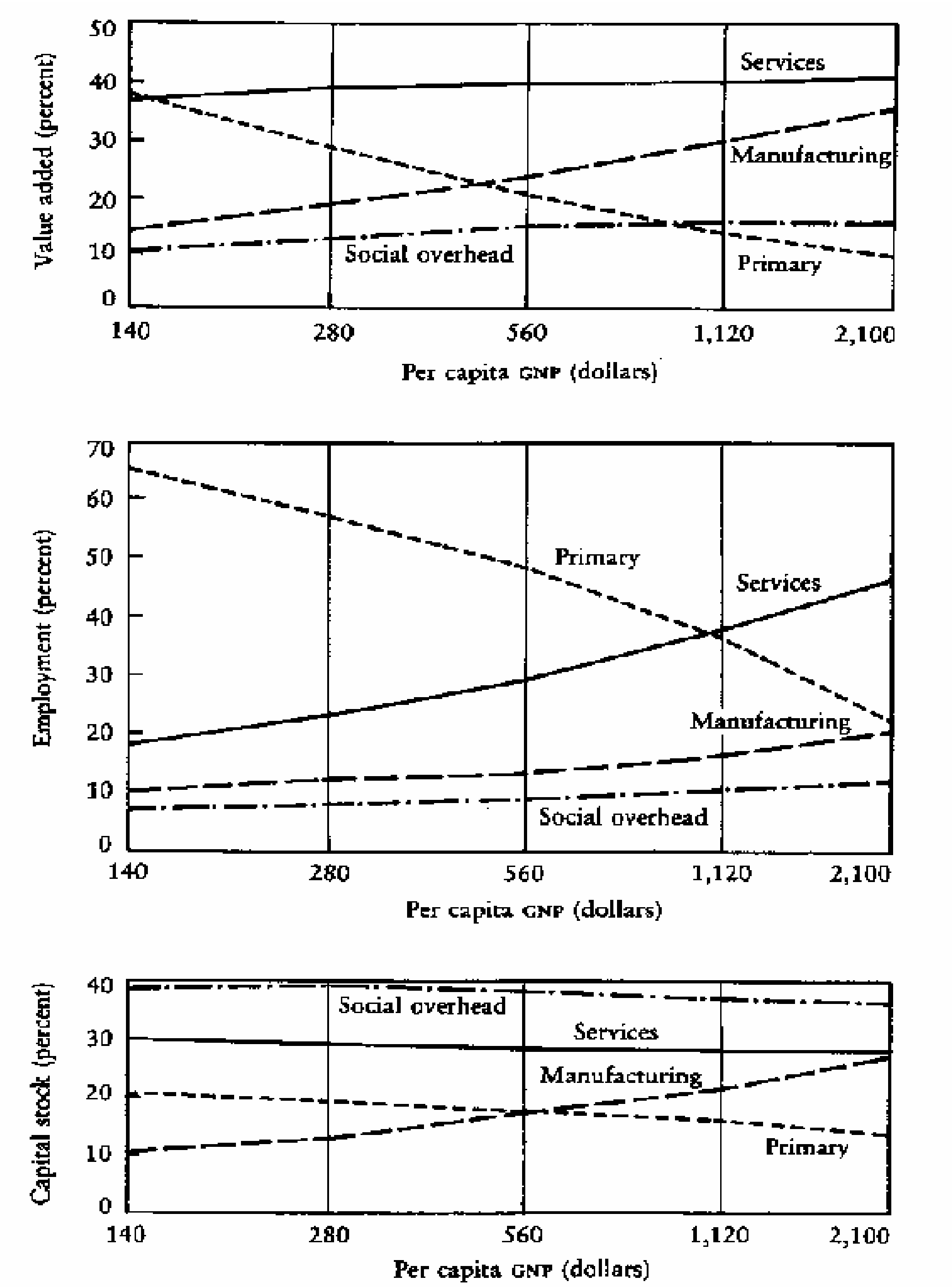
### *E. Structure of Production*

The change in the commodity composition of trade reinforces the changes in final and intermediate demand to produce a more pronounced shift in production from primary activities to manufacturing and services. This shift is the centerpiece of the transformation and has been validated in the long-term experience in the industrial countries, and in virtually all countries in the postwar period.

Syrquin and Chenery (1989) conducted econometric estimates of cross-country patterns for the period 1950-83 to find the transformation patterns. They summarized that over the course of transition, there is a significant shift in value-added from primary production to manufacturing and nontradables. Changes in domestic demand (Engel effects) directly account for less than one half of the change in structure, and changes in net trade for about 10 percent on the average. The contribution of intermediates has two components. First, there is a significant increase in the demand for manufacturing products to be used as intermediates, and a decline in the relative use of intermediate inputs from the primary sector. The second component refers to variation in the ratio of value-added to gross output in a sector. In agriculture, this ratio tends to decline with the rise in income, or equivalently, the use of purchased intermediate inputs per unit of output tends to increase. This factor accounts for about one-fourth of the decline in the share of primary production in total GDP.

For a more complete picture of long-term changes in the structures of production and factor use, Chenery and Syrquin (1986) found the changes in the composition of value-added, labor, and capital generated by a model as shown in Figure 2.1. Figure 2.1 illustrates the shift from primary activities to manufacturing during the transition. The typical employment pattern reflects the lag in the movement of workers out of agriculture and the correspondingly lower growth in labor productivity in this sector during most of the transformation. The rise of employment in industry is much smaller than the decline in agriculture, and consequently most of the shift is from agriculture to services. The pattern of capital use shows a much higher proportion in social overhead, which is larger than primary production and manufacturing combined. Because this difference in capital intensity persists at all income levels, the shift from primary production to manufacturing appears less pronounced. The figure also portrays the decline in the share of manufacturing in output and factor use at higher income levels. Such a decline has taken place in virtually all industrial countries, and has become known as de-industrialization (Syrquin 1988: 235-239).

**Figure 2.1—Simulation of Value-Added, Employment, and Capital for Cross-Country Model**




Source: Chenery and Syrquin (1986: 67)

Syrquin and Chenery (1989) predicted change in the structure of manufacturing derived from regression analysis of the pooled time series for the period 1950-1983. The results confirmed the strong association of economic structure with the level of development. They concluded that as income rises, the composition of manufacturing shifts from light to heavy industry. The early increase in light industry is generally the result of the expansion of domestic demand, and the opportunities for import substitution which are exhausted at an early stage. Heavy industry is composed of goods purchased by other sectors as intermediates or capital goods, and durable consumer goods with high income elasticitiies of demand. The transition may not be smooth and it may follow a variety of alternative path, but the overall process of structural transformation has enough common elements to justify its representation by a set of stylized facts.

In this section, the theoretical arguments and the empirical researches on structural transformation have been explained in detail. The next section will investigate features of the structural transformation of Thailand based on above frameworks. After that, in Section 2.3 we will outline problems that have arisen during the structural transformation process of Thailand. These problems will be the main focus of discussions in the next chapters.

## 2.2 Features of Structural Transformation of Thailand

According to the definitions of structural transformation given in the previous section, this section investigates features of the structural transformation of Thailand since the 1960s. Thailand's economic structure has transformed from a low income, agrarian rural economy during the post war period to a more industrialized one with substantially higher per capita income at present (2005). This section utilizes information from the input-output tables and time-series data for the analysis. A demand side decomposition analysis on Thailand will also be conducted in aiding the discussion to see the factors of growth in the Thai economy in Section 2.2.3.

### 2.2.1 Thailand's Growth and Accumulation

#### 2.2.1.1 Growth

Thailand has been successful in achieving high economic growth rates since the post war period. The Thai economy has grown at the fairly high rate in almost all years since 1960 (Table 2.1). In the 1960s, economic performance was good because of circumstances favorable to agriculture, expansion of farm land and development of irrigation facilities. Military expenditure related to the Vietnam War was another factor benefiting the Thai economy. In the early 1970s, Thailand suffered from inflation caused by the oil crisis in 1973. The Thai economy experienced slightly slower growth, with growth rates of less than 5 percent in 1974 and 1975. In the late 1970s, however, the economy performed better due to the high prices of agricultural products in the international market. The Thai government could then enjoy huge revenues from the rice exports. Thailand's GDP growth rates in 1976-77 were nearly double-digit and reached 10 percent in 1978. However, in the early 1980s, Thailand faced poor economic performance due to the worldwide recession caused by the second oil shock (1979-1983) and trade protectionism which slowed the growth of Thai exports. By contrast, the Thai economy in the late of 1980s grew rapidly at double-digit rates. This rapid growth was led by FDI (Foreign Direct Investment), mainly by Japanese investors, who were prompted to relocate their factories because of the appreciation of the yen. Thailand at this time became a semi-industrial country. Manufacturing at this time led GDP growth, accounting for the major portion of GDP. In the 1990s, up to 1995, the Thai economy continued to grow at a rapid pace due to the rapid increase of FDI, not only from Japan but also from East Asian NIEs (Newly Industrialized Economies).

However, Thailand had straight years of current account balance deficits and the deficits increased substantially from 1990 to 1996, while the capital account balance had been in surplus until 1996. Although, this made Thailand's balance of payment in surplus from 1991-1996, the severity of the problem was covered by the huge capital inflow, which is easily speculated on and sensitive to investors' confidence. Because the fixed exchange rate regime was applied before 1997, the baht's real exchange rate had appreciated, and this led to a decline in Thailand's export competitiveness. When the pressure from the current account balance deficit increased, which shaking investors' confidence, capital flight happened rapidly. When the baht continued to lose its value and could not stand further speculation, the Thai government devalued the currency in July 1997,[8] which was the starting point of the Asian financial and economic crises. The growth of the Thai economy contracted by 10.51 percent in 1998, but continued to improve since 1999 until the present (2005).

**Table 2.1—GDP Growth, GDP per Capita, Current Account Balance, FDI Inflows, and Official Exchange Rate of Thailand, 1960-2004**

| Year | GDP growth (annual %) | GDP per capita (constant 1995 US$) | Current account balance (% of GDP) | Foreign direct investment, net inflows (% of GDP) | Foreign direct investment, net inflows (% of gross capital formation) | Official exchange rate (Baht per US$, period average) |
|---|---|---|---|---|---|---|
| 1960 | .. | 465 | .. | .. | .. | 21.18 |
| 1961 | 5.36 | 476 | .. | .. | .. | 21.06 |
| 1962 | 7.55 | 497 | .. | .. | .. | 20.88 |
| 1963 | 8.00 | 521 | .. | .. | .. | 20.83 |
| 1964 | 6.83 | 540 | .. | .. | .. | 20.80 |
| 1965 | 8.18 | 566 | .. | .. | .. | 20.80 |
| 1966 | 11.12 | 610 | .. | .. | .. | 20.80 |
| 1967 | 8.62 | 642 | .. | .. | .. | 20.80 |
| 1968 | 8.12 | 673 | .. | .. | .. | 20.80 |
| 1969 | 6.55 | 695 | .. | .. | .. | 20.80 |
| 1970 | 11.41 | 752 | .. | 0.60 | 2.36 | 20.80 |
| 1971 | 4.90 | 765 | .. | 0.53 | 2.18 | 20.80 |
| 1972 | 4.28 | 774 | .. | 0.84 | 3.87 | 20.80 |
| 1973 | 10.24 | 828 | .. | 0.72 | 2.67 | 20.49 |

[8] Thai baht depreciated substantially from B25.34/$ in 1996 to B40.89/$ at the end of 1997, and B47.40/$ in the first quarter of 1998.

| Year | GDP growth (annual %) | GDP per capita (constant 1995 US$) | Current account balance (% of GDP) | Foreign direct investment, net inflows (% of GDP) | Foreign direct investment, net inflows (% of gross capital formation) | Official exchange rate (Baht per US$, period average) |
|---|---|---|---|---|---|---|
| 1974 | 4.47 | 841 | .. | 1.37 | 5.16 | 20.38 |
| 1975 | 4.97 | 859 | (4.07) | 0.58 | 2.15 | 20.38 |
| 1976 | 9.33 | 915 | (2.59) | 0.47 | 1.94 | 20.40 |
| 1977 | 9.84 | 979 | (5.55) | 0.54 | 1.99 | 20.40 |
| 1978 | 10.30 | 1,054 | (4.80) | 0.23 | 0.82 | 20.34 |
| 1979 | 5.37 | 1,085 | (7.62) | 0.20 | 0.74 | 20.42 |
| 1980 | 5.17 | 1,116 | (6.42) | 0.59 | 2.01 | 20.48 |
| 1981 | 5.91 | 1,158 | (7.38) | 0.83 | 2.81 | 21.82 |
| 1982 | 5.35 | 1,196 | (2.74) | 0.52 | 1.97 | 23.00 |
| 1983 | 5.58 | 1,240 | (7.18) | 0.87 | 2.91 | 23.00 |
| 1984 | 5.75 | 1,290 | (5.04) | 0.96 | 3.26 | 23.64 |
| 1985 | 4.65 | 1,329 | (3.95) | 0.42 | 1.49 | 27.16 |
| 1986 | 5.53 | 1,381 | 0.57 | 0.61 | 2.35 | 26.30 |
| 1987 | 9.52 | 1,488 | (0.73) | 0.70 | 2.50 | 25.72 |
| 1988 | 13.29 | 1,658 | (2.68) | 1.79 | 5.50 | 25.29 |
| 1989 | 12.19 | 1,829 | (3.46) | 2.46 | 7.01 | 25.70 |
| 1990 | 11.17 | 1,997 | (8.53) | 2.86 | 6.92 | 25.59 |
| 1991 | 8.56 | 2,135 | (7.71) | 2.05 | 4.79 | 25.52 |
| 1992 | 8.08 | 2,278 | (5.66) | 1.90 | 4.74 | 25.40 |
| 1993 | 8.25 | 2,440 | (5.09) | 1.44 | 3.61 | 25.32 |
| 1994 | 8.99 | 2,638 | (5.59) | 0.95 | 2.35 | 25.15 |
| 1995 | 9.24 | 2,865 | (8.07) | 1.23 | 2.93 | 24.92 |
| 1996 | 5.90 | 3,015 | (8.09) | 1.29 | 3.07 | 25.34 |
| 1997 | (1.37) | 2,954 | (2.00) | 2.58 | 7.67 | 31.36 |
| 1998 | (10.51) | 2,625 | 12.73 | 6.54 | 31.98 | 41.36 |
| 1999 | 4.45 | 2,721 | 10.16 | 4.99 | 24.33 | 37.81 |
| 2000 | 4.76 | 2,828 | 7.59 | 2.74 | 12.02 | 40.11 |
| 2001 | 2.14 | 2,866 | 5.38 | 3.31 | 13.72 | 44.43 |
| 2002 | 5.41 | 3,000 | 6.03 | 0.71 | 2.96 | 42.96 |
| 2003 | 6.87 | .. | 5.57 | .. | .. | 41.48 |
| 2004 | 6.05 | .. | 4.46 | .. | .. | 40.22 |

Source: Data from 1960-2002 is from World Bank's World Development Index 2004 CD-Rom. Data from 2003-2004 is from ADB's Key Indicators 2005.

### 2.2.1.2 Capital Accumulation and TFP growth

Turning into the capital accumulation, overall, Thailand has been successful in raising and maintaining its aggregate saving ratio and its capital accumulation. The gross domestic saving rate, the gross national saving rate, and the gross domestic capital formation were 33.4, 31.5, and 27.1 percent of GDP, respectively, in 2004.

### Table 2.2—Thailand's Savings and Capital Formation, 1960-2004

| Year | Gross domestic savings (% of GDP) | Gross national savings (% of GDP) | Gross capital formation (% of GDP) |
|---|---|---|---|
| 1960 | 14.08 | .. | 15.41 |
| 1961 | 15.07 | .. | 14.76 |
| 1962 | 15.98 | .. | 17.95 |
| 1963 | 17.81 | .. | 20.98 |
| 1964 | 18.21 | .. | 19.65 |
| 1965 | 18.57 | .. | 19.74 |
| 1966 | 22.72 | .. | 23.07 |
| 1967 | 21.23 | .. | 23.23 |
| 1968 | 20.94 | .. | 24.64 |
| 1969 | 21.95 | .. | 25.80 |
| 1970 | 21.17 | .. | 25.58 |
| 1971 | 21.32 | .. | 24.19 |
| 1972 | 20.69 | .. | 21.69 |
| 1973 | 25.57 | .. | 27.01 |
| 1974 | 24.28 | .. | 26.65 |
| 1975 | 22.12 | 22.67 | 26.74 |
| 1976 | 21.50 | 21.52 | 23.98 |
| 1977 | 21.46 | 21.36 | 26.89 |
| 1978 | 23.95 | 23.37 | 28.16 |
| 1979 | 20.50 | 19.59 | 27.21 |
| 1980 | 22.89 | 22.72 | 29.14 |
| 1981 | 23.40 | 22.30 | 29.68 |
| 1982 | 24.80 | 23.77 | 26.52 |
| 1983 | 22.81 | 22.78 | 29.98 |
| 1984 | 25.21 | 24.47 | 29.47 |
| 1985 | 25.52 | 24.28 | 28.24 |
| 1986 | 27.91 | 26.45 | 25.87 |
| 1987 | 28.43 | 27.15 | 27.87 |
| 1988 | 31.20 | 30.00 | 32.59 |
| 1989 | 32.50 | 31.57 | 35.07 |
| 1990 | 33.84 | 32.83 | 41.35 |
| 1991 | 36.30 | 35.09 | 42.84 |
| 1992 | 35.95 | 34.31 | 39.96 |
| 1993 | 35.77 | 34.92 | 40.01 |
| 1994 | 35.41 | 34.65 | 40.25 |
| 1995 | 35.35 | 34.01 | 42.09 |
| 1996 | 35.54 | 33.75 | 41.82 |
| 1997 | 35.08 | 32.79 | 33.66 |
| 1998 | 36.33 | 33.25 | 20.45 |
| 1999 | 33.07 | 30.63 | 20.50 |
| 2000 | 31.44 | 30.36 | 22.81 |
| 2001 | 30.61 | 29.47 | 24.09 |
| 2002 | 31.13 | 29.98 | 23.94 |
| 2003 | 33.27 | 31.40 | 25.01 |

| Year | Gross domestic savings (% of GDP) | Gross national savings (% of GDP) | Gross capital formation (% of GDP) |
|---|---|---|---|
| 2004 | 33.42 | 31.47 | 27.13 |

Source: Data from 1960-2002 is from World Bank's World Development Index 2004 CD-Rom. Data from 2003-2004 is from ADB's Key Indicators 2005.

In the neoclassical growth theory, TFP growth also plays a very important part in accounting for output growth. Therefore, in addition to the observation of the capital accumulation situation in Thailand, TFP growth in Thailand is also examined. There have been several researches on the TFP growth of Thailand using different methodologies as shown in Table 2.3, but this study will focus on the latest results calculated by Bhuvapanich (2002), which follows the methodology and data management used by a famous study of Tinakorn and Sussangkarn (1996) applying the Solow-Denison growth accounting framework.

Bhuvapanich (2002) calculated the contribution of factor inputs and TFP to the GDP growth from 1981-1999 and divided the calculation into four periods as shown in Table 2.4. The figures show that the highest contribution to output growth comes from capital. As the separation between two kinds of capital is being made, one can observe a very small contribution from foreign capital compared to that of domestic capital. On average, foreign capital accounts for only 3-4 percent of total net capital stock. Next to the domestic capital, labor can explain a major part of growth while land contributes the least.

**Table 2.3—TFP Growth in Thailand: Selected Various Studies in Chronological Order**

| Author | Time Period of Study | TFPG* | Contribution to Growth | Methodology Approach and Type of Data |
|---|---|---|---|---|
| Ikemoto (1986) | 1970-1980 | 1.4 | 19.70% | Non-parametric Growth Accounting, Time series |
| Limskul (1988) | 1970-1985 | 0.46 | 7.20% | Parametric, Time series |
| World Bank (1993) | 1960-1990 | 2.5 | n.a. | Parametric, Time series |
| Drydale and Yiping (1995) | 1950-1988 | 1.7 | 29.30% | |
| Kawai (1995) | 1970-1990 | 1.9 | 27.10% | |

| Author | Time Period of Study | TFPG* | Contribution to Growth | Methodology Approach and Type of Data |
|---|---|---|---|---|
| Tinakorn and Sussangkarn (1996) | 1978-1990 | 2.69; 1.19 | 35.6%; 15.8% | Non-parametric Growth Accounting, Time series |
| Marti (1996) | 1970-1990 | 1.8 | 36% | Parametric, Panel data |
| Collins and Bosworth (1997) | 1960-1994 | 1.8 | 36% | Parametric, Panel data |
| Sarel (1997) | 1978-1996 | 2.03 | 39% | Elasticity Estimate + Growth Accounting, Panel data |
| | 1991-1996 | 2.25 | 35% | |
| Tinakorn and Sussangkarn (1998) | 1981-1995 | 2.11; 1.27 | 25.9%; 15.6% | Non-parametric Growth Accounting, Time series |
| Nararak (2000) | 1981-1985 | 0.21 | 3.85% | Non-parametric Growth Accounting, Time Series |
| | 1986-1990 | 3.06 | 29.59% | |
| | 1991-1996 | 0.30 | 3.73% | |
| | 1996-1998 | -4.93 | -5.54% | |
| Bhuvapanich (2002) | 1981-1985 | 0.60;0.35 | 11.05%; 6.40% | Non-parametric Growth Accounting, Time Series |
| | 1986-1990 | 3.59; 2.09 | 34.73%;20.19% | |
| | 1991-1995 | 1.54;1.52 | 1.54%; 1.52% | |
| | 1996-1999 | -2.75;-3.99 | | |

* The former number is the unadjusted TFP growth. The latter number is the TFP growth after adjusting the quality of labor.
Sources: Tinakorn et al. (1998) and Bhuvapanich (2002)

### Table 2.4—Contribution of Inputs and TFP to Growth: All Sectors

| Period | GDP growth | Contribution from inputs | | | | | TFP | Adjusted TFP |
|---|---|---|---|---|---|---|---|---|
| | | Land | Kd | Kf | L | Adjusted L | | |
| 1981-1985 | 5.45 | 0.10 | 2.97 | 0.12 | 1.65 | 1.90 | 0.60 | 0.35 |
| | | (1.88) | (54.58) | (2.25) | (30.24) | (34.89) | (11.05) | (6.40) |
| 1986-1990 | 10.34 | 0.05 | 4.27 | 0.43 | 2.00 | 2.24 | 3.59 | 2.09 |
| | | (0.50) | (41.28) | (4.14) | (19.35) | (21.64) | (34.73) | (20.19) |
| 1991-1995 | 8.66 | -0.06 | 6.05 | 0.30 | 0.82 | 1.55 | 1.54 | 1.52 |
| | | (-0.74) | (69.94) | (3.51) | (9.53) | (17.86) | (17.76) | (17.61) |
| 1996-1999 | -0.53 | -0.01 | 1.83 | 0.55 | -0.16 | 1.09 | -2.75 | -3.99 |
| 1981-1999 | 6.32 | 0.02 | 3.89 | 0.34 | 1.14 | 1.87 | 0.93 | 0.20 |
| | | (0.34) | (61.0) | (5.40) | (18.09) | (29.62) | (14.71) | (3.19) |

Note: Kd is domestic capital, Kf is foreign capital, Adjusted L is the labor with quality adjustment.
Source: Bhuvapanich (2002)

The TFP growth rates shown in Table 2.4 change in each period following the overall economic performance of Thailand in that period. In the period of 1981-1985, TFP growth was small, accounting for only 6.4 percent of the GDP growth (adjusted TFP), due to the strong external pressures from the second oil shock, a worldwide recession, and the low real GDP growth rate. When the GDP growth performed well in the late 1980s, TFP growth's contribution to GDP growth also increased to 20.19 percent. Thailand then experienced a little slowdown in TFP growth in the early 1990s following a small decline in GDP growth during that period compared to the late 1980s. When the GDP growth rate contracted in the late 1990s due to the economic crises, TFP growth also contracted into a negative of -3.99 percent.

Tinakorn and Sussangkarn (1996) and Bhuvapanich (2002) also calculated the sectoral TFP growth and divided the calculation into different periods as shown in Table 2.5 and Table 2.6. The results in both tables show that, with the exception of the primary sectors (agriculture and mining) and public administration, the TFP contributions in most sectors appear to be unimpressive or negative. The higher TFP growth found in agriculture than in non-agricultural sectors may be due to the increasing limitation in pushing the land frontier and the availability of research and extension services in the agricultural sector (Tinakorn and Sussangkarn 1996: 81). In the non-agricultural sectors, the rapid output growth has been sustained through imported technology, in the shape of new machinery and equipment. This situation is unlike that in other newly industrializing countries where some local industries have attained independence from imported technology through indigenous research and development, something which seems to have attracted little attention in Thailand (Tinakorn and Sussangkarn 1996: 81).

**Table 2.5—Sectoral TFP Growth by Tinakorn and Sussangkarn, 1996**

| Period | Agriculture | Manufacturing | Industry | Services and other |
|---|---|---|---|---|
| 1978-1990 | 1.29<br>(32.2) | -0.36<br>(-4.1) | -0.61<br>(-6.8) | -0.26<br>(-3.2) |
| 1981-1990 | 1.02<br>(25.7) | 0.85<br>(9.1) | 0.21<br>(2.2) | 0.18<br>(2.2) |

Notes: Numbers in ( ) are the percentage contribution to GDP. The calculation is based on 1972 prices.
Source: Tinakorn and Sussangkarn (1996: 78-79).

**Table 2.6—Sectoral TFP Growth by Bhuvapanich, 2002**

| Period | 1988-1990 | 1991-1995 | 1996-1999 | 1988-1999 |
|---|---|---|---|---|
| Agriculture | 1.70<br>(33.12) | 2.16<br>(55.05) | 2.02 | 2.00<br>(63.78) |
| Mining | 5.95<br>(67.39) | 0.31<br>(4.00) | 12.68 | 5.87<br>(70.63) |
| Light Manufacturing | 0.84<br>(5.68) | -1.07<br>(-11.47) | -3.40 | -1.37<br>(-16.47) |
| Heavy Manufacturing | 0.90<br>(4.43) | -1.01<br>(-6.77) | -5.62 | -2.07<br>(-17.09) |
| Construction | 1.08<br>(5.12) | -8.73<br>(-90.79) | -10.23 | -6.78<br>(-172.06) |
| Electrition | 9.29<br>(65.44) | -3.01<br>(-27.21) | -5.27 | -0.69<br>(-7.51) |
| Transportation | 5.84<br>(43.38) | 0.86<br>(8.36) | -1.18 | 1.42<br>(16.22) |
| Trade | 8.48<br>(61.69) | -1.62<br>(-21.03) | -4.77 | -0.15<br>(-2.61) |
| Banking | 19.41<br>(69.63) | 8.51<br>(52.96) | -22.55 | 0.88<br>(12.08) |
| Public Administration | 7.36<br>(161.33) | -2.48<br>(-48.54) | 0.23 | 3.90<br>(81.41) |
| Service | -0.83<br>(-14.80) | -3.61<br>(-77.01) | -0.40 | -1.84<br>(-40.58) |

Source: Bhuvapanich (2002: 58:60).

The high TFP growth of primary sectors and the low TFP growth of manufacturing sectors will be recalled again in Chapter IV when we discuss the potential of the agricultural sector and agro-industry. Results from these TFP growth analyses should provide some meaningful implications to our analysis which will be discussed in Chapter IV.

### 2.2.2 Changes in Thailand's Sector Proportions

#### 2.2.2.1 Employment

As shown in Table 2.7, Thai agriculture contributed only around 10 percent to the GDP in 2000. This represents a decline from 38 percent in 1951, 27 percent in 1970 and 20 percent in 1980, while the contribution of industry rose from 17 percent in 1951 to 41 percent in 2000. Meanwhile, employment in the agricultural sector fell from 71 percent in 1980 to 51 percent in 1998, as shown in Table 2.8. This discrepancy between fall in contribution to GDP and fall in share of employment reflects the low level of labor productivity in Thai agriculture (in percentage contribution). The figures can be compared with other Asian developing countries, where unlike in Thailand, shares of agriculture to GDP dropped in about the same proportion as the drops in employment in agriculture.

**Table 2.7—Gross Domestic Product at 1988 Prices by Industrial Origin (percent)**

| Year | Agriculture | Industry | Manufacturing (included in Industry) | Services |
|---|---|---|---|---|
| 1951 | 38 | 17 | 14 | 45 |
| 1960 | 31 | 20 | 14 | 49 |
| 1970 | 27 | 24 | 17 | 49 |
| 1980 | 20 | 30 | 23 | 50 |
| 1990 | 13 | 38 | 28 | 49 |
| 1995 | 11 | 41 | 31 | 48 |
| 2000 | 10 | 41 | 32 | 49 |

Source: The author, using data from Thailand's National Economic and Social Development Board (NESDB).

The figures in Table 2.8 show a very contradictory picture of Thailand's development in the past decades as the country has tried very hard to become a newly industrializing economy (NIE), while more than half of the population are still engaged in the agricultural sector and more than three quarters still live in rural areas. It is obvious that though agriculture's contribution to GDP in Thailand has dropped dramatically, the country has failed to push more workers out of agriculture and channel them to industrial or service sectors, as should take place during the industrialization process. This phenomenon would not be a problem if the majority of Thailand's population still in the agricultural sector and living in the countryside had a better standard of living and welfare. However, lower standard of living and neglect of rural interests have been a common story in Thailand's countryside.[9]

**Table 2.8—Gross National Income per Capita, Employment in Agriculture, Percentage of Agricultural Value-Added to GDP, and Percentage of Rural Population (selected countries)[10]**

| Country | Gross National Income Per Capita | Employment in Agriculture | | Agriculture Value Added | | Rural Population | |
|---|---|---|---|---|---|---|---|
| | US$ | % of total labor force | | % of GDP | | % of total population | |
| Year | 2000 | 1980 | 1998 | 1970 | 1999 | 1980 | 2000 |
| Thailand | 2,000 | 71 | 51 | 26 | 10 | 83 | 78 |
| Bangladesh | 370 | 73 | 63 | 44 | 25 | 86 | 76 |
| Cambodia | 260 | 76 | .. | .. | 51 | 88 | 84 |
| China | 840 | 69 | 47 | 35 | 18 | 80 | 68 |
| India | 450 | 70 | .. | 46 | 28 | 77 | 72 |
| Indonesia | 570 | 56 | 45 | 45 | 19 | 78 | 59 |
| Japan | 35,620 | 10 | 5 | 6 | 2 | 24 | 21 |
| Korea, Rep | 8,910 | 34 | 12 | 26 | 5 | 43 | 18 |
| Lao PRD | 290 | 80 | .. | .. | 53 | 87 | 77 |
| Malaysia | 3,380 | 37 | 19 | 29 | 11 | 58 | 43 |
| Philippines | 1,040 | 52 | 40 | 30 | 18 | 63 | 41 |
| Vietnam | 390 | 73 | 71 | .. | 25 | 81 | 76 |
| Average World | 5,170 | 51 | .. | .. | 5 | 60 | 53 |
| Average of Lower Middle Income Countries | 1,130 | 58 | 45 | 31 | 14 | 69 | 58 |
| Average of East Asia and Pacific Countries | 1,060 | 66 | 46 | 33 | 14 | 78 | 65 |

Sources: Data of Gross National Income per Capita and Rural Population is from World Bank's 2002 World Development Indicators, p.18-20, 134-136. Data of Employment in Agriculture and Agriculture Value Added is from World Bank's 2001 World Development Indicators, p. 28-30.

[9] Will be illustrated in Section 2.2.4.3 *Income Distribution* below

[10] Cambodia, Indonesia, Lao PRD, Malaysia, Philippines, and Vietnam are selected because they are ASEAN countries with similar climate, features of cultivation, and labor utilization. Bangladesh, China, and India are selected because they are Asia's developing countries which have quite strong agricultural sectors. Korea, Rep is selected because it is a newly industrializing economy whose path Thailand may follow. Japan is selected because it is considered Thailand's influential model of development with the same constitutional monarchy.

It is noticeable in Table 2.9 that the rise of employment in industry is much smaller than the decline in agriculture, and consequently most of the shift is from agriculture to services. This feature is consistent with the finding from the empirical research.

**Table 2.9—Sectoral Employment in Thailand, 1980-2002**

| Year | Employment in agriculture (% of total employment) | Employment in industry (% of total employment) | Employment in services (% of total employment) |
|---|---|---|---|
| 1980 | 70.8 | 10.3 | 18.9 |
| 1985 | 68.4 | 12.1 | 22.0 |
| 1990 | 64.0 | 14.0 | 22.0 |
| 1995 | 52.0 | 19.8 | 28.3 |
| 2000 | 48.8 | 19.0 | 32.2 |
| 2002 | 46.2 | 21.1 | 32.7 |

Source: World Bank's World Development Index 2004 CD-Rom.

This slow transformation in employment is a crucial point leading to our analysis in Chapter V as we will propose a strategy to reallocate labor from primary agriculture to agro-industry, which we hypothesized to be the most appropriate sector.

### 2.2.2.2 Production and Trade Patterns

For the changes in production and trade patterns, one can find good information related to this from the input-output tables of Thailand.[11] Seven years of Thailand's noncompetitive-import type input-output tables[12] are used: 1975, 1980, 1985, 1990, 1995, 1998, and 2000. The original 179 sectors of Thailand's input-output tables are aggregated into 19 sectors. Details of input-output analysis theory and methodology will be discussed in Chapter IV, Section 4.2.1.

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[11] The input-output tables of Thailand are available every five years starting from 1975 (also available in 1998) by Thailand's National Economic and Social Development Board (NESDB). Thailand's input-output tables can be downloaded from www.nesdb.go.th.

[12] Noncompetitive-import type input-output tables are those which have import matrix separated from the intermediate transaction and the final demand so that they can present the domestic and import effects separately.

***A. Production***

The changes in the production structure in the Thai economy can be traced from the input-output tables. These changes are the change in each sector's production's inputs, and the change in each sector's value added share.

For the shares of inputs in each sector's total productions, results are shown in Table 2.10. In all primary sectors (sector 1 to 7) and in agricultural machinery, trade, transport, and services, the use of intermediate input has been on the rise, which means these sectors' production processes have been modernized and become more complicated. As stated in the empirical research by Syrquin (1988), during the process of development, the total use of intermediates relative to total gross output tends to rise. Most of the overall rise in intermediate use is not due to changes in the composition of output but rather to increases in the density of the input-output matrices. These trends reflect the evolution to a more complex system with a higher degree of fabrication, and the shift from handicrafts to factory production. The share of intermediate inputs in the total value of output also increases significantly with the level of income. The increase in the use of intermediate services is indicative of the dependence of industrial growth on a parallel expansion of modern services.

For the share of inputs from value-added, the significant decline happened in primary sectors (Sector 1-7) and quite stable in manufacturing and nontradable sectors. This is consistent with the empirical research mentioned previously, which summarized that over the course of transition, there is a significant shift in value-added from primary production to manufacturing and nontradables. In primary sectors, the value-added ratio tends to decline with the rise in income, or equivalently, the use of purchased intermediate inputs per unit of output tends to increase.

## Table 2.10—Share of Inputs in Each Sector's Total Production, 1975-2000 (percent)

| | Sector | Domestic intermediate input | | | | | | | Imported intermediate input | | | | | | | Value added | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 |
| 1 | Paddy | 11.7 | 14.6 | 16.6 | 16.1 | 16.9 | 20.1 | 19.4 | 2.5 | 3.6 | 5.1 | 6.4 | 6.4 | 6.7 | 11.0 | 85.8 | 81.8 | 78.3 | 77.5 | 76.8 | 73.2 | 69.6 |
| 2 | Other crops | 13.4 | 14.7 | 21.6 | 19.1 | 18.2 | 21.9 | 25.4 | 2.5 | 3.3 | 5.6 | 5.9 | 6.3 | 4.9 | 6.5 | 84.1 | 81.9 | 72.8 | 75.0 | 75.5 | 73.2 | 68.1 |
| 3 | Livestock | 52.2 | 49.4 | 57.4 | 57.8 | 60.2 | 61.3 | 55.8 | 0.4 | 0.9 | 2.4 | 1.8 | 3.8 | 1.1 | 0.4 | 47.5 | 49.7 | 40.2 | 40.4 | 36.0 | 37.6 | 43.8 |
| 4 | Agri service | 23.8 | 24.1 | 24.8 | 24.8 | 25.5 | 30.8 | 33.2 | 0.2 | 0.3 | 2.8 | 0.9 | 0.4 | 0.3 | 1.1 | 75.9 | 75.6 | 72.4 | 74.3 | 74.1 | 68.9 | 65.8 |
| 5 | Forestry | 10.7 | 12.2 | 17.7 | 13.0 | 16.0 | 15.9 | 16.2 | 0.5 | 1.2 | 1.4 | 0.3 | 0.5 | 0.4 | 0.1 | 88.8 | 86.6 | 80.9 | 86.7 | 83.5 | 83.7 | 83.7 |
| 6 | Fishing | 21.4 | 34.2 | 38.9 | 25.4 | 26.9 | 32.6 | 39.6 | 0.4 | 0.3 | 8.1 | 11.3 | 11.7 | 2.9 | 3.2 | 78.2 | 65.5 | 53.0 | 63.3 | 61.4 | 64.5 | 57.2 |
| 7 | Mining | 14.5 | 12.0 | 26.4 | 27.2 | 29.6 | 28.9 | 29.3 | 2.5 | 3.7 | 6.4 | 3.2 | 3.0 | 2.0 | 0.7 | 83.0 | 84.3 | 67.2 | 69.6 | 67.5 | 69.0 | 70.1 |
| 8 | Agro-Industry | 72.4 | 73.4 | 70.4 | 66.6 | 68.4 | 67.7 | 65.8 | 1.2 | 2.4 | 2.8 | 8.6 | 8.3 | 9.3 | 9.7 | 26.4 | 24.2 | 26.8 | 24.8 | 23.3 | 23.0 | 24.5 |
| 9 | Beverage & Tobacco | 32.4 | 31.5 | 25.3 | 26.0 | 27.7 | 29.8 | 28.7 | 9.9 | 10.5 | 8.3 | 8.5 | 8.9 | 7.0 | 13.9 | 57.6 | 58.1 | 66.3 | 65.5 | 63.3 | 63.3 | 57.4 |
| 10 | Textile & Leather | 52.1 | 54.8 | 51.3 | 49.8 | 49.7 | 49.5 | 52.5 | 14.1 | 12.6 | 12.9 | 19.1 | 17.1 | 16.9 | 14.5 | 33.8 | 32.6 | 35.8 | 31.2 | 33.2 | 33.6 | 33.0 |
| 11 | Wood, Paper, Rubber | 52.3 | 50.7 | 51.2 | 46.8 | 46.7 | 47.7 | 41.9 | 8.6 | 10.1 | 16.5 | 21.5 | 24.3 | 16.5 | 21.9 | 39.2 | 39.2 | 32.4 | 31.7 | 29.0 | 35.9 | 36.1 |
| 12 | Agri Machinery | 42.0 | 44.5 | 37.1 | 36.5 | 40.8 | 49.5 | 46.5 | 23.4 | 23.1 | 26.0 | 42.9 | 29.5 | 17.5 | 19.9 | 34.7 | 32.4 | 36.9 | 20.6 | 29.8 | 33.0 | 33.6 |
| 13 | Other Manufacturing | 33.8 | 34.5 | 34.5 | 30.2 | 30.8 | 33.3 | 28.5 | 31.9 | 34.3 | 31.4 | 38.2 | 39.6 | 33.5 | 46.6 | 34.3 | 31.2 | 34.1 | 31.6 | 29.7 | 33.2 | 24.9 |
| 14 | Utilities | 53.2 | 27.2 | 49.1 | 51.8 | 46.3 | 56.7 | 47.0 | 3.9 | 38.2 | 1.8 | 0.9 | 1.4 | 0.7 | 2.1 | 43.0 | 34.6 | 49.0 | 47.3 | 52.3 | 42.6 | 50.9 |
| 15 | Construction | 53.6 | 55.0 | 54.9 | 45.5 | 45.4 | 50.2 | 52.2 | 9.6 | 10.9 | 11.2 | 16.4 | 16.0 | 13.9 | 16.7 | 36.8 | 34.0 | 33.9 | 38.2 | 38.6 | 35.9 | 31.1 |
| 16 | Trade | 16.1 | 14.7 | 18.9 | 19.9 | 22.0 | 21.8 | 17.6 | 0.9 | 2.1 | 0.7 | 1.8 | 2.3 | 2.3 | 0.9 | 83.0 | 83.2 | 80.5 | 78.4 | 75.7 | 75.9 | 81.5 |
| 17 | Transport | 42.6 | 44.9 | 36.5 | 35.6 | 37.4 | 51.4 | 57.1 | 2.9 | 11.9 | 17.5 | 13.9 | 12.1 | 4.6 | 1.9 | 54.6 | 43.2 | 46.0 | 50.4 | 50.4 | 44.1 | 41.0 |
| 18 | Services | 25.3 | 25.0 | 26.2 | 28.1 | 28.8 | 29.8 | 31.8 | 3.5 | 3.8 | 4.0 | 4.7 | 3.8 | 3.3 | 4.9 | 71.2 | 71.2 | 69.9 | 67.2 | 67.4 | 66.9 | 63.3 |
| | All sectors | 36.7 | 37.1 | 38.6 | 36.4 | 36.4 | 38.6 | 36.8 | 7.3 | 10.6 | 10.5 | 15.3 | 16.2 | 13.3 | 18.5 | 56.0 | 52.4 | 50.9 | 48.2 | 47.5 | 48.2 | 44.7 |

Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

For the changes in the composition of value-added, the empirical research stated that there are shifts from primary activities to manufacturing in labor and capital during the transition. This transition pattern of labor also happened in Thailand. In the case of labor, as we can see from Table 2.11, the shares of wage and salary in primary sectors have increased substantially over 25 years due to a continuation of labor moving out of these sectors into the manufacturing or nontradable sectors. However, there is still a lag in the movement of workers out of primary sectors (as explained before in Section 2.2.2.1 *Employment*). This causes a lower growth in labor productivity in these sectors during the transformation.

When disregarding the trend but looking only at sizes of the shares themselves, one can see that sizes of the return to labor (in terms of share of wage and salary in value-added) of primary sectors were low because labor in these sectors received very low income from their low opportunity cost of labor, since they are comparatively abundant. In addition, these primary workers cannot maximize their labor use because they might be underemployed due to their underdeveloped farm or business management. The shares of wage and salary in value-added were higher in non-agricultural sectors because workers in these sectors receive higher income from their higher opportunity cost of labor, and they are comparatively more productive.

In addition to the information we have from the input-output tables, we can utilize some information from the time-series data. Figure 2.2 and 2.3 show that although the agricultural GDP per agricultural worker has been on the rise, this average labor productivity (Y/L) is still very low compared to the per capita GDP the manufacturing workers received during those years.

For the transformation pattern of capital, as shown in Table 2.11, the shares of operating surplus have been quite steady in manufacturing and nontradable sectors, except that in the utility sector. The shares of operating surplus of primary sectors have been on the declining trend. This may be caused by the increasing shares that went to wage and salary in these primary sectors.

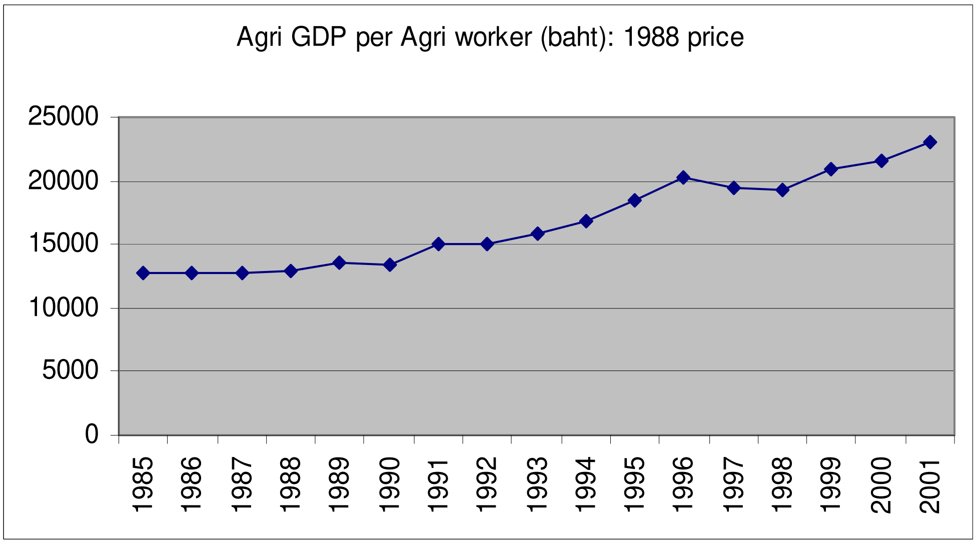
**Table 2.11—Share of Each Value-Added in Each Sector, 1975-2000 (percent)**

| | Sector | Wage and Salary | | | | | | | Operating Surplus | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 |
| 1 | Paddy | 9.3 | 12.6 | 10.5 | 9.4 | 9.8 | 15.7 | 34.2 | 85.5 | 84.8 | 87.3 | 88.9 | 87.3 | 81.7 | 62.8 |
| 2 | Other crops | 9.5 | 14.1 | 17.9 | 18.0 | 18.6 | 24.0 | 24.9 | 87.9 | 84.0 | 77.8 | 79.0 | 77.9 | 71.8 | 68.1 |
| 3 | Livestock | 7.6 | 7.9 | 17.7 | 18.0 | 21.3 | 18.1 | 18.6 | 88.9 | 88.9 | 76.4 | 75.4 | 71.9 | 75.4 | 77.3 |
| 4 | Agricultural service | 15.7 | 16.9 | 18.2 | 18.0 | 20.2 | 21.0 | 20.9 | 71.7 | 74.0 | 69.7 | 69.0 | 68.9 | 64.7 | 64.9 |
| 5 | Forestry | 7.4 | 7.5 | 14.3 | 20.5 | 41.0 | 43.0 | 34.6 | 85.1 | 85.3 | 77.3 | 74.8 | 54.3 | 53.4 | 59.9 |
| 6 | Fishing | 15.5 | 18.2 | 25.5 | 26.3 | 25.6 | 22.4 | 22.8 | 74.0 | 71.1 | 64.2 | 63.0 | 62.7 | 64.2 | 62.8 |
| 7 | Mining | 15.7 | 18.4 | 22.3 | 23.5 | 22.8 | 22.0 | 24.3 | 57.9 | 47.9 | 46.1 | 54.9 | 52.6 | 46.1 | 44.8 |
| 8 | Agro-Industry | 28.0 | 30.0 | 30.2 | 27.1 | 28.1 | 31.4 | 30.6 | 59.6 | 53.9 | 57.9 | 60.1 | 55.4 | 54.6 | 57.9 |
| 9 | Beverage & Tobacco | 14.6 | 13.3 | 12.6 | 8.1 | 8.4 | 9.9 | 12.3 | 40.0 | 21.7 | 23.5 | 16.3 | 19.5 | 23.5 | 23.7 |
| 10 | Textile & Leather | 31.8 | 27.7 | 29.5 | 38.4 | 35.7 | 36.2 | 33.8 | 47.1 | 55.0 | 53.6 | 46.3 | 45.8 | 43.0 | 47.2 |
| 11 | Wood, Paper, Rubber | 24.7 | 19.9 | 31.8 | 32.7 | 29.7 | 24.6 | 26.3 | 57.4 | 61.2 | 51.8 | 53.8 | 50.8 | 58.3 | 59.0 |
| 12 | Agri Machinery | 28.5 | 29.7 | 34.0 | 38.9 | 38.5 | 37.8 | 43.3 | 47.1 | 52.0 | 48.5 | 39.7 | 40.7 | 43.6 | 37.5 |
| 13 | Other Manufacturing | 26.7 | 20.7 | 25.0 | 28.5 | 25.1 | 24.3 | 25.8 | 50.3 | 46.1 | 44.5 | 46.7 | 46.3 | 48.5 | 45.5 |
| 14 | Utilities | 16.7 | 45.4 | 33.0 | 25.1 | 22.6 | 27.9 | 34.9 | 60.7 | 61.2 | 54.0 | 55.7 | 53.5 | 45.0 | 30.5 |
| 15 | Construction | 26.8 | 34.0 | 35.2 | 35.5 | 31.9 | 31.8 | 33.0 | 57.5 | 56.6 | 51.3 | 54.2 | 51.8 | 42.5 | 42.1 |
| 16 | Trade | 30.3 | 32.0 | 26.6 | 19.4 | 15.5 | 16.4 | 16.4 | 57.8 | 62.8 | 66.0 | 73.3 | 69.6 | 66.3 | 67.7 |
| 17 | Transport | 38.4 | 35.8 | 38.3 | 30.8 | 30.6 | 35.1 | 36.4 | 38.7 | 52.2 | 41.8 | 52.6 | 49.5 | 41.4 | 40.9 |
| 18 | Services | 43.9 | 49.3 | 51.8 | 44.5 | 45.4 | 48.1 | 50.1 | 28.6 | 32.8 | 31.0 | 34.2 | 36.1 | 31.9 | 28.8 |
| | All sectors | 27.5 | 30.0 | 32.9 | 30.6 | 29.5 | 30.0 | 30.8 | 55.5 | 55.5 | 50.3 | 52.5 | 50.9 | 48.4 | 47.8 |

| | | Depreciation | | | | | | | Indirect Taxes less Subsidies | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 |
| 1 | Paddy | 4.6 | 2.0 | 1.6 | 1.3 | 2.6 | 2.4 | 2.9 | 0.6 | 0.6 | 0.5 | 0.3 | 0.3 | 0.2 | 0.0 |
| 2 | Other crops | 1.9 | 1.4 | 2.6 | 2.6 | 3.4 | 4.0 | 6.9 | 0.7 | 0.5 | 1.7 | 0.4 | 0.1 | 0.2 | 0.1 |
| 3 | Livestock | 3.3 | 2.8 | 5.6 | 6.3 | 6.5 | 6.2 | 4.1 | 0.2 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.0 |
| 4 | Agricultural service | 12.2 | 8.7 | 12.0 | 12.1 | 10.9 | 14.2 | 14.2 | 0.4 | 0.4 | 0.1 | 0.9 | 0.0 | 0.0 | 0.0 |
| 5 | Forestry | 2.4 | 2.2 | 3.9 | 2.6 | 2.8 | 2.8 | 3.1 | 5.1 | 4.9 | 4.5 | 2.1 | 2.0 | 0.8 | 2.4 |
| 6 | Fishing | 9.2 | 9.2 | 9.9 | 10.7 | 11.6 | 13.4 | 14.3 | 1.3 | 1.5 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | Mining | 7.6 | 7.0 | 16.1 | 12.6 | 12.1 | 17.0 | 17.7 | 18.8 | 26.6 | 15.5 | 9.1 | 12.5 | 15.0 | 13.2 |
| 8 | Agro-Industry | 7.2 | 4.3 | 7.2 | 8.7 | 10.9 | 11.4 | 9.5 | 5.2 | 11.8 | 4.7 | 4.1 | 5.6 | 2.5 | 2.0 |
| 9 | Beverage & Tobacco | 5.3 | 3.7 | 4.0 | 3.7 | 5.9 | 6.9 | 7.9 | 40.1 | 61.3 | 59.9 | 71.9 | 66.1 | 59.7 | 56.1 |
| 10 | Textile & Leather | 10.9 | 6.9 | 8.6 | 12.1 | 15.0 | 16.4 | 15.7 | 10.2 | 10.4 | 8.3 | 3.2 | 3.5 | 4.4 | 3.3 |
| 11 | Wood, Paper, Rubber | 8.4 | 6.4 | 7.4 | 8.3 | 13.3 | 13.6 | 12.2 | 9.4 | 12.5 | 9.1 | 5.2 | 6.2 | 3.5 | 2.5 |
| 12 | Agri Machinery | 15.9 | 10.4 | 11.6 | 17.9 | 15.8 | 15.5 | 18.1 | 8.5 | 7.9 | 6.0 | 3.5 | 5.0 | 3.1 | 1.1 |
| 13 | Other Manufacturing | 11.0 | 9.5 | 10.4 | 10.4 | 13.9 | 14.8 | 17.0 | 12.0 | 23.7 | 20.1 | 14.4 | 14.8 | 12.3 | 11.8 |
| 14 | Utilities | 21.0 | 15.5 | 13.3 | 19.1 | 18.4 | 22.7 | 27.2 | 1.7 | (22.2) | (0.3) | 0.1 | 5.4 | 4.3 | 7.4 |
| 15 | Construction | 10.6 | 4.7 | 7.4 | 7.0 | 11.5 | 15.3 | 19.3 | 5.1 | 4.6 | 6.1 | 3.3 | 4.8 | 10.5 | 5.6 |
| 16 | Trade | 4.9 | 3.8 | 5.8 | 6.1 | 7.8 | 11.1 | 9.2 | 7.0 | 1.5 | 1.6 | 1.1 | 7.0 | 6.2 | 6.7 |
| 17 | Transport | 16.8 | 11.2 | 15.3 | 15.3 | 18.9 | 22.4 | 21.1 | 6.1 | 0.8 | 4.7 | 1.2 | 0.9 | 1.0 | 1.6 |
| 18 | Services | 22.7 | 12.9 | 13.5 | 11.3 | 11.2 | 12.6 | 14.8 | 4.9 | 5.0 | 3.8 | 10.0 | 7.3 | 7.5 | 6.3 |
| | All sectors | 10.7 | 7.0 | 9.5 | 9.4 | 11.3 | 13.3 | 14.1 | 6.4 | 7.4 | 7.4 | 7.6 | 8.4 | 8.3 | 7.4 |

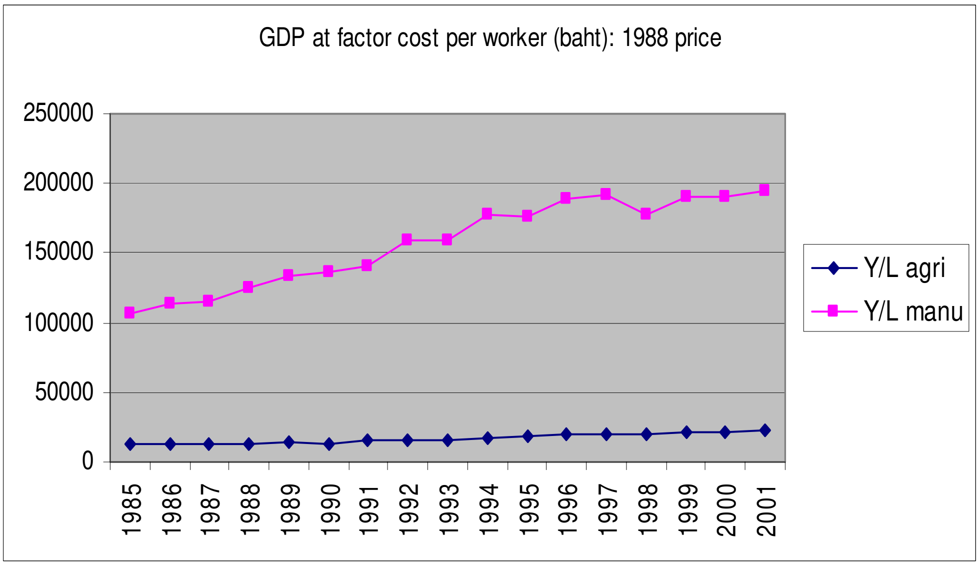
Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

**Figure 2.2—Agricultural GDP per Agricultural Worker (Baht: 1988 price), 1985-2001**




Source: Author, using data from the NESDB

**Figure 2.3—GDP at Factor Cost per Worker (Baht: 1988 price), 1985-2001**



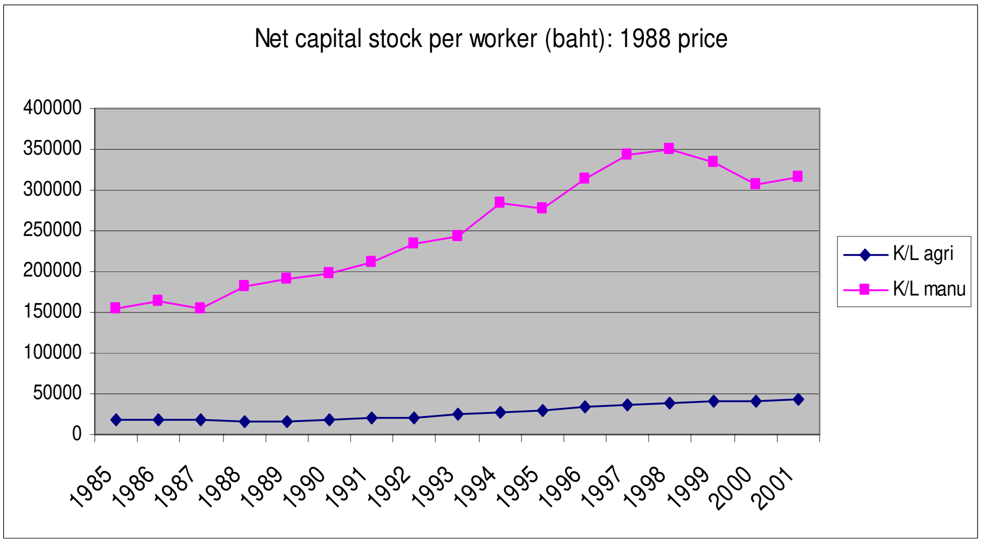

Source: Author, using data from the NESDB

However, disregarding the trend but looking only at sizes of the shares themselves, one can see that sizes of the shares of operating surplus in value-added of primary sectors were higher than those of other sectors. This is because capital is expensive, compared to labor, in primary sectors, and usually capital investment is not sufficient in these sectors. Therefore, investing even a small amount of capital in these sectors would give a very high rate of return. Although, it should be noted that in primary sectors, the compensation to employee covers only the wage of workers. Incomes of self-employed farmers are recorded in operating surplus. Therefore, these incomes of self-employed farmers recorded in operating surplus may have contributed to the large shares of operating surplus in value-added of primary sectors.

Other information from the time-series data can also be observed from Figure 2.4. Figure 2.4 shows clearly that the net capital stock per worker, the degree of capital deepening, in agricultural sector is much lower than that of the manufacturing sector even though labor has been moving out of the agricultural sector. This may imply that only a small proportion of capital investment is allocated to the agricultural sector. On the other hand, the increasing trend of net capital stock per worker in the manufacturing sector may be due to the large allocation into this sector, and the allocation has been so large that even when the number of workers increased, their per capita capital use was still on the rise.

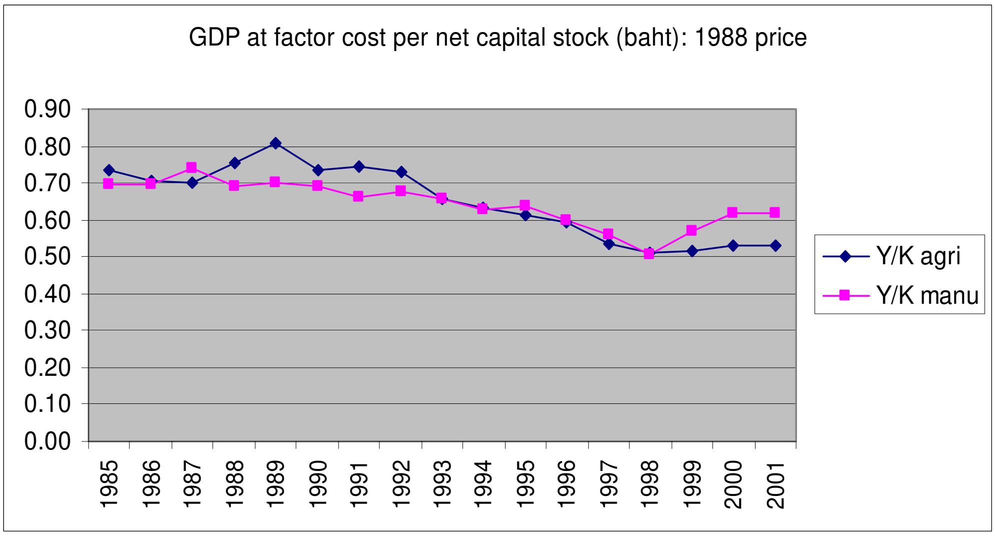
However, when we look at the productivity of capital in each sector, we are surprised by how productive agricultural capital can be. Agricultural capital is as productive as manufacturing capital, as shown in Figure 2.5. Therefore, we assume that if more capital is allocated to the agricultural sector, its capital productivity should increase due to the scarcity of capital in this sector. And we also assume that if capital deepening (K/L increase) happens in the agricultural sector, the labor productivity of this sector should also increase (Y/L). These assumptions will be tested in the CGE analysis in Chapter V.

**Figure 2.4—Net Capital Stock per Worker (Baht: 1988 price), 1985-2001**




Source: Author, using data from the NESDB

**Figure 2.5—GDP at Factor Cost per Net Capital Stock (Baht: 1988 price), 1985-2001**




Source: Author, using data from the NESDB

The pattern of capital use shows a higher proportion in social overhead, which can be understood from the high depreciation shares in utility, transport, and services sectors. Although in the empirical research it is stated that there is a decline in the share of manufacturing in output and factor use at higher income levels. Such a decline has not taken place and is not applicable to Thailand yet since Thailand has not yet reached the level achieved by the advanced countries nor has it de-industrialized.

### *B. Trade*

In the 1960s, Thailand relied on natural resources and agricultural exports for its export earnings. The overall level of effective protection for industry was modest by developing country standards. In the 1970s, Thailand, pursuing the import substitution strategies favored by many other developing countries, raised tariffs on consumer goods. Capital and intermediate goods continued to be imported at low duty rates, contributing to an increase in effective protection to value added in import-substituting industries and to declines in effective protection for agricultural and other traditional exports. In 1981, Thailand's trade policy shifted explicitly in the direction of export promotion (World Bank 1993). Remaining export taxes were reduced, and the baht was devalued. The government also began to reduce protection of local industries and to lower tariffs. The maximum duty rate was reduced from 100 to 60 percent (Yamada 1998). Year 1985 is the first year that the value of the manufacturing industrial export exceeded the value of the agricultural export, partly due to the depressed agricultural produce price in the world market during this time. Although Thailand had implemented an export-oriented strategy since the 1980s, it faced long years of current account balance deficit until the Asian economic and financial crises happened in 1997. From 1997 onwards, Thailand has been even more aggressive in its export-oriented strategy to bring in more foreign exchange earnings to compensate for that lost during the crises. Because of this, Thailand's current account balance has been in surplus since 1997, and it can be said that Thailand's export oriented strategy has succeeded.

For detailed observation of Thailand's transformation in trade, the input-output tables are used to find Thailand's self sufficiency ratio[13] and export ratio.[14] These ratios are shown in Table 2.12 from year 1975 to 2000. Table 2.12 illustrates that the self-sufficiency ratios did not change much over 25 years. Almost every sector had high self-sufficiency ratio except forestry; mining; agricultural machinery; and other manufacturing. This means that these sectors depended heavily on import materials. The reasons are clear for forestry and mining because their domestic resources have been depleted. For agricultural machinery, a large number of farm tractor engines and machinery parts were imported to be assembled in Thailand for both domestic use and export to neighboring countries. The use of around 40 percent of import materials in total domestic consumption of other manufacturing is not a good sign for a country which wants to base its growth and development on manufacturing industrial sectors. Although, it may not be such a bad sign if high import dependency is the end result of product differentiation by the horizontal trade which requires various kinds of imported inputs.

The export ratios were high in other crops; agro-industry; textile and leather; wood, paper, rubber; other manufacturing; and transport. These ratios suggest the importance of these sectors to bring in foreign exchange earnings. The significant rise in export ratio of agricultural machinery from 1990 associated with the drop in its self-sufficiency ratio resulted from the inability to produce machinery's engines and parts domestically. However, such contradictory movement of the two ratios may also be due to the coexistence of export promotion and import liberalization.

[13] Defined as the share of domestic supply against total consumption, which shows the degree of import substitution.
[14] Calculated from the share of exports in total production, which indicates export orientation.

**Table 2.12—Self-Sufficiency Ratio and Export Ratio Derived from Input-Output Tables, 1975-2000**

| | Sector | Self-sufficiency ratio (%) | | | | | | | Export ratio (%) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 |
| 1 | Paddy | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Other crops | 95 | 94 | 92 | 89 | 88 | 87 | 85 | 14 | 12 | 7 | 8 | 13 | 13 | 8 |
| 3 | Livestock | 100 | 100 | 99 | 97 | 97 | 97 | 97 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 4 | Agricultural service | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | Forestry | 99 | 97 | 76 | 39 | 39 | 70 | 39 | 4 | 2 | 5 | 5 | 9 | 8 | 27 |
| 6 | Fishing | 100 | 100 | 100 | 99 | 99 | 99 | 99 | 0 | 1 | 0 | 2 | 0 | 1 | 1 |
| 7 | Mining | 33 | 31 | 49 | 51 | 49 | 48 | 36 | 12 | 11 | 8 | 10 | 4 | 6 | 12 |
| 8 | Agro-Industry | 98 | 95 | 96 | 90 | 91 | 91 | 91 | 20 | 31 | 32 | 40 | 42 | 42 | 40 |
| 9 | Beverage & Tobacco | 92 | 91 | 92 | 89 | 85 | 88 | 80 | 4 | 4 | 4 | 4 | 6 | 8 | 9 |
| 10 | Textile & Leather | 92 | 94 | 94 | 91 | 89 | 89 | 88 | 8 | 14 | 20 | 32 | 34 | 35 | 35 |
| 11 | Wood, Paper, Rubber | 91 | 89 | 85 | 78 | 78 | 86 | 83 | 21 | 23 | 31 | 26 | 29 | 33 | 42 |
| 12 | Agri Machinery | 54 | 64 | 79 | 59 | 19 | 51 | 32 | 1 | 2 | 1 | 9 | 12 | 53 | 42 |
| 13 | Other Manufacturing | 59 | 60 | 57 | 54 | 53 | 62 | 61 | 9 | 17 | 15 | 25 | 37 | 52 | 51 |
| 14 | Utilities | 100 | 99 | 98 | 99 | 100 | 99 | 97 | 1 | 1 | 1 | 0 | 2 | 2 | 3 |
| 15 | Construction | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | Trade | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 8 | 8 | 9 | 8 | 10 | 12 | 13 |
| 17 | Transport | 98 | 97 | 95 | 96 | 92 | 93 | 93 | 13 | 14 | 16 | 21 | 19 | 28 | 27 |
| 18 | Services | 98 | 95 | 98 | 97 | 94 | 94 | 95 | 4 | 4 | 4 | 7 | 9 | 11 | 10 |
| | Total | 89 | 85 | 86 | 81 | 79 | 82 | 79 | 9 | 12 | 12 | 16 | 20 | 26 | 28 |

Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

In summary, the changes of the above indicators from 1975 to 2000 confirm the importance and success of Thailand's export oriented strategy. There is also a good sign that the self-sufficiency ratios of many sectors have been high. However, excessive reliance on the performance of the manufacturing industrial sectors should be treated with caution as long as their production depends heavily on imported materials. This result suggests that the development of Thai manufacturing industries is not self-reliant or sustainable, and these sectors could lose their comparative advantage any time when the costs of imported materials become overly expensive. It is suggested that the policy should be focused more on sectors which can sustain themselves by domestic inputs, possess high potential, and are promising as engines of growth. We will return to this discussion again in Chapter IV to see whether the agricultural industries and livestock sectors can fulfill this role.

### 2.2.3 Accounting for the Transformation—Demand Side Decomposition: Decomposition of the Factors of Growth in the Thai Economy[15]

In addition to the observations on Thailand's structural transformation above using the information from the input-output tables and the time-series data, a more sophisticated method can also be used to find the factors of growth in the Thai economy. For this, the well-known Syrquin model is used to conduct a decomposition analysis in input-output framework[16] (Syrquin, 1976, 1986, 1988), which is the extension from the original development due to Chenery (1960) and Chenery, Shishido, and Watanabe (1962). The technique is able to separate demand effect into domestic consumption expansion and export expansion, and also able to indicate the progress of import substitution. Seven competitive-import type input-output tables[17] are used in this analysis to see the trend over 25 years.

Syrquin's equilibrium output equation, $X = [I-(I-M^{\wedge})A]^{-1}\,[(I-M^{\wedge})F+E]$ is used, where $X$ is the output vector, A is the input coefficient matrix, $F$ is the final demand vector, $E$ is the export vector, $M^{\wedge}$ is the import matrix where the diagonal elements are import coefficients and other off-diagonal elements are all zero. Assuming that a suffix 'o' denotes a base year and 't' denotes a year of comparison, the growth of output ($\Delta X$) is given by $\Delta X = X_t - X_o = [(I-(I-M^{\wedge}_t)A_t)]^{-1}\,[(I-M^{\wedge}_t)F_t+E_t] - [(I-(I-M^{\wedge}_o)A_o)]^{-1}\,[(I-M^{\wedge}_o)F_o+E_o]$. Replacing the Leontief inverse by $B$

[15] The author is grateful to Professor Hiroshi Osada and Mr. Ye ZuoYi of Nagoya University for their valuable comments and suggestions on this section. The analysis in this section is stimulated by Osada (1996).
[16] The input-output analysis framework will be discussed in detail in Chapter IV.
[17] Competitive-import type input-output tables are those which have import values included in the input coefficient matrix and the final demand.

and the terms of final demand and export by $G$, the equation will be decomposed into five factors of growth:

$$\Delta X = B_tG_t - B_oG_o = B_t\Delta G + \Delta B_tG_o$$

$$= B_t(I-\hat{M}_o)\Delta F + \quad (2.1)$$

$$B_t\Delta E + \quad (2.2)$$

$$B_t[(I-\hat{M}_t)-(I-\hat{M}_o)]F_t + \quad (2.3)$$

$$\{[I-(I-\hat{M}_t)A_t]^{-1} - \{[I-(I-\hat{M}_o)A_t]^{-1}\}G_o + \quad (2.4)$$

$$\{[I-(I-\hat{M}_o)A_t]^{-1} - \{[I-(I-\hat{M}_o)A_o]^{-1}\}G_o \quad (2.5)$$

The domestic final demand effect (FD) is derived from (2.1). It shows the induced increase by the change in domestic final demand at given $B_t$ and $B_o$. The export effect (E) is derived from (2.2). It shows the induced output by the change in export at a given $B_t$. The import substitution effect in the domestic final demand (ISFD) is derived from (2.3). It indicates how much the change in the import coefficient in the final demand sector has increased or decreased output. The import substitution effect in the intermediate demand (ISID) is derived from (2.4). It indicates how much the change in the import coefficients under given input coefficient of the year for comparison and $G_o$ of the base year has increased or decreased output. The effect of technological change (TC) is derived from (2.5). It estimates the change in output due to the change of the input coefficient matrix. Note that the impact of technological change here is not only the influence of the change in the sector's input coefficient, rather, it is the aggregate influence of the change in the whole input structure of the economy on the sector.

The same equations (2.1) to (2.5) can also be derived from switching the base year and the terminal year because the decomposition can be defined either using the terminal-year structural coefficients and initial-year volume weights or using the initial-year structural coefficients and the terminal-year volume weights. The two versions are analogous to Paasche and Laspeyres price indices (Dervis, de Melo, and Robinson 1982: 95). In this analysis, both indices have been computed separately for the decomposition in each period and averages of the two are presented.

Furthermore, the effect of the domestic final demand can also be divided into: $B_t(I-\hat{M}_o)\Delta F = B_t(I-\hat{M}_o)(\Delta PVC+\Delta GC+\Delta FK+\Delta ST)$, where *PVC* is the effect due to private consumption, *GC* is the effect due to government consumption, *FK* is the effect due to fixed capital formation, and *ST* is the effect due to increase in stock.

Note that in general, improvement in inventory management techniques and sales forecast will lead to a reduction in stock. Fixed capital formation (fixed assets investment) and inventory investment (increase in stock) show opposite movements. During an economic boom, fixed assets investment will be high and inventory investment decreases. On the other hand, during economic recession, the level of fixed assets investment will be low whereas inventory increases.

Table 2.13 illustrates the decomposition of output growth during 25 years from 1975 to 2000. In all sectors, the output growths were mainly brought about by the expansion of domestic final demand and exports. However, in some sectors, exports had better potential to induce output growth. These sectors are paddy; forestry (after 1980); mining (after 1995); agro-industry (after 1980); textile and leather (after 1995); wood, paper, rubber (after 1995); and other manufacturing (after 1990). For the economy as a whole, the FD effect declined over the years and the export effect increased over the years, except during the 1997 crises. The export effect surpassed the domestic final demand effect from 1995 onwards. This suggests the gaining importance of the export market over the domestic market and confirms the results found in Section 2.2.2.2 *B. Trade*. Agro-industry and other agricultural sectors' FD's induced more output growth during the 1997 crises than other manufacturing and construction sectors, as the domestic final demand's inducement of the latter contracted significantly during the crises.

Both ISFD and ISID improved to positive numbers in 1980-1985 and 1995-1998 in almost all sectors, but were in negative in other periods, as shown in Table 2.13. This suggests Thailand's import substitution strategy was not at all successful during 1975-1980. Instead, the start of export promotion in 1981 and its early period (1980-1985) helped in improving the import substitution as production became more efficient through better resource allocation so that intersectoral linkages expanded or deepened. However, when more productions shifted to non-agricultural manufacturing industrial sectors from 1985 onwards, the Thai economy became more import dependent. This feature persisted until the period before the crises (1995-1998). The production of manufacturing industrial sectors, especially electronics, declined substantially before the crises because Thailand had lost its competitiveness in these sectors to China. Therefore, imports, especially imported inputs, also declined during this time, which resulted in positive numbers of ISFD and ISID in 1995-1998. After the crises, the Thai economy was back dependence on imports again.

The effects of TC change did not have a clear trend in any sector. There were both positive and negative effects in each sector over 25 years. However, when comparing the year 1975 as the starting point with the year 2000, the largest positive TC effect are observed in fishing, utilities, and agricultural service, respectively. The largest negative TC effect are observed in forestry, paddy, and mining, respectively. This means the increase in the overall density of the input-output matrix that accompanies development is important to the former sectors than the latter sectors.

From Table 2.14, for the overall periods of 1975 to 2000, sectors which had high shares in the total decomposition according to sector share were agro-industry; textile and leather; other manufacturing (the highest); trade; transport; and services.

In all sectors, the growths in domestic final demand were mainly brought about by the expansion of private consumption, as shown in Table 2.15. The shares of fixed capital were high before the 1997 crises, but went into negative figures after the crises for all sectors. There had been low inventory (stock) in the Thai economy, suggesting the economy had performed well. There was no clear trend to any of these contributions in any sector.

In summary, this analysis confirms that exports have higher potential to induce more output growth than domestic demand in many sectors. Therefore, one cannot ignore the importance of the export oriented strategy. The slightly negative figures of the import substitution effects (except in forestry and agricultural machinery) suggests that the increases of production for domestic use in most sectors were only big enough to maintain the constant proportion to the domestic demand even in the time that Thailand pursued the import substitution strategy (1970s-1981).

## Table 2.13—Factors of Growth, Demand-Side Decomposition, 1975-2000 (total = 100)

| | Sector | 1975-1980 | | | | | 1980-1985 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FD | E | ISFD | ISID | TC | FD | E | ISFD | ISID | TC |
| 1 | Paddy | 85 | 66 | (10) | (5) | (37) | 95 | 176 | 13 | 1 | (186) |
| 2 | Other crops | 64 | 30 | (3) | (2) | 10 | 131 | 54 | (3) | (23) | (58) |
| 3 | Livestock | 67 | 23 | (3) | (1) | 14 | (51) | 101 | 5 | (1) | 47 |
| 4 | Agricultural service | 31 | 18 | (2) | (2) | 55 | 20 | 17 | 0 | (3) | 66 |
| 5 | Forestry | 141 | 44 | (6) | (5) | (74) | 15180 | 16045 | (20454) | (39246) | 28375 |
| 6 | Fishing | 88 | 15 | (2) | (1) | (1) | 25 | 40 | 4 | 1 | 31 |
| 7 | Mining | 61 | 33 | (2) | (7) | 16 | 35 | 14 | 4 | 53 | (5) |
| 8 | Agro-industry | 59 | 51 | (7) | (3) | (1) | 37 | 40 | 2 | 0 | 21 |
| 9 | Beverage & Tobacco | 92 | 9 | (4) | (1) | 4 | 103 | 7 | 4 | 1 | (16) |
| 10 | Textile & Leather | 65 | 31 | 1 | 1 | 2 | 58 | 46 | 0 | (1) | (4) |
| 11 | Wood, Paper, Rubber | 59 | 34 | (2) | (3) | 11 | 1000 | 922 | (137) | (394) | (1492) |
| 12 | Agricultural Machinery | 75 | 8 | 17 | 5 | (5) | (2) | 5 | 40 | 24 | 32 |
| 13 | Other Manufacturing | 66 | 31 | (2) | (1) | 7 | 84 | 21 | (6) | (8) | 8 |
| 14 | Utilities | 64 | 21 | (2) | (2) | 20 | 48 | 8 | 0 | (1) | 45 |
| 15 | Construction | 105 | 1 | 0 | 0 | (6) | 98 | 1 | 0 | 0 | 2 |
| 16 | Trade | 80 | 18 | (1) | (1) | 4 | 129 | 33 | 1 | (1) | (63) |
| 17 | Transport | 79 | 20 | (2) | (1) | 4 | 64 | 22 | (2) | (1) | 17 |
| 18 | Services | 98 | 9 | (5) | (1) | (1) | 77 | 7 | 4 | 1 | 10 |
| 19 | Unclassified | 16928 | 2490 | (7935) | (9283) | (2100) | 63 | (2) | 65 | 5 | (32) |
| | Total | 77 | 25 | (3) | (2) | 3 | 71 | 23 | 1 | 0 | 5 |

| | Sector | 1985-1990 | | | | | 1990-1995 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FD | E | ISFD | ISID | TC | FD | E | ISFD | ISID | TC |
| 1 | Paddy | 139 | 226 | (27) | (26) | (213) | 47 | 56 | (1) | 0 | (2) |
| 2 | Other crops | 69 | 45 | (6) | (8) | 0 | 65 | 66 | (4) | (5) | (22) |
| 3 | Livestock | 58 | 46 | (7) | (10) | 13 | 50 | 76 | (1) | 1 | (27) |
| 4 | Agricultural service | 147 | 126 | (15) | (19) | (138) | 88 | 93 | (5) | (5) | (71) |
| 5 | Forestry | 49 | 88 | (14) | (219) | (4) | 80 | 66 | (3) | (6) | (37) |
| 6 | Fishing | 55 | 22 | (3) | (4) | 31 | 49 | 18 | (1) | 0 | 35 |
| 7 | Mining | 314 | 209 | (37) | (8) | (377) | 80 | 61 | (7) | (7) | (28) |
| 8 | Agro-industry | 35 | 69 | (8) | (9) | 13 | 47 | 62 | (1) | 0 | (8) |
| 9 | Beverage & Tobacco | 98 | 11 | (5) | (2) | (1) | 102 | 14 | (10) | (3) | (3) |
| 10 | Textile & Leather | 47 | 64 | (5) | (5) | (1) | 59 | 58 | (4) | (3) | (10) |
| 11 | Wood, Paper, Rubber | 67 | 38 | (6) | (9) | 10 | 51 | 51 | (2) | (2) | 2 |
| 12 | Agricultural Machinery | (20) | 92 | (72) | (90) | (11) | 812 | 52 | (626) | (146) | 7 |
| 13 | Other Manufacturing | 67 | 42 | (8) | (9) | 9 | 49 | 62 | (7) | (7) | 2 |
| 14 | Utilities | 98 | 44 | (6) | (5) | (32) | 72 | 35 | (3) | (2) | (2) |
| 15 | Construction | 100 | 1 | 0 | 0 | (1) | 100 | 1 | 0 | 0 | 0 |
| 16 | Trade | 77 | 21 | (1) | (2) | 6 | 73 | 27 | (2) | (1) | 3 |
| 17 | Transport | 73 | 41 | (2) | (2) | (11) | 86 | 30 | (7) | (4) | (6) |
| 18 | Services | 77 | 18 | (2) | (1) | 9 | 74 | 22 | (5) | (3) | 12 |
| 19 | Unclassified | 27 | 7 | 41 | 13 | 11 | 71 | 70 | (35) | (20) | 15 |
| | Total | 72 | 35 | (4) | (5) | 2 | 67 | 40 | (4) | (3) | 1 |

**Table 2.13—Factors of Growth, Demand-Side Decomposition, 1975-2000 (total = 100) (cont.)**

| | Sector | 1995-1998 | | | | | 1998-2000 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FD | E | ISFD | ISID | TC | FD | E | ISFD | ISID | TC |
| 1 | Paddy | 30 | 38 | 0 | 0 | 31 | (10) | 0 | 0 | 0 | (90) |
| 2 | Other crops | 49 | 62 | 1 | 3 | (16) | (19) | (82) | (26) | (67) | 93 |
| 3 | Livestock | 95 | 69 | 0 | 1 | (65) | (163) | (2) | (2) | 0 | 68 |
| 4 | Agricultural service | 76 | 97 | 1 | 5 | (80) | (48) | (36) | (12) | (47) | 242 |
| 5 | Forestry | (126) | 142 | 65 | 486 | (668) | (52) | 48 | 15 | (157) | 46 |
| 6 | Fishing | 50 | 28 | 0 | 1 | 21 | (94) | 5 | 0 | (2) | (9) |
| 7 | Mining | (25) | 61 | 1 | (12) | 75 | 13 | 124 | 7 | (209) | 165 |
| 8 | Agro-industry | 48 | 55 | 0 | 0 | (3) | 27 | (4) | (1) | (1) | 79 |
| 9 | Beverage & Tobacco | 72 | 19 | 10 | 3 | (5) | (42) | 2 | (43) | (18) | 0 |
| 10 | Textile & Leather | 28 | 74 | 1 | 2 | (5) | 288 | 136 | (129) | (150) | (45) |
| 11 | Wood, Paper, Rubber | (48) | 130 | 19 | 51 | (53) | (2) | 153 | (14) | (47) | 10 |
| 12 | Agricultural Machinery | (395) | 342 | 15 | 134 | 4 | 587 | (245) | (242) | (304) | 104 |
| 13 | Other Manufacturing | (85) | 181 | 3 | 7 | (5) | 25 | 60 | 0 | 0 | 15 |
| 14 | Utilities | 47 | 41 | 0 | 0 | 12 | 38 | 20 | (2) | (6) | 51 |
| 15 | Construction | (98) | 1 | 0 | 0 | (3) | (96) | 1 | 0 | 0 | (4) |
| 16 | Trade | 42 | 50 | 1 | 2 | 6 | 42 | 32 | (1) | (2) | 29 |
| 17 | Transport | (17) | 86 | 1 | 2 | 28 | 45 | 39 | (2) | (3) | 20 |
| 18 | Services | 81 | 60 | (4) | (1) | (36) | 259 | 52 | 17 | (7) | (222) |
| 19 | Unclassified | (92) | 87 | 20 | 55 | 31 | 136 | (26) | (22) | (17) | 29 |
| | Total | (6) | 103 | 2 | 4 | (3) | 40 | 58 | (3) | (10) | 14 |

| | Sector | 1995-2000 | | | | | 1975-2000 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FD | E | ISFD | ISID | TC | FD | E | ISFD | ISID | TC |
| 1 | Paddy | 66 | 116 | 1 | 1 | (84) | 97 | 120 | (13) | (5) | (100) |
| 2 | Other crops | 56 | 59 | (3) | (10) | (1) | 71 | 53 | (8) | (9) | (6) |
| 3 | Livestock | 85 | 79 | 1 | 1 | (66) | 57 | 51 | (6) | (5) | 3 |
| 4 | Agricultural service | 48 | 67 | (1) | (5) | (8) | 46 | 43 | (6) | (7) | 24 |
| 5 | Forestry | (42) | 63 | 3 | (14) | (109) | 3713 | 7252 | (68) | (2444) | (8353) |
| 6 | Fishing | 24 | 46 | 0 | 0 | 30 | 46 | 27 | (3) | (3) | 34 |
| 7 | Mining | (13) | 80 | 4 | (80) | 110 | 41 | 85 | (7) | (3) | (16) |
| 8 | Agro-industry | 46 | 49 | 0 | 0 | 4 | 47 | 54 | (6) | (4) | 8 |
| 9 | Beverage & Tobacco | 110 | 44 | (31) | (11) | (12) | 106 | 17 | (14) | (3) | (6) |
| 10 | Textile & Leather | 47 | 78 | (8) | (8) | (8) | 56 | 60 | (6) | (4) | (6) |
| 11 | Wood, Paper, Rubber | (25) | 140 | 3 | 6 | (24) | 42 | 70 | (5) | (9) | 1 |
| 12 | Agricultural Machinery | (467) | 405 | 59 | 62 | 41 | 103 | 82 | (59) | (45) | 19 |
| 13 | Other Manufacturing | (9) | 98 | 1 | 3 | 8 | 34 | 69 | (6) | (8) | 11 |
| 14 | Utilities | 41 | 29 | (1) | (4) | 35 | 54 | 28 | (3) | (4) | 25 |
| 15 | Construction | (97) | 1 | 0 | 0 | (3) | 105 | 4 | 0 | 0 | (9) |
| 16 | Trade | 41 | 41 | 0 | 0 | 17 | 68 | 32 | (2) | (2) | 3 |
| 17 | Transport | 10 | 65 | 0 | 0 | 25 | 57 | 41 | (4) | (3) | 9 |
| 18 | Services | 121 | 56 | 2 | (2) | (77) | 81 | 21 | (3) | (1) | 4 |
| 19 | Unclassified | 51 | 3 | 14 | 9 | 22 | 75 | 27 | 3 | 1 | (6) |
| | Total | 15 | 81 | 1 | (1) | 4 | 57 | 48 | (5) | (5) | 5 |

Source: Author’s calculation based on seven competitive-import type input-output tables of Thailand.

**Table 2.14— Sectoral Sources of Growth, Demand-Side Decomposition, 1975-2000 (total = 100)**

| | Sector | 1975-2000 | | | | | |
|---|---|---|---|---|---|---|---|
| | | ΔX | FD | E | ISFD | ISID | TC |
| 1 | Paddy | 1 | 1 | 2 | (2) | (1) | (16) |
| 2 | Other crops | 2 | 2 | 2 | (3) | (4) | (3) |
| 3 | Livestock | 1 | 1 | 1 | (1) | (1) | 0 |
| 4 | Agricultural service | 0 | 0 | 0 | (0) | (0) | 1 |
| 5 | Forestry | 0 | 0 | 0 | (0) | (2) | (5) |
| 6 | Fishing | 1 | 1 | 1 | (1) | (1) | 8 |
| 7 | Mining | 1 | 1 | 2 | (2) | (1) | (5) |
| 8 | Agro-industry | 7 | 6 | 9 | (9) | (6) | 13 |
| 9 | Beverage & Tobacco | 2 | 3 | 1 | (5) | (1) | (2) |
| 10 | Textile & Leather | 8 | 7 | 10 | (10) | (6) | (10) |
| 11 | Wood, Paper, Rubber | 3 | 2 | 4 | (3) | (6) | 1 |
| 12 | Agricultural Machinery | 0 | 0 | 0 | (0) | (0) | 0 |
| 13 | Other Manufacturing | 30 | 18 | 44 | (39) | (53) | 71 |
| 14 | Utilities | 4 | 3 | 2 | (2) | (3) | 19 |
| 15 | Construction | 3 | 6 | 0 | (0) | (0) | (6) |
| 16 | Trade | 13 | 15 | 9 | (5) | (6) | 9 |
| 17 | Transport | 7 | 7 | 6 | (6) | (4) | 13 |
| 18 | Services | 17 | 23 | 7 | (12) | (5) | 12 |
| 19 | Unclassified | 1 | 1 | 1 | 1 | 0 | (1) |
| | Total | 100 | 100 | 100 | (100) | (100) | 100 |

Source: Author's calculation based on seven competitive-import type input-output tables of Thailand.

## Table 2.15—Contributions to Domestic Final Demand in Each Sector, 1975-2000 (total = 100)

| | 1975-1980 | | | | 1980-1985 | | | | 1985-1990 | | | | 1990-1995 | | | | 1995-1998 | | | | 1998-2000 | | | | 1995-2000 | | | | 1975-2000 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | PVC | GC | FK | ST | PVC | GC | FK | ST | PVC | GC | FK | ST | PVC | GC | FK | ST | PVC | GC | FK | ST | PVC | GC | FK | ST | PVC | GC | FK | ST | PVC | GC | FK | ST |
| 1 | 89 | 7 | 2 | 2 | 115 | 22 | 11 | (48) | 93 | 9 | 8 | (11) | 79 | 8 | 5 | 7 | 104 | 10 | (3) | (11) | (12) | (15) | (0) | (72) | 142 | 8 | (4) | (47) | 98 | 7 | 3 | (8) |
| 2 | 84 | 6 | 5 | 6 | 49 | 13 | 13 | 25 | 79 | 5 | 14 | 1 | 77 | 9 | 12 | 3 | 134 | 10 | (18) | (26) | 79 | (15) | 9 | (173) | 151 | 11 | (20) | (43) | 92 | 7 | 5 | (4) |
| 3 | 94 | 4 | 4 | (1) | (216) | 22 | 132 | (38) | 80 | 4 | (11) | 26 | 124 | 11 | 7 | (42) | 96 | 6 | (0) | (2) | (140) | (7) | (3) | 50 | 83 | 6 | (1) | 13 | 88 | 7 | 3 | 2 |
| 4 | 85 | 6 | 5 | 4 | 69 | 18 | 13 | (1) | 82 | 6 | 14 | (2) | 77 | 9 | 11 | 4 | 118 | 10 | (11) | (18) | (1) | (14) | 1 | (87) | 149 | 10 | (14) | (46) | 94 | 8 | 5 | (7) |
| 5 | 67 | 8 | 23 | 1 | 29 | 11 | 65 | (6) | 79 | 11 | 219 | (210) | 23 | 6 | 47 | 24 | 35 | 7 | (113) | (29) | (29) | 1 | (3) | (68) | 6 | 4 | (51) | (59) | 63 | 19 | 56 | (38) |
| 6 | 96 | 3 | 1 | (0) | 24 | 44 | 16 | 16 | 95 | 5 | 4 | (4) | 90 | 7 | 3 | (0) | 95 | 8 | (2) | (1) | (108) | (0) | (0) | 9 | 65 | 28 | (8) | 16 | 88 | 9 | 2 | 1 |
| 7 | 37 | 6 | 44 | 14 | 47 | 8 | 39 | 6 | 30 | 2 | 76 | (8) | 35 | 5 | 60 | (1) | 20 | 5 | (122) | (4) | 197 | 23 | (1) | (119) | 77 | 13 | (138) | (52) | 47 | 7 | 51 | (4) |
| 8 | 95 | 6 | 2 | (3) | 72 | 11 | 5 | 13 | 110 | 10 | 9 | (28) | 85 | 9 | 5 | 1 | 94 | 10 | (2) | (2) | (35) | (61) | (3) | 199 | 86 | 6 | (2) | 10 | 90 | 6 | 2 | 1 |
| 9 | 89 | 9 | 1 | 0 | 80 | 7 | 1 | 13 | 109 | 5 | 4 | (18) | 89 | 5 | 2 | 5 | 94 | 6 | (2) | 1 | 213 | (0) | (1) | (311) | 231 | 8 | (3) | (136) | 117 | 6 | 1 | (24) |
| 10 | 89 | 6 | 3 | 1 | 93 | (1) | 2 | 6 | 89 | 1 | 8 | 2 | 95 | 2 | 5 | (1) | 160 | (1) | (20) | (39) | 33 | (0) | 3 | 64 | 102 | (1) | (10) | 8 | 94 | 1 | 3 | 2 |
| 11 | 52 | 11 | 34 | 3 | 19 | 1 | 80 | 0 | 42 | 2 | 64 | (8) | 39 | 8 | 51 | 2 | (12) | 10 | (153) | 55 | 1376 | 189 | 339 | (2004) | 34 | 16 | (131) | (19) | 57 | 13 | 35 | (5) |
| 12 | 10 | 1 | 89 | (0) | 176 | 994 | (1274) | 5 | 282 | (81) | (309) | 7 | 3 | (1) | 100 | (2) | 21 | 1 | (92) | (29) | (30) | 31 | 209 | (109) | 14 | 16 | (34) | (96) | 34 | 28 | 195 | (158) |
| 13 | 47 | 7 | 44 | 2 | 50 | 8 | 42 | 0 | 26 | 1 | 65 | 8 | 34 | 4 | 63 | 0 | (8) | 1 | (74) | (18) | 40 | 5 | 25 | 31 | 50 | 12 | (168) | 5 | 44 | 6 | 47 | 4 |
| 14 | 62 | 16 | 21 | 1 | 78 | 12 | 9 | 1 | 56 | 9 | 34 | 2 | 69 | 13 | 18 | 0 | 111 | 19 | (25) | (5) | 82 | 11 | 2 | 5 | 95 | 15 | (11) | 1 | 77 | 13 | 10 | 1 |
| 15 | 5 | 2 | 93 | 0 | 5 | 3 | 92 | 0 | 1 | 0 | 99 | 0 | 2 | 0 | 98 | (0) | (2) | 0 | (98) | (0) | (0) | 1 | (101) | 0 | (1) | 0 | (99) | (0) | 3 | 1 | 95 | 0 |
| 16 | 67 | 7 | 25 | 1 | 80 | 3 | 15 | 2 | 59 | 2 | 37 | 2 | 62 | 4 | 34 | 0 | 109 | 8 | (14) | (3) | 85 | 2 | 3 | 10 | 99 | 5 | (7) | 3 | 69 | 4 | 25 | 1 |
| 17 | 76 | 8 | 15 | 0 | 77 | 7 | 14 | 1 | 51 | 1 | 48 | (0) | 72 | 6 | 21 | 0 | 20 | (0) | (115) | (4) | 98 | 2 | (6) | 7 | 204 | 5 | (119) | 9 | 76 | 5 | 18 | 1 |
| 18 | 62 | 33 | 4 | 1 | 59 | 37 | 3 | (0) | 66 | 18 | 16 | 0 | 58 | 31 | 10 | 0 | 40 | 84 | (22) | (2) | 100 | 3 | (5) | 1 | 69 | 44 | (13) | (0) | 63 | 33 | 4 | 0 |
| 19 | 21 | 67 | 11 | 0 | 6 | 91 | 3 | 0 | 17 | 68 | 15 | 0 | 35 | 52 | 14 | 0 | 14 | (106) | (7) | (1) | 116 | (16) | (0) | (0) | 178 | (74) | (4) | (0) | 88 | 4 | 8 | 0 |
| Total | 62 | 12 | 25 | 1 | 61 | 15 | 22 | 2 | 47 | 5 | 47 | 1 | 52 | 10 | 38 | 0 | 571 | 205 | (780) | (95) | 95 | 2 | (6) | 9 | 233 | 46 | (172) | (7) | 65 | 12 | 23 | 0 |

Notes: PVC = private consumption effect, GC = government consumption effect, FK = fixed capital formation effect, and ST = increase in stock effect.
Source: Author's calculation based on seven competitive-import type input-output tables of Thailand.

List of Sectors

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

### 2.2.4 Other Indicators Regarding the Structural Transformation of Thailand

#### 2.2.4.1 Urbanization

Thailand's urbanization is happening quite slowly, and 67.8 percent of the total population still lived in rural areas in 2004 (see Table 2.16). This is in contrast to what has happened in other newly industrializing economies. Among countries with about the same development level as Thailand, Thailand has the slowest rate of labor movement from rural to urban areas.

Reasons for this slow urban migration may be due to various factors. First, people in the rural areas of Thailand are highly attached to their hometowns. Although many of them may practice seasonal migration or work overseas, their objective is to make savings and build a better house or invest back in their hometowns. Most of these people would return permanently to their hometowns after their financial status has improved. Second, Thailand is considered to have developed quite a good road system, electrification, and communication system. Therefore, it is not inconvenient to live in Thai rural areas. Poverty is, however, a stronger drive to push rural dwellers to practice seasonal migration or work overseas. Third, although primary agriculture is dominantly rural, it is not the only sector practiced in rural areas. Therefore, even though the rural households' income from primary agriculture is very low, many of them also earn their living from other non-agricultural activities, such as services, petty trade, or some light manufacturing. Some families also receive remittances from family members or relatives working in urban areas or abroad. These financial supports allow them to continue living and engaging in primary agriculture in rural areas.

A large rural population should not be a problem in economic development if there are enough jobs created in rural areas. Primary agriculture has limits in income expansion, but agro-industry in rural areas offers the prospect of raising rural income, and it should be easy to promote since agro-industry has close intersectoral linkages with primary agriculture. This strategy could also prevent problems of severe urban migration and urban slums. In Chapter V, this development strategy of promoting agro-industry in rural areas is proposed and its potential examined using tax and subsidy incentives under CGE simulations.

**Table 2.16—Thai Population in Rural and Urban Areas and Its Annual Growth, 1960-2004**

| Year | Rural population (% of total pop) | Urban population (% of total pop) | Population Growth (annual %) |
|---|---|---|---|
| 1960 | 87.49 | 12.51 | 2.96 |
| 1965 | 87.14 | 12.86 | 3.06 |
| 1970 | 86.71 | 13.29 | 3.03 |
| 1975 | 84.90 | 15.10 | 2.73 |
| 1980 | 82.96 | 17.04 | 2.18 |
| 1985 | 82.13 | 17.87 | 1.51 |
| 1990 | 81.29 | 18.72 | 1.77 |
| 1995 | 80.73 | 19.27 | 0.58 |
| 2000 | 80.17 | 19.83 | 0.80 |
| 2002 | 79.78 | 20.22 | 0.70 |
| 2004 | 67.80 | 32.20 | 0.85 |

Note: Data in 2004 shows a big rise in urban population. This may be due to use of different sources of data set.
Sources: Data for 1960-2002 is from World Bank's World Development Index 2004 CD-Rom. Data for 2004 is from ADB's Key Indicators 2005.

### 2.2.4.2 Demographic Transition

Thailand has been successful in reducing its population growth rate since the 1980s. Its demographic transition is tending toward developed countries' path as the annual population growth rate was maintained at 0.85 percent in 2004 (see Table 2.16).

### 2.2.4.3 Income Distribution

The income distribution is still a major problem resulting from the economic development in Thailand. The Gini coefficient of Thailand was still quite high, 0.432, in 2000.

As much as 33.83 percent of total income share went to the richest decile's households, while only 2.52 percent of total income went to the poorest decile's households in 2000. The poverty headcount was unsurprisingly higher in the rural area in 1992.

**Table 2.17—Income Distribution Indicators**

| Year | 1981 | 1992 | 2000 |
|---|---|---|---|
| GINI index | 0.452 | | 0.432 |
| Income share held by highest 10% | 35.51 | | 33.83 |
| Income share held by lowest 10% | 2.29 | | 2.52 |
| Income share held by highest 20% | 51.40 | | 50.00 |
| Income share held by fourth 20% | 20.69 | | 20.93 |
| Income share held by third 20% | 13.50 | | 13.54 |
| Income share held by second 20% | 8.99 | | 9.48 |
| Income share held by lowest 20% | 5.42 | | 6.06 |
| Living on less than $1 a day (PPP) (% of population) | | | 2.00 |
| Living on less than $2 a day (PPP) (% of population) | | | 32.47 |
| Poverty headcount, national (% of population) | | 13.10 | |
| Poverty headcount, rural (% of population) | | 15.50 | |
| Poverty headcount, urban (% of population) | | 10.20 | |

Sources: World Bank's World Development Index 2004 CD-Rom.

Other statistics show that, in 1975/6, 12.5 percent of the urban population lived below the poverty line, but as much as 36.1 percent of the rural population were in the same condition. In 1987/9, the rural population living below the poverty line decreased to 29.4 percent, but was still high compared to that of the urban population (6.9 percent) (TDRI). With the other source of statistics, the percentage of poor in villages in 1992 was 29.7 percent (3.6 in municipal areas), 21.2 percent in 1994 (2.4 percent in municipal areas), and 14.9 percent in 1996 (1.6 percent in municipal areas) (NESDB 1999). The UNDP's Human Development Report of Thailand 1999 shows Human Development Index figures of 0.912 for Bangkok, 0.873 for central region, 0.897 for eastern region, 0.817 for western region, 0.655 for northeastern region, 0.717 for northern region, 0.766 for southern region, and 0.880 for the whole kingdom (UNDP 1999: 112).

Other evidence of the contradictory development in Thailand that has led to the unequal income distribution is the income gaps between farmers and the group of urban professionals and technical workers, administrators and academes, which have widened precipitously. In 1998 the average monthly income per household of farm operators mainly owning land, farm operators mainly renting land, and farm workers were only 24.50 percent, 26.52 percent, and 16.03 percent of that of the group of urban professional and technical workers, administrators and academes, respectively. In 2002, the gaps widened to 26.0 percent, 29.36 percent, and 16.10 percent, respectively.[18]

### 2.2.4.4 Institutional Development

The institutional development in Thailand is still undergoing big improvement and restructuring processes. The key issues are the development of good governance, decentralization, development of financial sectors, the privatization issue, and development of laws and regulations. Discussion on this institutional development is, however, beyond the scope of this dissertation.

## 2.3 Problems in Economic Development and Structural Transformation of Thailand

Thailand's economic development has been quite successful in terms of achieving high growth rate and reasonable per capita income. The country's economic performance in terms of the transformation of production and exports are tending toward the average path of increasing share of manufactured products. However, the major problems Thailand is still facing are the late reduction of its agricultural labor force, and inequality resulting from the development process.

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[18] Author's own calculation using data from National Statistical Office (NSO)'s *Statistical Yearbook of Thailand 1999*, and *Statistical Yearbook of Thailand 2003* (Table 7.2).

Problems also occur in the manufacturing industrial sectors as Thai manufacturing production and exports are not based on advanced technology, complexity in interindustrial linkages,[19] or ability to achieve significant sectoral rates of TFP growth. Thai manufacturing industrial sectors alone are not able to finance the balance trade deficits caused by their high dependency on imported materials (46.6 percent of their total inputs in 2000). The persistence of unproductive manufacturing industrial sectors could, therefore, hinder Thailand's economic growth in the future.

These three issues (labor allocation, inequality, and problems in potential of the manufacturing industrial sectors) are made the main discussions of later chapters of this dissertation. In Chapter IV, we will discuss the potential of the agricultural sector and agro-industry in the economic development of Thailand, and see whether their performances are better than those of the manufacturing industrial sectors. A social accounting matrix (SAM) analysis and an input-output analysis will be used to investigate the sectors' multiplier effects and their intersectoral linkages, and to identify key sectors which have the best backward and forward linkages. In Chapter V, we will perform a computable general equilibrium (CGE) analysis by conducting simulations on labor allocation movements from primary agriculture to agro-industry, in comparison with the move to other industries, and conduct policy simulations related to them to find out impacts on economic growth, adjustments on factor inputs, labor wage, capital rent, price, and quantity, and the impacts on household income and income distribution.

[19] This issue of intersectoral linkages will be discussed in Chapter IV.

## Chapter III—Structural Transformation and Thai Agriculture

***Chapter Outline***

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The main focus of this chapter is effects of structural transformation on Thai agriculture. In order to understand this analysis, an overview of Thai agriculture and its role in economic development are first illustrated. The former is presented in Section 3.1, followed by discussion of the structural transformation and Thai agriculture in Section 3.2. In Section 3.2.3, we then discuss the effects of this structural transformation on Thai agriculture. The discussion notes to the negative effects that Thai agriculture has to face as a result of the industrialization process.

## 3.1 Overview of Thai Agriculture

### 3.1.1 The Condition of Thai Agriculture

#### 3.1.1.1 The Two Different Aspects of Thai Agriculture

Thailand's agriculture has two contrasting images. The first is as a rich, well-watered, inexhaustible land, an image captured since the reign of King Ramkhamhaeng of Sukhothai era in the thirteenth century. Thai agriculture has never failed to preserve the country's food security. It is, has been, and continues to be a major source of rural income and undividable part of rural livelihood. It provided great revenues to the country from commodities exports. It was a major source of industrial sector's inputs during the industrialization process. Its comparative advantage to other countries' agriculture has made Thailand able to preserve its long status of net food exporter. As shown in Table 3.1, Thailand was number one exporter of rice, cassava, and natural rubber in 2000. Its export volumes accounted for 26 percent of the world's export volumes for rice, 85 percent for cassava, and 44 percent for natural rubber. It was among the top exporters of sugar (12 percent), and fruits and vegetables (4 percent). The success of Thai agriculture has been shown by the country's diversified agriculture taking advantage of world demand for a wide range of commodities, starting with cassava, kenaf, maize, and sugarcane in the 1960s and 1970s, moving on to soybeans, oil palm, and coffee in the 1980s, and in the 1990s, pioneering in the production and export of prawns, frozen fowl, fruits, and flowers (Bello 1998: 133).

The other image of Thai agriculture is, however, as a poor, unproductive sector which is losing its competitiveness to other sectors in the country. As shown in Chapter II, Thai agriculture contribution to the GDP has been on a decline to only 10 percent in 2000, while the contribution of industry has been on a rise to 41 percent in the same year. However, the drops in share of agriculture to GDP are not proportionate as respective the drops of employment in agriculture. The country has failed to push more workers out of agriculture and channel them to industrial sectors, as should take place during the industrialization process. This discrepancy between fall in contribution to GDP and fall in share of employment reflects the problems in the structural transformation of Thailand, i.e. the fall in share of employment in agriculture in Thailand has been much slower, observed at the same level of per capita GNP, than the trend found in the empirical research by Chenery, Robinson, and Syrquin (1986), and other Asian developing countries with the same level of development as discussed in Chapter II.[20]

This phenomenon would not be a problem if the majority of Thailand's population still in the agricultural sector and living in the countryside had a better standard of living and welfare. However, lower standard of living and neglect of rural interests have been a common story in Thailand's countryside. The poor, unproductive image of Thai agriculture, therefore, is due to pervasive poverty in the sector. Corresponding to the livelihood of the rural poor, Thai

[20] As shown in Figure 2.1, at per capita GNP of US$2,100, the share of employment in primary sector is around 25-40 percent from the empirical study, while this share was as high as 51 percent in the case of Thailand when its per capita GNP reached US$2,000 in year 2000 (as shown in Table 2.8).

agriculture suffers from lack of capital, low technology, and depressed interests. This aspect is a strong characteristic of the Northeastern region where land is unfertile, capital and technology inputs are missing, and rural poverty is pervasive. Other regions have also increasingly faced the problem of pervasive rural poverty, mostly due to lack of opportunities. Rural areas have been left far behind by the city and highly inequitable access to income from agricultural growth is a persistent problem. This makes for a contradiction between Thailand's status as a very strong agricultural economy and the continuing low living standards of the millions of agricultural population.

Other evidence of the contradictory development in Thailand is the gap in income between farmers and urban professionals, which has widened precipitously. The average monthly income of Thai households by different socio-economic classes is shown in Table 3.2. From Table 3.2, it can be seen that in 1998 the average total income of farm operators mainly owning land, farm operators mainly renting land, and farm workers were around 4.1 times, 3.8 times, and 6.2 times less than the average income of urban professional persons, respectively.

## Table 3.1—Crop Exports in Year 2000 (selected countries)

| Products | Rice | | Cassava (flour, tapioca, dried, starch) | | Natural Rubber | | Sugar (raw, centrifugal, refined) | | Fruits and Vegetables | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | Metric Ton | Value (1000$) | Metric Ton | Value (1000$) | Metric Ton | Value (1000$) | Metric Ton | Value (1000$) | Metric Ton | Value (1000$) |
| World | 23,162,904 | 6,459,824 | 15,753,836 | 472,295 | 5,700,817 | 3,875,785 | 34,968,680 | 8,016,289 | 114,085,244 | 67,777,921 |
| Thailand | 6,140,314 | 1,638,134 | 13,438,091 | 351,014 | 2,541,994 | 1,519,011 | 4,240,748 | 643,888 | 4,932,324 | 1,210,155 |
| Australia | 621,666 | 229,424 | … | … | 1,104 | 2,055 | 152,604 | 38,791 | 1,736,415 | 854,292 |
| Brazil | 26,380 | 6,505 | 56,666 | 4,072 | 180 | 320 | 6,692,200 | 1,199,425 | 1,942,179 | 1,525,012 |
| China, Hong Kong, Macao | 3,077,332 | 582,109 | 294,384 | 23,006 | 37,355 | 31,273 | 487,049 | 96,932 | 5,972,195 | 4,047,831 |
| France | 66,154 | 42,729 | 2,012 | 636 | 13,883 | 14,101 | 3,208,705 | 1,187,456 | 5,446,340 | 3,119,081 |
| India | 1,532,598 | 655,457 | 5,232 | 397 | 4,005 | 3,222 | 349,063 | 96,238 | 1,188,039 | 952,888 |
| Indonesia | 1,189 | 306 | 444,226 | 13,678 | 1,379,987 | 889,302 | 1,900 | 1,977 | 666,002 | 300,553 |
| Italy | 666,336 | 309,547 | 655 | 186 | 13,548 | 13,734 | 397,245 | 113,766 | 6,166,364 | 4,059,474 |
| Japan | 42,148 | 13,610 | 112 | 72 | 357 | 2,214 | 3,184 | 1,428 | 29,079 | 81,221 |
| Korea, Rep | 58 | 317 | 117 | 58 | 955 | 1,312 | 329,800 | 71,672 | 105,055 | 334,581 |
| Malaysia | 117 | 46 | 5,820 | 821 | 845,708 | 748,616 | 33,806 | 27,700 | 284,100 | 195,771 |
| Mexico | 323 | 292 | 443 | 128 | 1,435 | 1,870 | 305,507 | 50,828 | 4,884,704 | 3,270,010 |
| Pakistan | 2,016,273 | 533,314 | … | … | … | … | 20,330 | 4,768 | 454,169 | 126,314 |
| Philippines | 224 | 115 | 1,615 | 731 | 30,685 | 14,293 | 138,869 | 51,999 | 2,346,405 | 652,776 |
| United States | 2,736,462 | 835,996 | 31,145 | 2,019 | 38,044 | 58,749 | 101,150 | 39,883 | 9,465,810 | 7,954,295 |
| Vietnam | 3,477,000 | 667,349 | 337,642 | 12,100 | 273,000 | 166,022 | 70,030 | 450 | 265,259 | 267,931 |
| Thailand's Percentage to the World | 26.51 | 25.36 | 85.30 | 74.32 | 44.59 | 39.19 | 12.13 | 8.03 | 4.32 | 1.79 |

Source: Author, using data from the Food and Agriculture Organization of the United Nations (FAO) Statistical Database

**Table 3.2—Average Monthly Income per Household by Socio-economic Class of Household and Source of Income in 1998**

| | | Farm Operators | | | Employees | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | All Households | Mainly Owning Land | Mainly Renting Land | Own-account Workers, Non-farm | Professional, Tech., Adm. Workers | Farm Workers | General Workers | Clerical, Sales, Service Workers | Production Workers | Economically Inactive |
| Percent of All Households | 100.0 | 23.3 | 4.5 | 16.1 | 6.5 | 5.9 | 1.5 | 14.3 | 13.9 | 14.0 |
| Average Household size | 3.7 | 4.2 | 4.2 | 3.9 | 3.5 | 3.8 | 3.5 | 3.5 | 3.8 | 2.9 |
| Source of Income Total Monthly Income (baht) | 12,492 | 7,915 | 8,568 | 17,655 | 32,307 | 5,179 | 6,570 | 16,015 | 9,807 | 8,972 |
| Total Current Income | 12,271 | 7,683 | 8,316 | 17,335 | 32,000 | 5,092 | 6,469 | 15,769 | 9,696 | 8,784 |
| Money Income | 9,955 | 5,534 | 6,282 | 14,798 | 27,792 | 3,727 | 4,993 | 13,182 | 8,022 | 6,383 |
| Wages and Salaries | 5,015 | 610 | 812 | 1,319 | 24,782 | 3,317 | 4,441 | 11,542 | 7,148 | 670 |
| Profits, Non-farm | 2,315 | 184 | 226 | 12,491 | 953 | 71 | 135 | 729 | 295 | 290 |
| Profits from farming | 1,404 | 4,309 | 4,966 | 342 | 216 | 182 | 172 | 174 | 275 | 244 |
| Property Income | 236 | 78 | 42 | 269 | 788 | 21 | 37 | 212 | 50 | 585 |
| Current Transfers | 986 | 353 | 236 | 377 | 1,053 | 136 | 208 | 525 | 254 | 4,594 |
| Non-money income | 2,316 | 2,149 | 2,034 | 2,537 | 4,208 | 1,365 | 1,476 | 2,587 | 1,674 | 2,401 |
| Other Money Receipts | 221 | 232 | 252 | 320 | 307 | 87 | 101 | 246 | 111 | 188 |

Source: Statistical Yearbook Thailand No. 46, 1999, National Statistical Office.

#### 3.1.1.2 Tenancy and Landlessness

Tenancy and landlessness have been prominent features in Thai agriculture for decades. The condition was initially caused by commercialization and biased government policies against agriculture. Commercialization or the commodification of agricultural production in Thailand accelerated following the Bowring Treaty of 1855, when Britain, in search of cheap rice for its colonies and raw materials like timber for its industries, dragged Thailand into the world market. This orientation of agriculture to urban and international markets became a consistent element of Thailand's economic policy to use agriculture as an engine of industrial growth, and made Thailand a key exporting country. However, as in other cases of the rapid spread of capitalism and industrialization, it also promoted social differentiation and triggered social stress.

The trend of social differentiation and economic deterioration were most advanced in the central region. This region is the most fertile and suitable for rice cultivation. It is not surprising that the central region was integrated earliest into the capitalist world economy. With commercial rice production becoming a profitable activity, many aristocratic families of the old *sakdina* system (Thai feudalism) took advantage of having more power, knowledge and resources to accumulate large holdings along the newly constructed canals immediately to the north and the west of Bangkok. For instance, when the Rangsit Canal project was undertaken, the Svitongse family, who operated the Siam Canal company, was able to acquire 800,000 rai[21] (measure of land area) of land in Pathum Thani, Ayuthaya, and Saraburi provinces (Pongpanich 1993: 41).

Peasant dispossession was accelerated by the dynamics of the international markets as peasants became extensively dependent upon conditions external to the local economy, over which they had no control. As aristocrats took advantage of busts in commercialization to gain possession of lands from subsistence farmers, more and more farmers lost their independent

[21] One Rai = 0.16 hectare or 0.395 acre.

farming status and became tenant or landless farmers. Commercialization also increased their vulnerability to losing income from the wide price swings of the market.

Table 3.3 shows the structure of landholding in Thailand in 1998. It is obvious that the percentage of farm households who rented land was very high in the central and northern regions, at 34 and 24 percent, respectively. However, in terms of area of farm holding, the percentage of rented land area in each region was very small, except in the central region where as much as 25 percent of the total farm land was rented or sharecropped. This reflects the fact that tenant farmers could utilize smaller pieces of farm land than farmers who owned land. It also suggests that tenant farmers had less opportunity and probably poorer standards of living than those owing land. Further, the lowest of the low, the landless, have become farm workers and receive lesser income than ordinary farmers. As shown before in Table 3.2, the average national monthly income per household of farm workers (landless) in 1999 was only 5,179 baht, compared to 8,568 baht of tenant farmers, and 7,915 baht of those who mainly farmed their own land.

**Table 3.3—Structure of Landholding, 1998**

| | Whole Kingdom | Northeast | North | Center | South |
|---|---|---|---|---|---|
| Farm Households (%) | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 |
| Owners | 70 | 76 | 61 | 49 | 79 |
| Renters | 15 | 7 | 24 | 34 | 5 |
| Other (land rented free) | 16 | 16 | 15 | 17 | 15 |
| Areas of farm holding (%) | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 |
| Owner-occupied | 82 | 88 | 75 | 70 | 92 |
| Rented | 11 | 5 | 17 | 25 | 2 |
| Other (land mortgaged and land rented free) | 6 | 6 | 8 | 5 | 6 |

Source: Author, using data from the Office of Agricultural Economics, Ministry of Agriculture and Co-operatives.

In the northern region, commercialization began a few decades later than in the central region, mainly because land in this region is relatively scarce due to the mountainous geography. A further reason for late commercialization was the late political and administrative integration of the northern region into the central government structure managed from Bangkok. Cultivation in this region is done in relatively small plots that are either rain-fed or serviced by traditional indigenous irrigation systems. The average farm size is smaller than in the central region, though sometimes the yields are higher.

Commodification of production, as in the central plain, was accompanied by the displacement of many independent smallholders and the accumulation of control over land by village-based wealthy peasants and town-based Chinese commercial interests, both of which developed close ties to the government system.

In the case of the northeast, since this region is the poorest and land is usually very unfertile and dry, tenant-farming families formed a much lower proportion of rural households, as can be seen in Table 3.3. Rice produced in this region was mainly for household consumption, and since production conditions permitted only a small margin of surplus that could be collected as rent, this region avoided the growth of severe class differentiation.

However, when commercialization accelerated as Thailand's rice economy was integrated more fully into the world economy, some of this region's rice production was exported. Nevertheless, the scarcity of water and other harsh conditions of production permitted relatively little rice surplus for export, and farmers seeking to supplement subsistence needs were attracted by world demand to go into the production of less water-intensive commercial crops like kenaf, maize, and cassava. The demand for these commodities was mainly from the world market. For example, European demand for cassava for livestock feedings resulted in the boom in cassava production in this region in the mid-1970s.

However, the boom in rice and commercial crops had its costs. First, increases in production were achieved not through intensive cultivation but through the extension of production to upland and lowland forested areas. In 1938, forests in Thailand accounted for 72 percent of the total land area. This dropped to 53 percent in 1961, 43 percent in 1973, 31 percent in 1982, and 25 percent in 1999.[22] Second, social conflict over land and scarce water resources increased. Third, social differentiation increased. As already mentioned, with more people exposed to the vagaries of the market, it was not surprising that increasing numbers of villagers fell into debt and eventually lost their lands, forcing them to become either tenant farmers or landless workers.

Although the Land Reform Act was passed in 1975 with the Agricultural Land Reform Office (ALRO) as the agent in charge, at the time of writing, these efforts are still considered an extremely ineffective, corrupted affair. Land reform is one of the most sensitive issues, involving the interests of Thai elites, and has been processed at a snail's pace. Government after government has been unable to solve the problems, but ended up creating another fancy promise to farmers or unintentionally finding out about previous corruption.

Without sincere land reform by the government, Thai farmers have only four choices: continue in rice farming as low-income tenants, become wage laborers either by migrating to Bangkok or engaging in non-farm rural livelihoods, shift over to upland farming on encroached forest land, or organize to march into Bangkok and protest in front of the Parliament house.

### 3.1.1.3 Low Productivity

This condition of Thai agriculture reflects a strong contrast to the country's export achievement, since Thai commodities exports are among the world's leading ones, both in

[22] Data from Phongpaichit and Baker (1995: 62) and Office of Agricultural Economics.

quality and quantity, and contrast to the high TFP growth found in the agricultural sector. The yield figures reveal surprisingly low per rai productivity in Thai agriculture. As shown in Table 3.4, per rai yield of rice in Thailand was the lowest among major rice producing countries, despite the fact that Thailand has long been the world's top rice exporter. The yields of other crops, such as sugarcane and maize, were in the low ranges. Other commodity yields were in middle ranges. None of the highest yields shown in the table were counted for Thailand.

**Table 3.4—Yields of Major Crop Production in Thailand and Selected Major Exporters in Year 2000 (kilograms per rai)**

| Country | Rice | Cassava | Sugarcane | Maize | Sorghum | Soybean | Jute and Jute-like fiber | Cotton | Coffee beans |
|---|---|---|---|---|---|---|---|---|---|
| Thailand | 420 | 2,695 | 9,052 | 582 | 277 | 230 | 284 | 228 | 197 |
| Australia | .. | .. | 14,102 | .. | .. | .. | .. | 587 | .. |
| Bangladesh | 536 | .. | 10,795 | .. | .. | .. | 619 | .. | .. |
| Brazil | 487 | 2,152 | .. | 438 | .. | 384 | .. | 372 | 124 |
| China | 998 | .. | 11,334 | 747 | .. | 273 | 444 | 518 | .. |
| France | .. | .. | .. | 1,449 | .. | .. | .. | .. | .. |
| India | 481 | 3,711 | 12,004 | 283 | 145 | 152 | 265 | 110 | 161 |
| Indonesia | 708 | 1,923 | .. | .. | .. | 198 | .. | .. | 76 |
| Japan | 1,072 | .. | .. | .. | .. | .. | .. | .. | .. |
| Korea, Rep | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Mexico | .. | .. | 11,954 | 347 | 472 | .. | .. | .. | 75 |
| Myanmar | 533 | .. | .. | .. | .. | .. | 142 | .. | .. |
| Nigeria | .. | 1,703 | .. | .. | 180 | .. | .. | .. | .. |
| Pakistan | .. | .. | 7,342 | .. | .. | .. | .. | 311 | .. |
| Philippines | 492 | .. | 14,409 | .. | .. | .. | .. | .. | .. |
| United States | .. | .. | .. | 1,376 | 611 | 410 | .. | 289 | .. |
| Vietnam | 680 | .. | .. | .. | .. | .. | 306 | .. | 441 |

Sources: Data of rice production in Thailand is from Office of Agricultural Economics, data for other countries is from the United Nations Food and Agriculture Organization.

The low productivity has its causes. Outputs are usually low when inputs are poor. Thai agriculture receives very poor inputs. It lacks enough water or good irrigation systems. It has low fertilizer consumption. It receives low capital inputs. It is short of research and technology development. Table 3.5 shows statistics of major agricultural inputs and outputs of selected countries, such as the percentage of irrigated land to crop land, fertilizer consumption, supply of agricultural machinery, output of cereals production, and agricultural productivity. From the table, the percentage of irrigated land in Thailand was lower than the average of East Asia and Pacific countries, and behind those of other developing countries which are strong in commodities exports, such as Bangladesh, China, Ecuador, India and Vietnam. The table shows the percentages in two different periods, in the 1980s and 1990s. Despite the fact that the percentage of irrigated land in Thailand did increase, yield per hectare did not increase much. This implies that Thailand had a small improvement in irrigation management compared to Bangladesh and Vietnam.

Fertilizer consumption in Thailand is also lower than many other developing countries, let alone developed countries. In some cases, low fertilizer consumption may imply that land is very fertile and the use of fertilizer is not necessary, but in Thailand's case this is not a satisfactory explanation since the nation's only fertile areas are minor areas of the central plain and northern valleys. As will be explained in the later section, the use of fertilizer in Thailand was depressed because of the high price of fertilizer imposed by a commercial monopoly under the import substitution policy, and the quality of fertilizer does not match with the price.

Another input insufficient is the money capital. It is common that farmers in developing countries have very little access to credit or loans from the formal financial sector. The bank which usually provides loans to farmers in Thailand is the Bank of Agriculture and Agricultural Co-operatives (BAAC). But most of the credit goes to well-off farmers or farmers who have land as collateral. Smallholders of subsistence agriculture, farmers who rent the land, or farm workers rarely have access to loans from this formal sector. They usually make loans from the informal sector, such as from relatives, landlords or local merchants. The interest rate in the informal market can be incredibly high, as high as 56 percent per year.[23] As a result, the loan stipulations did speed up the spread of commercial capitalist agriculture, but suppressed the interests of smallholders.

The last factor emphasized in this section is insufficiency of research and technological development in the agricultural sector. Although the agricultural extension service in Thailand has been greatly developed, technology in terms of new hybrid-improved seedlings, suitable machinery and techniques in irrigation, cultivation, product preservation and transportation still lag behind. Agricultural extension has been improved in terms of numbers, but the techniques used are not much improved. The country lacks enough advance research laboratories and scientists for this sector. Further, the private sector has not been encouraged to take a role in agricultural research because the legal framework regarding intellectual property is not well developed, and because agricultural research and technology is considered a public goods. Therefore, the government must play a large role in research in this area.

One reason Thailand can still be a world-top net exporter of agricultural produce despite Thai agriculture's low productivity is the extensive deforestation before 1989[24] to expand production area. The obscure government laws and regulations to protect the forest areas, and the lack of enforcement of forestry law were major causes of deforestation in Thailand before 1989. Therefore, there was no need for farmers to increase either land productivity[25] (yield per rai) or labor productivity[26] (yield per worker) because new land could be upon encroached easily, and population growth was high before the 1980s. An econometric study by Thailand Development

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[23] The average interest rate of loans received from local neighbors in Northeastern region in 1998. Statistics is from the Office of Agricultural Economic.
[24] In 1989, Thai government banned on logging in natural forest after a major flood disaster happened in the South.
[25] Land productivity can be increased by introducing biological-chemical innovations, such as hybrid seeds, fertilizers, and pesticides for yield-increasing and thus save on land.
[26] Labor productivity can be increased by introducing mechanical technology since it permits more timely cultivation and an extension of multiple cropping of heavy soils, or the use of water pumps on dry lands, or make agricultural work less physically burdensome to save on the amount of labor needed to produce a unit of output.

Research Institute (TDRI) (Panayotou and Parasuk 1990) found that productivity, expansion of nonagricultural sectors, and a shift towards higher value-added crops reduce the pressure for farmland expansion in Thailand. The rapid expansion of land frontier which could absorb the rise in population made it less necessary to increase the yield. Even after the land frontier was closed in 1989, the population growth declined and labor began slowly moving out of primary agriculture, land area per worker has not increased due to land speculation by the rich which has left large areas idle.

Another contrasting result to the low productivity found in Thai agriculture is the high TFP growth found by Tinakorn and Sussangkarn (1996), and Bhuvapanich (2002) as discussed in Chapter II. Reasons for the high TFP growth found may be, first, although there is insufficient research and technological development in the agricultural sector, Thailand's road system and electrification in the rural area have been well developed. Second, high TFP growth may be caused by reasons other than production yield, such as the accumulation of knowledge by farmers (local wisdom and local technology); the effective systems for developing and disseminating innovations in agriculture, even though individual farmers may have little incentive to undertake research; the development of agricultural extension service; the import of more efficient and modern machinery; or the more productive workers. Third, the TFP measurement may include a lot of unexplained residual since the residual does not only include technology, but also other things such as the contribution of input (labor and capital) quality which cannot be easily measured in growth accounting method, and benefits from resource allocation. For example, an econometric study by Tinakorn and Sussangkarn (1996) found that the pace of capital accumulation and the increase in foreign exposure and foreign competition have great influence on TFP. Therefore, the low productivity mentioned in this section and the high TFP growth may not be the same thing.

Over the years, natural resource endowments have been depleted. Production costs have become more expensive (land, water, fertilizers). Primary agriculture exports therefore cannot be a reliable source of foreign exchange earnings unless there is continued technological innovation and water management to increase productivity. These public goods obviously require government investment and responsibility. Productivity improvement in primary agriculture is, therefore, crucial for Thai agricultural development, which also has direct effect on farmers' real wage and income distribution. Impacts of the productivity improvement on the real wage of farmers and household incomes will be tested in the computable general equilibrium (CGE) analysis in Chapter V.

## Table 3.5—Agricultural Inputs, Outputs and Productivity

| Country | Inputs | | | | | | | | | | | | | | Output | | Productivity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Arable Land | | Irrigated Land | | Land under Cereal Production | | Fertilizer Consumption | | Agricultural Machinery | | | | | | Cereal Yield | | Agricultural Productivity | |
| | hectares per capita | | % of cropland | | thousand hectares | | hundreds of grams per hectare of arable land | | | Tractors per 1,000 agricultural workers | | Tractors per 100 sq.km. of arable land | | | kg. per hectare | | Agri. value added per worker 1995$ | |
| Year | 1979-81 | 1997-99 | 1979-81 | 1997-99 | 1979-81 | 1997-99 | 1979-81 | 1997-99 | | 1979-81 | 1997-99 | 1979-81 | 1997-99 | | 1979-81 | 1998-2000 | 1979-81 | 1998-2000 |
| Thailand | 0.35 | 0.25 | 16.4 | 26.0 | 10,625 | 11,684 | 177 | 1,102 | | 1 | 10 | 11 | 147 | | 1,911 | 2,478 | 630 | 909 |
| Bangladesh | 0.10 | 0.06 | 17.1 | 46.1 | 10,823 | 11,568 | 459 | 1,491 | | 0 | 0 | 5 | 7 | | 1,938 | 2,927 | 217 | 296 |
| Cambodia | 0.29 | 0.32 | 5.8 | 7.1 | 1,241 | 2,037 | 45 | 27 | | 0 | 0 | 6 | 4 | | 1,025 | 1,875 | .. | 403 |
| China | 0.10 | 0.10 | 45.1 | 39.0 | 94,647 | 87,077 | 1,494 | 2,911 | | 2 | 1 | 76 | 60 | | 3,027 | 4,879 | 161 | 321 |
| Ecuador | 0.20 | 0.13 | 24.8 | 28.8 | 419 | 904 | 417 | 1,024 | | 6 | 7 | 40 | 57 | | 1,633 | 2,064 | 1,206 | 1,773 |
| France | 0.32 | 0.31 | 4.6 | 10.3 | 9,804 | 9,032 | 3,260 | 2,649 | | 737 | 1,303 | 836 | 694 | | 4,700 | 7,271 | 19,318 | 53,785 |
| India | 0.24 | 0.17 | 22.8 | 33.6 | 104,349 | 100,602 | 345 | 1,058 | | 2 | 6 | 24 | 92 | | 1,324 | 2,299 | 272 | 397 |
| Indonesia | 0.12 | 0.09 | 16.2 | 15.5 | 11,825 | 15,149 | 645 | 1,415 | | 0 | 1 | 5 | 39 | | 2,837 | 3,915 | 609 | 736 |
| Japan | 0.04 | 0.04 | 56.0 | 54.6 | 2,724 | 2,048 | 4,131 | 3,207 | | 209 | 690 | 2,723 | 4,675 | | 5,252 | 5,971 | 17,378 | 30,086 |
| Korea, Rep | 0.05 | 0.04 | 59.6 | 60.7 | 1,689 | 1,174 | 3,920 | 5,323 | | 1 | 60 | 14 | 908 | | 4,986 | 6,336 | 3,765 | 12,374 |
| Lao PRD | 0.24 | 0.17 | 13.3 | 17.8 | 751 | 742 | 35 | 79 | | 0 | 1 | 7 | 12 | | 1,402 | 2,925 | .. | 578 |
| Malaysia | 0.07 | 0.08 | 6.7 | 4.8 | 729 | 714 | .. | .. | | 4 | 24 | 77 | 238 | | 2,828 | 2,860 | 3,939 | 6,638 |
| Mexico | 0.34 | 0.26 | 20.3 | 23.8 | 9,356 | 10,952 | 570 | 706 | | 16 | 20 | 54 | 69 | | 2,164 | 2,604 | 1,482 | 1,772 |
| Philippines | 0.11 | 0.08 | 12.8 | 15.5 | 6,790 | 6,611 | 636 | 1,315 | | 1 | 1 | 20 | 21 | | 1,611 | 2,434 | 1,347 | 1,328 |
| United States | 0.83 | 0.64 | 10.8 | 12.5 | 72,639 | 58,055 | 1,092 | 1,127 | | 1,230 | 1,546 | 253 | 271 | | 4,151 | 5,794 | .. | .. |
| Vietnam | 0.11 | 0.07 | 25.6 | 41.3 | 5,962 | 8,299 | 302 | 3,179 | | 1 | 5 | 38 | 218 | | 2,049 | 3,955 | .. | 240 |
| Average World | 0.25 | 0.23 | 17.7 | 19.8 | 588,601 | 670,080 | 870 | 1,013 | | 19 | 20 | 172 | 188 | | 1,608 | 2,083 | .. | .. |
| Average of Lower Middle Income Countries | 0.13 | 0.20 | 33.6 | 23.8 | 155,654 | 203,551 | 1,060 | 1,181 | | 5 | 7 | 83 | 96 | | 1,741 | 2,083 | .. | .. |
| Average of East Asia and Pacific Countries | 0.12 | 0.10 | 36.9 | 38.1 | 141,593 | 141,801 | 1,154 | 2,407 | | 2 | 2 | 55 | 74 | | 2,116 | 2,945 | .. | .. |

Sources: Data of Agricultural Inputs is from World Bank's 2002 World Development Indicators, p. 138-140. Data of Agricultural Output and productivity is from Bank's 2002 World Development Indicators, p. 142-144.

### 3.1.1.4 Thailand's Attempt to Become a Newly Agro-Industrializing Country

Although Thailand had been focusing its development through the strategy of urban-industrialization since the end of the Second World War, in the mid-1980s the country started to pay some attention to the new paradigm of "Newly Agro-Industrializing Country" (NAIC). The government envisioned a central role for export agriculture via the consolidation of the country's comparative advantage in traditional export crops and increases in comparative advantage in new agro-industrial exports, such as canned food, frozen prawns and broiler chickens. They also saw the strategy as a mean for rural development and for creating opportunities for smallholders who could become growers on contract with big local or multinational firms.

However, this strategy has encountered many obstacles. First, the fertile land for cultivation had been bought up by land speculators during the rapid expansion of industry. These lands are now either engaged in industrial activities or left idle, but the speculation left many farmers tenants or agricultural workers. Since the lands were speculated, their prices for sale and rent had become too high for farmers to afford. It also made it difficult for the Agrarian Land Reform Office (ALRO) to purchase private land for distribution to farmers as part of the land reform program, though the land reform program is considered to be unsuccessful. The speculative boom also affected the agro-industrial enterprises to relocate from agricultural areas near to Bangkok to the upper central region and the lower northeast.

Second, the intensification of industrialization around Bangkok area had pushed up labor costs in the city and created a big gap between income from urban factory work and income from agricultural farms. This encouraged more and more laborers to settle permanently in Bangkok rather than the more traditional pattern of seasonal migration. This resulted in difficulties for the agro-industrial enterprises to attract specific agricultural inputs from the farms or to introduce a contract farming system.

Third, there are limitations to contract farming. Contract farming in Thailand was introduced in the 1980s when big corporations engaged small farmers to raise inputs that they processed into high value commodities and exports, like broiler chickens. Contract farming promised to keep small farmers on the land while making them efficient producers. There were stories both of success and failure of contract farming, but the latter seemed to outweigh the former. Smallholders were often swindled into accepting unfair contracts, with many of them falling into debt with the company from purchases of seeds, fertilizers, and other inputs. Many firms did not do adequate research on the prerequisite conditions for cultivating each crop or consider suitability for the cultivation before contracting with farmers. This kind of ill-prepared project turned into disaster for farmers. There were also cases in which government officials who received financial arrangements disguised as consultancies used their position to get farmers to grow crops for firms.

Fourth, there were technological constraints. In order to create higher value-added commodities and maintain competitiveness, substantial technological innovation is required. However, this issue is a major constraint for Thai agriculture. The government is ill-equipped to be the R&D coordinator and technological innovator. The public research infrastructure for agriculture is underdeveloped. Because of this, there was an expectation that the private sector could step in to fill the R&D deficiency. However, private firms are not likely to expend much R&D effort on open-pollinated crops like rice and corn since this kind of R&D can easily become public goods, though the R&D improvement on such open-pollinated crops would benefit ordinary farmers the most. Private firms would find it more attractive to invest in hybrid plants and livestock whose mass reproduction necessitates specific biotechnological processes that can be monopolized and patented. Furthermore, there must be concern whether the new technological innovation can sufficiently increase jobs for farmers who are threatened with unemployment by the crisis of traditional crops. In addition, more attention should be paid on the technological innovation to upgrade post-harvest technologies, from processing to packaging.

Last but not least, Thailand must be aware of fierce competition, trade barriers, and price fluctuations in the world trade. Thai agricultural exports have long faced the problems of world market price fluctuation, particularly in the 1980s. Moreover, Thai commodities exports are confronting effective competitors, such as China and Vietnam. Many Thai agricultural products lost their Generalized System of Preferences (GSP) privileges as European countries claimed that Thailand's per capita income has been greatly improved and it must graduate from the GSP privileges.[27] Furthermore, at the time of writing, WTO trade talks (the Doha round) on agriculture are still far from success. Many developed countries still continue to subsidize their farmers, notably in the United States, Japan and EU countries. However, Thailand is seeking bilateral free trade area (FTA) agreements with more and more countries.[28] At the time of writing there is no clear picture whether Thai agriculture would gain or lose from this practice.[29] Outbreaks of viruses and diseases, such as the bird flu that hit Thai poultry in 2004, and strict quarantine standards set by trading partners are another obstacle which can directly affect Thai food productions and exports.

Given all the above conditions, if policy makers still desire to push Thailand to become a newly agro-industrializing country, they have to dedicate more time and resources, and correctly

[27] Although, the EU and the US pledged to review their policies in 2005 in favor of Thai shrimp export as part of EU and US support for tsunami-hit countries.

[28] At the time of writing (2005), Thailand already signed or negotiated FTA agreements with China, Australia, New Zealand, India, United States, Japan, Peru, Bahrain, BIMSTEC (Bangladesh, India, Myanmar, Sri Lanka, Bhutan, Nepal), EFTA (Switzerland, Liechtenstein, Norway, Iceland). For more information, see www.thaifta.com.

[29] Example of success stories is that shipments to China of some of the favorite fruits in the country—durian, mangosteen and longan—have surged remarkably a year after the FTA pact was implemented (October 1, 2003). For its farm sector alone, Thailand enjoyed a trade surplus from Thailand-China FTA of nearly 50 billion baht in 2004, from about a 40 billion baht surplus the year before (2003). Example of failure stories is that garlic growers in Chiangmai have been told to cut back their plantation areas in 2006 in exchange for financial assistance from the government, and to switch to other crops besides onions, red onions, lychee, longan and oranges. These five crops also face the prospect of a critical blow from the Thailand-China FTA pact on fruits and vegetables (Bangkok Post 2005).

solve the fundamental problems of Thai agriculture. Products with growth potential should receive government support to improve productivity and competitiveness in the world market. Primary commodities should be processed to avoid risks from price fluctuation and add value. Items with low potential should be phased out, but only after proper plans are in place to help planters make the transition to higher-value crops.

Thailand's recent attempt to become a newly agro-industrializing country should then focus more on building a strong agro-industry and high value-added agriculture instead of mono-cropping or contract farming. As our objective is to smoothen the employment transformation from subsistence agriculture to advanced industry and to increase real wages in the primary sector, agro-industry can help in achieving these objectives. The potential of high-value agriculture and agro-industry in facilitating Thailand's economic development and structural transformation will be discussed in the next two chapters.

### 3.1.2 Causes of the Depressed Agrarian Condition – The Bias of Government Policies

Thailand has been known for many centuries for its fertile natural resources, various kinds of good-quality agricultural produce, and its strong comparative advantage in agriculture. However, as described in the previous section, Thai agriculture has been devitalized for many decades. A very influential explanation for this is the biased policies of Thai governments subordinating the countryside to the city.

Thai agriculture has been exploited by powerful aristocrats since the early nineteenth century when the rice frontier was expanded in the central plains and along the river basins to increase the production of rice for exports. During that time, Thai society was dominated by the *Sakdina* system, or Thai feudalism. Peasants, at that time had the status of *phrai,* and were used as a source of labor, military manpower, necessities provider, and to reflect the social status of the lords. Each *phrai* had to be inscribed to a king or a lord, worked when ordered and paid taxes in portions of rice yield. Other labor was indentured as *thad* or slaves, who were on the fringes of society. They worked as full-time servants or general laborers in the households of the king and the great noble families. In the *Sakdina* system, every resident below the king was awarded a ranking measured in units of land ranging from 100,000 rai for the highest official of the court down to 25 for the ordinary *phrai* and 5 for a *thad*, but no land was attached to the ranks. The land grant was the only concept of resource entitlement, and was the king's way to allocate labor power which was the key scarce resource in that time.

The social status of *phrai* and *thad* was improved in the reign of King Chulalongkorn, 1868-1910, when *phrai* could become independent peasants and *thad* or slaves were gradually freed and became peasants. It can be said that peasantry is quite a new social status in Thai society since it was developed only around a hundred years ago. However, this improvement of social status was still far from creating an egalitarian society as the majority of the farmers could not acquire enough land for rice cultivation, particularly in the central plain or near the newly constructed canals. Most of the fertile lands were taken by the royal and noble families as they had foreseen the opportunities from land speculation and profits from rents when Thai rice was highly demanded by the world market; rice production in the country increased substantially. This similar practice of land being taken over by powerful families later spread to other fertile parts of the country. The production of other cash crops was introduced later after the country became more exposed to the world market and the commercialization.

After the Second World War, Thailand's development policy has focused on promotion of industrialization. The policies have essentially sacrificed the interests of the rural people, who are numerous but politically powerless smallholders, to the interests of an urban coalition dominated by extremely powerful commercial, bureaucratic, and military elites.

#### 3.1.2.1 The Agricultural Pricing Policies

A study of the World Bank (Schiff and Valdés 1992) on the agricultural pricing policies found that direct and indirect interventions in developing countries give severe negative impacts to the agricultural sector. These policies affect production incentives by making agriculture more or less attractive than other sectors of the economy. Intervention usually reduced agriculture's share of gross national product and was often related to both slower growth in agricultural production and agricultural exports and slower economic growth overall.

Many of the direct measures have been equivalent to a tax on agriculture, depressing the prices received by agricultural producers below levels that would otherwise prevail. Governments have intervened directly through procurement measures, quotas on exports of food crops and other agricultural commodities, and direct taxation of such exports. Yet other direct interventions have attempted to hold down the costs of food for urban consumers, for example, by fixing retail food prices or imposing ceilings on producer prices.

Agricultural production incentives have been even more strongly influenced through the indirect effects of macroeconomic policies and industrial sector protection policies. Macroeconomic policies that cause appreciation of real exchange rate can raise the relative cost of nontradable inputs and reduce the real purchasing power of income received from the sales of export and import-competing commodities. And protection for domestic industry affects agriculture by raising the domestic price of importable agricultural inputs above world prices, reducing the purchasing power of farm households as consumers of manufactured goods, and causing further appreciation of the real exchange rate.

This World Bank study conducted a comparative analysis on eighteen countries, including Thailand, on economic aspects of agricultural price intervention. This study provided systematic estimates of the degree of price discrimination against agriculture within individual countries, explained how it changed over time, and determined how this intervention affected such key variables as foreign exchange earnings, agricultural output, and income distribution. The study pointed out that governments influence agricultural prices both directly, through agricultural sector policies, and indirectly, through industrial protection and macroeconomic policies that tax agriculture relative to tradables and nontradables outside the agricultural sector. Indirect interventions affect the prices of agricultural tradables relative to nontradables (through their impact on the real exchange rate) or to other tradables (as a result of industrial protection).

The findings of this study on Thailand over the period 1962-84 showed that industrial protection policies reduced agricultural incentives by 14 percent. The real exchange rate overvaluation reduced agricultural incentives by 15 percent. The direct agricultural price policies reduced agricultural incentives by 25 percent. The total rate of nominal protection was 40 percent (nominal protection rates are used to measure the impact of direct and indirect policies on agricultural incentives), which means that Thai agriculture was taxed, on average, at 40 percent during 1962-84. This also means that Thai farmers received 40 percent less for their output than they would have received in the absence of total price interventions. The average rate of total protection of eighteen countries under this study is 30 percent, with the highest rate that agriculture was taxed at 60 percent (Ghana), and the lowest rate at 8 percent (Brazil). However, among these eighteen countries, Korea and Portugal were overall supporting their agriculture, on average at 10 percent.

Results of this World Bank study on Thailand may imply that Thai agriculture is not itself declining because it is losing competitiveness, but because it has been taxed substantially, directly and indirectly, by governments so that it has become less attractive. Therefore, by stopping these biased policies, the agricultural sector should be reinvigorated, and a healthy agricultural sector should help in facilitating the structural transformation.

Example of the most prominent instrument of price policy is the *rice premium,* or an *ad valorem* or variable tax based on the value of a commodity, on rice exports, imposed by the Thai government from 1955 to 1985. Actually, the government began to tax the rice economy before regularizing it as the rice premium, and had imposed a monopoly on rice exports and set up machinery to buy supplies at low prices since the end of World War II. The rice premium, which was changed at irregular intervals, sometimes reached 30 percent of the world market price (Sugunnasil 1991: 84, Bello 1998: 135). By tightly controlling the flow of the marketable surplus to the world market, the premium had the effect of insulating the domestic market from international rice price movements and consistently depressing the domestic price of rice. This was a mechanism for protecting the urban consumer against shortages caused by excessive exports in times of high international prices. It avoided the administrative complexity and political difficulties of introducing a large land tax or any similar direct tax on the peasant. The result was that rice producers were deprived of substantial income, this being transferred instead in the form of lower food costs to urban employers and workers. In particular, the rice premium reduced the need to increase pay for civil servants.

Since Thailand has comparative advantage in agricultural exports, the exports of agro-commodities brought in the foreign exchange to the country, and the rice premium provided substantial revenue to the government. In 1956, the premium yielded 17 percent of the government's tax revenues and 7 percent in 1969. In the mid-1960s, an economist calculated that the premium represented a tax of 45 percent on the value of rice production for the export market. Another estimated that the premium extracted 25 percent of all rural income (Phongpaichit and Baker 1995: 36). The government used the rice premium to finance its strategic objectives, including industrialization, expanding government bureaucracy, and, most importantly, to maintain political stability by pleasing the urban consumers by setting a low rice price, even at times of severe inflation. With the resurgence of political protest in the countryside in the 1970s, the rice premium was reduced and then abolished in 1985.

In addition, another World Bank study by Siamwalla and Setboonsarng (1989) found that for much of the 25-year period covered by this report (1960-1985), government intervention in the prices of rice, maize, and natural rubber was extensive. In the cases of rice and natural rubber, both of them traditional Thai exports, intervention took the form of explicit export taxes. Intervention in the price of maize, on the other hand, took the form of restrictive quotas on maize exports to countries other than Japan and Taiwan, the principal buyers. Intervention in the prices of rice and natural rubber had the effect of penalizing farm producers by reducing their output prices. There was, as a consequence, a shift of resources towards Thailand's small industrial sector.

#### 3.1.2.2 Biased Urban-Industrial Policies

Biased urban-industrial policies come in various forms, such as through the import substitution policy, through the industrial policy, or through the resource allocation policy which favor urbanism or industrialization. For example, while import substitution is generally a sound path for a country seeking to industrialize, it is often abused to favor selected interests with special ties to the bureaucracy so that its balance of social costs and benefits is lopsidedly skewed toward them. With development policies to support the urban-industrialists, Bangkok today dominates Thailand in a way unlike any other capital city in East Asia. In 2000, it was home to more than 12 percent of Thai population (only population on registration record)[30] and accounted for almost 37 percent of the GDP in 1998,[31] though, if counted the number of unregistered people

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[30] From National Statistical Office (NSO), 7,645,756 out of 62,481,450 persons registered to live in Bangkok in 2000.

[31] From National Statistical Office (NSO), 1,700,436 out of 4,635,926 million baht of GDP was from activities in Bangkok in 1998.

living in Bangkok could double population. This position of dominance did not arise solely from natural market forces, but also with help from Bangkok-based policy makers.

Another example of biased urban-industrial policies is the development of the fertilizer industry when restrictions were placed on imports of urea, the cheapest available source of nitrogen nutrient, while a monopoly was granted in the 1970s to Thai Central Chemical, a client firm of Bangkok Bank, to build a plant to produce ammonium phosphate, a lower-grade fertilizer. The result of this arrangement was that Thailand had one of the highest fertilizer price-to-paddy ratios in all of Asia (Christensen 1993: 218, Bello 1998: 137). This abuse of industrial policy undoubtedly contributed to a disincentive to fertilizer use. As shown in Table 3.5, excluding Cambodia and Lao PRD, Thailand had the lowest average fertilizer consumption during 1979-81. As a result, yields for major crops in Thailand were lower than in most other Asian countries (see Table 3.5).

The water allocation can be another clear example. Thai agriculture used to have plentiful water resources to consume for a second rice crop during the dry season and the policy of planting the second rice crop was encouraged by the Thai government before the industrialization boom in 1980s in order to push Thai rice onto the world market. The policy was supported by the Royal Irrigation Department (RID), which controls water allocation and management. However, in the early 1990s, owing to the short-sighted entrepreneurial and government approaches to the country's resources, Thailand was running out of water. With the degradation of watershed areas caused by deforestation and increasing water consumption in the north, where the watershed areas for the central plain are located, the water available for dams in the central plain breadbasket dropped from 11 billion cubic meters to 7 billion, at the same time that water demand in agriculture, industry, and Bangkok was skyrocketing (Bello 1998: 166). Although most of the dam-water had traditionally been used for irrigation, especially for the second crop during the dry season, agriculture was now being squeezed by competing demands from other sectors. Demands from bureaucracies servicing primarily urban-industrial interests, like the Electricity Generating Authority of Thailand (EGAT) and the Bangkok Metropolitan Water Authority (BMWA), increasingly took precedence over farmers' demands in the water (Christensen and Boonlong 1993, Bello 1998: 166). Ironically, water could not be allocated to farm land because higher priority was given to allocations to golf courses.

To accommodate urban demand, the RID in fact reversed its 40-year policy of encouraging farmers to plant a second rice crop during the dry season. Since the past decade, farmers in the central plain have been discouraged from planting a second rice crop because of rice's great demand for water and told to plant vegetables or other less water-intensive crops. This was highly threatening to farmers, who had become dependent on the second crop to make ends meet following the low rice price policies implemented by the government. This policy of discouraging a second or third crop was seen not simply as a short-term accommodation, but as the latest example of agriculture's long subordination to urban-industrial interests.

#### 3.1.2.3 Suppressing Peasants' Interests

Thai peasants did form themselves once as an organization, the Farmer's Federation of Thailand (FFT), during the 1970s. Although, the communist cadres probably played some role in the formation, the central role was filled by peasant grassroots leaders. The Federation served to bring together issues, concerns, and demands from different regions and different sectors of the Thai peasantry, though the problems and demands are different in degree. The peasant support for the federation apparently came from the north and the central plain, where rates of tenancy and landlessness were highest. The membership was estimated to be around 1.5 million farmers nationwide (Karunan 1984: 46, Bello 1998: 147), and the geographical scope of the federation's organizing was unprecedented. The scope of the program covered from speaking for the rural poor, the landless, those with smallholdings, and tenant farmers, to a wider degree of support for all those who experienced injustice and denial of democratic freedoms. The success of the FFT, therefore, was due to its non-ideological style of organizing. It was the first time the peasantry had sought to organize itself autonomously as a class on a national scale and on the basis of a secular program.

The peasantry pressured the elite reformist government during 1970s to reverse the past policy of keeping rice prices low to benefit urban groups, and to raise or stabilize the income of paddy farmers. The government responded half-heartedly to the requests by setting minimum prices for rice on the open market, promising government purchase of rice at guaranteed prices, and managing the sale of subsidized rice to low-income groups, particularly those in Bangkok. Following these policies, the government of Prime Minister Kukrit Pramoj attempted to deliver to the countryside a rural reform package consisting of the following measures: requiring commercial banks to transfer 5 percent of their deposits as loans to farmers; the creation of a special fund for development projects in the countryside, the so-called Tambon Fund; the implementation of land rent controls; and land reform and redistribution (Bello 1998: 148). The Tambon Fund was considered successful in the sense of accelerating the disbursement of government resources to the countryside and creating jobs by putting people to work in infrastructure projects. However, when the budget for public investment dropped in 1974, it had a serious effect on the incomes of the thousands of rural people who had come to rely on casual and semi-permanent work in government construction projects. Moreover, in many cases, the selection of projects was not done under popular control, but by the self-interest-driven Tambon Council, made up of local authorities, local business elites, and appointed village headmen who sought their own benefit.

Although the elite reformist government of 1973 to 1976 tried to introduce rural development programs as mentioned above, they failed to implement the land tenure reform program which was actually the centerpiece of agricultural development. The result of land tenure reform in Thailand was very limited despite the Land Rent Control Act, Land Control Act, and Land Reform Act. This was because the legislation ran up against the realities of Thailand's power structure. These laws were perceived as threatening the very foundations of elite rule in Thailand, with significant negative impact not only on landowners but on the urban and bureaucratic elites as well.

With this clash of interests, an opposition movement by the landed elites began. They formed paramilitary groups to initiate a wave of terror against the FFT and its student supporters. Confronted with this rightist reaction, the parliamentary regime put land reform on hold and took side with landed interests in specific struggles against peasants. The right-wing could deploy superior resources in organization, firepower, and ideological combat. Their ideological offensive was the slogan "Nation-Religion-King" to make the participants feel important and identify themselves closely with the nation, the religion, and the king. The rural population, however, joined with the left, whose ideology won their hearts, to organize a peasant movement.

The confrontation came to a peak in October 1976 when bloody suppression of the peasantry was followed by the massive October 6, 1976 massacre at Thammasart University, when crowds of students were killed, hundreds wounded, and thousands arrested by police and paramilitary groups. This bloody event put an end to what had been a historic development in Thai history, the first effort of the peasantry to self-organize as a class. This suppression made the peasantry politically much weaker today than it was in the 1970s.

### 3.1.3 Recent Strategies to Promote Thai Agricultural Development

The agenda of agricultural development and the quality of growth received attention from the public and academic community increasingly after the East Asian economic crises in 1997. This is because at that time the financial sector in Thailand collapsed, the industrial and service sectors were paralyzed, the unemployment rate rose sharply, and people in almost every sector and level of income suffered from the crises. Therefore, the country's past development strategy based on promoting industrialization and capitalism lost its credibility as many questioned whether this strategy was still a viable or sustainable way to promote the country's development. At that time, the agricultural sector and related industries, although wounded, helped cushion the blow by absorbing thousands of unemployed workers. Thus, during the economic turmoil, there was an outpouring of new ideas and discussion about economic and social development in the country. Many groups had urged the government to solve the problems and try new strategies. However, utilizing the full potential of the sector remains one of the most daunting public policy challenges as promoting sustainable development, adding value to products and managing commodity price swings are all easier said than done. The following section will discuss the highly debated, influential strategies on Thai agriculture which have been implemented since the East Asian economic crises.

#### 3.1.3.1 The King's *New Theory*

Right after the East Asian economic crises burst, King *Bhumipol Adulyadej* spoke out urging the public sector to recognize the importance of Thai agriculture and rural development. His Majesty brought back and developed the old knowledge of integrated farming to apply in Thai agriculture once again. His initiative received much attention from the public sector and academia, and his *New Theory* concept was researched and improved to suit the contemporary environment of Thai agriculture. The *New Theory* points out ways to manage and increase agricultural production by applying mixed-crop and organic-crop agriculture for adequate household consumption, while surplus can be sold on the market. At the same time, it aims to improve rural livelihood, quality of life and the environment while increasing participation and cooperation among the villagers. It includes the meaning of self-sufficient and self-reliant. The King called it a *self-sufficient economy*.[32]

This strategy introduced by the King has been widely welcomed and adapted by many farm households and rural people who found it very helpful, adaptable, and meaningful to their way of life. The government agencies related to agriculture and rural development also accepted the concept and took a key role in providing information and inputs, such as digging reservoirs, teaching new planting techniques, providing new seeds and livestock for farmers who want to implement the concepts of mix-crop, organic-crop, and self-sufficient ways of living.

#### 3.1.3.2 Prime Minister Thaksin's Development Policies

Farmers and grassroots groups have received priority attention from the Thaksin Shinawatra government since it took office early in 2001. Its most popular vote-getting policies were the three-year debt suspension for small farmers, one-million-baht funds for 70,000 villages, and the One Tambon, One Product project to help villagers develop items for commercialization. The government also set a small budget of 5,000 baht per head for farmers who entered career rehabilitation schemes, 2,000 baht for training and the rest to buy production essentials for their chosen activities.

The programs were warmly welcomed by the grassroots despite strong criticism from economists and some officials. The policies themselves showed the government's good intentions,

[32] The key term named by the King in Thai is *Setthakid Por Peang.*

but there were no proper and sustainable measures to ensure the permanent well-being of farmers. At the time of writing, the new policies to upgrade rural livelihood and Thai agriculture introduced by Priminister Thaksin's government are still facing many obstacles and criticism. Nevertheless, the effort must be acknowledged as the first time in Thai history that the government has come up with many strategies at once to solve rural and agricultural problems, with much more attention and willingness than ever before.

## 3.2 Structural Transformation and Thai Agriculture

### 3.2.1 Meanings of Agricultural Transformation

Timmer (1988) categorized the agricultural transformation process into four phases using both historical and contemporary cross-section perspectives from various literatures. The four phases are summarized as follows:[33]

Phase I—"Getting agriculture moving"

The process starts when agricultural productivity per worker rises. This increased productivity creates a surplus which can be tapped in the second phrase. In this first phase, some of the resources should be devoted to the agricultural sector itself in order to build a dynamic sector. There should be significant investments in rural infrastructure, new technology, structure of markets and favorable price incentives to farmers to adopt new technology as it becomes available. A significant share of a country's investable resources may well be extracted from agriculture at this stage, but this is because the rest of the economy is so small. This first phase is called "Mosher Environment" as the definition is given by Arthur Mosher (1966).

[33] This theoretical section on agricultural transformation draws heavily on Timmer (1988).

Phase II—"Agriculture as a contributor to growth"

The second phase emerges in which the agricultural sector becomes a key contributor to the overall growth process through a combination of factors outlined by Johnston and Mellor (1961). This phase is then called "Johnston-Mellor Environment." In this phase, agriculture establishes market links with industry. There should still be investment in technology and incentives to create a healthy agricultural sector. Factor markets should be improved to mobilize rural resources. However, as surplus from agriculture is tapped through taxation, factor flows, and government intervention into the rural-urban terms of trade to develop non-agricultural sectors in this phase, there is a substantial disequilibrium between agriculture and industry at this early stage of the development process. This condition is emphasized by the empirical literature on structural patterns of growth such as Kuznets (1966), Chenery and Taylor (1968), Chenery and Syrquin (1975), and this phase has been the focus of most dual economy models of development.

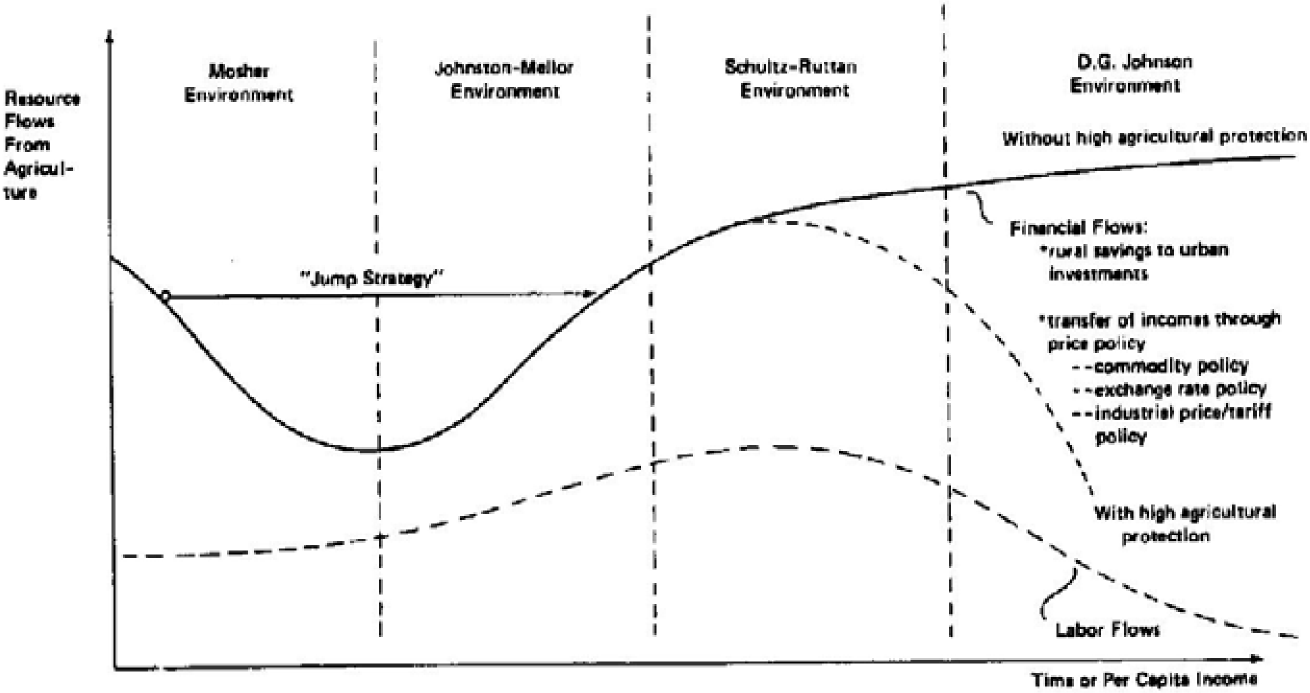
Phase III—"Integrating agriculture into the macro economy"

For resources to flow out of agriculture, rural factor and product markets must become better integrated with those in the rest of the economy via improved infrastructure and market-equilibrium linkages. The improved functioning of factor markets merely speeds the process of extracting labor and capital from those uses in agriculture with low returns for those in industry or services with higher productivity. The improved markets have welfare consequences as well, because they lessen the burden on individuals trapped in low-income occupations. However, the gain has costs as agriculture in this phase becomes much more vulnerable to fluctuations in macro prices and level of aggregate activity and trade (Schuh 1976) and much less susceptible to management by traditional instruments for the agricultural sector, such as extension activities and specific programs for commodity development and marketing. There is also a substantial income distribution problem in this stage from lagging rural labor productivity. This stage is also called "Schultz-Ruttan Environment."

Phase IV—"Agriculture in industrial economy"

The vulnerability and complexity in the third phase create the fourth phase in the agricultural transformation as the treatment of agriculture in industrialized economies. As the share of labor force in agriculture falls below about 20 percent and share of food expenditures in urban household budgets drops to about 30 percent, low-cost food is not as important to the overall economy nor is it as expensive in relative terms to increase in prices (Anderson 1983). However, income distribution becomes a political issue if low farm incomes, induced by rapid technological change and low farm-gate prices, are allowed to push resources out of agriculture. Farmers do not want to leave their farms, and agriculture becomes a nostalgic 'way-of-life' issue leading many second- and third-generation farm migrants living in the cities to lend political support to higher incomes for agriculture, even at the expense of higher grocery bills. Unemployment in the industrial sector also creates pressure to keep labor in agriculture. By this stage of the process, commodity price supports become the primary vehicle for supporting farm incomes, and the subsidies have devastating effects on resource allocation. This phase is called "D.G. Johnston Environment."

**Figure 3.1—Changing Environments for Agriculture's Contribution to Economic Growth**




Policy Settings:

| | | | |
|---|---|---|---|
| "Getting Agriculture Moving"—institutional change; new technology; structure of markets and incentives; significant investments in rural infrastructure | "Agriculture as a Contributor to Growth"—establish market links with industry; technology and incentives to create a healthy agricultural sector; improve factor markets to mobilize rural resources | "Integrating Agriculture into the Macro Economy"—deciding share of food in urban budget; push to make agriculture efficient; shift resources out, but substantial income distribution problems from lagging rural labor productivity | "Agriculture in Industrial Economies"—small share of food commodities in consumer budgets; income distribution a political issue; unemployment in industrial sector creates pressures to keep labor in agriculture; environmental concerns and "way of life" issues |

Source: Timmer (1988: 282)

### 3.2.1.1 Application to Thailand

According to the meanings of agricultural transformation above, Thailand's agriculture may be placed between phase II and III since Thai agriculture is in the process of being integrated into the macro economy. The Thai agricultural sector is still a key contributor to the overall growth process through a combination of factors. The surplus from agriculture is tapped through factor flows (both capital and labor), and government intervention into the rural-urban terms of trade to develop non-agricultural sectors, as stated in Phase II. There is still a substantial disequilibrium between agriculture and industry at this stage of Thailand's development process. However, the heavy extraction from agriculture has been improved in terms of taxation on agricultural exports. What makes parts of Thai agriculture fall into Phase III is that the rural factor and product markets have become better integrated with those in the rest of the economy via improved infrastructure and market-equilibrium linkages. This improved functioning of factor markets speeds the process of labor movement from agriculture to industries or services, which have higher labor productivity. Agriculture in phase III becomes much more vulnerable to fluctuations in macro prices and level of aggregate activity and trade. There is also a substantial income distribution problem at this stage, due to lagging rural-agricultural labor productivity.

### 3.2.2 Agriculture's Role in Economic Development

Most economists and decision makers believe that a country can be developed if it passes through a structural transformation from agricultural-based to industrial-based economy, or develops the ability to absorb a larger fraction of the rural population in new income-earning opportunities. They think that agricultural-based economies are primitive, with low productivity and technology, and a country can never be developed remaining in that stage; therefore, they believe that in order to develop a country, elements in the industrialization process, such as accumulating capital, improving technology, increasing productivity, and creating specialization, are necessary. With these general beliefs, national development policies are usually biased against agriculture.

One of the main theoretical principles underlying an imbalance between agriculture and industry is the Lewis model of development (Lewis 1954) or the two-sector model. It assumes that the traditional sector (subsistence agriculture) is characterized by a large surplus of labor, low labor productivity, and an absence of capital accumulation. In contrast, the modern sector (large industry) is the hub of economic activity and capital accumulation. The rate of capital accumulation in the modern sector determines the rate at which rural surplus labor can be transferred to this sector. It is implicitly assumed that full employment prevails in the modern sector and that surplus labor in the traditional sector is in almost unlimited supply at a constant wage which is somewhat above the average earnings in this sector, and which sets a floor to the urban or capitalist wage. The productivity differentials in the two sectors will narrow until the entire rural labor surplus is exhausted. At this stage, it is presumed that the dichotomy between the traditional versus modern and subsistence versus capitalist production will disappear.

Another explanation why industry receives higher priority than agriculture lies in the concept of "big push." It is assumed that the benefits of growth will "trickle down" to everyone and what is needed is a high rate of growth. According to this concept, the industrial sector would bring a higher rate of growth because it can generate greater externalities and more important linkages, but the agricultural sector lacks direct stimulus to the setting up of new activities through linkage effects. In addition, the preference towards agriculture or the optimal agricultural growth rate would tend to be lower than that of industry since farm sales usually grow more slowly than GDP because of the low income elasticity of demand for food and other agricultural products. Moreover, the experience of the industrialized countries led to a generalization that modern economic growth, which is reflected in increasing per capita incomes, is accompanied by a movement of labor and capital out of agriculture and into industry and services. For these reasons, governments perceive that to achieve a higher rate of growth, a country should promote more investment in the industrial sector.

The Lewis model and the concept of big push are among the seminal ideas of development thinking, and they are widely accepted. However, most of growth theories and similar concepts overlook one important point—that it is impossible to create sustainable growth and equitable society by consuming all the primary resources available and ignore the development of the agricultural sector. As the Lewis model explains itself, agriculture is necessary during the industrialization process as a source of labor input. It is, moreover, important in the early stage of development to act as a source of capital or an engine of industrial growth. There is no doubt that a country is able to develop faster if it has a strong basis in agricultural development, as most of the currently advanced countries had during their development process. However, the disparity between urban and rural welfare in efficiency and equity is much greater in poor countries now than it was in rich countries during their early development. Although it is true that no country has ever become developed by purely basing its development on agriculture. However, the important question is not whether using agriculture as the main engine of growth is possible or not, but how greatly a strong agricultural sector can help in the process of a country's development, and how development can lead to a more equitable society.

Given the importance and objectives of agricultural development during the industrialization process as strengthening and smoothing economic growth and reducing the social differentiation and social stress between the urban and the rural through efficient production and supply of resources and labor, it is now important to present how agriculture can play such roles in economic development.

The early definitions of agriculture's roles in economic development were given by Johnston and Mellor (1961), and have become the classic definitions referred in many works. The following definitions are also influenced by their works.

First, agriculture provides factor inputs, which are labor and capital, in terms of foreign exchange, to industry and other sectors. The rural sector is virtually the only source of increased labor power for the urban sector since more than half or more of the population in developing countries is in agriculture. If restrictions are placed on the movement of labor out of agriculture, economic development would be severely crippled. Agriculture provides capital by inducing foreign exchange through primary exports since developing countries' comparative advantage usually lies with natural resources or agricultural products, or at least, agriculture helps in relaxing the foreign exchange constraints by replacing imports of foodstuffs with home production. In this way, agriculture provides an investible surplus of savings to the economy since the foreign exchange can be used to invest in other economic activities in the country or can be used to import capital equipment and intermediate goods that cannot be produced at home.

Second, exports of agricultural produce can improve the factor utilization as all factors of production can be fully employed at the outset according to the concept "vent for surplus". It also helps to expand factor endowment since the expansion of primary product exports can lead to the accumulation of additional factors of production, especially capital and labor. Moreover, it can create further linkages, which are backward linkages (increase demand for inputs from other industries), forward linkages (provide more inputs to other industries), consumption linkages (increase demand for a wide range of consumption goods), infrastructure linkages (more usage of infrastructure reduces cost and induces more industries), human capital linkages (development of local entrepreneurs and skilled labor), and fiscal linkages (taxes and dividends can be used to finance development in other sectors). Investigating the extent to which agriculture can create further linkages in the economy compared to the manufacturing industrial sectors, especially in the case of Thailand, is the main objective of this chapter; therefore, Section 4.2 will explain precisely the intersectoral linkages and the key sectors analysis, and Section 4.3 will presents agricultural sectors' and agro-industry's multiplier effects analysis. Results of the analyses will show that in the case of Thailand, the general perception that agriculture is a less productive sector with weak linkages and low production multipliers is not true. Instead, the linkages and multiplier effects of the agricultural sector and agro-industry in Thailand are better than those of the manufacturing industrial sector, and can induce a relatively more equitable distribution of income.

Third, since persons involved in agriculture are usually the majority population in developing countries, agricultural households provide savings to the economy which can be used for further investment. However, there is a condition that the welfare of these people must be lifted above the poverty line. It cannot be denied that most farming households are poor in developing countries, and they cannot save to provide savings to the economy. Nevertheless, this argument should not be used to further depress the agricultural sector and its people. Rather, these facts should support the counter argument, that since farmers are the majority population and to move them out of the agricultural sector would require a lot of time, therefore, while they still remain in the sector, it is better that the government support them and strengthen the agricultural sector. In this way, farmers can be lifted from poverty and become active economic players to provide demand, supply, and savings to the economy. This will further help to strengthen the whole economic system more than just leaving farmers to struggle on their own while the government puts all resources and efforts on promoting industrialization.

In addition, agriculture can be a source of capital formation in ways other than the simple lending of voluntary savings. There may be a compulsory transfer from agriculture for the benefit of other sectors through taxation, or by turning the terms of trade against agriculture by imposing price controls on agricultural products or by using exchange rate controls that discriminate against agriculture, in which the burden on agriculture is greater than the government services provided to agriculture. If the improvement in the terms of trade in the non-agricultural sectors raises non-agricultural incomes, and the beneficiaries save at a higher marginal rate than the decreased agricultural income, aggregate saving rates will increase, and agriculture will have made a net contribution to total saving in an indirect manner.

Fourth, agriculture generates income for the rural population that will raise demand for products of other expanding sectors; therefore, the agricultural population of a developing country is an important market for the output of the modern urban sector. The demand for industrial products depends on growth of farm cash income, unless the country can export its growing industrial output. With more than half of the population living in rural areas in most developing countries, the nature of rural demand will affect the growth of nonfarm employment and output. Increased agricultural productivity, a growing marketable surplus, and rising real income are necessary to raise the rural sector's demand for industrial output. If rural population has low purchasing power, the growth of the industrial sector will also be inhibited.

Fifth, agriculture is the source of a country's food supply and raw materials. If food supplies to the modern sector do not keep up with the modern sector's demand for labor, the modern sector will have to consume a larger share of its output in feeding its labor force, and this will leave a smaller surplus for capital accumulation. Moreover, with abundant supply of food, workers are healthy and labor productivity will increase. Raw materials are important as sources of production. With plentiful supplies of food and raw materials, a country can save its food and input costs which will help to maintain positive current account and balance of payment.

### 3.2.3 Effects of Structural Transformation on Thai Agriculture

#### 3.2.3.1 Costs to Agriculture

Structural Transformation in Thailand has given many difficulties to the development of Thai agriculture. First, the increasing role of the industrial sector against the agricultural sector makes the government policies tend to favor the industrial sector by keeping the price of food low for the urban industrial population. As a result, prices of primary products are usually lower than the prices of industrial products. Eventually, farmers have to produce more agricultural products to buy the same amount of manufactured goods.

Second, Thailand's abundant food supply came with a high cost of heavy deforestation as the uncontrolled land expansion before 1989 made it unnecessary for Thailand to increase land productivity (yield per land area) and labor productivity (yield per labor). Even after the land frontier was closed in 1989, population growth declined and labor began slowly moving out of primary agriculture, land area per worker has not increased due to land speculation by the rich, which has left large areas idle. Although, land productivity in Thailand has gradually increased in major crop production, it is still low by Asian standards.

Third, financial surplus has been drawn from agriculture, directly (i.e. tax policy) and indirectly (i.e. industrial protection, and appreciation of real exchange rate), but less is returned in terms of new investment (excluding infrastructure) and welfare. These policies affect production incentives by making agriculture less attractive than other sectors of the economy. Intervention usually reduced agriculture's share of gross national product and was often related to slower growth in both agricultural production and agricultural exports.

Fourth, although industrialization is happening rapidly in Thailand as part of the structural transformation process, Thai manufacturing industry fails to pull agricultural labor out of their primary sector. As a result, the real wage in primary agriculture has been very low and the income gap between the rich and the poor has been widened. Instead, these unskilled workers from rural areas seek to work overseas (see Appendix A for the Thai migrant labor statistics) due to the limited number of jobs offered by industrial sectors, and due to the extremely low pay for agricultural work in the rural areas. Meanwhile, Thailand needs to import a lot of unskilled labor from the neighboring countries to work in primary agriculture.[34] These employment problems reflect the unhealthy industrialization process of Thailand which cannot absorb Thai farmers into higher paid domestic jobs, and the unbalanced production structure in primary agriculture which cannot apply labor saving technology or change the production structure where needed.

#### 3.2.3.2 Suggestions

Given the importance of agriculture's role in economic development and negative effects of Thailand's structural transformation to Thai agriculture above, there are strong reasons why the development of the agricultural sector and its people's welfare are crucial to increase the country's growth and development. The explanation of the importance of agriculture's role proves, first that by increasing the investment and supports in this sector, together with implementing sound agricultural development plans and policies to deal with internal and external problems, a developing country can enjoy substantial benefit from successful agricultural development, such as having more and better factor inputs, better factor utilization and linkages, more savings, more demand for manufacturing products, and more supply of food and raw materials, and second by having a stronger agricultural sector, the economy as a whole can gain more than from suppressing the agricultural sector. Governments should be aware of potential problems during the development process. The problems can be reduced by understanding their causes and by creating sound policies to tackle and prevent them.

[34] There were 1.2 million migrants from neighboring countries registered to work in Thailand in 2004.

To some extent, the negative effects mentioned can be avoided, and at the same time the agricultural sector and welfare of its population can be strengthened and improved. First, instead of suppressing food prices for the benefit of the urban population, the government should more seriously promote yield improving technology so that increased quantity of agricultural produce can automatically drive down the price under the demand-supply rule. Meanwhile, farmers can receive higher income from the increased quantity they produce. Their total income should then rise. Moreover, there should be increased R&D for new technology, which helps to stimulate demand for new materials leading to increasing intersectoral linkages, and reduces production costs. Together with this, governments should increase investment in the agricultural sector since its return to investment is very high and benefits are quite evenly distributed to farmers. These investments are, for example, financing irrigation systems, providing credit to farmers, investing in rural health and education facilities, and building infrastructure in the rural areas.

Second, the farmers' labor productivity in growing food and cash crops should be raised by providing new trainings on production techniques and farm management. At the same time farmers should increasingly be able to access factor inputs, such as fertilizers, tractors and cheap loans, so that they can also reduce costs and increase land and capital productivity.

Third, the government should try to improve the market system in order to reduce transportation costs and improve prices of agricultural produce. The government should try to seek new foreign markets and promote agricultural trade through bilateral negotiation and WTO forums. The fluctuation of agricultural commodity prices can be reduced by having good production planning system, implementing production zones, or creating agricultural exporters' groups with other major agricultural exporting countries to gain bargaining power.

Fourth, a developing country like Thailand should try to diversify it agricultural exports. Not only types of agricultural produce should be diversified, but also markets. Agricultural produce can be diversified through adding value, and markets can be diversified through seeking trade agreements with new countries, especially the developing ones.

In sum, the shift to industrialization seems to be unstoppable, but there are still choices to be made which would affect the future of economy and society. Even though the long term objective is structural transformation, there remains the complex problem of the timing of this transformation and the intertemporal sequence of policies to accomplish it. Agriculture must be viewed not merely as a source of surpluses to support industrialization, but also as a dynamic source of growth, employment, and better distribution of income. The intersectoral relations between agriculture and industry will determine the course of structural transformation in a developing economy. An urban bias can discriminate against agriculture, and the net outflow of resources from agriculture may be excessive. Therefore, it is essential to eliminate urban bias that hinders agricultural progress because agricultural conditions should not constrain development. To unlock this potential of the agricultural sector demands a new attitude to rural development and a new respect for the farmer. The new strategies must equip farmers with knowledge, technology, capital, rights, and political power. If in the long run, there is to be a structural transformation in output and labor force from subsistence agriculture to advanced industry, in the short run there must be successful polices of agricultural development to facilitate this transformation.

### 3.3 Concluding Remarks

Agriculture has long been the backbone of the Thai economy, acting as the engine of industrial growth, bringing in a large amount of foreign exchange from its exports, providing the major source of income for more than half of the country's population, and representing the rural livelihood. However, all it received back from the government and the thriving economy was suppression and deprivation. There are still many serious problems unsolved in the Thai agricultural sector, namely, pervasive poverty, lack of inputs and capital, low technology, low productivity, low income, depressed interests, high tenancy and landlessness, and price fluctuation. The bias of government policies lay as the main cause of the depressed agrarian conditions. According to the theory of structural change and two-sector model, every society seeking to industrialize with minimal dependence on foreign capital has no choice but to exploit resources from agriculture in the early stages of development. In this sense, it cannot be denied that Thailand is no exception if it also wants to promote its industry. The problem lies in the highly unbalanced character of the process by which agriculture had been used to permanently subsidize urban commercial-industrial interests and industrialization with little concern for the future of agriculture. Farmers had long been experts at surviving on their own because no government solved chronic problems, ranging from debt to land holding, in a systematic way. Moreover, much of the expenditure on agriculture focused on activities, like dam construction and road-building, which were designed to promote commercialization and greater production for export, rather than on activities that would directly uplift rural incomes, like subsidies for small producers, land reform, and support for smallholder technological innovation. Although Thailand has a huge comparative advantage in agriculture, without investing back a huge amount of capital into this sector, it cannot be reinvigorated. Lack of investment only makes agriculture weaker and leaves farmers ever poorer. A substantial part of government revenues should have been recycled back to the agricultural sector to counter the negative impacts of policies biased against agriculture. Fortunately but ironically, since the East Asian economic crises burst in 1997, agriculture's role became more important in the eyes of Thai government, and the government has become aware of the potential of this sector. Many projects and policies have been implemented to upgrade the sector and the quality of life of the rural people. It cannot be denied that Thai agriculture still has high potential to grow and become stronger, and therefore the role of the government to revive and promote it is very much desired. Since Thai agriculture still continues to encounter many challenges under this unpredictable, dynamic world economy, more careful policies and strategies must be carried out without delay. In sum, if in the long run, there is to be a structural transformation in output and labor force from subsistence agriculture to advanced industry, in the short run there must be successful polices of agricultural development to facilitate this transformation.

# Chapter IV— Potential of Thai Agricultural Sector and Agro-Industry

***Chapter Outline***



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This chapter focuses on the potential of the Thai agricultural sector and food industry (agro-industry) in economic development of Thailand. Section 4.1 first discusses all the major points of potential, which include the potential in terms of the world food demand issues and the ability of Thailand to export agricultural and food produce, the ability of Thailand to improve technology related to agricultural and agro-industrial sectors, and the potential from the strong intersectoral linkage and multiplier effects of agricultural and agro-industrial sectors. Analyses of intersectoral linkage effects and multiplier effects are the main objectives of this chapter, which are elaborated in Section 4.2 and 4.3, respectively. The linkage effect analysis is done using an input-output analysis in order to find out the key sectors for the Thai economy which have strong backward and forward linkages. The multiplier effect analysis is done to find out which sector gives the highest output multiplier effects using an input-output analysis, with a reference to previous study using a social accounting matrix (SAM) analysis.

## 4.1 Potential of Thai Agricultural Sector and Agro-Industry

### 4.1.1 Food Demand Issues and Ability to Export

Mellor (1983) stated that in the developing world, demand for food would clearly continue to shift more rapidly than supply. Therefore, the price of food would shift upwards over the next two decades. This statement seems to be true in the present world at least in the case of Thailand. The producer prices of the majority of agricultural produce in Thailand have been on the increasing trend over the past decade as shown in Table 4.1. In developing countries, food import grew more rapidly than food exports despite different records of growth in per capita food production (Mellor and Johnston 1984). This leaves a large opportunity and markets for Thailand to export its agricultural and food produce to developing countries in many decades to come. Moreover, rising income in developing countries causes food demand to shift to highly income elastic food, such as livestock, fruits and vegetables, and preferred cereals. This restrains the decline in the overall income elasticity for basic food staples. Therefore, Engel's Law may not hold in an opened economy case, or at least not when there is a lot of food demand from developing countries and when world population is rising.

Moreover, high value-added agricultural products from Thailand are unique and have become globally well-known, such as the jasmine rice, packaged Thai cuisines and Thai sweets, tropical fruits, and Thai herbs. The Thai government is currently promoting Thai brand names to increase the products' value-added.

In terms of the size effect, agricultural and agro-industrial exports ranked among the top five major exports of Thailand as can be seen in Table 4.2 (year 2001-2004).[35] The share of agricultural export was still as large as 10.7 percent in 2004, which was after only electronics and electrical appliance exports. The performance of agro-industrial export in total export is also considered very high as its share was 6.6 percent in 2004. Moreover, the food industry (agro-industry) did contribute the most to GDP among all manufacturing sectors in the 1980s and was still among the top-performance sectors in the 1990s as shown in Figure 4.1 and 4.2.

[35] Although agro-industry export ranked the 6$^{th}$ in 2004, but its share was very close to textile export (the 5$^{th}$).

**Table 4.1—Producer Prices of Selected Agricultural Produce in Thailand, 1991-2002**

Unit: Baht per Metric Ton

| Year | 1991 | 1993 | 1995 | 1997 | 1999 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|
| Rice, Paddy | 4,089 | 3,215 | 4,132 | 5,472 | 5,579 | 4,484 | 4,425 |
| Maize | 2,690 | 2,760 | 3,546 | 4,190 | 4,090 | 3,950 | 4,142 |
| Beans, Green | 7,660 | 9,130 | 10,960 | 12,120 | 11,000 | 15,180 | 16,139 |
| Mung Beans, Dry | 7,700 | 6,911 | 8,374 | 8,451 | 9,182 | 9,587 | 10,090 |
| Soybeans | 7,570 | 7,940 | 8,080 | 9,220 | 8,700 | 9,720 | 10,098 |
| Sorghum | 2,010 | 2,170 | 2,907 | 2,930 | 2,800 | 2,820 | 2,867 |
| Sugar Cane | 400 | 359 | 435 | 439 | 477 | 498 | 524 |
| Oil Palm Fruit | 1,920 | 1,830 | 2,050 | 2,150 | 2,028 | 2,266 | 2,354 |
| Castor Beans | 6,300 | 5,300 | 6,110 | 8,000 | 10,820 | 10,000 | 10,288 |
| Sesame Seed | 12,110 | 9,360 | 12,000 | 12,430 | 21,070 | 18,550 | 18,979 |
| Seed Cotton | 12,967 | 11,310 | 15,742 | 13,559 | 12,794 | 14,295 | 14,851 |
| Cabbages | 4,940 | 4,250 | 6,030 | 7,900 | 8,000 | 6,330 | 6,263 |
| Cauliflower | 8,430 | 6,270 | 15,270 | 15,320 | 8,990 | 10,400 | 10,476 |
| Pumpkins, Squash, Gourds | 3,320 | 3,080 | 5,700 | 5,290 | 4,740 | 6,160 | 6,442 |
| Cucumbers and Gherkins | 4,340 | 4,660 | 6,630 | 7,700 | 6,440 | 6,170 | 6,154 |
| Eggplants | 4,520 | 4,490 | 5,600 | 7,400 | 4,800 | 6,370 | 6,595 |
| Garlic | 17,900 | 8,430 | 31,670 | 21,300 | 28,350 | 20,330 | 22,073 |
| Beans, Green | 7,660 | 9,130 | 10,960 | 12,120 | 11,000 | 15,180 | 16,139 |
| Mushrooms | 34,530 | 33,000 | 44,530 | 45,700 | 44,540 | 44,100 | 45,706 |
| Watermelons | 1,750 | 2,205 | 2,521 | 3,060 | 3,792 | 3,132 | 3,139 |

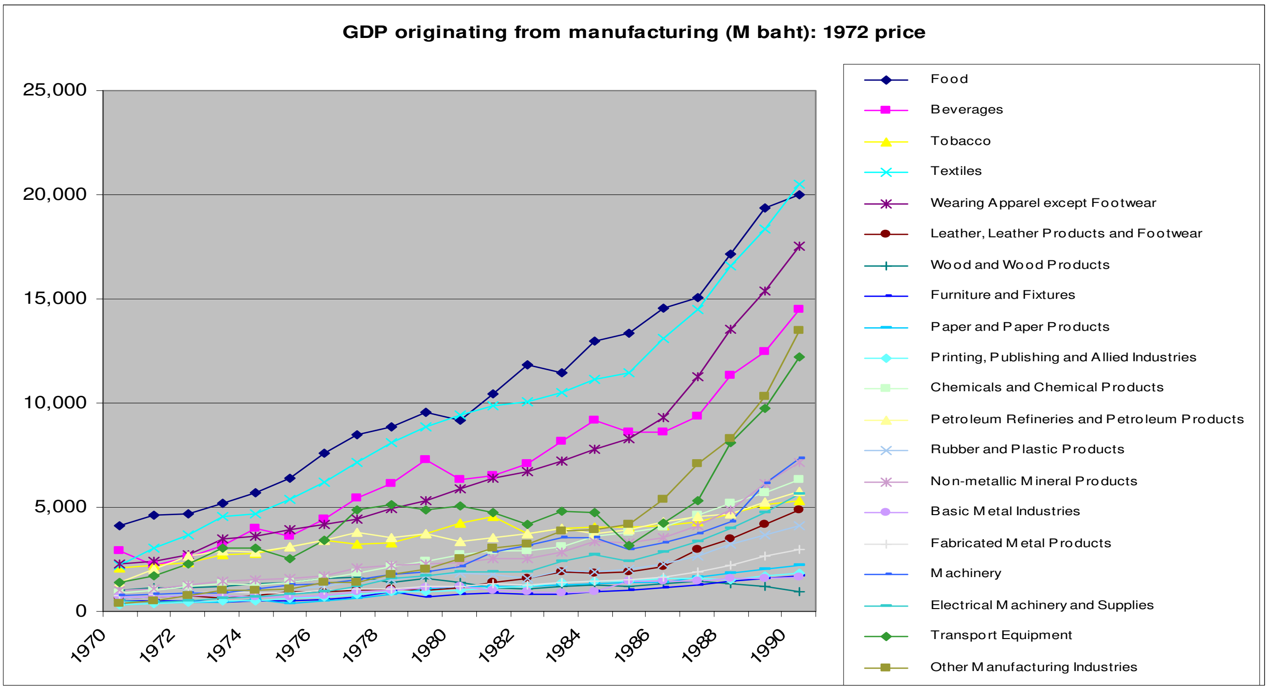
Source: FAOSTAT

**Table 4.2—Thai Exports, 2001-2004 (percent of total export)**

| Year | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|
| Agriculture | 10.83 | 10.45 | 10.98 | 10.70 |
| Agro-Industry | 7.40 | 7.49 | 7.44 | 6.60 |
| Textile | 8.08 | 7.54 | 6.83 | 6.63 |
| Electrical Appliances | 11.06 | 12.06 | 12.15 | 13.62 |
| Electronics | 24.02 | 22.93 | 22.09 | 19.97 |
| Furniture and Wood Products | 2.22 | 2.40 | 2.20 | 2.19 |
| Metal Products | 2.06 | 2.25 | 2.53 | 3.08 |
| Plastics | 3.80 | 4.00 | 4.23 | 4.68 |
| Chemical Products | 1.56 | 1.75 | 1.98 | 2.14 |
| Vehicle and Parts | 5.15 | 5.50 | 6.40 | 7.83 |
| Machinery | 1.32 | 1.36 | 1.56 | 1.73 |
| Other Manufacturing | 16.01 | 16.35 | 16.50 | 15.42 |
| Mining and Fuel | 3.14 | 2.94 | 2.88 | 3.82 |
| Others | 3.35 | 2.99 | 2.24 | 1.58 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 |

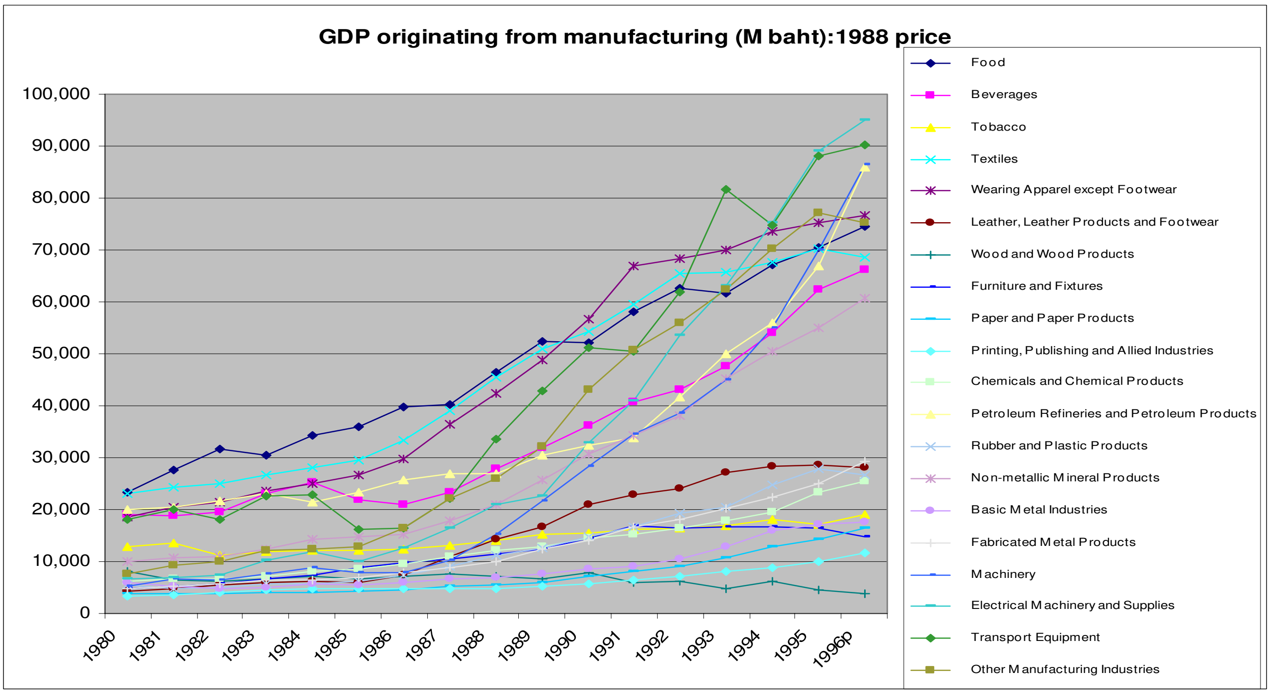
Source: Author, using data from the Ministry of Commerce

## Figure 4.1—GDP Originating from Manufacturing Sectors, 1970-1990




Source: NESDB

## Figure 4.2—GDP Originating from Manufacturing Sectors, 1980-1996




Source: NESDB

### 4.1.2 Technological Issues

Johnston and Mellor (1961) stated that a healthy agricultural sector can be created by raising productivity by new technology, which would reduce the input usage and production costs and increase farm receipts. The agricultural sector itself requires only moderate capital outlays, so it can make net contribution to the capital requirements for infrastructure and industrial expansion. Therefore, return to investment in agricultural sector is very high, especially in terms of technological development. A healthy agricultural sector can be a good source of capital accumulation for industries and infrastructure for a country's overall economic growth, which helps in structural transformation process.

In the case of Thailand, the agricultural sector has higher TFP growth than manufacturing industrial sectors, and higher than most nontradable sectors, except public administration, as shown in Section 2.2.1 in Chapter II (calculated by Tinakorn and Sussangkarn (1996); and Bhuvapanich (2002)). This is partly related to increased complexity of the input-output coefficient of the agricultural sector, but a lot is related to the investment in infrastructure development, the knowledge accumulation of farmers and agricultural scientists over the long years, and the effective systems for developing and disseminating innovations in agriculture, even though individual farmers may have little incentive to undertake research. Therefore, when giving more attention to the agricultural sector, the government needs not fear economic stagnation as a consequence. In fact, having a strong agricultural sector may provide an advantage as long as the diffusion of technology is encouraged. More sophisticated technological development in agricultural-related sectors should be easy for Thailand to improve if promoted more seriously exploiting the experiences of stakeholders. Moreover, since Thailand is lagging behind in technological improvement in manufacturing industrial sectors and the world competition is getting fiercer, it may be wise to invest more effort and budget in technological improvement in areas where the country has more comparative advantage, such as agricultural and food sectors.

Impacts of the technological and productivity improvement on the real wage of farmers and household incomes will be tested in the computable general equilibrium (CGE) analysis in Chapter V.

### 4.1.3 Linkage Effects and Multiplier Effects

Linkage and multiplier effects will be analyzed in detail in Section 4.2 and 4.3, respectively, which are the main analyses of this chapter. The objective of the linkage effect analysis is to find out the key sectors for the Thai economy which have strong backward and forward linkages, using an input-output analysis. The objective of the multiplier effect analysis is to find out which sector gives the highest output multiplier effects using an input-output analysis. In conducting these two analyses we hope to find results that can support our hypothesis, that Thai agricultural-related sectors should be promoted since they have better linkage and multiplier effects than the non-food manufacturing industrial sectors, and they can also generate a better income distribution in the Thai economy.

## 4.2 The Intersectoral Linkages and the Key Sector Analysis—An Input-Output Analysis

This intersectoral linkage and key sector analysis is the first main analysis of this chapter. It aims to examine which sectors have strong backward and forward linkages in terms of both size and evenness. Those sectors then should be selected as the key sectors to be promoted under government's policy. Before getting into the key sector analysis in Section 4.2.2, the theoretical backgrounds of the input-output analysis and the intersectoral backward and forward linkage analysis are explained in detail in Section 4.2.1. In conducting this key sector analysis, we hope to find a positive result in both linkage size and evenness from the agricultural and agro-industrial sectors to support our hypothesis.

### 4.2.1 The Theoretical Background of Input-Output Analysis

#### 4.2.1.1 Input-Output Framework

The input-output analysis was developed by Professor Wassily Leotief in the 1930s as a theoretical framework and an applied economic tool in a market economy. It displays sales and purchases relationship between different producers and consumers in an economy. It focuses on the interrelationships between sectors or industries in an economy with respect to the production and uses of their products and the products imported from abroad. The input-output analysis assumes that (1) the inputs used in producing a product are related to the industry output by a linear and fixed coefficient production function, at least in the short run, so each industry uses a fixed input ratio for the production of its output; (2) each industry produces only one homogenous commodity and there is no substitution among the different inputs; (3) production in every industry is subject to constant returns to scale; (4) there is excess in production capacity in all sectors, and increasing demand can always be met by higher output with no price increase. In other words, sectoral production is completely demand-driven. Since these assumptions are likely to be unrealistic, input-output models are more useful as guidelines to potential induced linkage, and as indicators of likely supply bottlenecks that may occur in a growing economy, than as predictive models.

Table 4.3 shows a simplified input-output table and accounts. It distinguishes three producers and shows the input-output flow matrix describing their transactions. The economy is viewed with each sector or industry listed horizontally as a consuming sector (*j*), and vertically as a supplying sector (*i*). The values in the square box represent intermediate consumption or uses of products as inputs in the production process. The total input and the total output in each corresponding row and column must balance.

**Table 4.3—Input-output Flow Table and Accounts**

| | Sectors (*j*) Sector 1 | Sector 2 | Sector 3 | Final Demand | Total output |
|---|---|---|---|---|---|
| Sectors (*i*) | | | | | |
| Sector 1 | 10 | 15 | 35 | 40 | 100 |
| Sector 2 | 20 | 0 | 40 | 140 | 200 |
| Sector 3 | 20 | 75 | 20 | 55 | 170 |
| Value added | 50 | 110 | 75 | | |
| Total input | 100 | 200 | 170 | | |

The input-output analysis became an economic tool when Leontief introduced an assumption of fixed-coefficient linear production functions relating inputs used by a sector or industry along each column to its output flow. The amount of sector *i*th's output required for the production of sector *j*th's output is assumed to be proportional to sector *j*th's output, which is denoted by $a_{ij}$ or an *input coefficient.* The first subscript in $a_{ij}$ refers to the input, and the second to the output, so that $a_{ij}$ indicates how much of the *i*th commodity is used for the production of each unit of the *j*th commodity. Specifically, the production of each unit of the *j*th commodity will require $a_{1j}$ amount of the first commodity, $a_{2j}$ of the second commodity, and $a_{nj}$ of the *n*th commodity as can be seen in Table 4.4.

**Table 4.4—Input Coefficient Table in General Terms**

| | Sectors (*j*) Sector 1 | Sector 2 | Sector 3 | Final demand | Total output |
|---|---|---|---|---|---|
| Sectors (*i*) | | | | | |
| Sector 1 | $a_{11}$ | $a_{12}$ | $a_{13}$ | $f_1$ | $x_1$ |
| Sector 2 | $a_{21}$ | $a_{22}$ | $a_{23}$ | $f_2$ | $x_2$ |
| Sector 3 | $a_{31}$ | $a_{32}$ | $a_{33}$ | $f_3$ | $x_3$ |
| Value added | $v_1$ | $v_2$ | $v_3$ | | |
| Total input | $x_1$ | $x_2$ | $x_3$ | | |

The various elements of the final demand, which include final consumption expenditures and gross capital formation of the firm sector, the government sector and the exports minus imports, are considered as a single column vector $f$. The elements of value added, which are also referred as primary inputs, are considered as a single row vector $v$. Since the total input and total output must balance, they both are represented as vector $x$.

The values of input coefficients, they can be obtained by dividing the entries in the column by the total input of the consuming sector. For example, from the entries in Table 4.3, one can find the input coefficients $a_{11}$, $a_{21,}$ $a_{31}$, and $v_1$ by calculating 10/100, 20/100, 20/100, and 50/100, respectively. The outcomes are shown in Table 4.5.

**Table 4.5—Input Coefficient Table (inputs per unit of output)**

| | Sectors ($j$) | | |
|---|---|---|---|
| | Sector 1 | Sector 2 | Sector 3 |
| Sectors ($i$) | | | |
| Sector 1 | 0.10 | 0.08 | 0.21 |
| Sector 2 | 0.20 | 0.00 | 0.24 |
| Sector 3 | 0.20 | 0.38 | 0.12 |
| Value added | 0.50 | 0.55 | 0.44 |

The input coefficients in Table 4.5 indicate that, for example, one unit of output of sector 1 requires 0.10 unit of output of sector 1, 0.20 unit of output of sector 2, 0.20 unit of output of sector 3, and generates 0.50 unit of value added. Thus, in order to produce output $x_1$, $x_2$ and $x_{3,}$ the total amount of sector 1's output required as intermediate input in the production process of an economy is equal to

(4.1) $a_{11}x_1 + a_{12}x_2 + a_{13}x_3$ or $0.10x_1 + 0.08x_2 + 0.21x_3$

If the remaining value of the same product left for final demand is further added to intermediate consumption, the total output of sector 1 is obtained in Equation 4.2.

(4.2) $a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + f_1 = x_1$ or $0.10x_1 + 0.08x_2 + 0.21x_3 + 40 = 100$

It is possible to check the equality property of Equation 4.2 by replacing the values of $x_1$, $x_2$ and $x_3$ in table 1.1 by their actual values. The results are shown in Equation 4.3.

(4.3) 0.10 (100) + 0.08 (200) + 0.21 (170) + 40 = 100

The utilization of products from sector 2 and 3 as intermediate inputs of production may be similarly calculated. Therefore, in a more general form with *n* sectors and *n* products, system of equation can be written as follows:

$$
\begin{aligned}
(4.4)\quad & a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + \ldots + a_{1n}x_n + f_1 = x_1 \\
& a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + \ldots + a_{2n}x_n + f_2 = x_2 \\
& a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + \ldots + a_{3n}x_n + f_3 = x_3 \\
& \cdot \; + \; \cdot \; + \; \cdot \; + \ldots + \; \cdot \; + \cdot = \cdot \\
& a_{n1}x_1 + a_{n2}x_2 + a_{n3}x_3 + \ldots + a_{nn}x_n + f_n = x_n
\end{aligned}
$$

In matrix form, Equation 4.4 can be written as follows:

$$
(4.5)\quad \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdot & a_{1n} \\ a_{21} & a_{22} & a_{23} & \cdot & a_{2n} \\ a_{31} & a_{32} & a_{33} & \cdot & a_{3n} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ a_{n1} & a_{n2} & a_{n3} & \cdot & a_{nn} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ \cdot \\ x_n \end{bmatrix} + \begin{bmatrix} f_1 \\ f_2 \\ f_3 \\ \cdot \\ f_n \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ \cdot \\ x_n \end{bmatrix}
$$

The computation of the coefficient matrix can be described in the following mathematical form:

(4.6) $a_{ij} = x_{ij}/x_j$ or

(4.7) $x_{ij} = a_{ij}\, x_j$

where $x_{ij}$ stands for the amount of sector *i*th output required for the production of sector *j*th's output. Equation 4.5 can be written in matrix form as:

(4.8) $Ax + f = x$

The relationship in Equation 4.8 is the basic input-output system of equations. It is suitable for model-building or analysis. Matrix $A$ is called the *input coefficient matrix*; vector $x$ is the vector of outputs, and $f$ is the vector of final demands. If the values of the coefficients and of final demands are known, then it is possible to solve this set of simultaneous equations in order to find the level of output of various industries or sectors necessary to satisfy the specified level of the final demands.

#### 4.2.1.2 The Inverse Matrix

The inverse matrix is fundamental to input-output analysis as it shows the full impact of an exogenous increase in net final demand on all industries (or sectors). Mathematically, the vector of output $x$ in the system of Equation 4.8 can be solved as follows:

(4.9) $x - Ax = f$

(4.10) $(I - A)\, x = f$

(4.11) $x = (I - A)^{-1} f$

where I stands for *identity matrix,* which is a square matrix where all the diagonal elements are equal to 1 and all other elements are equal to zero. $(I - A)^{-1}$ is the Leontief inverse[36] which can be calculated with some difficulty. At present, spreadsheet computer software can easily invert a large size matrix.

The inverse matrix can be interpreted as a chain of interactions. If the final demand in a given sector $i$ increases by, say $f_i$, initially production increases by the same amount, $x_i^1 = f_i$. However, this increase in production raises the intermediate demand for all sectors, including $i$ itself, by $x_j^2 = \sum a_{ji}x_i^1$. To produce these intermediate inputs, however, more intermediate inputs are needed, and there is a third round of effects $x_j^3 = \sum a_{ji}x_i^2$. This obviously leads to more and

[36] Also called “input-inverse” due to the fact that Leontief inverse represents only backward linkages.

more rounds of effects. In other words, the exogenous shock $f$ gives impact to input requirement of any increase in output, or the coefficient matrix $A$, for the first round as $Af$, the second round as $A^2f$, the third round as $A^3f$, and the $n$th round as $A^nf$, so that the total impact is

(4.12) $(I + A + A^2 + \dots + A^n) f$, which

(4.13) $I + A + A^2 + \dots + A^n = (I - A)^{-1}$.

Thus, sectoral outputs keep rising as a result of the higher intermediate-goods demand each round of effects generates. However, in each round output increases become smaller and smaller such that their total always has a limit. Therefore, $(I - A)^{-1}$ is a multiplier which can be used to calculate overall changes in sectoral outputs which result from changes in final demands.

With the inverse matrix $(I\text{-}A)^{-1}$ it is possible to unravel the technological interdependence of the productive system and to trace the generation of output demand from final assumption which is part of final demands throughout the system. It is then possible to calculate what output levels would be required to meet various postulated levels of net final demand and consequently how output levels would be required to change to meet postulated changes in net final demand.

In chain reactions in input-output analysis, the first exogenous shock is assumed to be initiated by an exogenous increase in final demands, like an increase in export demand, or an increase in fixed capital formation. This assumption is made mainly for the sake of simplicity of exposition. Actually, the first shock can happen anywhere. It can be an increase in domestic production of intermediate consumption to replace imports, an increase in indirect taxes, a change in technology represented by changes in input structures, etc (United Nations 1999: 8).

**4.2.1.3 Competitive- and Noncompetitive-Import Type Input-Output Tables**

Typically, input-output data are presented with imports classified as either competitive, that is perfect substitutes, or as noncompetitive. If they are noncompetitive, then they are not grouped with domestic products but are viewed as a nonproduced input into a sector, analogous to labor and capital. Figures 4.3 and 4.4 present features of competitive-import type and noncompetitive-import type input-output tables, respectively.

**Figure 4.3—Competitive-Import Type Input-Output Table**

| | | | | |
|---|---|---|---|---|
| ***A*** | ***F*** | ***E*** | ***-M*** | ***X*** |
| ***VA*** | | | | |
| ***X*** | | | | |

From a material balance equation:

(4.14) $X = A + F + E - M$

where

$X$ = gross output vector

$A$ = input coefficient matrix of domestic and import transaction

$F$ = vectors of final demands of domestic and import transactions which includes private consumption (PVC), government consumption (GC), gross fixed capital formation (FK), and increase in stock (ST)

$E$ = export demand vector

$M$ = vector of total import of intermediate use and final use

$VA$ = vectors of value-added which includes wage and salary (W), operating surplus (OS), depreciation (DP), and indirect tax less subsidy (TAX).

In the competitive-import type input-output table, imports of commodity $i$, $M_i$, are demanded for intermediate use ($Am_i$) and for final use ($Fm_i$). In Equation 4.14, they appear in the total import supply ($M$) and as part of both intermediate ($A$) and final demand ($F$). Let $u_i^{\ a}$ and $u_i^{\ f}$ stand for the domestic supply ratios (the proportion of intermediate and of final demand produced domestically). Substituting these ratios in equation 4.14, we obtain the material balance equation for domestic production:

(4.15) $X_i = u_i^{\ a} \sum_j a_{ij} X_j + u_i^{\ f} F_i + E_i$

and similarly for imports:

(4.16) $M_i = m_i^{\ a} A_i + m_i^{\ f} F_i$

where the import coefficients are defined as $m_i = (1 - u_i)$ for both intermediate and final goods.

From Equations 4.15 and 4.16, it is important to note that, first, the formulation implicitly assumes that imports and domestic goods with the same sector classification are alternative sources of supply and are perfect substitutes in all uses. But for many intermediate and capital goods such an assumption might be incorrect. Second, exports are netted out of production in defining the domestic supply ratios. This is appropriate when there is no direct re-export of imports. Third, the domestic supply ratio for intermediate use, $u_i^{\ a}$, is assumed to be the same for all sectors using commodity $i$ as an input but to be different from the domestic supply ratio for final use, $u_i^{\ f}$ (Kubo, Robinson, and Syrquin 1986: 123).

Equation 4.15 and 4.16 can be conveniently restated in matrix notation as:

(4.17) $X = \hat{u}^a AX + \hat{u}^f F + E$

(4.18) $M = \hat{m}^a AX + \hat{m}^f F$

where ^ over a variable denotes a diagonal matrix.

From the information in Equations 4.17 and 4.18, we can distinguish imports from intermediate use and final use when using a competitive-import type input-output table by:

(4.19) $X = [I-(I-\hat{M})A]^{-1} \ [(I-\hat{M})F + E]$

where ^ over M denotes import matrix where the diagonal elements are import coefficients and other off-diagonal elements are all zero.

Equation 4.19 was used in the demand side decomposition of the factors of growth in Chapter II. The competitive-import type input-output tables will also be used in the key sector analysis in Section 4.2.2.

In some countries, including Thailand, the noncompetitive-import type input-output table is also available. With this type of table, a full import matrix is provided as shown in Figure 4.4.

**Figure 4.4—Noncompetitive-Import Type Input-Output Table**

| | | | |
|---|---|---|---|
| $A^d$ | $F^d$ | $E$ | $X$ |
| $A^m$ | $F^m$ | | $M$ |
| $VA$ | | | |
| $X$ | | | |

In the noncompetitive-import type input-output table, the A matrix, which represents the technology of interindustry relations, can be separated into a domestic component and an imported one as:

(4.20) $A = A^d + A^m$

where

$A^d$ = domestic input-output matrix

$A^m$ = import matrix of intermediate use

The final demand can also be separated into domestic and import components as:

(4.21) $F = F^d + F^m$

where

$F^d$ = vectors of final demands of domestic transaction

$F^m$ = vectors of final demands of import transaction

For the domestic material balances, $A^d$ is the relevant matrix to yield the domestic production needed to satisfy a specific level of domestic and export demand with a given technology, $A$, and import structure $A^m$. Therefore, the output balance equation used with a noncompetitive-import type input-output table is then written as:

(4.22) $X = (I - A^d)^{-1} F^d + E$

which is also called the production inducement equation.

Equation 4.22 from the noncompetitive-import type input-output table then has similar features as the SAM inverse matrix in equation 4.11. Equation 4.22 will be used in the multiplier effect analysis using input-output tables in Section 4.3.2 to compare the simulation results with the previous study of the SAM multiplier effect in Section 4.3.1.

There are 179 commodity and service sectors in each input-output table of Thailand. All commodity and sectoral flows in both competitive-import type and noncompetitive-import type input-output tables are recorded in Thai baht at producer price. The producer price of a good or services is the amount receivable by the producer minus tax payable and plus any subsidy receivable. From the raw data of the input-output of Thailand provided by the NESDB, the producer price is the purchaser price minus the transport cost, the wholesale trade, and the retail trade.

Examples of the competitive-import type and the noncompetitive-import type input-output tables of Thailand are shown in Appendix B and C, which are the aggregated 19-sector input-output tables of year 2000 used in our analysis. The full import matrix of year 2000 is shown is Appendix D.

### 4.2.1.4 Intersectoral Backward and Forward Linkages[37]

Intersectoral (interindustry) linkages have been studied since the late 1950s with the purpose of identifying 'key sectors' that are central for economic development. The traditional linkage literature initiated by Hirschman (1958) and Rasmussen (1956) was solely focused on demand and supply effects, searching for the industries that had the maximal effects on the total system through their demand and supply relations with other industries.

The linkage concept was first introduced in 1958 by Albert Hirschman. The notions of backward and forward linkages became widely applied in economic analyses of interdependence. A Hirschman linkage is at play when ongoing activities 'induce' agents to take up new activities. Backward linkage effects are related to derived demand, while forward linkage effects are related to output utilization (Hirschman 1958:100). The total linkage effect for an industry $i$ is defined as

(4.23) $TL = \sum_{j} x_i\, p_{ij}$

with $x_i$ being the net output of industry $i$, and $p_{ij}$ being the probability that each of the industries $j$ will be set up as a consequence of the establishment of industry $i$.

For backward linkages the probability can be interpreted as the ratio of annual inputs required from industry $i$, denoted as $y$, over the minimum economic size, in terms of annual productive capacity, of firms that would produce these outputs, $z$ (i.e. $p = y/z$) (Hirschman 1958: 101).

For forward linkages the probability is not easily defined since the size of the market for the industries that might be established as the consequence of forward linkages does not depend on their suppliers. The probability is related to the importance of the products of industry $i$ as inputs into the production of the output of the 'to-be-linked' industry. If these inputs are a very

[37] This section drawn heavily from Drejer (2003) and Diamond (1974)

small fraction of the industry's eventual output, then their domestic availability is not likely to be an important factor in calling forth that industry.

Hirschman's motivation behind the interest in linkages was related to the understanding of how economic systems evolve. A Hirschmanian system is in theory always developing as long as the linkage effects are at play, and thus this is a dynamic system. The existing industries provide the incentives and driving forces for the development or expansion of the system through their activities, or rather through the input demands as well as output production stemming from these activities. This implies that economic systems with a high degree of interrelatedness and strong causal linkage effects are more dynamic than systems with few causal linkages due to few incentive-driving activities in the existing industries. 'Authentic' Hirschman-linkages could in fact be perceived as induced innovations in term of 'new activities' (Schumpeter 1934) emerging as the consequence of the demand and supply effects of ongoing activities.

Due to the causal effect that influences, or rather creates, the set-up of an economic (input-output) system, linkages and interdependence cannot be used interchangeably in a Hirschman setting. The industry which shows the highest degree of interdependence could very well have been set up last, thus providing that maximum interdependence is quite compatible with complete absence of active (causal) linkage effects (Hirschman 1958: 105). However, even though this is a misuse of Hirschman's original concept, linkages have largely come to be perceived as interchangeable with interdependence as they can be expressed in an input-output table. It is in fact very likely that it is this misuse that has guaranteed the strong liveliness of the linkage concept, since the apparent intimate tie with input-output analysis provided a relation to a technical corpus of economic knowledge and made linkages operational. And Hirschman does actually propose that once a country has a fairly broad industrial base, where the expansion of a given industry leads primarily to the expansion of existing industries rather than the creation of new industries, the measurement of linkage effects on the basis of input-output tables has some meaning (Hirschman 1986b: 58-59).

A coincidence in time contributed to the association of linkages with input-output tables. Around the same time as Hirschman introduced the linkage concept, the Danish economist P. Nørregaard Rasmussen published his doctoral thesis on *Studies in Inter-Sectoral Relations* (1956/57), which introduced two input-output based linkage measures that became known as the "Rasmussen dispersion indices." The power of dispersion index, which has been widely applied as a measure of backward linkages, describes the relative extent to which an increase in final demand for the products of a given industry is dispersed throughout the total system of industries. The index is defined as:

$$(4.24)\ \sum_{i=1}^{n} U_{ij} = (1/n \sum_{i=1}^{n} B_{ij})/(1/n^2 \sum_{i=1}^{n} \sum_{j=1}^{n} B_{ij}),$$

where $n$ is the number of industries or sectors, and $\sum_{i=1}^{n} B_{ij}$ is the sum of the column elements in the Leontief inverse matrix, where $B = (I-(I-\hat{M})A)^{-1}$ for the competitive-import type input-output table, or $B = (I-A^d)^{-1}$ for the noncompetitive-import type input-output table, and $\sum_{i=1}^{n} \sum_{j=1}^{n} B_{ij}$ is the sum over all the elements of the Leontief inverse. The weighting introduced by $(1/n)/[(1/n^2)/(\sum_{i=1}^{n} \sum_{j=1}^{n} B_{ij})]$ normalizes the linkage measure in such a way that a linkage value above 1 for a given industry indicates that this industry draws more than average on the system of industries, i.e. the industry will hand over a relatively large share of the increase of final demand for its products to the system of industries in general. Likewise an industry with a linkage value below 1 draws less than average on the system. Because the average linkage value is 1, the sum of the linkage values is always equal to the number of industries in the system.

Rasmussen also presents an index describing the extent to which the system of industries draws upon a given industry - an index of the 'sensitivity of dispersion'. The sensitivity of dispersion index, which has been interpreted as a measure of forward linkages, expresses the increase in the production of industry *i*, driven by a unit increase in the final demand for all industries in the system. This index is defined as:

$$(4.25)\ \sum_{j=1}^{n} U_{ij} = (1/n\sum_{j=1}^{n} B_{ij})/(1/n^2\sum_{i=1}^{n}\sum_{j=1}^{n} B_{ij}),$$

$\sum_{j=1}^{n} B_{ij}$ is the sum of the row elements of the Leontief inverse, and is interpreted as the increase in output in industry *i* needed in order to cope with a unit increase in the final demand for the product of each industry. A key sector is defined as an industry with an index value above 1.

There are different practices concerning whether just one or both of the index values should be above 1 for any given industry before it is considered a key sector. In the present context a sector is defined as key if just one of the index values is above 1.

For simplicity, from now we denote $U_j$ (column elements) for backward linkage index, and $U_i$ (row elements) for forward linkage index.

$U_j$ and $U_i$ only regard the size of the linkages and disregard the distribution of these elements and possibility of extreme values. To have a greater degree of specialization and inter-industry integration, not only a high average impact on the economy should be favored but also a high degree of dispersion impact in order to avoid the possibility of picking extreme values of the size of the linkages. This is because an economy which focuses heavily on sectors which have high $U_j$ or $U_i$ may tend to have dual structure because such sectors or industries may draw heavily for their inputs on only a few sectors or industries, and in turn meet a large proportion of these sectors'demands. Therefore, the linkage indices must be weighted by a measure of their concentration among sectors. Rasmussen recognized that a sector could have relatively high values of $U_j$ and $U_i$ and yet be related only to a small proportion of the other sectors in the economy. For this reason he supplemented these two measures with a standard deviation coefficient[38] $\sum_{i=1}^{n} V_{ij}$ *and* $\sum_{j=1}^{n} V_{ij}$. These indices can be defined for matrix *B* by:

(4.26) $\sum_{i=1}^{n} V_{ij} = ((1/n\text{-}1) \sum_{i=1}^{n} (B_{ij}\text{-}1/n \sum_{i=1}^{n} B_{ij})^2)^{1/2} / (1/n \sum_{i=1}^{n} B_{ij})$, for backward linkage

(4.27) $\sum_{j=1}^{n} V_{ij} = ((1/n\text{-}1) \sum_{j=1}^{n} (B_{ij}\text{-}1/n \sum_{j=1}^{n} B_{ij})^2)^{1/2} / (1/n \sum_{j=1}^{n} B_{ij})$, for forward linkage

For simplicity, from now we denote $V_j$ (column elements) for backward linkage standard deviation, and $V_i$ (row elements) for forward linkage standard deviation.

Thus, $V_j$ may be interpreted as an index showing the extent to which any sector draws evenly on the system of sectors, and $V_i$ as an index showing the extent to which the system of sectors draws evenly on any one sector. The smaller these indices the more even is the spread of backward and forward linkages respectively.

However, many economists, pioneered by Ghosh (1958), Augustinovics (1970), and Jones (1976), question the use of row sum from the Leontief inverse as forward linkage effect, also whether the Rasmussen's dispersion index of forward linkage ($U_i$) and its variation index ($V_i$) derived from the Leontief inverse is proper as a measure of forward linkage indices. They argue that there is not much economic sense in exploring what happens to a sector if all sectors, no matter their size, are to expand their output by an identical unit increase. They find such an identical unit-increase an unlikely situation, and instead proposed to utilize the "output-inverse" matrix[39] in the calculation of the index, denoted here as:

(4.28) $W = (1\text{-}Z)^{-1}$

[38] Also called 'variation index.'

[39] Also called the "row coefficient model." Leontief's demand-side input-output model is then called "column coefficient model."

where $Z$ is the output coefficient matrix, also called the allocation coefficient matrix, which derived from

(4.29) $z_{ij} = x_{ij}/x_i$ or

(4.30) $x_{ij} = z_{ij}\, x_i$

where $x_i$ is the total demand or total output of row $i$. Thus, the matrices of output coefficients and input coefficients share the same diagonal since $X_i = X'_j$.

The output inverse element $w_{ij}$ of $W$ expresses the increase in output of the $j$th sector required to utilize the increased output brought about by a unit of primary input into the $i$th sector. In other words, if input from each and every sector in into the $i$th sector increases by one unit, then how much the output of the $j$th sector must increase to utilize the increase output of the $i$th sector. Therefore, the $i$th row sum of $W$ is the increase in total output of the system required to utilize the increased output from an initial unit of primary input into sector $i$.

Leontief inverse gives the effect of expansion on suppliers, while output inverse gives the impact on user sectors. The Leontief inverse matrix starts at the end of the production process, with an increase in final demand, and traces the effect backward through the system. The output inverse matrix starts at the beginning of the production process, with an increase in primary inputs, and traces the effect forward through the system. The modification of the forward linkage measure thus appears to be more in line with Hirschman's original idea behind a forward linkage: a linkage related to the output utilization.

Therefore, instead of following Rasmussen's forward linkage, strictly in using the Leontief-inverse in calculating forward linkages, the output-inverse has been used, drawing on the lessons from Jones (1976). Therefore, the forward linkage index and standard deviation is rewritten as:

(4.31) $\sum_{j=1}^{n} U_{ij} = (1/n \sum_{j=1}^{n} W_{ij})/(1/n^2 \sum_{i=1}^{n} \sum_{j=1}^{n} W_{ij})$, and

(4.32) $\sum_{j=1}^{n} V_{ij} = ((1/n\text{-}1) \sum_{j=1}^{n} (W_{ij}\text{-}1/n \sum_{j=1}^{n} W_{ij})^2)^{1/2} /(1/n \sum_{j=1}^{n} W_{ij})$.

However, from a policy perspective, the supply-side input-output models are not as interesting as the demand-side input-output models which can predict actual economic behavior better. However, it is plausible that under the economic principles there are two poles of a continuum, "demand determines output" and also "output determines demand." Therefore, it is good not only for policy makers to be aware which sector's output may be able to determine other sectors' demand, but also the more empirical studies in this area of supply-side input-output model can help further research on this issue which can be directly useful in policy and planning exercises.

In sum, backward and forward linkage dispersion indices ($U_j$ and $U_i$) and their standard deviations ($V_j$ and $V_i$) allow us to find the key sectors which give the highest backward and forward linkages both in terms of size and evenness.

### 4.2.2 The Key Sector Analysis

To conduct this analysis, Rasmussen's dispersion and variation indices (Equations 4.24 and 4.26) are used to find backward linkage effects based on the Leontief inverse (input-inverse). For the forward linkage effects, the concept of output-inverse developed by Ghosh (1958), Augustinovics (1970), Jones (1976), and elaborated by Miller and Blair (1985), and Bon (1988) is applied with Rasmussen's indices (Equation 4.31 and 4.32). The sectors then are ranked to find the key sectors. The Spearman rank order correlation coefficient method is used to find out correlations between indices.

After getting the values of $U_j$, $U_i$, $V_j$, and $V_i$, they are ranked, in descending order for $U_j$ and $U_i$ and in ascending order for $V_j$ and $V_i$ (relatively low standard deviation is good). The key sectors are those which rank highly both in backward and forward linkages. By taking the difference between $U_j$ and $V_j$, and $U_i$ and $V_i$, according to Diamond (1974), the ultimate key sectors can be obtained, which means sectors with high linkage indices and low standard deviation come first. The method is equivalent to giving equal weight to the size of the linkage index and its standard deviation.

Note that it is not necessary that the key sectors have to be the sectors which have values of ($U_j$-$V_j$) more than 1. This is because $U_j$ has to be subtracted by $V_j$, so that the value of ($U_j$-$V_j$) declines. The same applies to values of $U_i$-$V_i$.

To find the correlations between $U_j$ and $U_i$, and $V_j$ and $V_i$, and key sectors from forward and backward linkages, the Spearman rank order correlation coefficient ($R_s$) is used:

(4.33) $R_s = 1-[(6\sum D^2)/N(N^2-1)]$,

where $R_s > 0$ means the correlation occurs along the upward slant, with higher values of x ranking tending to be associated with higher values of y ranking, and vice versa.

In this key sector analysis of Thailand, seven input-output tables of Thailand are used (1975, 1980, 1985, 1990, 1995, 1998, and 2000) to see the trend over 25 years. The original 179-sector input-output tables of Thailand are aggregated into 19 sectors, which are paddy; other crops; livestock; agricultural service; forestry; fishing; mining; agro-industry; beverage and tobacco; textile and leather; wood, paper, rubber; agricultural machinery; other manufacturing; utilities; construction; trade; transport; services; and unclassified. Note that the unclassified sector is not accounted for in any case.

Both competitive-import type and noncompetitive-import type input-output tables are used to conduct this analysis for the results comparison. Again, competitive-import type input-output tables are those which have import values included in the input coefficient matrix and the final demand. When using the competitive-import type input-output tables, we do not differentiate the linkage effects caused by the domestically produced intermediate inputs from effects caused by the use of imported inputs. The use of noncompetitive-import type input-output tables can give us a clearer picture of the real potential of each sector in terms of the production sustainability and self-sufficient ability. Therefore, in this case, results from the noncompetitive-import type input-output tables should be honored.

### 4.2.3 Results of the Key Sector Analysis

Since we cannot select the key sectors from the indices valued over 1 because $U_j$ has to be subtracted by $V_j$, so that the value of ($U_j$-$V_j$) declines (same as $U_i$-$V_i$), we then pick the sectors which ranked in the top five as our key sectors.

Results from the noncompetitive-import type input-output tables ($U_j$-$V_j$) (Table 4.6) show that backward linkage's key sectors are livestock; agro-industry; construction; wood, paper, rubber; transport; agricultural machinery; and utilities.[40] The results have not changed much over 25 years, suggesting the continuity of importance of livestock and agro-industry in the Thai economy. Results from the competitive-import type input-output tables (Table 4.7) when looking at $U_j$ and $V_j$ separately, the rankings are much different from those of the noncompetitive-import type input-output tables. However, when the rankings are derived from taking the difference between $U_j$ and $V_j$, it confirms the importance of livestock, and agricultural industry's backward linkages, though construction and agricultural machinery ranked higher. Therefore, we can be comfortable with the compatible results of using competitive-import type or noncompetitive-import type input-output tables which show small sensitivity of including or

[40] The numbers of key sectors are more than five here since the rankings are different in various years.

excluding import inputs from the intermediate inputs. Although, the use of the noncompetitive-import type input-output tables can give the results more precisely under an economy which is highly import dependent like Thailand. A high backward linkage means that an increase in the final demand of any of these sectors' output will have a large impact on sectors or industries that supply inputs in the production of these sectors' output.

For the forward linkage key sectors, the $U_i$-$V_i$ of forward linkage rank agricultural service, and agricultural machinery the highest, followed by mining, forestry, utilities, and paddy for the noncompetitive-import type input-output tables (Table 4.6). The key sectors remain the same for competitive-import type input-output tables (Table 4.7), but the highest changed to mining, and forestry, followed by agricultural service, and agricultural machinery. The rankings also remain quite similar over 25 years. A high forward linkage means that a unit increase in the input from each and every sector into these sectors would make outputs of other sectors increase by a large amount in order to utilize the increased output from these sectors. In other words, a high forward linkage of agricultural service means that this sector induces a large increase in total output of the system required to utilize the increased output from agricultural service when it receives an initial unit of primary input.

As stated before, the backward and forward linkages are two poles of a continuum, "demand determines output" and also "output determines demand." The Leontief inverse gives the effect of expansion on suppliers, while output inverse gives the impact on user sectors. The Leontief inverse matrix starts at the end of the production process, with an increase in final demand, and traces the effect backward through the system. The output inverse matrix starts at the beginning of the production process, with an increase in primary inputs, and traces the effect forward through the system. Therefore, it is good for policy makers to be aware which sector's output may be able to determine other sectors' demand from their forward linkage effect.

The Spearman rank order correlation is only conducted on results from the noncompetitive-import type input-output tables since the ranking results are quite similar from both types of input-output tables. There are positive correlations between $U_j$ and $V_j$ (0.55 on average) and between $U_i$ and $V_i$ (0.65), as shown in Table 4.8, suggesting that more than fifty percent of sectors which ranked high for their size of the linkage index are associated with sectors which ranked high for their evenness of the linkage index. However, there are either negative correlations or very small positive correlations between the higher ranks of backward linkages and the higher ranks of forward linkages (-0.33 for $U_j$ and $U_i$ (size), 0.03 for $V_j$ and $V_i$ (evenness), and -0.31 for $U_j$-$V_j$ and $U_i$-$V_i$ (difference)), which means sectors with strong backward linkages tend to have weak forward linkages, and vice versa.

In summary, this analysis shows the importance of the agricultural-related sectors as many of them ranked higher than the non-agricultural sectors. This means investing more in these sectors will help to stimulate the economy better through the backward and forward linkage effects. Compared to the manufacturing industrial sector, agro-industry and livestock sectors in Thailand have higher potential to increase domestic production through backward linkage effects. And agricultural service and agricultural machinery have high potential to increase other sectors' demand on their increased outputs through forward linkage effects. The results confirm that the growth of the Thai economy lies in the potential of the country's agricultural-related sectors, especially high value-added agricultural sectors (like livestock), and agro-industrial sectors. Now, with the key sectors listed, it may become easier for the government to set its economic policies and plans to promote the best interindustry integration. Moreover, the results help to support the argument that the Thai agricultural-related sectors have long been engines of economic growth as they may have boosted the economy through their high linkage effects.

## Table 4.6—Noncompetitive-Import Type Backward and Forward Linkage Indices, 1975-2000

| 1975 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | | 1980 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.60 | 19 | 0.20 | 19 | 1.41 | 4 | 1.55 | 19 | 0.23 | 4 | 1.29 | 1 | 19 | 1.61 | 13 | 0.19 | 19 | 1.41 | 4 | 1.64 | 14 | 0.24 | 4 | 1.38 |
| 2 | 8 | 1.27 | 15 | 0.29 | 8 | 0.95 | 12 | 1.45 | 4 | 0.26 | 12 | 1.19 | 2 | 8 | 1.30 | 15 | 0.28 | 8 | 1.00 | 7 | 1.35 | 4 | 0.26 | 14 | 1.05 |
| 3 | 3 | 1.23 | 3 | 0.30 | 3 | 0.93 | 7 | 1.27 | 14 | 0.26 | 7 | 0.99 | 3 | 10 | 1.26 | 8 | 0.30 | 3 | 0.89 | 14 | 1.29 | 19 | 0.29 | 7 | 1.03 |
| 4 | 10 | 1.21 | 8 | 0.31 | 15 | 0.85 | 1 | 1.24 | 12 | 0.27 | 19 | 0.98 | 4 | 3 | 1.19 | 3 | 0.30 | 15 | 0.87 | 1 | 1.28 | 12 | 0.31 | 1 | 0.86 |
| 5 | 14 | 1.14 | 17 | 0.34 | 14 | 0.79 | 19 | 1.21 | 7 | 0.28 | 14 | 0.91 | 5 | 15 | 1.15 | 6 | 0.33 | 11 | 0.72 | 12 | 1.13 | 7 | 0.32 | 12 | 0.82 |
| 6 | 15 | 1.13 | 11 | 0.35 | 11 | 0.75 | 14 | 1.17 | 5 | 0.31 | 1 | 0.81 | 6 | 11 | 1.09 | 17 | 0.34 | 17 | 0.71 | 5 | 1.08 | 5 | 0.32 | 5 | 0.76 |
| 7 | 11 | 1.10 | 14 | 0.35 | 17 | 0.70 | 5 | 1.05 | 16 | 0.33 | 5 | 0.74 | 7 | 17 | 1.05 | 12 | 0.36 | 12 | 0.69 | 10 | 1.02 | 16 | 0.32 | 19 | 0.65 |
| 8 | 17 | 1.04 | 9 | 0.36 | 12 | 0.66 | 13 | 1.04 | 11 | 0.34 | 13 | 0.69 | 8 | 12 | 1.05 | 4 | 0.36 | 6 | 0.65 | 3 | 1.01 | 2 | 0.32 | 11 | 0.63 |
| 9 | 12 | 1.03 | 4 | 0.36 | 10 | 0.60 | 10 | 0.99 | 2 | 0.35 | 11 | 0.63 | 9 | 6 | 0.98 | 11 | 0.37 | 10 | 0.63 | 11 | 0.99 | 11 | 0.36 | 2 | 0.63 |
| 10 | 13 | 0.95 | 6 | 0.37 | 9 | 0.57 | 3 | 0.99 | 13 | 0.36 | 3 | 0.60 | 10 | 13 | 0.95 | 9 | 0.37 | 9 | 0.56 | 13 | 0.97 | 17 | 0.37 | 3 | 0.62 |
| 11 | 9 | 0.93 | 12 | 0.37 | 18 | 0.50 | 11 | 0.97 | 17 | 0.36 | 16 | 0.50 | 11 | 9 | 0.94 | 18 | 0.38 | 13 | 0.50 | 2 | 0.95 | 6 | 0.37 | 13 | 0.59 |
| 12 | 18 | 0.88 | 18 | 0.38 | 4 | 0.50 | 2 | 0.85 | 6 | 0.37 | 2 | 0.50 | 12 | 18 | 0.88 | 14 | 0.39 | 4 | 0.50 | 19 | 0.94 | 13 | 0.38 | 16 | 0.56 |
| 13 | 4 | 0.86 | 7 | 0.40 | 13 | 0.49 | 16 | 0.83 | 3 | 0.39 | 17 | 0.46 | 13 | 14 | 0.88 | 7 | 0.42 | 18 | 0.50 | 16 | 0.88 | 3 | 0.40 | 17 | 0.45 |
| 14 | 6 | 0.85 | 16 | 0.41 | 6 | 0.48 | 17 | 0.82 | 9 | 0.42 | 6 | 0.42 | 14 | 4 | 0.87 | 16 | 0.42 | 14 | 0.49 | 17 | 0.82 | 18 | 0.41 | 6 | 0.44 |
| 15 | 16 | 0.79 | 2 | 0.44 | 16 | 0.38 | 6 | 0.79 | 18 | 0.42 | 10 | 0.33 | 15 | 16 | 0.78 | 2 | 0.43 | 16 | 0.36 | 6 | 0.81 | 9 | 0.42 | 9 | 0.37 |
| 16 | 7 | 0.77 | 1 | 0.45 | 7 | 0.37 | 9 | 0.73 | 1 | 0.43 | 9 | 0.32 | 16 | 2 | 0.77 | 1 | 0.44 | 2 | 0.33 | 9 | 0.78 | 1 | 0.42 | 10 | 0.33 |
| 17 | 2 | 0.75 | 13 | 0.46 | 2 | 0.31 | 8 | 0.71 | 15 | 0.45 | 18 | 0.29 | 17 | 1 | 0.76 | 13 | 0.45 | 7 | 0.33 | 18 | 0.73 | 8 | 0.47 | 18 | 0.31 |
| 18 | 1 | 0.73 | 5 | 0.47 | 1 | 0.28 | 18 | 0.71 | 8 | 0.46 | 8 | 0.25 | 18 | 7 | 0.75 | 5 | 0.46 | 1 | 0.32 | 8 | 0.72 | 15 | 0.48 | 8 | 0.25 |
| 19 | 5 | 0.73 | 10 | 0.62 | 5 | 0.26 | 15 | 0.62 | 10 | 0.66 | 15 | 0.17 | 19 | 5 | 0.75 | 10 | 0.63 | 5 | 0.29 | 15 | 0.59 | 10 | 0.69 | 15 | 0.11 |

<u>List of Sectors</u>

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.6— Noncompetitive-Import Type Backward and Forward Linkage Indices, 1975-2000 (cont.)

| 1985 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.58 | 19 | 0.19 | 19 | 1.39 | 4 | 1.68 | 12 | 0.26 | 4 | 1.42 |
| 2 | 8 | 1.28 | 3 | 0.29 | 8 | 0.98 | 7 | 1.45 | 4 | 0.26 | 7 | 1.16 |
| 3 | 3 | 1.26 | 15 | 0.29 | 3 | 0.97 | 1 | 1.35 | 7 | 0.29 | 14 | 0.99 |
| 4 | 10 | 1.18 | 8 | 0.30 | 15 | 0.84 | 14 | 1.32 | 5 | 0.30 | 12 | 0.94 |
| 5 | 15 | 1.13 | 6 | 0.31 | 11 | 0.73 | 12 | 1.20 | 2 | 0.31 | 1 | 0.90 |
| 6 | 14 | 1.09 | 12 | 0.34 | 6 | 0.70 | 3 | 1.18 | 16 | 0.32 | 3 | 0.77 |
| 7 | 11 | 1.07 | 11 | 0.34 | 14 | 0.64 | 2 | 1.02 | 14 | 0.32 | 2 | 0.71 |
| 8 | 6 | 1.01 | 17 | 0.35 | 12 | 0.61 | 5 | 1.01 | 6 | 0.35 | 5 | 0.71 |
| 9 | 12 | 0.96 | 4 | 0.36 | 17 | 0.61 | 13 | 1.00 | 11 | 0.35 | 13 | 0.63 |
| 10 | 17 | 0.95 | 9 | 0.37 | 10 | 0.57 | 11 | 0.94 | 17 | 0.36 | 11 | 0.59 |
| 11 | 13 | 0.94 | 18 | 0.38 | 9 | 0.50 | 10 | 0.94 | 13 | 0.37 | 6 | 0.54 |
| 12 | 18 | 0.87 | 16 | 0.39 | 18 | 0.50 | 6 | 0.89 | 18 | 0.40 | 16 | 0.53 |
| 13 | 9 | 0.86 | 2 | 0.40 | 13 | 0.49 | 16 | 0.85 | 9 | 0.40 | 17 | 0.44 |
| 14 | 7 | 0.85 | 5 | 0.44 | 4 | 0.48 | 17 | 0.80 | 3 | 0.42 | 18 | 0.33 |
| 15 | 4 | 0.85 | 1 | 0.44 | 16 | 0.40 | 8 | 0.76 | 1 | 0.45 | 9 | 0.32 |
| 16 | 2 | 0.80 | 14 | 0.45 | 2 | 0.40 | 18 | 0.73 | 8 | 0.46 | 8 | 0.30 |
| 17 | 16 | 0.79 | 13 | 0.45 | 7 | 0.39 | 9 | 0.72 | 15 | 0.47 | 10 | 0.26 |
| 18 | 5 | 0.77 | 7 | 0.47 | 5 | 0.33 | 15 | 0.58 | 19 | 0.48 | 15 | 0.10 |
| 19 | 1 | 0.75 | 10 | 0.60 | 1 | 0.32 | 19 | 0.57 | 10 | 0.68 | 19 | 0.09 |

| 1990 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.41 | 19 | 0.24 | 19 | 1.17 | 4 | 1.61 | 5 | 0.23 | 4 | 1.35 |
| 2 | 3 | 1.29 | 3 | 0.29 | 3 | 1.00 | 12 | 1.42 | 12 | 0.23 | 12 | 1.19 |
| 3 | 8 | 1.29 | 15 | 0.31 | 8 | 0.98 | 7 | 1.40 | 7 | 0.24 | 7 | 1.16 |
| 4 | 10 | 1.18 | 8 | 0.32 | 15 | 0.75 | 1 | 1.32 | 4 | 0.26 | 5 | 1.03 |
| 5 | 14 | 1.16 | 12 | 0.33 | 14 | 0.71 | 14 | 1.27 | 2 | 0.30 | 14 | 0.93 |
| 6 | 11 | 1.08 | 7 | 0.36 | 11 | 0.71 | 5 | 1.26 | 16 | 0.32 | 1 | 0.90 |
| 7 | 15 | 1.06 | 6 | 0.36 | 12 | 0.64 | 3 | 1.11 | 6 | 0.32 | 3 | 0.71 |
| 8 | 17 | 0.98 | 4 | 0.37 | 10 | 0.63 | 2 | 0.99 | 14 | 0.34 | 2 | 0.69 |
| 9 | 12 | 0.98 | 11 | 0.37 | 17 | 0.60 | 6 | 0.95 | 19 | 0.36 | 6 | 0.63 |
| 10 | 13 | 0.92 | 9 | 0.37 | 6 | 0.54 | 11 | 0.87 | 17 | 0.37 | 16 | 0.50 |
| 11 | 18 | 0.92 | 17 | 0.38 | 7 | 0.54 | 10 | 0.83 | 11 | 0.38 | 11 | 0.49 |
| 12 | 9 | 0.90 | 16 | 0.39 | 9 | 0.53 | 16 | 0.82 | 9 | 0.39 | 17 | 0.45 |
| 13 | 6 | 0.90 | 18 | 0.40 | 18 | 0.52 | 13 | 0.82 | 18 | 0.39 | 13 | 0.39 |
| 14 | 7 | 0.89 | 2 | 0.42 | 4 | 0.50 | 17 | 0.82 | 3 | 0.40 | 19 | 0.37 |
| 15 | 4 | 0.87 | 1 | 0.44 | 13 | 0.46 | 8 | 0.78 | 1 | 0.42 | 18 | 0.36 |
| 16 | 16 | 0.83 | 14 | 0.45 | 16 | 0.44 | 18 | 0.76 | 13 | 0.42 | 9 | 0.35 |
| 17 | 2 | 0.81 | 5 | 0.45 | 2 | 0.39 | 9 | 0.74 | 8 | 0.44 | 8 | 0.33 |
| 18 | 1 | 0.78 | 13 | 0.46 | 1 | 0.33 | 19 | 0.72 | 15 | 0.49 | 10 | 0.18 |
| 19 | 5 | 0.75 | 10 | 0.55 | 5 | 0.30 | 15 | 0.54 | 10 | 0.65 | 15 | 0.05 |

List of Sectors

Sector 1 = Paddy
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Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.6— Noncompetitive-Import Type Backward and Forward Linkage Indices, 1975-2000 (cont.)

| 1995 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.49 | 19 | 0.21 | 19 | 1.28 | 12 | 1.63 | 12 | 0.21 | 12 | 1.42 |
| 2 | 3 | 1.32 | 3 | 0.29 | 3 | 1.03 | 4 | 1.63 | 4 | 0.24 | 4 | 1.38 |
| 3 | 8 | 1.30 | 15 | 0.31 | 8 | 0.99 | 7 | 1.38 | 7 | 0.24 | 7 | 1.14 |
| 4 | 10 | 1.16 | 8 | 0.31 | 15 | 0.74 | 1 | 1.31 | 5 | 0.26 | 1 | 0.90 |
| 5 | 14 | 1.07 | 12 | 0.32 | 11 | 0.69 | 3 | 1.17 | 2 | 0.29 | 14 | 0.87 |
| 6 | 11 | 1.05 | 6 | 0.35 | 12 | 0.68 | 14 | 1.17 | 14 | 0.30 | 5 | 0.84 |
| 7 | 15 | 1.05 | 7 | 0.36 | 14 | 0.67 | 5 | 1.10 | 16 | 0.32 | 3 | 0.77 |
| 8 | 12 | 1.00 | 11 | 0.37 | 10 | 0.63 | 6 | 1.03 | 6 | 0.33 | 2 | 0.71 |
| 9 | 17 | 0.98 | 4 | 0.37 | 17 | 0.61 | 2 | 1.00 | 11 | 0.36 | 6 | 0.70 |
| 10 | 13 | 0.91 | 17 | 0.38 | 6 | 0.56 | 11 | 0.87 | 17 | 0.37 | 11 | 0.51 |
| 11 | 18 | 0.91 | 9 | 0.38 | 7 | 0.55 | 17 | 0.81 | 19 | 0.37 | 16 | 0.49 |
| 12 | 6 | 0.91 | 16 | 0.39 | 9 | 0.53 | 16 | 0.81 | 18 | 0.38 | 17 | 0.45 |
| 13 | 9 | 0.91 | 14 | 0.40 | 18 | 0.50 | 18 | 0.80 | 9 | 0.40 | 18 | 0.42 |
| 14 | 7 | 0.90 | 18 | 0.41 | 4 | 0.50 | 10 | 0.79 | 3 | 0.40 | 8 | 0.35 |
| 15 | 4 | 0.86 | 2 | 0.42 | 16 | 0.45 | 8 | 0.78 | 1 | 0.42 | 9 | 0.33 |
| 16 | 16 | 0.84 | 5 | 0.43 | 13 | 0.45 | 13 | 0.78 | 8 | 0.44 | 13 | 0.32 |
| 17 | 2 | 0.79 | 1 | 0.44 | 2 | 0.37 | 9 | 0.73 | 13 | 0.45 | 19 | 0.31 |
| 18 | 1 | 0.77 | 13 | 0.47 | 5 | 0.34 | 19 | 0.68 | 15 | 0.49 | 10 | 0.15 |
| 19 | 5 | 0.77 | 10 | 0.53 | 1 | 0.33 | 15 | 0.53 | 10 | 0.65 | 15 | 0.04 |

| 1998 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 3 | 1.30 | 19 | 0.24 | 3 | 1.02 | 12 | 1.97 | 12 | 0.25 | 12 | 1.73 |
| 2 | 8 | 1.26 | 3 | 0.28 | 19 | 0.97 | 4 | 1.59 | 7 | 0.25 | 4 | 1.33 |
| 3 | 19 | 1.22 | 15 | 0.29 | 8 | 0.96 | 7 | 1.34 | 4 | 0.26 | 7 | 1.09 |
| 4 | 14 | 1.17 | 8 | 0.31 | 15 | 0.78 | 1 | 1.24 | 19 | 0.27 | 5 | 0.90 |
| 5 | 10 | 1.13 | 6 | 0.34 | 14 | 0.77 | 5 | 1.17 | 5 | 0.27 | 1 | 0.80 |
| 6 | 17 | 1.10 | 4 | 0.35 | 17 | 0.75 | 14 | 1.12 | 2 | 0.30 | 14 | 0.79 |
| 7 | 12 | 1.09 | 17 | 0.35 | 12 | 0.72 | 3 | 1.06 | 16 | 0.32 | 3 | 0.66 |
| 8 | 15 | 1.08 | 7 | 0.36 | 11 | 0.68 | 6 | 0.99 | 14 | 0.33 | 2 | 0.65 |
| 9 | 11 | 1.05 | 12 | 0.37 | 10 | 0.61 | 2 | 0.96 | 6 | 0.34 | 6 | 0.65 |
| 10 | 6 | 0.94 | 9 | 0.37 | 6 | 0.60 | 19 | 0.91 | 11 | 0.37 | 19 | 0.64 |
| 11 | 13 | 0.92 | 11 | 0.37 | 4 | 0.55 | 11 | 0.87 | 17 | 0.38 | 11 | 0.51 |
| 12 | 9 | 0.91 | 16 | 0.38 | 9 | 0.54 | 13 | 0.81 | 18 | 0.38 | 16 | 0.46 |
| 13 | 18 | 0.90 | 18 | 0.39 | 7 | 0.52 | 17 | 0.80 | 3 | 0.40 | 17 | 0.42 |
| 14 | 4 | 0.90 | 14 | 0.40 | 18 | 0.51 | 16 | 0.78 | 9 | 0.42 | 18 | 0.37 |
| 15 | 7 | 0.88 | 2 | 0.41 | 16 | 0.44 | 10 | 0.76 | 1 | 0.44 | 13 | 0.36 |
| 16 | 16 | 0.82 | 5 | 0.42 | 13 | 0.43 | 18 | 0.75 | 13 | 0.45 | 8 | 0.26 |
| 17 | 2 | 0.80 | 1 | 0.43 | 2 | 0.39 | 8 | 0.71 | 8 | 0.45 | 9 | 0.25 |
| 18 | 1 | 0.78 | 13 | 0.49 | 1 | 0.35 | 9 | 0.67 | 15 | 0.49 | 10 | 0.12 |
| 19 | 5 | 0.75 | 10 | 0.52 | 5 | 0.33 | 15 | 0.51 | 10 | 0.64 | 15 | 0.02 |

List of Sectors

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.6— Noncompetitive-Import Type Backward and Forward Linkage Indices, 1975-2000 (cont.)

| 2000 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 8 | 1.28 | 19 | 0.25 | 19 | 0.98 | 12 | 2.17 | 5 | 0.24 | 12 | 1.93 |
| 2 | 3 | 1.25 | 15 | 0.29 | 3 | 0.95 | 4 | 1.56 | 12 | 0.24 | 4 | 1.31 |
| 3 | 19 | 1.23 | 3 | 0.30 | 8 | 0.95 | 7 | 1.32 | 4 | 0.25 | 7 | 1.07 |
| 4 | 10 | 1.16 | 6 | 0.32 | 17 | 0.81 | 5 | 1.29 | 17 | 0.26 | 5 | 1.06 |
| 5 | 17 | 1.16 | 8 | 0.33 | 15 | 0.81 | 1 | 1.25 | 2 | 0.29 | 1 | 0.79 |
| 6 | 15 | 1.10 | 4 | 0.35 | 6 | 0.70 | 3 | 1.08 | 19 | 0.29 | 14 | 0.73 |
| 7 | 14 | 1.07 | 17 | 0.35 | 12 | 0.68 | 14 | 1.07 | 16 | 0.32 | 2 | 0.70 |
| 8 | 12 | 1.05 | 7 | 0.36 | 10 | 0.67 | 6 | 1.05 | 14 | 0.34 | 6 | 0.69 |
| 9 | 6 | 1.02 | 12 | 0.37 | 14 | 0.64 | 2 | 0.98 | 6 | 0.35 | 3 | 0.67 |
| 10 | 11 | 1.00 | 11 | 0.37 | 11 | 0.63 | 19 | 0.84 | 11 | 0.36 | 19 | 0.55 |
| 11 | 18 | 0.93 | 18 | 0.37 | 4 | 0.56 | 11 | 0.81 | 17 | 0.39 | 11 | 0.45 |
| 12 | 4 | 0.91 | 9 | 0.38 | 18 | 0.55 | 17 | 0.78 | 18 | 0.39 | 16 | 0.45 |
| 13 | 9 | 0.90 | 2 | 0.39 | 7 | 0.52 | 16 | 0.77 | 3 | 0.41 | 17 | 0.39 |
| 14 | 7 | 0.89 | 16 | 0.40 | 9 | 0.51 | 13 | 0.72 | 9 | 0.42 | 18 | 0.30 |
| 15 | 13 | 0.87 | 1 | 0.41 | 2 | 0.46 | 10 | 0.72 | 13 | 0.44 | 13 | 0.28 |
| 16 | 2 | 0.84 | 5 | 0.42 | 13 | 0.41 | 8 | 0.71 | 1 | 0.46 | 9 | 0.26 |
| 17 | 16 | 0.79 | 14 | 0.43 | 16 | 0.40 | 18 | 0.69 | 8 | 0.48 | 8 | 0.23 |
| 18 | 1 | 0.79 | 13 | 0.47 | 1 | 0.37 | 9 | 0.67 | 15 | 0.49 | 10 | 0.10 |
| 19 | 5 | 0.76 | 10 | 0.49 | 5 | 0.34 | 15 | 0.49 | 10 | 0.62 | 15 | 0.00 |

Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

List of Sectors

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.7—Competitive-Import Type Backward and Forward Linkage Indices, 1975-2000

| 1975 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.56 | 19 | 0.18 | 19 | 1.38 | 7 | 3.40 | 19 | 0.19 | 7 | 2.64 |
| 2 | 10 | 1.32 | 15 | 0.27 | 15 | 0.95 | 19 | 1.28 | 14 | 0.24 | 19 | 1.10 |
| 3 | 12 | 1.27 | 3 | 0.29 | 12 | 0.95 | 4 | 1.27 | 4 | 0.25 | 4 | 1.02 |
| 4 | 15 | 1.22 | 8 | 0.30 | 14 | 0.86 | 12 | 1.24 | 12 | 0.27 | 12 | 0.97 |
| 5 | 13 | 1.20 | 17 | 0.31 | 8 | 0.85 | 13 | 1.23 | 5 | 0.29 | 13 | 0.85 |
| 6 | 14 | 1.19 | 12 | 0.32 | 3 | 0.81 | 14 | 1.04 | 16 | 0.32 | 14 | 0.80 |
| 7 | 8 | 1.15 | 14 | 0.33 | 11 | 0.77 | 1 | 1.00 | 2 | 0.32 | 5 | 0.62 |
| 8 | 11 | 1.10 | 11 | 0.33 | 10 | 0.75 | 5 | 0.91 | 11 | 0.33 | 11 | 0.57 |
| 9 | 3 | 1.10 | 4 | 0.33 | 17 | 0.72 | 11 | 0.90 | 17 | 0.34 | 1 | 0.57 |
| 10 | 17 | 1.03 | 6 | 0.34 | 13 | 0.70 | 10 | 0.88 | 6 | 0.36 | 3 | 0.41 |
| 11 | 9 | 0.94 | 18 | 0.35 | 9 | 0.57 | 3 | 0.80 | 3 | 0.39 | 2 | 0.41 |
| 12 | 18 | 0.84 | 9 | 0.37 | 18 | 0.49 | 2 | 0.73 | 13 | 0.39 | 16 | 0.38 |
| 13 | 4 | 0.82 | 7 | 0.39 | 4 | 0.48 | 16 | 0.70 | 18 | 0.41 | 17 | 0.34 |
| 14 | 6 | 0.78 | 16 | 0.39 | 6 | 0.44 | 17 | 0.69 | 1 | 0.43 | 6 | 0.27 |
| 15 | 7 | 0.73 | 2 | 0.41 | 7 | 0.34 | 9 | 0.64 | 15 | 0.44 | 9 | 0.19 |
| 16 | 16 | 0.72 | 1 | 0.42 | 16 | 0.33 | 6 | 0.63 | 9 | 0.45 | 10 | 0.19 |
| 17 | 2 | 0.70 | 5 | 0.45 | 2 | 0.29 | 18 | 0.58 | 8 | 0.46 | 18 | 0.18 |
| 18 | 1 | 0.68 | 13 | 0.51 | 1 | 0.26 | 8 | 0.58 | 10 | 0.68 | 8 | 0.12 |
| 19 | 5 | 0.65 | 10 | 0.57 | 5 | 0.20 | 15 | 0.50 | 7 | 0.76 | 15 | 0.06 |

| 1980 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.54 | 19 | 0.18 | 19 | 1.37 | 7 | 3.49 | 19 | 0.18 | 7 | 2.56 |
| 2 | 10 | 1.31 | 15 | 0.26 | 15 | 0.96 | 19 | 1.97 | 14 | 0.23 | 19 | 1.79 |
| 3 | 14 | 1.25 | 8 | 0.28 | 12 | 0.94 | 4 | 1.25 | 4 | 0.24 | 4 | 1.00 |
| 4 | 12 | 1.25 | 3 | 0.28 | 14 | 0.92 | 13 | 1.13 | 5 | 0.29 | 14 | 0.87 |
| 5 | 15 | 1.22 | 6 | 0.30 | 8 | 0.87 | 14 | 1.09 | 2 | 0.30 | 13 | 0.73 |
| 6 | 13 | 1.19 | 17 | 0.30 | 17 | 0.82 | 1 | 0.97 | 16 | 0.30 | 5 | 0.60 |
| 7 | 8 | 1.15 | 12 | 0.31 | 10 | 0.76 | 5 | 0.90 | 12 | 0.31 | 12 | 0.58 |
| 8 | 17 | 1.12 | 4 | 0.33 | 3 | 0.76 | 12 | 0.88 | 11 | 0.34 | 1 | 0.56 |
| 9 | 11 | 1.08 | 14 | 0.33 | 11 | 0.74 | 11 | 0.88 | 17 | 0.35 | 11 | 0.54 |
| 10 | 3 | 1.04 | 11 | 0.34 | 13 | 0.69 | 10 | 0.82 | 6 | 0.37 | 2 | 0.47 |
| 11 | 9 | 0.93 | 18 | 0.34 | 6 | 0.60 | 2 | 0.76 | 3 | 0.39 | 16 | 0.38 |
| 12 | 6 | 0.90 | 9 | 0.37 | 9 | 0.56 | 3 | 0.75 | 8 | 0.40 | 3 | 0.36 |
| 13 | 18 | 0.82 | 16 | 0.39 | 18 | 0.47 | 16 | 0.69 | 13 | 0.40 | 17 | 0.30 |
| 14 | 4 | 0.79 | 2 | 0.39 | 4 | 0.46 | 17 | 0.64 | 1 | 0.41 | 6 | 0.23 |
| 15 | 7 | 0.69 | 7 | 0.40 | 16 | 0.30 | 9 | 0.64 | 9 | 0.44 | 9 | 0.19 |
| 16 | 2 | 0.69 | 1 | 0.40 | 2 | 0.30 | 6 | 0.60 | 8 | 0.46 | 18 | 0.16 |
| 17 | 16 | 0.69 | 5 | 0.43 | 7 | 0.30 | 18 | 0.56 | 15 | 0.47 | 10 | 0.12 |
| 18 | 1 | 0.69 | 13 | 0.50 | 1 | 0.29 | 8 | 0.55 | 10 | 0.70 | 8 | 0.09 |
| 19 | 5 | 0.65 | 10 | 0.55 | 5 | 0.22 | 15 | 0.43 | 7 | 0.93 | 15 | -0.04 |

<u>List of Sectors</u>

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.7—Competitive-Import Type Backward and Forward Linkage Indices, 1975-2000 (cont.)

| 1985 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | | 1990 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.53 | 19 | 0.17 | 19 | 1.36 | 7 | 2.91 | 4 | 0.25 | 7 | 2.41 | 1 | 19 | 1.59 | 3 | 0.27 | 19 | 1.29 | 5 | 2.58 | 4 | 0.23 | 5 | 2.11 |
| 2 | 10 | 1.22 | 3 | 0.26 | 15 | 0.95 | 4 | 1.42 | 12 | 0.25 | 4 | 1.17 | 2 | 12 | 1.41 | 19 | 0.29 | 12 | 1.04 | 7 | 2.40 | 12 | 0.25 | 7 | 1.83 |
| 3 | 15 | 1.22 | 15 | 0.27 | 12 | 0.89 | 13 | 1.33 | 5 | 0.26 | 5 | 0.96 | 3 | 10 | 1.29 | 15 | 0.30 | 8 | 0.88 | 12 | 1.36 | 2 | 0.25 | 12 | 1.12 |
| 4 | 12 | 1.20 | 6 | 0.28 | 8 | 0.88 | 5 | 1.22 | 2 | 0.27 | 13 | 0.94 | 4 | 13 | 1.26 | 6 | 0.30 | 15 | 0.87 | 18 | 1.27 | 16 | 0.28 | 4 | 1.03 |
| 5 | 13 | 1.18 | 8 | 0.28 | 3 | 0.87 | 14 | 1.21 | 14 | 0.29 | 14 | 0.92 | 5 | 8 | 1.19 | 8 | 0.31 | 3 | 0.85 | 13 | 1.21 | 14 | 0.30 | 14 | 0.80 |
| 6 | 8 | 1.17 | 12 | 0.31 | 11 | 0.81 | 1 | 1.10 | 16 | 0.30 | 12 | 0.78 | 6 | 15 | 1.17 | 7 | 0.33 | 10 | 0.79 | 14 | 1.09 | 19 | 0.31 | 13 | 0.65 |
| 7 | 3 | 1.13 | 17 | 0.31 | 17 | 0.77 | 12 | 1.04 | 11 | 0.32 | 11 | 0.67 | 7 | 11 | 1.12 | 4 | 0.33 | 11 | 0.78 | 1 | 1.01 | 6 | 0.31 | 1 | 0.59 |
| 8 | 11 | 1.13 | 11 | 0.32 | 6 | 0.75 | 11 | 0.99 | 6 | 0.34 | 1 | 0.66 | 8 | 3 | 1.11 | 17 | 0.33 | 17 | 0.69 | 11 | 0.92 | 11 | 0.33 | 11 | 0.59 |
| 9 | 17 | 1.08 | 4 | 0.32 | 10 | 0.68 | 3 | 0.97 | 17 | 0.35 | 2 | 0.64 | 9 | 17 | 1.02 | 9 | 0.34 | 6 | 0.60 | 3 | 0.86 | 17 | 0.34 | 2 | 0.59 |
| 10 | 6 | 1.03 | 18 | 0.34 | 13 | 0.66 | 2 | 0.91 | 19 | 0.36 | 3 | 0.55 | 10 | 14 | 0.99 | 11 | 0.34 | 14 | 0.58 | 2 | 0.84 | 18 | 0.36 | 3 | 0.47 |
| 11 | 14 | 1.00 | 9 | 0.34 | 14 | 0.58 | 10 | 0.82 | 18 | 0.38 | 16 | 0.42 | 11 | 6 | 0.91 | 18 | 0.35 | 13 | 0.55 | 6 | 0.71 | 3 | 0.39 | 6 | 0.40 |
| 12 | 9 | 0.84 | 2 | 0.35 | 9 | 0.49 | 6 | 0.73 | 13 | 0.39 | 6 | 0.38 | 12 | 9 | 0.83 | 2 | 0.36 | 9 | 0.50 | 10 | 0.69 | 9 | 0.39 | 16 | 0.38 |
| 13 | 7 | 0.81 | 16 | 0.37 | 4 | 0.49 | 16 | 0.72 | 3 | 0.41 | 17 | 0.35 | 13 | 18 | 0.81 | 16 | 0.36 | 7 | 0.47 | 16 | 0.66 | 1 | 0.42 | 17 | 0.31 |
| 14 | 4 | 0.81 | 1 | 0.38 | 18 | 0.47 | 17 | 0.70 | 9 | 0.42 | 18 | 0.25 | 14 | 7 | 0.79 | 12 | 0.37 | 18 | 0.46 | 17 | 0.65 | 8 | 0.45 | 19 | 0.28 |
| 15 | 18 | 0.81 | 5 | 0.40 | 2 | 0.41 | 8 | 0.64 | 1 | 0.44 | 19 | 0.23 | 15 | 4 | 0.79 | 1 | 0.38 | 4 | 0.46 | 8 | 0.63 | 5 | 0.47 | 18 | 0.23 |
| 16 | 2 | 0.76 | 14 | 0.42 | 7 | 0.39 | 18 | 0.63 | 8 | 0.46 | 9 | 0.20 | 16 | 2 | 0.73 | 14 | 0.41 | 2 | 0.37 | 18 | 0.59 | 15 | 0.48 | 8 | 0.18 |
| 17 | 1 | 0.70 | 7 | 0.43 | 1 | 0.32 | 9 | 0.62 | 15 | 0.47 | 8 | 0.18 | 17 | 1 | 0.70 | 5 | 0.43 | 16 | 0.33 | 19 | 0.58 | 13 | 0.56 | 9 | 0.17 |
| 18 | 5 | 0.69 | 13 | 0.52 | 16 | 0.31 | 19 | 0.59 | 7 | 0.51 | 10 | 0.11 | 18 | 16 | 0.69 | 10 | 0.50 | 1 | 0.32 | 9 | 0.57 | 7 | 0.57 | 10 | 0.00 |
| 19 | 16 | 0.69 | 10 | 0.54 | 5 | 0.29 | 15 | 0.46 | 10 | 0.70 | 15 | -0.01 | 19 | 5 | 0.61 | 13 | 0.71 | 5 | 0.18 | 15 | 0.38 | 10 | 0.69 | 15 | -0.10 |

List of Sectors

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.7—Competitive-Import Type Backward and Forward Linkage Indices, 1975-2000 (cont.)

| 1995 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.52 | 19 | 0.22 | 19 | 1.30 | 7 | 2.41 | 4 | 0.22 | 5 | 1.89 |
| 2 | 12 | 1.31 | 3 | 0.26 | 12 | 0.93 | 5 | 2.37 | 12 | 0.22 | 7 | 1.73 |
| 3 | 13 | 1.30 | 8 | 0.29 | 8 | 0.91 | 12 | 1.56 | 2 | 0.24 | 12 | 1.33 |
| 4 | 10 | 1.24 | 6 | 0.30 | 3 | 0.91 | 4 | 1.28 | 19 | 0.26 | 4 | 1.06 |
| 5 | 8 | 1.20 | 15 | 0.31 | 15 | 0.87 | 13 | 1.15 | 14 | 0.28 | 14 | 0.73 |
| 6 | 15 | 1.18 | 17 | 0.33 | 11 | 0.81 | 14 | 1.00 | 16 | 0.29 | 2 | 0.62 |
| 7 | 3 | 1.17 | 7 | 0.33 | 10 | 0.77 | 1 | 0.99 | 6 | 0.31 | 11 | 0.59 |
| 8 | 11 | 1.16 | 4 | 0.33 | 17 | 0.69 | 11 | 0.93 | 17 | 0.34 | 1 | 0.59 |
| 9 | 17 | 1.01 | 9 | 0.33 | 6 | 0.63 | 3 | 0.89 | 11 | 0.34 | 13 | 0.50 |
| 10 | 14 | 0.95 | 11 | 0.35 | 14 | 0.58 | 2 | 0.86 | 18 | 0.35 | 3 | 0.50 |
| 11 | 6 | 0.93 | 16 | 0.35 | 13 | 0.54 | 6 | 0.77 | 3 | 0.39 | 6 | 0.46 |
| 12 | 9 | 0.86 | 2 | 0.36 | 9 | 0.53 | 19 | 0.67 | 9 | 0.40 | 19 | 0.41 |
| 13 | 18 | 0.81 | 14 | 0.36 | 7 | 0.48 | 16 | 0.65 | 1 | 0.41 | 16 | 0.37 |
| 14 | 7 | 0.81 | 18 | 0.37 | 4 | 0.46 | 17 | 0.64 | 8 | 0.43 | 17 | 0.31 |
| 15 | 4 | 0.79 | 1 | 0.38 | 18 | 0.44 | 10 | 0.64 | 5 | 0.48 | 18 | 0.29 |
| 16 | 2 | 0.72 | 12 | 0.38 | 2 | 0.36 | 18 | 0.64 | 15 | 0.48 | 8 | 0.18 |
| 17 | 16 | 0.70 | 5 | 0.39 | 16 | 0.35 | 8 | 0.62 | 13 | 0.65 | 9 | 0.15 |
| 18 | 1 | 0.70 | 10 | 0.47 | 1 | 0.32 | 9 | 0.55 | 10 | 0.67 | 10 | -0.03 |
| 19 | 5 | 0.64 | 13 | 0.77 | 5 | 0.25 | 15 | 0.37 | 7 | 0.67 | 15 | -0.11 |

| 1998 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 12 | 1.27 | 19 | 0.22 | 19 | 1.04 | 7 | 2.53 | 4 | 0.25 | 7 | 1.89 |
| 2 | 19 | 1.26 | 3 | 0.26 | 8 | 0.93 | 12 | 1.87 | 19 | 0.25 | 12 | 1.61 |
| 3 | 10 | 1.25 | 8 | 0.29 | 3 | 0.92 | 5 | 1.43 | 12 | 0.25 | 5 | 1.15 |
| 4 | 13 | 1.24 | 15 | 0.30 | 15 | 0.89 | 4 | 1.36 | 2 | 0.27 | 4 | 1.11 |
| 5 | 8 | 1.22 | 6 | 0.31 | 12 | 0.88 | 13 | 1.14 | 5 | 0.28 | 14 | 0.72 |
| 6 | 15 | 1.19 | 4 | 0.32 | 10 | 0.78 | 1 | 1.04 | 16 | 0.29 | 2 | 0.63 |
| 7 | 3 | 1.17 | 17 | 0.33 | 11 | 0.77 | 14 | 1.03 | 14 | 0.31 | 1 | 0.60 |
| 8 | 11 | 1.12 | 9 | 0.34 | 17 | 0.75 | 11 | 0.91 | 6 | 0.33 | 11 | 0.55 |
| 9 | 17 | 1.08 | 7 | 0.34 | 14 | 0.68 | 3 | 0.90 | 11 | 0.35 | 13 | 0.54 |
| 10 | 14 | 1.05 | 16 | 0.35 | 6 | 0.59 | 2 | 0.90 | 17 | 0.35 | 19 | 0.52 |
| 11 | 6 | 0.90 | 11 | 0.36 | 9 | 0.54 | 6 | 0.83 | 18 | 0.36 | 3 | 0.51 |
| 12 | 9 | 0.87 | 18 | 0.36 | 13 | 0.53 | 19 | 0.77 | 3 | 0.39 | 6 | 0.50 |
| 13 | 4 | 0.85 | 2 | 0.36 | 4 | 0.53 | 16 | 0.69 | 9 | 0.42 | 16 | 0.39 |
| 14 | 18 | 0.83 | 1 | 0.37 | 18 | 0.47 | 17 | 0.69 | 1 | 0.44 | 17 | 0.33 |
| 15 | 7 | 0.80 | 14 | 0.37 | 7 | 0.46 | 10 | 0.68 | 8 | 0.46 | 18 | 0.30 |
| 16 | 2 | 0.75 | 12 | 0.38 | 2 | 0.39 | 18 | 0.65 | 15 | 0.48 | 8 | 0.16 |
| 17 | 1 | 0.75 | 5 | 0.39 | 16 | 0.38 | 8 | 0.62 | 13 | 0.60 | 9 | 0.13 |
| 18 | 16 | 0.73 | 10 | 0.47 | 1 | 0.37 | 9 | 0.56 | 7 | 0.64 | 10 | 0.02 |
| 19 | 5 | 0.65 | 13 | 0.71 | 5 | 0.26 | 15 | 0.40 | 10 | 0.67 | 15 | -0.08 |

List of Sectors

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.7—Competitive-Import Type Backward and Forward Linkage Indices, 1975-2000 (cont.)

| 2000 | Uj | | Vj | | Uj-Vj | | Ui | | Vi | | Ui-Vi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index | Sect | Index |
| 1 | 19 | 1.42 | 19 | 0.25 | 19 | 1.17 | 7 | 3.06 | 4 | 0.24 | 5 | 1.85 |
| 2 | 13 | 1.33 | 3 | 0.27 | 15 | 0.93 | 5 | 2.39 | 12 | 0.24 | 7 | 1.76 |
| 3 | 15 | 1.25 | 6 | 0.29 | 8 | 0.89 | 12 | 1.84 | 2 | 0.25 | 12 | 1.60 |
| 4 | 10 | 1.22 | 8 | 0.31 | 12 | 0.84 | 4 | 1.21 | 19 | 0.27 | 4 | 0.97 |
| 5 | 12 | 1.21 | 15 | 0.32 | 3 | 0.79 | 13 | 1.02 | 16 | 0.29 | 14 | 0.60 |
| 6 | 8 | 1.19 | 9 | 0.32 | 17 | 0.78 | 1 | 0.92 | 14 | 0.31 | 2 | 0.59 |
| 7 | 17 | 1.11 | 4 | 0.32 | 10 | 0.75 | 14 | 0.92 | 6 | 0.34 | 1 | 0.46 |
| 8 | 11 | 1.08 | 18 | 0.32 | 11 | 0.72 | 2 | 0.84 | 11 | 0.35 | 11 | 0.46 |
| 9 | 3 | 1.06 | 2 | 0.33 | 6 | 0.68 | 3 | 0.81 | 17 | 0.36 | 6 | 0.44 |
| 10 | 6 | 0.97 | 1 | 0.33 | 9 | 0.61 | 11 | 0.81 | 18 | 0.36 | 3 | 0.42 |
| 11 | 9 | 0.93 | 17 | 0.34 | 4 | 0.56 | 6 | 0.78 | 3 | 0.40 | 19 | 0.37 |
| 12 | 14 | 0.91 | 7 | 0.34 | 13 | 0.55 | 19 | 0.65 | 9 | 0.40 | 16 | 0.34 |
| 13 | 4 | 0.88 | 11 | 0.36 | 18 | 0.52 | 16 | 0.63 | 1 | 0.46 | 13 | 0.30 |
| 14 | 18 | 0.85 | 16 | 0.36 | 14 | 0.52 | 17 | 0.60 | 8 | 0.48 | 17 | 0.25 |
| 15 | 1 | 0.78 | 12 | 0.37 | 2 | 0.45 | 10 | 0.59 | 15 | 0.49 | 18 | 0.17 |
| 16 | 2 | 0.78 | 5 | 0.38 | 1 | 0.45 | 8 | 0.55 | 5 | 0.54 | 9 | 0.10 |
| 17 | 7 | 0.77 | 14 | 0.40 | 7 | 0.43 | 18 | 0.53 | 10 | 0.66 | 8 | 0.06 |
| 18 | 16 | 0.65 | 10 | 0.46 | 16 | 0.28 | 9 | 0.50 | 13 | 0.72 | 10 | -0.06 |
| 19 | 5 | 0.62 | 13 | 0.78 | 5 | 0.24 | 15 | 0.34 | 7 | 1.30 | 15 | -0.15 |

Source: Author's calculation based on seven competitive-import type input-output tables of Thailand.

<u>List of Sectors</u>

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

**Table 4.8—Spearman Rank Order Correlation Coefficients, 1975-2000 (noncompetitive)**

| Correlations between | 1975 | 1980 | 1985 | 1990 | 1995 | 1998 | 2000 | Average |
|---|---|---|---|---|---|---|---|---|
| Uj and Vj | 0.68 | 0.64 | 0.54 | 0.42 | 0.52 | 0.51 | 0.55 | 0.55 |
| Ui and Vi | 0.66 | 0.56 | 0.61 | 0.59 | 0.69 | 0.71 | 0.72 | 0.65 |
| Uj and Ui | (0.17) | (0.45) | (0.41) | (0.41) | (0.35) | (0.25) | (0.25) | (0.33) |
| Vj and Vi | 0.06 | 0.02 | (0.24) | 0.05 | 0.10 | 0.16 | 0.06 | 0.03 |
| Uj - Vj and Ui - Vi | (0.20) | (0.44) | (0.48) | (0.33) | (0.29) | (0.19) | (0.25) | (0.31) |

Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

### 4.3 Agricultural Sector and Agro-Industry's Multiplier Effects—SAM and Input-Output Analyses

This multiplier effect analysis is the second main analysis of this chapter after the key sector analysis. The objective of the multiplier effect analysis is to find out which sector gives the highest output multiplier effects using a SAM and input-output tables. The multiplier analysis using a SAM has been done previously by the author (Thaiprasert 2003, 2004), and results of that SAM analysis will be presented in Section 4.3.1. Section 4.3.2 conducts a multiplier analysis by using input-output tables. This input-output multiplier analysis is extended from the SAM multiplier analysis in terms of, first, the time period studied covers a longer time span to see if there is any change over 25 years (1975-2000), and, second, non-agricultural sectors are further disaggregated. In conducting this analysis, we also hope to find a positive result from the agricultural and agro-industrial sectors to support our hypothesis.

#### 4.3.1 Previous Study on Multiplier Effect Analysis Using SAM

The author (Thaiprasert 2003, 2004) has previously conducted a multiplier analysis using the 1998 SAM of Thailand to simulate the outcomes of production increase after setting some exogenous changes. This SAM analysis also conducted simulations on inducements of household income, government income, total saving, and total import.

The 1998 SAM used in this analysis was obtained from the International Food Policy Research Institute (IFPRI), made by Jennifer Chung-I Li (2002). The 1998 SAM was aggregated into 29 endogenous accounts which include 21 productive sectors, 3 factors of production, 3 household types, and 2 enterprises, and there were 3 main exogenous accounts: first was the government which includes 9 sub-accounts of government taxes and subsidies; second was capital, and third was the rest-of-world.

The 21 productive sectors include: paddy, other crops, vegetable and fruits, other raw agricultural products, livestock, fishing, forestry, mining,[41] rice and flour, meat, canned food, other food, other agricultural products, beverage, tobacco, fuel,[42] other manufacturing (industrial),[43] infrastructure,[44] construction, trade and transportation,[45] and services.[46] Since the analysis focused mainly on the effects to agriculture, the aggregated 1998 SAM had 15 agriculture-related sub-sectors for detailed analysis. The remaining six productive sectors were those outside the agriculture-related sectors and were analyzed only on a sectoral level. The SAM had only one aggregated labor factor and three disaggregated household types: agricultural, non-agricultural, and government-employed.

The SAM multipliers are used to simulate the outcome of production increase after setting an exogenous change as shocks are given. The model then solves for the equilibrium level of all the endogenous accounts. In the case of SAM multipliers, we can also see the multiplier effects outside the production sectors, especially effects on incomes of the different

[41] Mining account comprises coal and lignite, crude petroleum and natural gas, and other mining.
[42] Fuel account comprises gasoline, diesel, aviation fuel, and fuel oil.
[43] Other manufacturing account comprises textiles, apparel, leather and footwear, wood products, furniture, paper, printing and publishing, basic chemicals, plastic and rubber, non-metal products, basic metals, fabric metals, machines, electrical manufacturing, transport equipment, and other industries.
[44] Infrastructure account comprises electricity, gas distribution, and water.
[45] Trade and transportation account comprises retail trade, land transportation, ocean transportation, inland water transportation, air transportation, and other transportation.
[46] Services account comprises restaurants, hotels, communication, banking, insurance, real estate, business services, public administration, education, health care and medical, nonprofit organizations, recreation, repairs, and personal services.

households (income effect across groups). These multipliers on household incomes allow us to see the effects to income distribution. The coefficients in the rows of the exogenous accounts provide the “leakages,” which are the induced demand for imports, the induced government revenues, and the induced savings.

The analysis performed several simulations of impacts from an exogenous change, such as an increase in export demand, an increase in demand by government, an increase in investment by government or abroad, or an income transfer from government to households. Results of the simulations are shown in Table 4.9 (simulation A to AB). From the simulations, it is interesting to examine the impacts on production, incomes, government’s revenues, change in import, and total saving. All simulations received shocks (in various kinds depending on each simulation) by 100 million baht. Details of how the simulations were conducted are described in Thaiprasert (2003, 2004).

#### 4.3.1.1 Simulation Results from SAM Multiplier Analysis

Results from the SAM multiplier analysis (shown in Table 4.9) show clearly that, compare to the manufacturing industrial sector, agricultural and agricultural-processing sectors in Thailand have high potential to increase domestic production through linkage or multiplier effects. The agricultural and agricultural-processing sectors also have better potential to generate more income to different households, to create better income distribution, and to induce more savings in the country. Moreover, these help to support the argument and our hypothesis that Thai agricultural and agricultural-related sectors have long been engines of economic growth as they have boosted the economy through their multiplier effects. On the other hand, the government’s biased policies to subordinate agriculture for the urban industrial sectors may have hindered the economic growth and country’s income distribution.

**Table 4.9—Policy Simulations with SAM Multipliers, Thailand, 1998**

Unit: million baht

| Policy Experiment | | | Total Production | Household Income | Government Income | Total Import | Total Saving |
|---|---|---|---|---|---|---|---|
| A | Exports or Demand from abroad | All products and services | 321.2 | 70.1 | 3.2 | 55.7 | 25.3 |
| B | | Other Crops | 339.8 | 101.3 | 2.4 | 52.3 | 28.6 |
| C | | Vegetable and fruits | 382.3 | 90.0 | 3.1 | 50.3 | 29.4 |
| D | | Other raw agri. products | 327.4 | 102.3 | 2.4 | 52.7 | 28.7 |
| E | | Livestock | 431.3 | 110.2 | 3.5 | 45.1 | 33.1 |
| F | | Fishing | 374.8 | 106.4 | 3.1 | 45.2 | 31.9 |
| G | | Forest | 188.4 | 39.9 | 1.3 | 76.4 | 11.4 |
| H | | Mining | 203.9 | 40.9 | 3.2 | 63.8 | 17.2 |
| I | | Rice and Flour | 454.7 | 113.8 | 3.7 | 43.7 | 34.0 |
| J | | Meat | 464.7 | 106.1 | 3.6 | 45.2 | 33.6 |
| K | | Canned food | 410.0 | 85.8 | 2.8 | 52.5 | 29.1 |
| L | | Other food | 399.1 | 82.2 | 4.4 | 50.5 | 28.4 |
| M | | Other agri. products | 391.9 | 95.2 | 3.2 | 45.8 | 33.3 |
| N | | Beverage | 291.3 | 59.2 | 4.2 | 36.0 | 21.7 |
| O | | Tobacco | 281.2 | 44.1 | 5.1 | 28.7 | 15.7 |
| P | | Fuel | 264.2 | 49.3 | 3.6 | 45.8 | 18.9 |
| Q | | Other manufacturing | 303.5 | 55.3 | 2.8 | 62.7 | 20.5 |
| R | Demand or Investment (except Paddy) by Govt. or Exports | Paddy | 374.4 | 133.2 | 2.8 | 43.9 | 34.4 |
| S | | Infrastructure | 327.2 | 90.5 | 5.7 | 41.9 | 32.8 |
| T | | Construction | 364.9 | 88.0 | 4.8 | 47.0 | 31.3 |
| U | | Trade &Transportation | 308.4 | 87.6 | 4.8 | 39.6 | 37.4 |
| V | | Services | 322.9 | 93.6 | 3.6 | 45.1 | 32.9 |
| W | Income Transfers | To Agri. Household | 382.3 | 189.1 | 3.9 | 55.2 | 18.2 |
| X | | To Govt. employed HH. | 266.6 | 165.7 | 2.9 | 38.8 | 34.3 |
| Y | | To Non-agri. Household | 240.5 | 159.3 | 2.6 | 34.7 | 44.2 |
| Z | | Redistribution rich to poor | 136.9 | 28.6 | 1.3 | 19.7 | -24.2 |
| AA | Investment by Govt. Transfers or Investment by ROW | Agricultural Capital | 240.5 | 121.5 | 2.5 | 44.8 | 34.6 |
| AB | | Non-agricultural Capital | 145.7 | 94.0 | 1.6 | 30.6 | 48.6 |

Source: Thaiprasert (2004: 204)

The sector that induces highest production in the economy if it receives economic stimulations, such as an increase in export demand, an increase in demand by government, an increase in investment by government or from abroad, or an income transfer from government to households, is meat production, followed by rice and flour, and livestock. The sector that induces the least is forestry, followed by mining, and fuel.

The sector that generates highest income to the different households in total if it receives economic stimulations is paddy, followed by rice and flour, and livestock. The sector that generates the least income is forestry, followed by mining, tobacco, and fuel. From 1998 SAM calculation, the ratio of labor in its value added of the paddy sector was 65 percent, that of rice and flour sector was 39.7 percent, and that of livestock sector was 55.8 percent. The ratio of labor in its value added of the forestry sector was 13.5 percent, that of mining sector was 12.1 percent, that of tobacco sector was 0.6 percent, and that of fuel sector was 21.7 percent Sectors that create better income distribution (income generation to agricultural households close or equal to income generation to non-agricultural households, and are relatively in high value (values shown in Appendix E)) are fishing, other crops, and other raw agricultural products. Economic stimulations into agricultural capital would generate better income distribution among agricultural and non-agricultural households. Economic stimulations into mining, beverage, tobacco, fuel, manufacturing, infrastructure, construction, trade and transportation, and service sectors would worsen the income distribution among different households as non-agricultural households would benefit the most.

The sector that induces highest total saving in the economy if it receives economic stimulations is trade and transport, followed by rice and flour, meat, and agricultural products. The sector that induces lowest savings into the economy is forestry, followed by mining, tobacco, and fuel. However, economic stimulations into agricultural households would induce low savings in the country, but economic stimulations into non-agricultural capital and non-agricultural households would induce high savings in the country. This is because the agricultural households are basically poor and lack savings. From 1998 SAM calculation, the ratio of agricultural household's saving to the country's total saving was -3.7 percent, while that of the government-employed household was 2.5 percent, and that of the non-agricultural household was 25.9 percent. Therefore, if the agricultural households received some transfers from the government, the money would be used for consumption rather than for investment, which would result in less total saving (although their higher consumption would induce higher total production). This reason relates and helps to refine the result of experiment W that the transfer of income to agricultural households induces more imports to the country than the transfers to government-employed and non-agricultural households (experiment X and Y). Since the agricultural population in Thailand is large, with 51 percent of the total labor force engaged in agriculture in 1998, agricultural households then consume products not only from their own sectors but from non-agricultural and services sectors which have high import ratios to their sector outputs. From 1998 SAM calculation, the manufacturing sector's import ratios to its sector output was 35 percent, and the service sector's import ratios to its sector output was 11.7 percent, while that of the agricultural and agricultural processing sectors together was 5.6 percent. Therefore, the huge consumption from the agricultural households can induce more imports to the country through this multiplier effect.

For inducing government income, the agricultural and agricultural-processing sectors have less potential than the infrastructure, construction, trade and transportation, beverage, and tobacco sectors due to the fact that the tax rates on the agricultural sector are quite low and there are also many tax exemption policies being applied in the sector (as to avoid the administrative complexity and political difficulties of introducing a large land tax or any similar direct tax on the peasant). The government's revenue from the agricultural sector comes mostly from the import tariffs since Thailand, to some extent, still protects its agricultural domestic market. Induced government income from the manufacturing sector is also quite low. This may be due to the fact that it receives many kinds of tax exemptions or privileges from the Thai government's Board of Investment (BOI) to promote industrialization in the country. From 1998 SAM calculation, the average import tariff rate on agricultural and agricultural-processing sectors together was 4.4 percent, while that on the manufacturing sector was 3.5 percent. Moreover, the ratio of tax in value added of the agricultural and agricultural processing sectors together was only 0.9 percent, and that of the manufacturing sector was 4.9 percent. Since other sectors use a lot of products from agricultural and manufacturing sectors as their intermediate inputs, government receives lesser tax from these two sectors due to the multiplier effect. In addition, since the manufacturing sector induces more import (35 percent to its sector output in 1998), it may generate lesser income to the domestic production and thus reduces the government's tax base. On the contrary, it is no surprise to see that from the simulation results in Table 4.9, the sectors which generate highest income to the government are infrastructure and tobacco. The construction sector ranked the same as the trade and transport sector, generating quite high income to the government. These are because, for the infrastructure sector, most enterprises were state-owned or partly owned by the government in 1998. (In 2002, many state-owned enterprises started their gradual transformation into privately-owned enterprises). For the tobacco sector, the government has always imposed heavy taxes. From 1998 SAM calculation, the ratio of tax in beverage and tobacco's value added was as high as 98.5 percent, and the average import tariff rate on tobacco sector was 10.8 percent. For the trade and transportation sector, most of the transportation companies are either run by the government or pay a high premium to stay in the oligopoly market, and the ratio of value added in its production was as high as 60 percent from 1998 SAM calculation. For the construction sector, there is no clear explanation, but the induced government revenue may be generated from taxing its labor as the ratio of labor in its value added was as high as 51 percent from 1998 SAM calculation.

For linkages to the rest of the world or effects to imports, the economic stimulations into forestry, mining and manufacturing sectors would induce more import demands in the country. This is unsurprising as Thailand has continually increased its timber imports since the 1989 start of mangrove conservation and the ban on logging in natural forests. From 1998 SAM calculation, the import ratio to domestic output of the forestry sector was as high as 155.2 percent, and that of the mining sector was 82.7 percent. There is also no doubt why the manufacturing sector induces more import demands, as it has many imported contents in its input materials, and the import ratio to domestic output of this sector was 35 percent from the 1998 SAM calculation. By contrast, the economic stimulations into tobacco, beverage and trade and transport sectors would induce lower import demands in the economy. This may be caused by the low import ratio to output these sectors have (6.2 percent for tobacco sector, 4.7 percent for beverage sector, and 4.2 percent for trade and transportation sector).

In sum, in the previous SAM analysis conducted by the author, the 1998 SAM of Thailand was used to investigate potential for reviving the role of the agricultural sector in the Thai economy and improving its income distribution. The results from the simulations prove that Thai agricultural and agricultural-processing sectors have better linkage or multiplier effects than Thai non-agricultural manufacturing sectors to: 1) induce more production in the economy; 2) generate more income to different households; 3) create better income distribution in the country; 4) induce more savings in Thailand.

### 4.3.2 The Input-Output Multiplier Analysis

As discussed before, the multiplier analysis is one of the main analyses in this Chapter. The objective of this input-output multiplier analysis is to confirm the results found in the SAM multiplier analysis shown in the previous section that the agricultural and agricultural-processing sectors in Thailand have high potential to increase domestic production through linkage or multiplier effects compared to that of the manufacturing industrial sector. This input-output multiplier analysis is extended from the SAM multiplier analysis in terms of, first, the time period studied covers a longer time span to see if there is any change over 25 years (1975-2000), and, second, non-agricultural sectors are further disaggregated.

This input-output multiplier analysis utilizes the inverse matrix as the fundamental part to calculate the multiplier effects when a shock is given to an exogenous account as explained earlier in Section 4.2.1.2. To be specific, the production inducement can be calculated by using Equation 4.19: $X = [I-(I-\hat{M})A]^{-1} \; [(I-\hat{M})F + E]$ for competitive-import type input-output table or Equation 4.22: $X = (I-A^d)^{-1} F^d + E$ for noncompetitive-import type input-output table.

The noncompetitive-import type input-output table is used in this case since it has similar features to a SAM, that is the import matrix is separated from the intermediate transaction and the final demand and can be aggregated into one row. With the use of the noncompetitive-import type input-output table, we can obtain the purely domestic multiplier effect to find out the backward linkage multiplier effect.

Extension of this input-output multiplier is to find "leakages." This technique is commonly used in a SAM multiplier as explained in the previous section. This leakage analysis can be performed in the input-output analysis by partitioning accounts into endogenous and exogenous accounts. Endogenous accounts are those for which changes in the level of expenditure directly follow any change in income, while exogenous accounts are those for which we assume that the expenditures are set independently of income. For this analysis, the exogenous accounts are all account other than the intermediate input accounts, which are import; wage and salary; operating surplus; depreciation; and indirect tax less subsidy accounts.

The production inducement is obtained by giving a shock, presented here as Δ, into the vector of final demand $F_d$ or vector of export $E$ in equation $X = (I - A^d)^{-1} F^d + E$. Actually, $F^d$ and $E$ can be combined since the first shock can happen anywhere. It can be an increase in domestic production of intermediate consumption to replace imports, an increase in indirect taxes, or a change in technology represented by changes in input structure. Then, the vector of impacts is:

(4.34) $\Delta X = (I - A^d)^{-1}\, \Delta F^d + \Delta E$

The coefficients in the rows of the exogenous accounts provide the "leakages." These leakages are, for example, the induced demand for imports, the induced government revenues (indirect tax less subsidy), the induced wage and salary, and the induced operating surplus. Therefore, the leakages can be obtained from:

(4.35) $\Delta L = H\, \Delta X$

where $L$ is the column vector of income of the exogenous accounts, and $H$ is the rectangular matrix ($m \times n$) of the coefficients with exogenous accounts as row ($m$) and endogenous accounts as columns ($n$).

The input-output multiplier analysis has a shortcoming that it cannot give an impact assessment on income of various socioeconomic households, unlike the SAM multiplier analysis, since there is no information on household groups in an input-output table.

This analysis examines, for the backward linkage, by increasing demand of each sector by 100 million baht, how much it will induce total output increase and increases in labor income, capital income, government income, and total import.

In this input-output multiplier analysis, seven years of noncompetitive-import type input-output tables (1975, 1980, 1985, 1990, 1995, 1998, and 2000) are used to see the trends of each sector's multiplier effects over 25 years. The original 179-sector input-output tables of Thailand are aggregated into 19 sectors, which are the same as those used in the key sector analysis.

#### 4.3.2.1 Simulation Results from Input-Output Multiplier Analysis

As shown in Table 4.10, results from the input-output multiplier analysis show that agro-industry and livestock performed the best over 25 years as they took turns for number one. Textile and leather performed quite well over 25 years. However, other manufacturing sector did not have a significant potential, which is due to its high import dependency.

For the leakages from backward linkage multipliers, results are shown in Table 4.11. Services induced the highest labor income (wages and salaries). For the income from operating surplus, inducement was high in other crops, forestry, paddy, and livestock. For the government income inducement, beverage and tobacco performed the best, followed by mining. This is due to their high tax rates paid to the government. Sectors which had high import inducement effect are other manufacturing, utilities, and agricultural machinery.

When observing the changes in output multipliers over 25 years (from Table 4.10), it is noticeable that the interindustrial linkages in most sectors have deepened as their values have increased over the years, except those of textile and leather; wood, paper, rubber; other manufacturing; utilities; and construction.

It should be noted that most simulations from the input-output and SAM analyses do not touch on how to finance the shocks, such as transfers or investment made by the government, nor do they guarantee that there will be an increase in export or a transfer from abroad. The money input to a sector in the simulation can be derived from either increasing government budget from the year before, or it can be drawn from budget reallocation from one sector to another sector. In the latter case, it may create problems of what is the proper budget reallocation strategy, or conflicts between different ministries or departments. Since one of the limitations of the input-output and SAM analyses is that the simulations are likely to be unrealistic, input-output and SAM models are not used as predictive models or to examine the feasibility of simulation assumptions, such as whether it is easier to increase 100 million baht of agricultural export or to increase 100 million baht of non-agricultural export. Therefore, when planning for a project's budget or working on a project appraisal, more careful studies on cost-benefit analysis need to be conducted along with the assessment of the project's purpose. If a sector is financed by increase in exports or increase in demand from abroad, the problems of budget reallocation can be avoided.

We can clearly notice that results from the input-output multiplier effect are very similar to the results from the SAM analysis in the previous section. This helps us to confirm that even when looking at the longer time span or adjusting the way we aggregate the sectors, Thai agricultural and agricultural related sectors still give the highest output multiplier effects and inducement of income from operating surplus. Therefore, it is confirmed that the agricultural-related sectors should be the most promising sectors and should be seriously promoted. Moreover, it shows that although agriculture is almost always viewed as a less productive sector with low production multipliers, the SAM and the input-output analyses show outcomes opposite to that perception. The linkage or multiplier effects of agricultural and agricultural-processing sectors in Thailand are better than those of the manufacturing sector. Furthermore, agricultural and agricultural-processing sectors induce a relatively more equitable distribution of income shown in the SAM analysis. These findings form an argument against those who ignore the importance of basing a development strategy on agricultural-related sectors, in the erroneous belief that with scarce resources, investment should be concentrated on selected non-agricultural manufacturing industries which are believed to have high multipliers.

**Table 4.10—Direct and Indirect Backward Linkage Multipliers, 1975-2000**

| Sector | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1975 | 1.160 | 1.189 | 1.946 | 1.359 | 1.151 | 1.346 | 1.226 | **2.004** | 1.478 | 1.924 | 1.735 | 1.631 | 1.505 | 1.805 | 1.796 | 1.257 | 1.641 | 1.398 | 2.539 |
| 1980 | 1.197 | 1.204 | 1.874 | 1.361 | 1.171 | 1.537 | 1.181 | **2.044** | 1.470 | 1.976 | 1.708 | 1.651 | 1.492 | 1.383 | 1.811 | 1.224 | 1.653 | 1.383 | 2.524 |
| 1985 | 1.226 | 1.304 | 2.046 | 1.376 | 1.254 | 1.643 | 1.386 | **2.090** | 1.406 | 1.912 | 1.749 | 1.556 | 1.528 | 1.773 | 1.831 | 1.287 | 1.551 | 1.423 | 2.569 |
| 1990 | 1.217 | 1.263 | **2.029** | 1.361 | 1.181 | 1.411 | 1.401 | **2.029** | 1.413 | 1.854 | 1.687 | 1.534 | 1.448 | 1.826 | 1.661 | 1.303 | 1.536 | 1.439 | 2.213 |
| 1995 | 1.229 | 1.254 | **2.095** | 1.374 | 1.227 | 1.449 | 1.438 | 2.067 | 1.443 | 1.843 | 1.676 | 1.594 | 1.456 | 1.709 | 1.664 | 1.334 | 1.565 | 1.450 | 2.372 |
| 1998 | 1.287 | 1.321 | **2.137** | 1.474 | 1.236 | 1.541 | 1.446 | 2.078 | 1.490 | 1.857 | 1.727 | 1.784 | 1.514 | 1.918 | 1.773 | 1.351 | 1.812 | 1.482 | 1.998 |
| 2000 | 1.277 | 1.371 | 2.031 | 1.482 | 1.233 | 1.653 | 1.440 | **2.076** | 1.460 | 1.888 | 1.618 | 1.708 | 1.419 | 1.732 | 1.784 | 1.288 | 1.888 | 1.504 | 1.995 |

Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

List of Sectors

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
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Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.11—Backward Linkage Exogenous Leakages, 1975-2000

| Year | 1975 | | | | | | 1980 | | | | | | 1985 | | | | | | 1990 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | X | W | OS | DP | TAX | M | X | W | OS | DP | TAX | M | X | W | OS | DP | TAX | M | X | W | OS | DP | TAX | M |
| 1 | 116.0 | 10.3 | 79.7 | 5.1 | 0.9 | 4.0 | 119.7 | 13.3 | 77.5 | 2.6 | 1.0 | 5.6 | 122.6 | 11.5 | **77.9** | 2.6 | 0.8 | 7.2 | 121.7 | 10.2 | **78.3** | 2.2 | 0.7 | 8.5 |
| 2 | 118.9 | 10.7 | 81.2 | 2.7 | 1.1 | 4.2 | 120.4 | 14.4 | 77.1 | 2.1 | 1.0 | 5.5 | 130.4 | 17.6 | 67.8 | 3.7 | 2.0 | 9.0 | 126.3 | 17.3 | 69.2 | 3.4 | 0.9 | 9.2 |
| 3 | 194.6 | 13.6 | 76.0 | 4.9 | 1.9 | 3.6 | 187.4 | 13.8 | 75.2 | 3.3 | 2.1 | 5.7 | 204.6 | 20.1 | 63.5 | 5.8 | 1.9 | 8.7 | **202.9** | 18.4 | 63.0 | 6.1 | 1.6 | 10.9 |
| 4 | 135.9 | 17.2 | 62.6 | 11.5 | 1.8 | 7.0 | 136.1 | 17.8 | 64.0 | 8.0 | 2.1 | 8.0 | 137.6 | 18.5 | 58.2 | 10.5 | 1.9 | 10.9 | 136.1 | 17.9 | 58.8 | 10.6 | 2.1 | 10.5 |
| 5 | 115.1 | 8.3 | **81.7** | 2.8 | 5.1 | 2.1 | 117.1 | 8.4 | **80.6** | 2.5 | 5.0 | 3.4 | 125.4 | 15.4 | 70.7 | 4.4 | 4.7 | 4.7 | 118.1 | 20.6 | 71.0 | 3.1 | 2.4 | 2.9 |
| 6 | 134.6 | 16.5 | 67.7 | 8.7 | 2.2 | 4.9 | 153.7 | 18.6 | 60.7 | 7.7 | 3.4 | 9.6 | 164.3 | 21.7 | 49.8 | 7.9 | 2.6 | 18.0 | 141.1 | 21.7 | 50.8 | 8.4 | 1.1 | 18.0 |
| 7 | 122.6 | 16.7 | 53.4 | 7.9 | 16.4 | 5.5 | 118.1 | 18.5 | 44.6 | 6.7 | 23.3 | 6.9 | 138.6 | 21.2 | 40.5 | **13.7** | 12.9 | 11.6 | 140.1 | 23.5 | 47.5 | 11.0 | 8.1 | 9.9 |
| 8 | **200.4** | 17.8 | 68.4 | 5.9 | 3.0 | 4.9 | **204.4** | 19.5 | 64.6 | 3.5 | 4.3 | 8.1 | **209.0** | 21.5 | 60.2 | 5.5 | 2.9 | 10.0 | **202.9** | 18.6 | 56.2 | 5.7 | 2.3 | 17.1 |
| 9 | 147.8 | 14.2 | 42.0 | 5.0 | **25.2** | 13.6 | 147.0 | 13.6 | 28.0 | 3.4 | **39.1** | 15.9 | 140.6 | 14.2 | 26.8 | 4.4 | **42.0** | 12.7 | 141.3 | 10.5 | 21.9 | 4.1 | **49.7** | 13.8 |
| 10 | 192.4 | 22.8 | 37.4 | 7.9 | 6.8 | 25.2 | 197.6 | 21.0 | 42.0 | 5.0 | 6.2 | 25.9 | 191.2 | 22.7 | 41.6 | 6.7 | 5.7 | 23.4 | 185.4 | 23.3 | 33.6 | 7.6 | 2.6 | 32.8 |
| 11 | 173.5 | 18.7 | 54.6 | 6.4 | 6.3 | 14.0 | 170.8 | 17.1 | 54.0 | 4.6 | 7.0 | 17.4 | 174.9 | 21.4 | 44.3 | 5.4 | 5.0 | 23.9 | 168.7 | 20.2 | 41.0 | 5.5 | 3.1 | 30.2 |
| 12 | 163.1 | 20.0 | 32.5 | 9.5 | 5.5 | 32.5 | 165.1 | 20.7 | 33.9 | 6.2 | 5.0 | 34.3 | 155.6 | 21.0 | 31.5 | 7.1 | 4.5 | 35.9 | 153.4 | 15.5 | 24.0 | 6.5 | 2.2 | **51.9** |
| 13 | 150.5 | 16.4 | 31.3 | 6.6 | 6.6 | **39.0** | 149.2 | 13.7 | 28.0 | 5.0 | 10.5 | 42.8 | 152.8 | 16.5 | 28.0 | 6.5 | 9.4 | **39.6** | 144.8 | 15.3 | 26.4 | 5.5 | 6.1 | 46.6 |
| 14 | 180.5 | 17.7 | 45.3 | 13.3 | 4.1 | 19.6 | 138.3 | 21.8 | 31.7 | 6.9 | (6.2) | **45.8** | 177.3 | 27.9 | 46.5 | 12.2 | 3.8 | 9.6 | 182.6 | 23.8 | 49.3 | **15.1** | 2.9 | 9.0 |
| 15 | 179.6 | 21.3 | 43.0 | 8.2 | 5.8 | 21.7 | 181.1 | 22.6 | 40.9 | 4.6 | 6.1 | 25.8 | 183.1 | 24.1 | 36.2 | 6.8 | 6.0 | 26.8 | 166.1 | 22.5 | 37.4 | 5.9 | 3.7 | 30.5 |
| 16 | 125.7 | 29.9 | 54.3 | 6.2 | 6.7 | 3.0 | 122.4 | 31.0 | 58.2 | 4.3 | 2.1 | 4.5 | 128.7 | 28.0 | 59.8 | 6.6 | 2.3 | 3.4 | 130.3 | 21.3 | 64.8 | 6.7 | 2.3 | 5.0 |
| 17 | 164.1 | 31.2 | 36.4 | 13.4 | 6.0 | 13.0 | 165.3 | 26.3 | 38.8 | 7.7 | 3.6 | 23.7 | 155.1 | 27.2 | 31.4 | 10.0 | 4.7 | 26.6 | 153.6 | 24.9 | 39.4 | 10.7 | 2.9 | 22.1 |
| 18 | 139.8 | **36.9** | 32.3 | **18.3** | 5.4 | 7.1 | 138.3 | **40.7** | 34.1 | **10.5** | 6.0 | 8.7 | 142.3 | **42.6** | 33.1 | 11.3 | 4.8 | 8.2 | 143.9 | **36.3** | 35.3 | 9.7 | 9.1 | 9.6 |
| 19 | 253.9 | 22.6 | 47.9 | 9.0 | 4.6 | 15.9 | 252.4 | 21.1 | 49.1 | 4.8 | 4.4 | 20.7 | 256.9 | 22.1 | 43.9 | 6.4 | 6.7 | 20.8 | 221.3 | 15.9 | 31.4 | 5.3 | 4.6 | 42.8 |

Notes: 100 million baht increase in final demand or export (unit: million baht).
X = Total production, W = Wages and Salaries, OS = Operating Surplus, DP = Depreciation, TAX = Indirect taxes less subsidies, M = Import
Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

<u>List of Sectors</u>

Sector 1 = Paddy
Sector 2 = Other crops
Sector 3 = Livestock
Sector 4 = Agricultural service
Sector 5 = Forestry
Sector 6 = Fishing
Sector 7 = Mining
Sector 8 = Agro-industry
Sector 9 = Beverage and Tobacco
Sector 10 = Textile and leather
Sector 11 = Wood, paper, rubber
Sector 12 = Agricultural machinery
Sector 13 = Other manufacturing
Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

## Table 4.11— Backward Linkage Exogenous Leakages, 1975-2000 (cont.)

| Year | 1995 | | | | | | 1998 | | | | | | 2000 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | X | W | OS | DP | TAX | M | X | W | OS | DP | TAX | M | X | W | OS | DP | TAX | M |
| 1 | 122.9 | 10.8 | **76.9** | 3.3 | 0.7 | 8.3 | 128.7 | 15.7 | **70.6** | 3.7 | 0.8 | 9.2 | 127.7 | 28.0 | 52.8 | 3.9 | 0.6 | 14.6 |
| 2 | 125.4 | 18.0 | 67.9 | 4.1 | 0.8 | 9.2 | 132.1 | 22.4 | 63.0 | 5.1 | 1.0 | 8.5 | 137.1 | 22.3 | 57.5 | 7.3 | 1.0 | 11.9 |
| 3 | **209.5** | 19.3 | 58.3 | 6.8 | 2.4 | 13.3 | 213.7 | 19.6 | 60.3 | 7.6 | 1.9 | 10.5 | 203.1 | 20.4 | **61.2** | 6.4 | 1.6 | 10.4 |
| 4 | 137.4 | 19.4 | 58.5 | 10.0 | 1.6 | 10.6 | 147.4 | 20.2 | 54.3 | 12.7 | 1.8 | 11.0 | 148.2 | 19.0 | 51.3 | 12.1 | 1.5 | 16.1 |
| 5 | 122.7 | **38.2** | 51.6 | 3.5 | 2.5 | 4.2 | 123.6 | **40.0** | 50.8 | 3.9 | 1.5 | 3.9 | 123.3 | 32.6 | 56.1 | 4.0 | 2.7 | 4.6 |
| 6 | 144.9 | 21.2 | 50.1 | 9.2 | 1.4 | 18.1 | 154.1 | 20.7 | 54.1 | 11.6 | 1.6 | 12.0 | 165.3 | 20.1 | 50.2 | 11.6 | 1.6 | 16.6 |
| 7 | 143.8 | 23.3 | 45.7 | 11.1 | 10.3 | 9.6 | 144.6 | 23.2 | 41.4 | 15.0 | 12.3 | 8.0 | 144.0 | 24.8 | 39.9 | 15.7 | 10.9 | 8.7 |
| 8 | 206.7 | 19.1 | 53.4 | 7.0 | 3.2 | 17.3 | **207.8** | 20.8 | 51.8 | 7.9 | 2.2 | 17.3 | **207.6** | 22.5 | 47.9 | 7.6 | 2.0 | 19.9 |
| 9 | 144.3 | 10.8 | 23.3 | 5.9 | **45.5** | 14.5 | 149.0 | 12.4 | 26.4 | 7.2 | **41.5** | 12.6 | 146.0 | 12.7 | 23.9 | 7.2 | **35.6** | 20.6 |
| 10 | 184.3 | 23.0 | 34.1 | 9.7 | 3.4 | 29.8 | 185.7 | 23.6 | 32.4 | 11.1 | 3.9 | 29.1 | 188.8 | 22.4 | 34.0 | 10.9 | 3.4 | 29.2 |
| 11 | 167.6 | 18.4 | 38.5 | 7.3 | 3.6 | 32.3 | 172.7 | 19.6 | 44.0 | 9.3 | 3.1 | 24.1 | 161.8 | 18.5 | 41.1 | 8.3 | 2.4 | 29.7 |
| 12 | 159.4 | 18.8 | 26.7 | 8.1 | 4.0 | 42.4 | 178.4 | 22.3 | 31.7 | 10.2 | 3.8 | 32.0 | 170.8 | 24.1 | 28.6 | 11.0 | 2.5 | 33.8 |
| 13 | 145.6 | 13.5 | 24.9 | 6.8 | 6.3 | **48.5** | 151.4 | 14.6 | 28.1 | 8.4 | 6.2 | **42.7** | 141.9 | 11.8 | 21.3 | 7.2 | 4.5 | **55.3** |
| 14 | 170.9 | 22.0 | 46.7 | **14.8** | 6.4 | 10.1 | 191.8 | 25.6 | 40.7 | **17.7** | 6.8 | 9.2 | 173.2 | 29.8 | 31.1 | **21.4** | 7.6 | 10.0 |
| 15 | 166.4 | 21.1 | 36.0 | 8.3 | 4.6 | 30.1 | 177.3 | 21.9 | 33.2 | 11.1 | 7.0 | 26.9 | 178.4 | 20.2 | 30.2 | 11.4 | 4.5 | 33.7 |
| 16 | 133.4 | 18.8 | 60.9 | 8.2 | 6.7 | 5.3 | 135.1 | 19.4 | 57.7 | 11.2 | 6.1 | 5.5 | 128.8 | 18.5 | 60.6 | 9.8 | 6.5 | 4.6 |
| 17 | 156.5 | 25.3 | 38.3 | 13.2 | 2.7 | 20.4 | 181.2 | 28.9 | 35.4 | 15.7 | 3.6 | 16.4 | 188.8 | 28.3 | 33.3 | 14.8 | 3.5 | 20.1 |
| 18 | 145.0 | 37.3 | 36.4 | 10.1 | 7.3 | 8.9 | 148.2 | 39.3 | 33.3 | 11.5 | 7.3 | 8.6 | 150.4 | **38.9** | 29.9 | 12.8 | 6.0 | 12.4 |
| 19 | 237.2 | 20.0 | 35.5 | 7.4 | 5.7 | 31.4 | 199.8 | 14.0 | 25.0 | 23.0 | 13.2 | 24.8 | 199.5 | 15.2 | 25.1 | 12.3 | 6.2 | 41.3 |

Notes: 100 million baht increase in final demand or export (unit: million baht).
X = Total production, W = Wages and Salaries, OS = Operating Surplus, DP = Depreciation, TAX = Indirect taxes less subsidies, M = Import
Source: Author's calculation based on seven noncompetitive-import type input-output tables of Thailand.

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Sector 14 = Utilities
Sector 15 = Construction
Sector 16 = Trade
Sector 17 = Transport
Sector 18 = Services
Sector 19 = Unclassified

### 4.4 Concluding Remarks

This chapter has discussed the potential of the agricultural sector and agro-industry, and performed two major analyses, which are the key sector analysis and the multiplier analysis. Results from the key sector analysis show the importance of the agricultural-related sectors as many of them ranked higher than the non-agricultural sectors. This means that investing more in these sectors will help to stimulate the economy better through the backward and forward linkage effects. Results from the multiplier effect analysis also show the strong multiplier effects from the agricultural-related sectors. These results confirm that growth of the Thai economy lies in the potential of the country's agricultural-related sectors, especially high value-added agricultural sectors and agro-industry.

Both the size effect (high share in export and GDP) and the per-unit-of-value-added effect (high linkage and multipliers) of the agricultural-related sectors should produce remarkable growth if they are seriously promoted. On the contrary, non-agricultural manufacturing sectors may have high output growth, but most of them have neither an impressive linkage effect nor multiplier effects. Its domestic up-stream industries are not well-developed and it relies too much on imported inputs. Limits in ability to develop manufacturing industrial technology will reduce Thailand's potential to compete for the near future. Therefore, non-agricultural manufacturing sectors cannot be relied on as a sustainable engine of growth in the Thai economy as long as these conditions still remain. Moreover, Thailand's current development strategy based on manufacturing industrial sectors is not yet sustainable since it does not generate a healthy structural transformation, that is a transformation which creates smooth employment transformation, relatively equal income distribution, less dependent on imports, and abilities to improve technology and productivity. However, this statement does not oppose the development of manufacturing industrial sectors which are technology-based, knowledge-based, and not overly dependent on imports.

These findings suggest the option is now open for Thailand to become a NIE basing its growth strategies on the development of agro-industry and agricultural-related sectors, especially in the rural areas. Technological development in agricultural-related sectors should be easy for Thailand to improve if promotions are given. Thai agricultural-related sectors have potential to induce growth through their export and their high demand for domestic intermediate inputs. As in the long-run Thailand aims to be an industrialized country, and in the short-run agricultural development is needed to lift up rural poverty, agro-industry can be a bridge connecting these two phases. Agro-industry can then be promoted in the rural areas. If labor is reallocated from primary agriculture to agro-industry, the real wage of agricultural workers would increase due to their higher productivity of labor when it becomes less abundant. The wage rate in the recipient sector is projected to decline but not excessively. Moreover, if capital is reallocated from urban industries to rural agriculture or rural agro-industry, the capital productivity in rural areas would increase because capital is scarce there. The total capital productivity should be maintained or even become higher through the higher capital productivity in rural areas. As increased capital intensity and the dynamics of food production itself will raise the real wage for agricultural-related workers, this will not only equalize real wages of urban and rural workers, but also allow Thailand to maintain the same speed of economic growth. The development of agricultural sectors should be seriously considered as a new development strategy through establishing new agro-industry in the rural areas. The potential of this new development strategy will be examined in the next chapter with the help of a computable general equilibrium (CGE) model because the SAM and the input-output analyses have weaknesses in conducting real world analysis since they do not incorporate relative price movements and their input coefficients are always fixed. Moreover, they cannot explicitly examine the effects resulting from factor input movements that should be tested under the proposed new development strategy.

# Chapter V— Proposing A New Development Strategy—Labor Allocation to Agro-Industry

***Chapter Outline***

***********************

This chapter proposes a new development strategy to reallocate primary agricultural workers to agro-industry. Since the structural transformation in terms of employment and income distribution in Thailand is happening quite slowly, the objective of this strategy is to improve the real wage of agricultural workers by channeling them into other productive sectors. Agro-industry is selected as the destination sector because it has the best intersectoral linkages as tested in the previous chapter. By imposing this strategy, the real wage in primary agriculture should increase due to the higher productivity of labor when it becomes less abundant. The wage rate in the recipient sector is projected to decline but not excessively. Since agro-industry's production technology is closely related to that of the agricultural sector, it should be easy to shift primary agricultural workers into agro-industry. Moreover, since agro-industry has very strong interindustrial linkages as evidenced in the previous chapter, at least the same speed of growth should be maintained when applying this labor allocation strategy. This labor allocation strategy will be tested using a Computable General Equilibrium (CGE) model. Other kinds of policy simulations related to the new development strategy will also be experimented under the same model, such as simulations on capital allocation, tax and subsidy incentives, protective policies, government expenditures and transfers, price movements in rest-of-world, exchange rate policies, and improvements in production technology. The reason the CGE analysis is used to test this new strategy is elaborated in Section 5.1. Section 5.2 discusses previous CGE models of Thailand. Section 5.3 elaborates features of the CGE model of Thailand used in this study and explains the simulations design and simulation results. Section 5.4 summarizes the distributional impacts on labor demand, wage rate in primary agriculture, and household incomes of all simulations. The last section will conclude the analysis of this strategy.

**5.1 Objective of the CGE Analysis on the Thai Economy**

In the previous SAM and input-output analyses in Chapter IV, we have found that the agricultural-related sectors, to be specific, the high value-added agricultural sectors such as livestock and agro-industry are the promising sectors which give highest multiplier effects and linkage effects. These sectors have served as an engine of growth for the Thai economy in the past and present, and should be able to do so in the future.

However, although we can be sure of the potential of these promising agricultural sectors, we are in doubt about the economic environments and policies which can facilitate their growth. As described in Chapter II and III, Thai governments' development policies have long focused on the country's structural transformation from a primary agricultural-based country to an advanced manufacturing industrial-based one. The objective itself is reasonable, but the process does not occur so smoothly and the results, in terms of poverty reduction and income distribution, are not so satisfactory. Our hypothesis set earlier to solve this problem is to move primary agricultural labor out of this sector into other production sectors. The previous SAM and input-output analyses show clearly that agro-industry and high value-added agricultural sectors are the promising and more sustainable ones, in terms of the less dependency on imported inputs, for promotion over other non-agricultural manufacturing industrial sectors. However, the SAM and the input-output analyses cannot explicitly examine the effects resulting from factor input movements (labor and capital) that we want to test in our hypothesis of the proposed new development strategy. This is because the SAM and the input-output analyses are not good tools to deal with factor input and relative price movement issues. This job is therefore left to the CGE model, though the SAM and the input-output analyses are very good to test the effects resulting from quantity change. We therefore rely on the simulation results from the SAM and the input-output analyses on effects from the quantity demand increase (from rest-of-world and the government) in the previous chapter.

The CGE model will be used to, firstly, test the impacts from the factor input movements. Simulations on labor allocation and capital allocation will be conducted. However, since the labor movement simulation is not applicable as a real policy implementation, other kinds of simulations related to our strategy and are policy-applicable must also be conducted. These policies can be related to the relative price movements to create incentives for producers to act in the real economy. These simulations are the capital allocation policy, the tax and subsidy incentive policies, the protective policies, the exchange rate policy, the improvement in production technology policy, and the change in rest-of-world environment such as the change in export and import prices. In addition, simulations related to the government expenditures, which are increases in government demand for specific products and government transfers to specific household groups, will also be tested since they are directly applicable as policies related to the income distribution issue.

## 5.2 Literature Survey of CGE Models of Thailand

Computable General Equilibrium (CGE) models are a class of economy-wide models that incorporate macroeconomic behaviors widely used in policy analysis. The term "computable" refers to the fact that the model solution can be computed, a prerequisite when a model is used for applied purposes. A general equilibrium model explicitly recognizes that an exogenous change (in policy or from some other sources, such as world markets) that affects any one part of the economy can produce repercussions throughout the system. General equilibrium model are preferable to partial equilibrium models for understanding the impact of exogenous shocks. Mathematically, a standard CGE model consists of a set of simultaneous nonlinear equations. Economically, its starting point is Walras' neoclassical world. However, CGE models used for applied policy analysis tend to deviate considerable from this starting point, incorporating a relatively large amount of detailed real-world structure (Löfgren 2003: 1). This kind of applied, real-world policy analysis is based on the structuralist approach taking into account structural characteristics of developing countries and questioning the applicability of orthodox neoclassical economics to these countries.

There are a number of CGE models and analyses on Thailand produced by various institutions and authors. However, most of them focus on trade, change in fiscal policy, exchange rate movement, structural change, and foreign direct investment (FDI) issues. The objective of the CGE analyses in this study is, however, different from the previous ones. The CGE model for this analysis aims to analyze impacts from and on the factor input allocations as discussed in section 5.1.

The historical development of the CGE models for Thailand is presented as follows. First, we discuss the major, well-known CGE model patterns for the Thai economy developed for various policy simulations. Next, specific studies that applied CGE models, which are relevant to this study, will be reviewed.

Grais (1981) developed a CGE model for Thailand called “SIAM1” based on a SAM to analyze the adjustments of the economy after the second oil shock (1979) over the period 1980-1990. Drud, Grais, and Vujovic (1982) adjusted SIAM1 slightly and used it to analyze the effects of a structural adjustment loan to Thailand in terms of the macroeconomic implication of alternative packages of policy measures and of other changes which might affect the Thai economy.

Taylor and Rosensweig (1984) designed the first CGE model for Thailand which includes the financial sector to examine the impacts of fiscal and monetary policies and of currency devaluation.

In the early 1990s, a CGE model for Thailand called “CAMGEM” [47] was developed to analyze policy impact (comparative static analysis) and for forecasting. CAMGEM has been applied in several policy studies in Thailand including Arunsmith and Trirut (1995), Arunsmith (1997a), Arunsmith (1997b), Arunsmith (1998), Arunsmith (1999), and Siksamat (2002)[48]. The applications of CAMGEM have been concentrated in the area of international trade policies. It was also used to assess the pattern of changes in structural variables such as technological changes, changes in preferences and changes in other observable variables in Thailand.

Another CGE model for Thailand called “PARA”[49] makes use of 1985 input-output data and was designed to address microeconomic policy issues in Thailand. It incorporated a highly disaggregated and detailed representation of the Thai economy. PARA provided a major

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[47] CAMGEM stands for Chulalongkorn and Monash Universities General Equilibrium Model, which is a product of joint effort between Faculty of Economics, Chulalongkorn University of Thailand and Center of Policy Studies (COPs), Monash University of Australia during 1991-1993. CAMGEM is closely related to ORANI, the internationally well-known CGE model of the Australian economy.

[48] Siksamat (2002)’s model is called GEM-H, which is patterned from CAMGEM-H.

[49] PARA stands for Protection Areas of Regional Agriculture, which was developed through the collaboration between the Office of Agriculture Economics, Ministry of Agriculture and the Australian National University.

contribution by incorporating the results of a large econometric research program directed toward estimating the economic behavioral parameters underlying the model based on the Thai data. It was used to analyze the effects of Thailand's protection policy (reduced protection under the Uruguay round of the General Agreement on Tariffs and Trade (GATT)) on the economy, particularly on the agricultural sector at the regional level, and on the distribution of income, and welfare (Siksamat 1998a, 1998b).

The most recent CGE model developed for Thailand is "GEMREG",[50] which is developed from ORANI and ORANI-F models. GEMREG is a multi-regional general equilibrium model of the Thai economy, which makes it different from other existing Thai CGE models. The GEMREG model contains two main parts. The first part is a national model and the second part is a regional equation system. Policy shocks are first imposed on the national model, after that the outcomes, which are projected by the national model, are allocated to the regions.

Other empirical studies using CGE models to simulate the Thai economy and related to this study are observed as follows.

Nitsmer (1992) used CGE analysis to examine the impacts of agricultural-led development on economic growth and income distribution in Thailand. Agricultural-led development was defined in model specification as simultaneous increases in agricultural productivity and government investment in agriculture, and a reduction in export taxes. Base period data used for simulations was year 1980. This study found that when world prices for agricultural commodities were assumed to be lower than in the base period, agricultural-led development sustained agricultural growth, but income distribution shifted in favor of urban households. Alternatively if world prices for agricultural commodities were assumed to be higher than in the base period, then again this strategy increases economic growth, but income

[50] GEMREG is abbreviated from "General Equilibrium Model" and "Regional"

distribution shifted in favor of rural households in the models. Results of the simulations showed that an agricultural-led development strategy was plausible for Thailand under the conditions prevailing in the early 1980s.

Wongwatanasin (1999) developed a consistent SAM and CGE model for Thailand in order to establish quantitatively the dimensions of the effects of industrial polices on particular industries, and on the Thai economy as a whole, under alternative tax transfer (replacement) policies for output, trade flows, and income distribution. The model results revealed that industrial policy enhances both economic efficiency and income equality, given appropriate government policies. Although more evidence is needed to decide which industry and tax policy was best for Thailand, the results showed clearly that the choice of an industry and a government tax policy mattered in the trade-off between economic efficiency and distributional equality. The social cost of industrial policy could be reduced by the proper industrial and fiscal policy decision. The model results revealed that industrial targeting of the 1980s strengthened the trade flows of intermediate and capital goods industries, but weakened the trade flows of other industries. Thus, industrial policy has been a contributing factor in the evolution of Thai industrial structure and trade patterns. However, the magnitudes of changes in the composition of output induced by industry-specific policies have been relatively small, implying that the industrial policy has had little input in driving growth. The model results also indicated that the industrial policy during the 1980s clearly coincided with a rising disparity in income distribution in Thailand’s outward-oriented phase. However, the trend of income distribution from the period 1981-85 appeared to have improved as the policy moved toward trade and industrial liberalization.

## 5.3 Simulating the New Strategy on the Thai Economy—A CGE Analysis

This section presents features of the real sector CGE model for the Thai economy used in the analysis. The model, which is broken down into blocks, is discussed in Section 5.3.2 with the full list of model equations and variables presented in Section 5.3.2.1. Section 5.3.3 discusses the equilibrium conditions and the model calibration. Section 5.3.4 discusses the simulation design and the simulation results.

### 5.3.1 Model Specification

The CGE model developed to use for policy analysis of Thailand is a standard CGE model for an open economy, developed by Hans Löfgren of the International Food Policy Research Institute (IFPRI).[51] The model is run by using GAMS (General Algebraic Modeling System) software which is specifically designed for modeling linear, nonlinear and mixed integer optimization problems, and is useful with large, complex modeling problems.[52] The mathematical statements and the GAMS codes for this model follow the standard notation used in CGE models developed in IFPRI's Trade and Macroeconomic Division. All endogenous variables are written in uppercase Latin letters, whereas parameters (including variables with fixed or exogenous values) have lower-case Latin or Greek letters. Subscripts refer to set indexes, with one to three letters per index. Superscripts are part of the parameter name (that is, not an index). In terms of letter choices, variables and parameters for commodity and factor *quantities* start with the letter *q*; for commodity and factor *prices*, the first letters are *p* and *w*, respectively.

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[51] Löfgren, Hans. 2003. *Exercises in General Equilibrium Modeling Using GAMS (and Key to Exercises in CGE Modeling Using GAMS).* Washington DC: International Food Policy Research Institute.
[52] See www.gams.com for details of the software.

### 5.3.2 The Real Sector in Standard CGE model

The standard CGE model of Thailand built for this study comprises the Price block, the Production and Commodity block, the Institution block, and the System Constraint block. Most of the model explanations in this and the next sections follow Löfgren (2003).

The model uses the data from 1998 SAM of Thailand produced by Jennifer Chung-I Li from the University of North Carolina at Chapel Hill and IFPRI (2002). The original SAM is disaggregated into 61 productive sectors with a total of 78 accounts. For this CGE model, productive sectors are aggregated into six activities and associated commodities which are: primary agriculture (PRIMA),[53] agro-industry (AINDUS),[54] other industries (MANU),[55] utility and construction (UTICON),[56] trade and transport (TRADE),[57] and services (SER).[58]

The three household groups (agricultural (A-HHD), government-employed (G-HHD), and non-agricultural (N-HHD)) remained the same as in the original SAM. The government-employed household is distinguished because it is considered an important household type with a quite significant number in employment (ranging from 7.5 to 9.5 percent of total labor force in 2001-2003 depends on quarters).[59] They are also the household group, other than the non-agricultural households, which benefit from the lower food costs maintained by the governments in order to reduce the need to increase pay for civil servants. Government-employed households represent a household group whose income is relatively neutral.

[53] Primary agriculture account comprises paddy, other crops, vegetable and fruits, other raw agricultural products, livestock, fishing, forestry, coal and lignite, crude petroleum, natural gas, and other mining.
[54] Agro-industry account comprises rice and flour, meat, canned food, other food, other agricultural products, beverage, and tobacco.
[55] Other industries account comprises gasoline, diesel, aviation fuel, fuel oil, textiles, apparel, leather and footwear, wood products, furniture, paper, printing and publishing, basic chemicals, plastic and rubber, non-metal products, basic metals, fabric metals, machines, electrical manufacturing, transport equipment, and other industries.
[56] Utility and construction account comprises electricity, gas distribution, water, and construction.
[57] Trade and transport account comprises retail trade, land transportation, ocean transportation, inland water transportation, air transportation, and other transportation.
[58] Services account comprises restaurants, hotels, communication, banking, insurance, real estate, business services, public administration, education, healthcare and medical, nonprofit organizations, recreation, repairs, and personal services.
[59] Data from National Statistical Office's report of the Labor force Survey 2001-2003 (Table 4).

Two factors of production (labor (LAB) and capital (CAP)) are arranged for the model by combining the original two kinds of capital factor (agricultural capital and non-agricultural capital) in the SAM. The aggregation of capital accounts is done for the simplicity of the model and because the aggregation should not affect the assigned simulations.

Other institution accounts used in the model are the same as in the original SAM. There are two kinds of enterprises (public (ENT-G) and private (ENT-P) enterprises), four accounts for the government which includes the government itself (GOV) and three kinds of tax accounts (income tax (YTAX), indirect tax (ITAX), and tariff (TAR)), one saving-investment account (capital account (S-I)), and one rest-of-world account (ROW).

Note that there are some adjustments on the entries in this 1998 SAM as some entries are not at all meaningful. One of them is the entry in agricultural household's expenditure on labor. This entry does not have a meaning in standard SAM as households usually do not pay for labor use but are the income receivers of their labor supply. This discrepancy value is small and can be adjusted easily by dropping this entry and balancing the SAM in the entry of agricultural household's labor income. Another adjustment is to combine the rows (and columns) of S-I and stock accounts together as the new S-I account. The last adjustment is to combine the entries in government incomes from households and enterprises (in GOV row) with the entries of household income tax and corporate tax paid to the government (in YTAX row). It is not reasonable to have entries in both GOV and YTAX rows from households and enterprises' columns since only one of them should represent the income tax. The discrepancy is adjusted in the entry of government income from YTAX.

# Table 5.1—Aggregated 1998 SAM for the CGE Model of Thailand

Values in million baht

| SECTORS | PRIMA-A | AINDUS-A | MANU-A | UTICON-A | TRADE-A | SER-A | PRIMA-C | AINDUS-C | MANU-C | UTICON-C | TRADE-C | SER-C | LAB | CAP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRIMA-A | | | | | | | 1148980 | | | | | | | |
| AINDUS-A | | | | | | | | 1362878 | | | | | | |
| MANU-A | | | | | | | | | 4326345 | | | | | |
| UTICON-A | | | | | | | | | | 719513 | | | | |
| TRADE-A | | | | | | | | | | | 1677846 | | | |
| SER-A | | | | | | | | | | | | 2132057 | | |
| PRIMA-C | 92547 | 362524 | 235059 | 49682 | 345 | 129329 | | | | | | | | |
| AINDUS-C | 46025 | 376244 | 23525 | 0 | 769 | 107806 | | | | | | | | |
| MANU-C | 190389 | 111879 | 2182141 | 207441 | 237283 | 169137 | | | | | | | | |
| UTICON-C | 21025 | 30164 | 130647 | 36930 | 33616 | 123720 | | | | | | | | |
| TRADE-C | 105951 | 110589 | 508591 | 88207 | 162183 | 126278 | | | | | | | | |
| SER-C | 66878 | 52249 | 275907 | 42413 | 241219 | 203525 | | | | | | | | |
| LAB | 190729 | 95787 | 362888 | 136124 | 135758 | 536704 | | | | | | | | |
| CAP | 421771 | 132049 | 500270 | 142260 | 835148 | 670803 | | | | | | | | |
| A-HHD | | | | | | | | | | | | | 202476 | 297923 |
| G-HHD | | | | | | | | | | | | | 425463 | 64894 |
| N-HHD | | | | | | | | | | | | | 830051 | 1237662 |
| ENT-G | | | | | | | | | | | | | | 124496 |
| ENT-P | | | | | | | | | | | | | | 897921 |
| GOV | | | | | | | | | | | | | | 79405 |
| YTAX | | | | | | | | | | | | | | |
| ITAX | 13665 | 91393 | 107317 | 16456 | 31525 | 64755 | 9235 | 6355 | 68802 | 93 | | 4003 | | |
| TAR | | | | | | | 1963 | 6117 | 50099 | 6 | | 3852 | | |
| S-I | | | | | | | | | | | | | | |
| ROW | | | | | | | 161597 | 83843 | 1432424 | 3784 | 71078 | 249579 | | |
| TOTAL | 1148980 | 1362878 | 4326345 | 719513 | 1677846 | 2132057 | 1321775 | 1459193 | 5877670 | 723396 | 1748924 | 2389491 | 1457990 | 2702301 |

## Table 5.1—Aggregated 1998 SAM for the CGE Model of Thailand (Cont.)

| SECTORS | A-HHD | G-HHD | N-HHD | ENT-G | ENT-P | GOV | YTAX | ITAX | TAR | S-I | ROW | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRIMA-A | | | | | | | | | | | | 1148980 |
| AINDUS-A | | | | | | | | | | | | 1362878 |
| MANU-A | | | | | | | | | | | | 4326345 |
| UTICON-A | | | | | | | | | | | | 719513 |
| TRADE-A | | | | | | | | | | | | 1677846 |
| SER-A | | | | | | | | | | | | 2132057 |
| PRIMA-C | 70608 | 27668 | 113860 | | | 831 | | | | 15633 | 223689 | 1321775 |
| AINDUS-C | 189171 | 92511 | 356467 | | | 55 | | | | -24282 | 290902 | 1459193 |
| MANU-C | 177269 | 86691 | 334041 | | | 22112 | | | | 493031 | 1666256 | 5877670 |
| UTICON-C | 9787 | 4787 | 18445 | | | 7364 | | | | 295545 | 11366 | 723396 |
| TRADE-C | 34720 | 42795 | 165657 | | | 13136 | | | | 100926 | 289891 | 1748924 |
| SER-C | 114914 | 141634 | 548255 | | | 457207 | | | | 3675 | 241615 | 2389491 |
| LAB | | | | | | | | | | | | 1457990 |
| CAP | | | | | | | | | | | | 2702301 |
| A-HHD | | | | | | 11443 | | | | | 19820 | 531662 |
| G-HHD | | | | | | 2945 | | | | | 3826 | 497128 |
| N-HHD | | | | | | 36068 | | | | | 35199 | 2138980 |
| ENT-G | | | | | | | | | | | | 124496 |
| ENT-P | 1011 | 13903 | 28848 | | | 18976 | | | | | 78981 | 1039640 |
| GOV | | | | | | | 276736 | 413599 | 62037 | | 20677 | 852454 |
| YTAX | 2576 | 41166 | 94444 | 34199 | 104351 | | | | | | | 276736 |
| ITAX | | | | | | | | | | | | 413599 |
| TAR | | | | | | | | | | | | 62037 |
| S-I | -68394 | 45973 | 478963 | 90297 | 632621 | 281451 | | | | | 390300 | 1851211 |
| ROW | | | | | 302668 | 866 | | | | 966683 | | 2882222 |
| TOTAL | 531662 | 497128 | 2138980 | 124496 | 1039640 | 852454 | 276736 | 413599 | 62037 | 1851211 | 2882222 | |

Source: Aggregated from the original SAM of Li, Jennifer Chung-I. 2002. *A 1998 Social Accounting Matrix (SAM) for Thailand: TMD Discussion Paper No. 95.* Washington DC: International Food Policy Research Institute.

#### 5.3.2.1 List of Equations and Variables

The Standard CGE Model of the Thai Economy (1998)

**Sets**

| | |
|---|---|
| $a \in A$ | activities |
| $c \in C$ | commodities |
| $c \in CM$ ($\subset C$) | imported commodities (all) |
| $c \in CE$ ($\subset C$) | exported commodities (all) |
| $f \in F$ | factors |
| $h \in H$ ($\subset ID$) | households |
| $ent \in ENT$ ($\subset ID$) | enterprises |
| $i \in ID$ ($\subset I$) | institutions (ID = domestic institutions except government = households and enterprises; I = households, enterprises, government and rest of world) |

**Parameters**

| | |
|---|---|
| $ad_a$ | production function efficiency parameter |
| $aq_c$ | shift parameter for composite supply (Armington) function |
| $at_c$ | shift parameter for output transformation (CET) function |
| $capital_a$ | net capital stock at 1998 cost (million baht) |
| $costgap_{fa}$ | gap calibrated factor cost-SAM value (should be zero) |
| cpi | consumer price index |
| $cwts_c$ | commodity weight in CPI |
| finv | Thailand's investment abroad |
| $ica_{ca}$ | quantity of c as intermediate input per unit of activity a |
| $int_{ent,h}$ | rate of interest and insurance payments from household to enterprises |
| $labor_a$ | quantity of labor employed by activity (no. of workers in million persons) |
| $pwe_c$ | export price (foreign currency) |
| $pwm_c$ | import price (foreign currency) |
| $qg_c$ | government commodity demand |
| $qinvbar_c$ | base-year investment demand |
| $shryid_{id,f}$ | share for domestic institutions except government in income of factor f |

| | |
|---|---|
| $tcap_f$ | rate of profit tax (tax on capital income) |
| $te_c$ | export tax rate |
| $tent_{ent}$ | rate of corporate tax |
| $tia_a$ | value-added tax rate (indirect tax) |
| $tic_c$ | sales tax rate (indirect tax) |
| $tm_c$ | import tax rate |
| $tr_{i,i'}$ | transfer from institution i' to institution i |
| $ty_h$ | rate of household income tax |
| $wfa_{fa}$ | wage (rent) for factor f in activity a (only for calibration) |
| $\alpha_{fa}$ | value-added share for factor f in activity a |
| $\beta_{ch}$ | share of commodity c in the consumption of household h |
| $\delta_c^q$ | share parameter for composite supply (Armington) function |
| $\delta_c^t$ | share parameter for output transformation (CET) function |
| $\theta_{ac}$ | yield of commodity c per unit of activity a |
| $\rho_c^q$ | exponent ($-1< \rho_c^q < \infty$) for composite supply (Armington) function |
| $\rho_c^t$ | exponent ($1< \rho_c^t < \infty$) for output transformation (CET) function |
| $\sigma_c^q$ | elasticity of substitution for composite supply (Armington) function |
| $\sigma_c^t$ | elasticity of transformation for output transformation (CET) function |

**Variables**

| | |
|---|---|
| EG | government expenditure |
| EXR | foreign exchange rate (domestic currency per unit of foreign currency) |
| $ENTSAV_{ent}$ | savings of enterprises |
| FSAV | foreign savings |
| IADJ | investment adjustment factor |
| $MPS_h$ | share of disposable household income to savings |
| $PA_a$ | activity price |
| $PD_c$ | domestic price of domestic output |
| $PE_c$ | export price (domestic currency) |
| $PM_c$ | import price (domestic currency) |
| $PQ_c$ | composite commodity price |

| | |
|---|---|
| $PVA_a$ | value-added price |
| $PX_c$ | producer price |
| $QA_a$ | activity level |
| $QD_c$ | quantity of domestic output sold domestically |
| $QE_c$ | quantity of exports |
| $QF_{fa}$ | quantity demanded of factor f by activity a |
| $QFS_f$ | supply of factor f |
| $QH_{ch}$ | quantity of consumption of commodity c by household h |
| $QINT_{ca}$ | quantity of intermediate use of commodity c by activity a |
| $QINV_c$ | quantity of investment demand |
| $QM_c$ | quantity of imports |
| $QQ_c$ | quantity supplied to domestic commodity demanders (composite supply) |
| $QX_c$ | quantity of domestic output |
| WALRAS | dummy variable (zero at equilibrium) |
| $WF_f$ | average wage (rental rate) of factor f |
| $WFDIST_{fa}$ | wage distortion factor for factor f in activity a |
| $YENT_{ent}$ | income of enterprises |
| $YF_f$ | income of factor f |
| $YFID_{id,f}$ | transfer of income to domestic institutions except govt from factor f |
| YG | government revenue |
| $YH_h$ | household income |

## Equations

### *Price block*

(1) Import Price

$$PM_c = (1 + tm_c) \cdot EXR \cdot pwm_c \qquad c \in CM$$

(2) Export Price

$$PE_c = (1 - te_c) \cdot EXR \cdot pwe_c \qquad c \in CE$$

(3) Absorption

$$PQ_c \cdot QQ_c = [PD_c \cdot QD_c + (PM_c \cdot QM_c)_{|c \in CM}] \cdot (1 + tic_c) \qquad c \in C$$

(4) Domestic Output Value

$$PX_c \cdot QX_c = PD_c \cdot QD_c + (PE_c \cdot QE_c)_{|c \in CE} \qquad c \in C$$

(5) Activity Price

$$PA_a = \sum_{c \in C} PX_c \cdot \theta_{ac} \qquad a \in A$$

(6) Value-added Price

$$PVA_a = PA_a \cdot (1 - tia_a) - \sum_{c \in C} PQ_c \cdot ica_{ca} \qquad a \in A$$

***Production and Commodity Block***

(7) Activity Production Function

$$QA_a = ad_a \cdot \prod_{f \in F} QF_{fa}^{\alpha_{fa}} \qquad a \in A$$

(8) Factor Demand

$$WF_f \cdot WFDIST_{fa} = \frac{\alpha_{fa} \cdot PVA_a \cdot QA_a}{QF_{fa}} \qquad f \in F,\ a \in A$$

(9) Intermediate Demand

$$QINT_{ca} = ica_{ca} \cdot QA_a \qquad c \in C,\ a \in A$$

(10) Output Function

$$QX_c = \sum_{a \in A} \theta_{ac} \cdot QA_a \qquad c \in C$$

(11) Composite Supply (Armington) Function

$$QQ_c = aq_c \cdot (\delta_c^q \cdot QM_c^{-\rho_c^q} + (1 - \delta_c^q) \cdot QD_c^{-\rho_c^q})^{-1/\rho_c^q} \qquad c \in CM$$

(12) Import-Domestic Demand Ratio

$$\frac{QM_c}{QD_c} = \left( \frac{PD_c}{PM_c} \cdot \frac{\delta_c^q}{1 - \delta_c^q} \right)^{1/1+\rho_c^q} \qquad c \boxtimes CM$$

(13) Output Transformation (CET) Function

$$QX_c = at_c \cdot ( \delta_c^t \cdot QE_c^{\rho_c^t} + (1 - \delta_c^t) \cdot QD_c^{\rho_c^t})^{1/\rho_c^t} \qquad c \boxtimes CE$$

(14) Export-Domestic Supply Ratio

$$\frac{QE_c}{QD_c} = \left( \frac{PE_c}{PD_c} \cdot \frac{1 - \delta_c^t}{\delta_c^t} \right)^{1/\rho_c^t - 1} \qquad c \boxtimes CE$$

***Institution Block***

(15) Factor Income

$$YF_f = \sum_{a \boxtimes A} WF_f \cdot WFDIST_{fa} \cdot QF_{fa} \qquad f \boxtimes F$$

(16) Institutional Factor Incomes

$$YFID_{id,f} = shryid_{id,f} \cdot [(1 - tcap_f) \cdot YF_f ] \qquad id \boxtimes ID,\ f \boxtimes F$$

(17) Household Income

$$YH_h = \sum_{f \boxtimes F} YFID_{hf} + tr_{h,gov} + EXR \cdot tr_{h,row} \qquad h \boxtimes H$$

(18) Household Consumption Demand

$$QH_{ch} = \frac{\beta_{ch} \cdot (1 - mps_h) \cdot (1 - ty_h) \cdot (1 - int_{ent,h}) \cdot YH_h}{PQ_c} \qquad c \boxtimes C,\ h \boxtimes H$$

(19) Enterprise Income

$$YENT_{ent} = \sum_{f \boxtimes F} YFID_{ent,f} + ( \sum_{h \boxtimes H} int_{ent,h} \cdot YH_h ) + tr_{ent,gov} + EXR \cdot tr_{ent,row} \qquad ent \boxtimes ENT$$

(20) Enterprise Expenditures

$$YENT_{ent} - (tent_{ent} \cdot YENT_{ent}) - EXR \cdot tr_{row,ent} = ENTSAV_{ent} \qquad ent \boxtimes ENT$$

(21) Investment Demand

$$QINV_c = qinvbar_c \cdot IADJ \qquad c \in C$$

(22) Government Revenue

$$YG = (\sum_{f \in F} tcap \cdot YF_f) + (\sum_{h \in H} ty_h \cdot YH_h) + (\sum_{ent \in ENT} tent_{ent} \cdot YENT_{ent})$$

$$+ (\sum_{c \in C} tic_c \cdot (PD_c \cdot QD_c + (PM_c \cdot QM_c)_{\mid c \in CE})$$

$$+ (\sum_{a \in A} tia_a \cdot (PA_a \cdot QA_a) + (\sum_{c \in CM} tm_c \cdot EXR \cdot pwm_c \cdot QM_c)$$

$$+ (\sum_{c \in CE} te_c \cdot EXR \cdot pwe_c \cdot QE_c) + EXR \cdot tr_{gov,row}$$

(23) Government Expenditures

$$EG = (\sum_{c \in C} PQ_c \cdot qg_c) + \sum tr_{h,gov} + \sum tr_{ent,gov} + \sum EXR \cdot tr_{row,gov}$$

***System Constraint Block***

(24) Factor Markets

$$\sum_{a \in A} QF_{fa} = QFS_f \qquad f \in F$$

(25) Composite Commodity Markets

$$QQ_c = \sum_{a \in A} QINT_{ca} + \sum_{h \in H} QH_{ch} + qg_c + QINV_c \qquad c \in C$$

(26) Current Account Balance for RoW (in Foreign Currency)

$$\sum_{c \in CE} pwe_c \cdot QE_c + \sum_{i \in I} tr_{i,row} + FSAV = \sum_{c \in CM} pwm_c \cdot QM_c + \sum_{i \in I} tr_{row,i} + finv$$

(27) Saving-Investment Balance

$$\sum_{h \in H} mps_h \cdot (1 - ty_h) \cdot (1 - int_{ent,h}) \cdot YH_h + (YG - EG)$$

$$+ (\sum_{ent \in ENT} YENT_{ent} - (tent_{ent} \cdot YENT_{ent}) - EXR \cdot tr_{row,ent}) + EXR \cdot FSAV$$

$$= \sum_{c \in C} PQ_c \cdot QINV_c + EXR \cdot finv + WALRAS$$

(28) Price Normalization

$$\sum_{c \in C} PQ_c \cdot cwts_c = cpi$$

### 5.3.2.2 The Price Block

Prices are defined and described in equations from one to six. The world prices of imports are treated exogenously in accordance with the small country assumption.[60] Equations 1 and 2 apply to imported and exported commodities, respectively.

For each commodity, absorption—total domestic spending on the commodity at domestic demander prices—is expressed as the sum of spending on domestic output and imports, including an upward adjustment for the sales tax. The fact that this condition holds follows from the linear homogeneity of the composite supply (Armington) function. In the Thai economy, all productive sectors have imported parts. The composite price, $PQ_c$, is paid by domestic demanders (household, the government, producers, and investors). The composite price, implicitly defined by Equation 3, could easily be derived by dividing through by $QQ_c$, the composite supply (further discussed in the Production and Commodity block).

For each commodity, domestic output value at producer prices is stated as the sum of the value of domestic output sold domestically and the export value (in domestic currency). Equation 4 reflects the fact that the CET (constant-elasticity-of-transformation) function (Equation 13) is linearly homogenous. In the Thai economy, all productive sectors have the export parts. The producer prices, $PX_c$, can be derived by dividing through by $QX_c$, quantity of domestic output.

Activity price is producer prices times yield of commodity c per unit of activity a (Equation 5). Value added price is activity prices minus indirect taxes and input cost per activity unit (intermediate costs) (Equation 6).

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[60] Although in some major agricultural produce such as rice, Thailand may not be considered a price taker since the volume of Thai rice export in the world market is quite dominant.

### 5.3.2.3 The Production and Commodity Block

The model assumes that producers maximize profits subject to production functions, with primary factors as arguments. Cobb-Douglas function is used for producer technology. As in the real world, wages tend to be distorted in the broad sense that they differ across activities. A treatment that permits this variation (with no distortions as a special case) is to assume that wages are distorted for labor and capital, in a setting with full (or fixed) employment for both factors. The quantities of workers employed and the net capital stocks used in each sector are introduced by exogenous variables. There are no changes in the SAM associated with the change in the factor treatment. It is assumed that each activity pays an endogenous wage expressed as the product of an endogenous (economy-wide) wage variable (for the base equal to the average wage) and an exogenous distortion factor. For the special case of no distortion, the distortion factor is equal to one for all activities. In each factor market, variations in the average wage clear the market.

Factors are then demanded by producers at market-clearing prices (rents). The activity production function and the factor demand function are presented in Equations 7 and 8, respectively. Equation 9 presents the intermediate demand which is the function of activity level. Equation 10 is the output function for which domestic output is another kind of function of activity level.

The composite commodities in Equation 11 are used by all domestic demanders. Imports and domestic output sold domestically are assumed to be imperfect substitutes and are captured by a CES (constant elasticity of substitution) aggregation function. Economically, this means that demander preferences over imports and domestic output are expressed as a CES function. This function is often called an Armington function after the originator of the idea of using a CES function for this purpose. The restriction on the value of $\rho_c^q$ ($-1 < \rho_c^q < \infty$) assures that the corresponding isoquant is convex to the origin, in terms of production economics equivalent to a diminishing technical rate of substitution. Equation 12 defines the optimal mix between imports and domestic output. Its domain is also limited to imported commodities. Together, Equations 3, 11, and 12 constitute the first-order conditions for cost-minimization given the two prices and subject to the Armington function and a fixed quantity of the composite commodity.

Similarly for producers, imperfect transformability is assumed between exports and domestic output sold domestically. The latter is captured by Equation 13. The treatment of export supply is based on a CET (constant elasticity of transformation) function. The CET function is identical to a CES function except for negative elasticities of substitution. The isoquant corresponding to the output transformation function will be concave to the origin given the restriction imposed on the value of $\rho_c^t$ ($-1 < \rho_c^t < \infty$). In economic terms, the difference between the Armington and CET function is that the arguments in the former are inputs, those in the latter are outputs. Equation 14 defines the optimal mix between exports and domestic sales. Equations 4, 13, and 14 constitute the first-order conditions for maximization of producer revenues given the two prices (export and domestic) and subject to the CET function and a fixed quantity of domestic output.

Imperfect substitutability and transformability may arise from differences in physical quality, differences in time and place of availability, and from aggregation biases. This treatment tends to generate more realistic responses by domestic prices, production, and consumption to changes in international prices. One important difference between the equations for import demand (12) and export supply (14) is that the quantity demanded of the imported commodity ($QM_c$) is inversely related to the import price, whereas the quantity supplied of the exported commodity ($QE_c$) is directly related to the export price.

#### 5.3.2.4 The Institution Block

Equation 15 defines the factor incomes of household and enterprise come from the factors demanded by activities with distorted wages. Equation 16 generates factor incomes to each institution according to their shares in factor income. For capital income, it is generated after subtracting the payment of tax on capital (profits). All labor income flows to households only. The capital income flows to both households and enterprises.

The model assumes that households maximize utility subject to budget constraints. Cobb-Douglas function is used for the utility functions from which household consumption demands are derived. Household income from Equation 17 consists of factor incomes, government transfers, and remittance from abroad. Household expenditure comprises personal income tax, and interest (or insurance) payments to enterprises. Interest (or insurance) payment from households to enterprises is a fixed share of the gross income of each household. Income tax is a fixed share of the income of each household after subtracting the interest (or insurance) payment. A fixed share of post-tax income and interest (or insurance) payment is saved as the household saving rate ($MPS_h$) and is computed as the ratio between household savings and household disposable (post-tax, post-interest payment) income. The rest is then spent on consumption as in the household consumption demand in Equation 18.

Equation 19 defines the enterprise income as the income from non-distributed profit (income from capital), interest (or insurance) payment from households, and transfers from the government and abroad. Enterprises then pay corporate taxes to the government and make current transfers abroad. The residual is the enterprises' saving as shown in Equation 20.

The investment demand for commodities is defined by the base-year sectoral investment times the proportional change in investment quantity (adjustment factor) as shown in Equation 21.

In Equation 22, the government of the model earns its revenues from income tax, corporate tax, indirect taxes (value-added tax and sales tax), tax on capital, tariff, and transfer from the rest of the world (such as foreign grants). Value-added taxes are fixed shares of activity prices, and sales taxes are fixed shares of (mark-ups on) producer commodity prices. The government then spends it on consumption (with fixed quantity and paying market prices which includes the sales tax) and transfers to households, enterprises and the rest of the world, according to Equation 23. Government savings is computed as the difference between expenditures (excluding savings) and revenues.

Government transfers to the households and enterprises are CPI-indexed, that is, they can simply be fixed in nominal terms. Indexation to the CPI is automatic since the CPI level is fixed via the price normalization equation. If government transfers and/or the labor wage are fixed, the model is, strictly speaking, no longer homogenous of degree zero in prices. Multiplying government transfer payments and the labor wage (but not the capital wage) by CPI will maintain homogeneity.

One important part of government consumption, government payment for the labor services of its administrators and other employees, does not appear explicitly in the SAM. These government employees may be viewed as working for a government service activity that produces a commodity purchased by the government (institution) account. The government-service activity-commodity pair in the SAM is part of the services activity and its commodity.

#### 5.3.2.5 The System Constraint Block

This block defines the constraints that are satisfied by the economy as a whole without being considered by its individual agents. The model's micro constraints apply to individual markets for factors and commodities. With the few exceptions discussed below (for labor, capital, exports, and imports), it is assumed that flexible prices clear the markets for all commodities and factors. The macro constraints apply to the government, the saving-investment balance, and the rest-of-world. For the government, savings clear the balance, whereas the investment value adjusts to changes in the value of total savings. For the rest of the world, the alternatives of a flexible exchange rate or flexible foreign savings are permitted in the current formulation.

In the factor market equation, the demand for factor f is equal to the supply of factor f. The closure rules can be set according to each assigned simulation, that is the labor and capital can be unemployed with fixed, activity-specific real wages or they can be fully-employed and mobile across sectors. This is achieved by adjusting the following variables at base values: $WFDIST_{fa}$ (wage distortion factor), $WF_f$ (average wage), $QF_{fa}$ (quantity demanded for factor f), and $QFS_f$ (supply of factor f).

In the composite commodity market equation (Equation 25), the composite supply is equal to the composite demand which comprises the sum of intermediate use of commodity c by activity a, the households, government, and investment demands. This equilibrium condition imposes equality in the composite commodity market with the demand side represented by all types of domestic commodity use while the supply comes from the Armington function that aggregates imports and domestic output sold domestically. The variable $PQ_c$ clears this market. In addition to the composite commodity, the model includes quantity (and associated price) variables for the following commodities and activities: $QM_c$, $QE_c$, $QX_c$, $QD_c$, $QA_a$. These variables represent both the quantities supplied and demanded (that is, the equilibrium quantity has been substituted for the quantities supplied and demanded throughout the model). For exports and imports, the quantities demanded and supplied clear the markets (infinitely elastic world market demands and supplies at fixed foreign-currency prices). For the remaining three quantities, the associated price variables ($PX_c$, $PD_c$, and $PA_a$) serve the market-clearing role.

Equation 26 presents the current-account which is expressed in foreign currency. The equation imposes equality between the country's earning and spending of foreign exchange. Foreign saving is equal to the current-account deficit. However, for the case of Thailand in 1998, instead, Thailand's investment abroad (foreign investment) is equal to the current-account surplus. Careful counting of equations and variables in the current model would indicate that the number of variables exceeds the number of equations by one. This is related to the fact that the model includes two variables that may serve the role of clearing the current-account balance—the foreign exchange rate (EXR) and foreign savings (FSAV). In setting equilibrium conditions, one can either set EXR fixed or FSAV fixed according to the assigned simulations.

Equation 27 shows the saving-investment balance equation. Foreign savings is converted into domestic currency in this equation. As long as either the exchange rate or foreign savings is fixed, their presence does not influence the saving-investment closure of the model, according to which the savings value determines the investment value.

The last equation presents the price normalization that is the consumer price index (CPI) equal to the composite commodity price times commodity weight in CPI. This CPI is selected as a numeraire. Since CGE models determine only relative prices, it is necessary to select a numeraire to define the absolute price level. Since this CGE model of Thailand is homogenous in all prices, the selection of a numeraire is simply a matter of convenience, and does not affect simulation results. The advantage of fixing the consumer price index is that it allows the country model to determine all variables in real terms, that is all variables are being deflated by appropriate price indices.

### 5.3.3 The Equilibrium Conditions—Model Calibration

The model satisfies Walras' law in that the set of commodity market equilibrium conditions is functionally dependent. Any one of these conditions can be dropped. The proposed model drops the equilibrium condition for saving-investment equation. The model is homogenous of degree zero in prices. To assure that only one solution exists, a price normalization equation, in this case fixing the CPI, has been added. After these adjustments, the model has an equal number of endogenous variables and independent equations. Given this definition of the price normalization equation, all simulated price changes can be directly interpreted as changes via-à-vis the CPI. The explicit distinction between activities and commodities facilitates model calibration, and is needed for models that deviate from a one-to-one mapping between activities and commodities, that is, for models where at least one activity produces more than one commodity and/or at least one commodity is produced by more than one activity. A value of unity for all factor and commodity prices (that were initialized at this level) is a reliable indicator that the initial model solution replicates the initial equilibrium as captured by the initial SAM.

Saving-investment balance assumes that (a) household income is allocated in fixed shares to saving and consumption; (b) investment is saving-driven, that is, the value of total investment spending is determined by the value of saving; and (c) investment spending is allocated to the six commodities in a manner such that the ratio between the quantities are fixed. Together, assumption (b) and (c) mean that when savings values and/or the prices of investment commodities change, there is a proportional adjustment in the quantities of investment demand for each commodity, generating an investment value equal to the saving value.

Note that investment is defined in terms of the commodities used in the production of the capital stock, not the activity of destination (the activity that receives the investment goods as an addition to its capital stock). This means that the model only applies to a period so short that there is not enough time for new investments to provide additional production capacity. For a model relevant to a longer time period (for example a multi-period model), it would also be necessary to consider explicitly the resulting changes in capital shocks.

The set of equilibrium conditions that is functionally dependent now includes (a) the commodity market equilibrium conditions, (b) the current account balance, and (c) the saving-investment balance. It would be possible to drop one of these equations. However, another approach is selected that is to introduce a variable called WALRAS in the saving-investment balance. This approach is commonly used for this class of models. The model still has an equal number of variables and equations. If the model works, the saving-investment balance should hold, that is, the value of WALRAS should be zero.

The following sections discuss the estimation of parameters, elasticities, and closures used in the model.

#### 5.3.3.1 Parameters Estimation

Most parameters used in this CGE model of Thailand can be estimated based on the benchmark data from the 1998 SAM of Thailand. For convenience, physical units are defined so that all prices equal one. This implies that the benchmark data measures both real and nominal magnitudes. Only the numbers of employed workers in each sector, and the net capital stock of each sector have to be introduced from other sources. The numbers of employed workers are used to find the average wage of workers in each sector. The net capital stocks are used to find the average rent of capital in each sector. The data (in Table 5.2) on quantities of labor is obtained from the National Statistic Office (NSO) and the data on net capital stocks is obtained from the National Economic and Social Development Board of Thailand (NESDB) with one adjustment. The adjustment is on the value of net capital stock of agro-industry, for which the value is not officially reported but is included in the value of net capital stock of the manufacturing sector as a whole. The net capital stock of agro-industry is therefore extracted from the total manufacturing industrial sector's net capital stock according to its weight in manufacturing industrial sector's GDP in 1998 (23 percent).

Table 5.3 shows the share values of factor inputs as value-added in each activity ($\alpha_{fa}$), and Table 5.4 shows values of production function's efficiency parameters ($ad_a$). These values are obtained from the benchmark data of 1998 SAM, and are used in the Cobb-Douglas production function in the CGE model. $\alpha_{fa}$ is calculated from dividing each factor in each activity by the sum of all factors in that activity. The sum of $\alpha_{fa}$ of all factors (labor and capital) in each activity must equal one. Values of $ad_a$ are calculated from equation 7, where $ad_a = QA_a / \prod_{f \in F} QF_{fa}^{\alpha_{fa}}$. It can be seen from Table 5.4 that agro-industry and other industries have high value of $ad_a$ while primary agriculture's and other three nontradable sectors' $ad_a$ are quite low.

**Table 5.2—Quantity of Labor and Net Capital Stock in Each Sector, 1998**

| Sectors | Quantity of Labor (persons) | Net Capital Stock (million baht) |
|---|---|---|
| Primary Agriculture | 13,941,000 | 1,231,548 |
| Agro-Industry | 849,000 | 671,835 |
| Other industries | 3,396,000 | 2,249,187 |
| Utility and Construction | 1,822,000 | 1,682,992 |
| Trade and Transport | 5,175,000 | 4,466,341 |
| Services | 5,420,000 | 5,824,863 |
| Total | 30,603,000 | 16,126,766 |

Sources: Data on Quantities of Labor is adjusted from the data from NSO.
Data on Net Capital Stocks is adjusted from the data from NESDB.

**Table 5.3—Share of Factor Input as Value-Added in Each Activity ($\alpha_{fa}$)**

| | Primary Agriculture | Agro-industry | Other industries | Utility & Construction | Trade & Transport | Services |
|---|---|---|---|---|---|---|
| Labor | 0.311 | 0.420 | 0.420 | 0.489 | 0.140 | 0.444 |
| Capital | 0.689 | 0.580 | 0.580 | 0.511 | 0.860 | 0.556 |

**Table 5.4— Values of Production Function's Efficiency Parameters ($ad_a$)**

| Primary Agriculture | Agro-industry | Other industries | Utility & Construction | Trade & Transport | Services |
|---|---|---|---|---|---|
| 0.438 | 1.838 | 1.618 | 0.411 | 0.368 | 0.378 |

**5.3.3.2 Elasticities Estimation**

The values of Armington elascities are derived from the GTAP 6 data base due to the lack of time series data and the limit of empirical studies on elasticities estimation of Thai economy. The values of elasticities used in previous CGE models of Thailand were applied when Thailand posted quite a level of trade protection. Recently, Thailand has signed many bilateral and multilateral free trade agreements (FTA) with other countries, therefore it is assumed that the value of elasticities are changed according to the new trade environment. However, the elasticities cannot be based solely on guesstimation. It is therefore more reliable to introduce the Armington elasticities from the GTAP 6 data set to the model. Since the GTAP data set does not have the elasticities of transformation in CET export functions, these elasticities are derived from the empirical studies.[61]

[61] Such as, Nguyen (2003: 117), and Bhuvapanich (2002: 78).

**Table 5.5—Elasticities Used in the CGE Model of Thailand**

| Sectors | Elasticities of substitution between imported and domestic products (Armington Elasticities) | Elasticities of transformation in CET export functions |
|---|---|---|
| Primary Agriculture | 2.50 | 0.80 |
| Agro-Industry | 2.20 | 0.80 |
| Other industries | 2.80 | 0.80 |
| Utility and Construction | 2.35 | 0.80 |
| Trade and Transport | 1.90 | 0.80 |
| Services | 1.90 | 0.80 |

Source: Armington elasticities are from the GTAP 6 data base. CET elasticities are from Nguyen (2003: 117), Bhuvapanich (2002: 78).

**5.3.3.3 Closures Selection**

In this CGE model of Thailand, there is a total of four main closures as listed below. The selection of these closures depends on the assigned simulations. Which closures are used in which simulations is discussed in the section on simulation design.

1. Saving-Investment Closure
    1.1. Saving is investment-driven
    1.2. Investment is saving-driven
2. Capital Market Closure
    2.1. Capital is mobile and fully utilized
    2.2. Capital is mobile and underutilized (fixed rent)
    2.3. Capital is activity-specific and fully utilized
3. Labor Market Closure
    3.1. Labor is mobile and fully employed
    3.2. Labor is mobile and unemployed (fixed wages)

3.3. Labor is activity-specific and fully employed

4. Rest-of-World Closure

   4.1. Exchange rate is flexible

   4.2. Foreign savings is flexible

### 5.3.4 Simulation Design and Simulation Results

#### 5.3.4.1 Simulation Design

In this section, the CGE model discussed in the previous section will be employed to run various simulations which are related to the objective of our study. Since the CGE model used for this analysis is a static one, it does not incorporate the accumulation of capital stocks. Since this study does not focus on policies on investment, the dynamic model is dropped from the analysis. Factor input allocation policies addressed in the hypothesis will be examined in our simulations.

The base run is created based on the benchmark data from the 1998 SAM, the exogenous variables of quantity of labor and net capital stock in each sector, and the elasticities introduced. Although some simulations to be conducted in the following section will use different closures across scenarios, we can compare the results from all simulations based on the static feature of this model since the base run is always identical to the 1998 SAM.

A number of simulation scenarios will be performed to examine the impacts from our proposed strategy of labor allocation and other applicable policies as shown in Table 5.6. The closures suited for each scenario in the simulations are selected as listed in Table 5.7.

Simulations 1 to 4 are tested on the factor input allocations. Simulations on labor allocation and capital allocation will be conducted. In general, if the labor allocations are tested, the capital movement is set to be mobile and fully employed (capital market closure 2.1). Vice versa, if the capital allocations are tested, the labor movement is set to be mobile and fully employed (labor market closure 3.1).

However, since the labor movement simulations are not applicable as real policy implementations, other kinds of simulations related to our strategy must also be conducted. Simulations 5 to 7 simulate the tax and subsidy incentive policies. Sales tax ($tic_c$) will be exempted in agro-industry in Simulation 5 as an incentive under assumption that government will not collect sales tax on producers who are willing to hire more agricultural labor and expand their production in the rural areas.[62] Export subsidy ($-te_c$) will also be given to agro-industry in Simulation 6 as an incentive, and import tariff ($tm_c$) will be raised in agro-industry in Simulation 7 as a protection for this sector. The decentralization of agro-industry is one of our objectives to create a more equally distribution of income between rural and urban areas. Since we are not clear where the agro-industry would be located if promoted, but we want to encourage them to start business or move into the rural areas to prevent the problems of urban migration, and the new factories can also benefit from the closer sources of production inputs from primary agriculture. From the latest statistics (2004) on agro-industry's location (shown in Appendix F), the high-value added Thai agro-industries (marine product processing; vegetable and fruit processing; processed food from flour; processed tea, coffee, and sweets; food seasoning; and animal feed) were mostly clustered in the Bangkok metropolitan areas and the central region. Most of simple processing agro-industries (tea and tobacco leaves curing; agricultural produce basic processing; vegetable and animal oil; rice milling; and flour) were located in other regions. This feature of agro-industry allocation could lead to an imbalance development and problem of

[62] Although this cannot be strictly enforced in this simulation model.

urban migration if there is no policy control from the government.[63] Simulations 5 to 7 will also be conducted on other industries to compare results.

Note that the tax incentive policy should still be legal under the WTO framework if that policy is designed to create good impacts on regional development and create more even growth among regions. This provision is called the 'Special and Differential Treatment' under the GATT/WTO article.[64] The argument is that economic inequality could not be corrected by the application of equal measures, but rather through the adoption of a treatment which, by favoring some nations, would eventually lead to an effective and certain equalization (Espiell 1974, in Hoda and Gulati 2003: 3).

Simulations 8 and 9 are tested on government expenditures, which are increases in government demand for specific products and government transfers to specific household groups. They are simulated since they are directly applicable as policies related to the income distribution issue.

Simulations 10 and 11 are tested on the change in rest-of-world environments which are the export and import price changes. The shocks are given to world prices ($pwe_c$ and $pwm_c$) directly in these simulations.

Simulations 12 and 13 are tested on the exchange rate policy under assumption that the depreciated exchange rate is good for the agricultural sector, and the appreciated exchange rate is good for the manufacturing sector as discussed before in Chapter III, Section 3.1.2.1.

[63] Although the Thai government is currently promoting industrial clusters, this policy should not be promoted in such a way to hinder regional development.
[64] Detailed information is written in WTO document symbol WT/COMTD/W/77REV.1. The WTO secretariat has classified the Special and Differential Treatment (S&D) provisions according to a six-fold typology as: 1) Provisions aimed at increasing the trade opportunities of developing country members; 2) Provisions under which WTO members should safeguard the interests of developing country members; 3) Flexibility of commitments, of action, and use of policy instruments; 4) Transitional time periods; 5) Technical assistance; 6) Provisions relating to least developing countries (Hoda and Gulati 2003: 4-5).

Simulation 14 is tested on the improvement of production technology or productivity under assumption that this improvement helps in reducing or maximizing the use of factor inputs while expanding outputs.

Note that although the 1998 SAM of Thailand may be seen as an abnormal year since the Asian economic and financial crises happened in late 1997, the input-output table used for this 1998 SAM is adjusted from the input-output table of year 1995.[65] Therefore, the input-output coefficients in 1998 input-output table remain quite the same as those in the input-output table of year 1995. The main abnormality in the 1998 SAM may be seen in the rest-of-world and saving-investment accounts, as 1998 is the year that Thailand did not have current account deficit after long years of straight deficits in the 1990s before the crises. This is due to the severe depreciation of the Thai baht after the crises, which raised the value of Thai exports and made the products from Thailand more attractive (cheaper) in the world market. The total export value was then much higher than the total import value in 1998. However, Thailand had a severe problem of capital account balance in 1998, that is foreign and domestic capital flew out of Thailand quickly and substantially. This phenomena is accounted in 1998 SAM as the value in the entry of Thailand's investment abroad is higher than the value of foreign saving (foreign capital investing in Thailand). Moreover, in 1998 agro-industry received negative investment shown in the capital (S-I) account. This pattern of investment should not represent the normality of the Thai economy. Furthermore, in 1998 after the crises, the Thai government reduced its expenditures substantially to follow the International Monetary Fund (IMF) agreements. The value in the entry of government saving is therefore very much positive in 1998 SAM (15.2 percent of total saving). The government consumption values in the SAM 1998 are also assumed to be abnormally low due to the balanced budget policy applied right after the crises. To avoid

[65] From a telephone conversation with the NESDB of Thailand, the institution in charge of building input-output tables of Thailand.

abnormality of the simulation results caused by the abnormality of the 1998 SAM, simulations on investment will not be conducted. Simulations on government expenditure's effects will be conducted, but the abnormality of 1998 SAM will be kept in mind when discussing the results.

**Table 5.6—List of CGE Simulations**

| | |
|---|---|
| SIM 0 | Base run scenario |
| SIM 1 | |
| SIM 1.1 | 500,000 workers moved from primary agriculture to agro-industry |
| SIM 1.2 | 500,000 workers moved from primary agriculture to other industries |
| SIM 1.3 | 500,000 workers moved from primary agriculture to utility and construction |
| SIM 1.4 | 500,000 workers moved from primary agriculture to trade and transport |
| SIM 1.5 | 500,000 workers moved from primary agriculture to services |
| SIM 2 | |
| SIM 2.1 | Workers moved from primary agriculture to agro-industry by 25 % of agro-industrial labor |
| SIM 2.2 | Workers moved from primary agriculture to other industries by 25 % of other industrial labor |
| SIM 2.3 | Workers moved from primary agriculture to utility & construction by 25 % of U & C labor |
| SIM 2.4 | Workers moved from primary agriculture to trade and transport by 25 % of T & T labor |
| SIM 2.5 | Workers moved from primary agriculture to services by 25 % of services' labor |
| SIM 3 | |
| SIM 3.1 | Increase net capital stock in primary agriculture by 100,000 million baht |
| SIM 3.2 | Increase net capital stock in agro-industry by 100,000 million baht |
| SIM 3.3 | Increase net capital stock in other industries by 100,000 million baht |
| SIM 3.4 | Increase net capital stock in utility and construction by 100,000 million baht |
| SIM 3.5 | Increase net capital stock in trade and transport by 100,000 million baht |
| SIM 3.6 | Increase net capital stock in services by 100,000 million baht |
| SIM 4 | |
| SIM 4.1 | Increase net capital stock in primary agriculture by 25 % |
| SIM 4.2 | Increase net capital stock in agro-industry by 25 % |
| SIM 4.3 | Increase net capital stock in other industries by 25 % |
| SIM 4.4 | Increase net capital stock in utility and construction by 25 % |
| SIM 4.5 | Increase net capital stock in trade and transport by 25 % |
| SIM 4.6 | Increase net capital stock in services by 25 % |
| SIM 5 | |
| SIM 5.1 | Sales tax exemption for agro-industry to 0 % |

| | |
|---|---|
| SIM 5.2 | Sales tax exemption for other industries to 0 % |
| SIM 6 | |
| SIM 6.1 | Export subsidy given to agro-industry for 10 % |
| SIM 6.2 | Export subsidy given to other industries for 10 % |
| SIM 7 | |
| SIM 7.1 | Tariff protection increased in agro-industry by 10 % |
| SIM 7.2 | Tariff protection increased in other industries by 10 % |
| SIM 8 | |
| SIM 8.1 | Government demand for primary agricultural commodity increased by 25 % |
| SIM 8.2 | Government demand for agro-industrial commodity increased by 25 % |
| SIM 8.3 | Government demand for other industrial commodity increased by 25 % |
| SIM 8.4 | Government demand for utility and construction's commodity increased by 25 % |
| SIM 8.5 | Government demand for trade and transport's commodity increased by 25 % |
| SIM 8.6 | Government demand for services' commodity increased by 25 % |
| SIM 9 | |
| SIM 9.1 | Transfer from government to agricultural household increased by 25 % |
| SIM 9.2 | Transfer from government to government-employed household increased by 25 % |
| SIM 9.3 | Transfer from government to non-agricultural household increased by 25 % |
| SIM 10 | |
| SIM 10.1 | Export price of primary agricultural commodity increased by 25 % |
| SIM 10.2 | Export price of agro-industrial commodity increased by 25 % |
| SIM 10.3 | Export price of other industrial commodity increased by 25 % |
| SIM 10.4 | Export price of utility and construction's commodity increased by 25 % |
| SIM 10.5 | Export price of trade and transport's commodity increased by 25 % |
| SIM 10.6 | Export price of services' commodity increased by 25 % |
| SIM 11 | |
| SIM 11.1 | Import price of primary agricultural commodity increased by 25 % |
| SIM 11.2 | Import price of agro-industrial commodity increased by 25 % |
| SIM 11.3 | Import price of other industrial commodity increased by 25 % |
| SIM 11.4 | Import price of utility and construction's commodity increased by 25 % |
| SIM 11.5 | Import price of trade and transport's commodity increased by 25 % |
| SIM 11.6 | Import price of services' commodity increased by 25 % |
| SIM 12 | Thai Baht appreciates by 10 % |
| SIM 13 | Thai Baht depreciates by 10 % |
| SIM 14 | |
| SIM 14.1 | Production technology of primary agriculture improved by 10 % |

| | |
|---|---|
| SIM 14.2 | Production technology of agro-industry improved by 10 % |
| SIM 14.3 | Production technology of other industries improved by 10 % |
| SIM 14.4 | Production technology of utility and construction improved by 10 % |
| SIM 14.5 | Production technology of trade and transport improved by 10 % |
| SIM 14.6 | Production technology of services improved by 10 % |

**Table 5.7—List of Macro Closures**

| Simulation | 0* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. S-I Closure | | | | | | | | | | | | | | | |
| 1.1 Saving is investment-driven | | | | | | | | | | | | | | | |
| 1.2 Investment is saving-driven | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 2. Capital Market Closure | | | | | | | | | | | | | | | |
| 2.1 Capital is mobile and fully utilized | ● | ● | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 2.2 Capital is mobile and underutilized | | | | | | | | | | | | | | | |
| 2.3 Capital is activity-specific and fully utilized | ● | | | ● | ● | | | | | | | | | | |
| 3. Labor Market Closure | | | | | | | | | | | | | | | |
| 3.1 Labor is mobile and fully employed | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 3.2 Labor is mobile and unemployed | | | | | | | | | | | | | | | |
| 3.3 Labor is activity-specific and fully employed | ● | ● | ● | | | | | | | | | | | | |
| 4. Rest-of-World Closure | | | | | | | | | | | | | | | |
| 4.1 Exchange rate is flexible | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● |
| 4.2 Foreign saving is flexible | ● | | | | | | | | | | | | ● | ● | |

Note: * This base run scenario can be shared across simulation exercises with different closures as it is based on the base year SAM.

### 5.3.4.2 Simulation Results

The main results of all simulations are displayed in Table 5.9 - 5.19. Results are presented in detail in Appendix G. GDPMP1 presents the GDP at market prices from spending side which includes private consumption, government consumption, investments, exports of goods and services minus imports of goods and services. GDPFC presents the GDP at factor prices ($\sum_{fa} WF_f \cdot WFDIST_{fa} \cdot QF_{fa}$). GDPMP2 is GDP at market prices from income side which derived from GDPFC plus net indirect taxes. GDPMP1 and GDPMP2 must be equal. PRVCON presents private consumption ($\sum_{ch} PQ_c \cdot QH_{ch}$), GOVCON presents government consumption ($\sum_c PQ_c \cdot qg_c$), INVEST presents total investment ($\sum_c PQ_c \cdot QINV_c$), EXP presents total export ($\sum_c EXR \cdot pwe_c \cdot QE_c$), IMP presents total import ( - $\sum_c EXR \cdot pwm_c \cdot QM_c$), and NITAX presents net indirect taxes ($\sum_c tic_c \cdot (PD_c \cdot QD_c + PM_c \cdot QM_c)_{\mid c \in CE}$) + ($\sum_a tia_a \cdot (PA_a \cdot QA_a)$ + ($\sum_{c \mid c \in CM} tm_c \cdot EXR \cdot pwm_c \cdot QM_c$) + ($\sum_{c \mid c \in CE} te_c \cdot EXR \cdot pwe_c \cdot QE_c$).

***A. Simulations on Labor Allocations (Simulations 1 and 2)***

Simulations 1 and 2 perform very similar tasks. Each has five subordinate simulations assuming a number of workers move out from primary agriculture to other sectors. In Simulation 1, the number of workers that move out is fixed at half a million persons to all recipient sectors, but in Simulation 2 the number is fixed in percentage (25 percent) of the existing workers in the recipient sectors. The closures set workers to be activity-specific and fully employed, and capital to be mobile and fully employed. Wage distortion factor ($WFDIST_{lab}$) is the market clearing variable, one for each segment of the labor market. This setting is done in order to capture the change in labor wage in each sector, which is recorded in the change in wage distortion factor (in each sector) as the total average wage ($WF_{lab}$) is fixed ($WF_{lab} \cdot WFDIST_{lab} = wfa_{lab}$), while letting the capital be mobile. Saving-driven investment (IADJ) is flexible, permitting investment quantity and value to adjust. Foreign saving is fixed, and a flexible exchange rate clears the current account of the balance of payments.

When workers are moved from primary agriculture into other sectors, labor productivity and wage in primary agriculture are expected to increase, while the labor productivity and wage in the recipient sectors are expected to decline. The relative wage rental ratio must also change in every sector. Since producers always maximize their profits, the capital usage will be adjusted to such a way to maximize their profit and to match with the new labor usage until both capital and labor usage are fixed again. From the simulations, we want to see to what extent the capital adjustment happens, how this labor allocation changes the relative prices, to what extent the price adjustment happens, and to what extent the quantity adjustment happens.

Results from both simulations are pretty much the same, suggesting insensitivity in direction of the results when the quantities of the labor allocation are adjusted. Results from simulation 1 show that when primary agricultural workers are moved into agro-industry, the GDP growth rate is the highest at 1.73 percent and the country's welfare improves the most as the private consumption increases by 1.54 percent. The total government revenue also increases the most in this scenario by 2.12 percent. In Simulation 2, since 25 percent of workers working in services is a large number (1,355,000 persons), the allocation of primary agricultural workers into services should give the highest GDP growth. However, when comparing between industrial sectors, the allocation of labor into agro-industry gives higher GDP growth than the allocation into other industries, although the number of workers in the former (212,250 persons) is much lower than that in the latter (849,000 persons).

When workers move out of primary agriculture, demand for capital factor ($QF_{cap}$) in primary agriculture increases in all scenarios except when those workers move to other industries. The demand for capital rises in primary agriculture because new capital is needed to compensate for the labor lost. Sectors that received new workers all face a decline in their demand for capital since new labor can substitute for capital under the Cobb-Douglas production function (see value of $\alpha_{fa}$ in Table 5.3). Agro-industry, utility and construction, and services are assumed to be labor-intensive sectors, therefore when each of them receives more labor from primary agriculture, this labor can substitute well with capital in the recipient sectors and make the demand for capital in recipient sectors decline while the demand for capital in primary agriculture increases. Other industries and trade and transport are assumed to be capital intensive sectors, therefore when these capital intensive sectors receive more labor from primary agriculture, this labor cannot substitute well with capital in their sectors. This results in only a small decline in capital demand in other industries and trade and transport. However, the increase in capital demand in primary agriculture is large enough to pull the country's average capital rent ($WF_{cap}$) up in almost all scenarios. This suggests return to capital and capital productivity should be very high in primary agriculture. This implies that a renewed agricultural modernization coupled with a shift of labor from primary agriculture into other sectors should be a desirable policy package.

The value of wage distortion ($WFDIST_{lab}$) in each sector, which captures the wage change, shows that the real wage of primary agricultural labor increases in every scenario from the base run because when the quantity of labor declines, the return to labor should increase. In Simulation 1 that wage increase is highest (10.27 percent) when primary agricultural workers move into agro-industry because, to agro-industry, half a million persons accounts for a 58.9 percent increase in its labor demand, the highest received in percentage among all sectors. In Simulation 2, the highest increase happens when these workers are moved into services. Again, as 25 percent of services' workers is the largest number being allocated, the primary agricultural wage increases the most in this scenario. The real wage ($WFDIST_{lab}$) in sectors that received new labor, however, contracts in every scenario, by 9 – 46 percent in Simulation 1 and by 21.5 – 31.5 percent in Simulation 2. The highest contraction occurs in agro-industry in Simulation 1. However, since the real wage ($wfa_{lab}$) in agro-industry is originally high (0.113) (the highest among all sectors), after the wage declines in this sector by 46 percent, it is still higher than the real wage in primary agriculture (0.014) and trade and transport sector (0.026) (see values of wfa of each sector in Table 5.8).

Household incomes (YH) increase the most in Simulations 1.1, 1.5, 2.1 and 2.5 suggesting household incomes also improve when labor is moved out of primary agriculture, and improve the most when it is reallocated to agro-industry or services.

For the domestic demand for commodities, since the wage decline in recipient sectors is offset by the wage increase in primary agriculture, this results in an increase in private consumption (QH · PQ) in all scenarios. The labor reallocations bring about increases in quantities of domestic output (QD, QX) as labor is now more productive in the new sectors, and the production increases drive down domestic output prices (PD, PX) in the labor recipient sectors. The investment (INVEST) also rises in all scenarios from the increased productivity of labor after being reallocated to new sectors, and from the increased capital productivity after capital demand rises in primary agriculture.

The movement of labor into agro-industry, utility and construction, and services also results in an increase in quantity of exports (QE) from these sectors because the production in these sectors is expanded. Since these sectors are labor-intensive and their imports and imported inputs are not so technological-based, their production expansion can bring about a reduction in quantity of imports and imported inputs (QM) demanded by these sectors since imports now can be substituted by the domestically produced goods. Under the assumption of fixed current account balance (no capital flow) set by the rest-of-world closure, Thai baht depreciates in order to regain the balance when production and exports expand in these simulations. Although, in reality, with expanding exports, currency should appreciate. In the case of other industries, Thai baht instead appreciates against foreign currency to regain the current account balance after the quantity of imports increases in this sector, although the quantity of exports in this sector also increases. This is due to the fact that new labor cannot produce industrial commodities to substitute for imported commodities well enough as this sector relies so much on capital-intensive imported inputs.

The results from Simulations 1 and 2 suggest that if the policy makers aim to improve the income gap between the poor, who mostly engaged in primary agriculture, and the rich, who mostly engaged in other sectors, moving primary agricultural labor into agro-industry would improve the real wage of primary agricultural workers than moving them into other industries. Focus is given to these two kinds of industrial sectors because we prefer to move the labor into the secondary (production or tradable) sectors than the tertiary (nontradable) sectors since production sectors are considered more important for economic development. Higher GDP growth can also be achieved through labor reallocation and job creation in agro-industry since primary agricultural labor can be more easily absorbed into the labor-intensive agro-industry than the capital-intensive other industries. The real wage of primary agricultural labor can also be increased by this strategy and can bring on decrease in the income gap. Welfare of Thai households is also improved as the private consumption increases substantially in all scenarios.

**Table 5.8—Wage (Rent) for Factor f in Activity a (wfa)**

| | PRIMA-A | AINDUS-A | MANU-A | UTICON-A | TRADE-A | SER-A |
|---|---|---|---|---|---|---|
| Labor | 0.014 | 0.113 | 0.107 | 0.075 | 0.026 | 0.099 |
| Capital | 0.342 | 0.197 | 0.222 | 0.085 | 0.187 | 0.115 |

## Table 5.9—Results of Simulations 1.1 – 1.5

| | | | BASE | SIM 1.1 ∆% | SIM 1.2 ∆% | SIM 1.3 ∆% | SIM 1.4 ∆% | SIM 1.5 ∆% |
|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 1.726 | 0.486 | 0.700 | 0.099 | 1.158 |
| | PRVCON | | 25292.80 | 1.540 | 0.383 | 0.547 | 0.120 | 1.075 |
| | GOVCON | | 5007.05 | 1.558 | 0.388 | (0.173) | 0.006 | (1.874) |
| | INVEST | | 8845.28 | 2.765 | 2.542 | 2.187 | 0.213 | 3.586 |
| | EXP | | 27237.19 | 2.280 | 0.224 | 1.317 | 0.143 | 1.201 |
| | IMP | | -20023.05 | 2.661 | 0.883 | 1.783 | 0.213 | 1.426 |
| EXR | PRIMA-A | | 1.00 | 1.223 | (1.605) | 0.021 | (0.051) | 0.578 |
| QF | LAB | PRIMA-A | 139410.00 | (3.587) | (3.587) | (3.587) | (3.587) | (3.587) |
| | LAB | AINDUS-A | 8490.00 | 58.893 | - | - | - | - |
| | LAB | MANU-A | 33960.00 | - | 14.723 | - | - | - |
| | LAB | UTICON-A | 18220.00 | - | - | 27.442 | - | - |
| | LAB | TRADE-A | 51750.00 | - | - | - | 9.662 | - |
| | LAB | SER-A | 54200.00 | - | - | - | - | 9.225 |
| | CAP | PRIMA-A | 12315.48 | 4.523 | (0.496) | 1.948 | 0.716 | 1.199 |
| | CAP | AINDUS-A | 6718.35 | (15.945) | (2.784) | 0.482 | (0.341) | (0.103) |
| | CAP | MANU-A | 22491.87 | (1.179) | (3.097) | 2.964 | 0.506 | 0.858 |
| | CAP | UTICON-A | 16829.92 | 1.386 | 4.091 | (15.441) | 0.473 | 3.394 |
| | CAP | TRADE-A | 44663.41 | 0.736 | 1.115 | 1.789 | (0.800) | 0.986 |
| | CAP | SER-A | 58248.63 | 0.374 | (0.416) | 1.478 | 0.169 | (2.310) |
| WF | LAB | | 0.05 | - | - | - | - | - |
| | CAP | | 0.17 | 1.719 | 0.931 | (0.090) | 0.012 | 1.009 |
| WFDIST | LAB | PRIMA-A | 0.29 | 10.273 | 4.168 | 5.648 | 4.475 | 6.021 |
| | LAB | AINDUS-A | 2.37 | (46.190) | (1.876) | 0.395 | (0.329) | 0.904 |
| | LAB | MANU-A | 2.24 | 0.520 | (14.743) | 2.875 | 0.519 | 1.875 |
| | LAB | UTICON-A | 1.57 | 3.129 | 5.064 | (33.707) | 0.485 | 4.437 |
| | LAB | TRADE-A | 0.55 | 2.466 | 2.059 | 1.700 | (9.529) | 2.003 |
| | LAB | SER-A | 2.08 | 2.099 | 0.515 | 1.389 | 0.181 | (9.659) |
| | CAP | PRIMA-A | 2.04 | - | - | - | - | - |
| | CAP | AINDUS-A | 1.17 | - | - | - | - | - |
| | CAP | MANU-A | 1.33 | - | - | - | - | - |
| | CAP | UTICON-A | 0.50 | - | - | - | - | - |
| | CAP | TRADE-A | 1.12 | - | - | - | - | - |
| | CAP | SER-A | 0.69 | - | - | - | - | - |
| YH | A-HHD | | 5316.62 | 1.561 | 0.370 | 0.581 | 0.102 | 1.083 |
| | G-HHD | | 4971.28 | 1.358 | 0.274 | 0.293 | 0.209 | 0.965 |
| | N-HHD | | 21389.80 | 1.578 | 0.416 | 0.598 | 0.105 | 1.100 |
| QE | PRIMA-C | | 2236.89 | 0.572 | (3.443) | (0.456) | (1.240) | (1.145) |
| | AINDUS-C | | 2909.02 | 14.863 | (3.185) | 0.192 | (0.353) | (0.431) |
| | MANU-C | | 16662.56 | (0.995) | 4.462 | 1.667 | 0.314 | 0.370 |
| | UTICON-C | | 113.66 | 0.028 | 0.135 | 10.065 | 0.204 | 1.051 |
| | TRADE-C | | 2898.91 | 0.209 | (0.740) | 1.610 | 1.309 | 0.866 |
| | SER-C | | 2416.15 | (0.041) | (1.914) | 0.892 | 0.021 | 4.927 |
| QM | PRIMA-C | | 1635.60 | 7.685 | 7.046 | 2.898 | 1.846 | 3.161 |
| | AINDUS-C | | 899.60 | (7.406) | 4.451 | 0.608 | 0.389 | 1.349 |
| | MANU-C | | 14825.23 | 1.290 | 1.336 | 1.966 | 0.163 | 1.299 |
| | UTICON-C | | 37.90 | 2.768 | 8.101 | (14.493) | 0.354 | 3.755 |
| | TRADE-C | | 710.78 | 1.946 | 6.347 | 1.313 | (1.553) | 0.792 |
| | SER-C | | 2534.31 | 0.908 | 4.632 | 0.613 | 0.297 | (3.474) |

## Table 5.10—Results of Simulations 2.1 – 2.5

| | | | BASE | SIM 2.1∆% | SIM 2.2 ∆% | SIM 2.3 ∆% | SIM 2.4 ∆% | SIM 2.5 ∆% |
|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 0.888 | 0.759 | 0.651 | 0.188 | 2.819 |
| | PRVCON | | 25292.80 | 0.798 | 0.590 | 0.509 | 0.239 | 2.607 |
| | GOVCON | | 5007.05 | 0.798 | 0.610 | (0.158) | (0.023) | (4.716) |
| | INVEST | | 8845.28 | 1.405 | 4.056 | 2.030 | 0.423 | 8.835 |
| | EXP | | 27237.19 | 1.139 | 0.371 | 1.219 | 0.323 | 2.992 |
| | IMP | | -20023.05 | 1.322 | 1.437 | 1.650 | 0.487 | 3.561 |
| EXR | PRIMA-A | | 1.00 | 0.630 | (2.589) | 0.020 | (0.132) | 1.415 |
| QF | LAB | PRIMA-A | 139410.00 | (1.522) | (6.090) | (3.267) | (9.280) | (9.720) |
| | LAB | AINDUS-A | 8490.00 | 25.000 | - | - | - | - |
| | LAB | MANU-A | 33960.00 | - | 25.000 | - | - | - |
| | LAB | UTICON-A | 18220.00 | - | - | 25.000 | - | - |
| | LAB | TRADE-A | 51750.00 | - | - | - | 25.000 | - |
| | LAB | SER-A | 54200.00 | - | - | - | - | 25.000 |
| | CAP | PRIMA-A | 12315.48 | 2.160 | (0.732) | 1.791 | 1.870 | 3.194 |
| | CAP | AINDUS-A | 6718.35 | (7.733) | (4.493) | 0.456 | (0.986) | (0.432) |
| | CAP | MANU-A | 22491.87 | (0.591) | (5.094) | 2.738 | 1.248 | 2.127 |
| | CAP | UTICON-A | 16829.92 | 0.692 | 6.632 | (14.272) | 1.081 | 8.480 |
| | CAP | TRADE-A | 44663.41 | 0.359 | 1.814 | 1.654 | (1.929) | 2.449 |
| | CAP | SER-A | 58248.63 | 0.188 | (0.667) | 1.367 | 0.403 | (5.775) |
| WF | LAB | | 0.05 | - | - | - | - | - |
| | CAP | | 0.17 | 0.889 | 1.486 | (0.078) | (0.036) | 2.423 |
| WFDIST | LAB | PRIMA-A | 0.29 | 4.663 | 7.278 | 5.147 | 12.251 | 17.074 |
| | LAB | AINDUS-A | 2.37 | (25.530) | (3.071) | 0.380 | (1.020) | 1.982 |
| | LAB | MANU-A | 2.24 | 0.294 | (22.945) | 2.661 | 1.213 | 4.602 |
| | LAB | UTICON-A | 1.57 | 1.588 | 8.219 | (31.470) | 1.046 | 11.110 |
| | LAB | TRADE-A | 0.55 | 1.251 | 3.329 | 1.576 | (21.571) | 4.931 |
| | LAB | SER-A | 2.08 | 1.080 | 0.811 | 1.290 | 0.369 | (22.793) |
| | CAP | PRIMA-A | 2.04 | - | - | - | - | - |
| | CAP | AINDUS-A | 1.17 | - | - | - | - | - |
| | CAP | MANU-A | 1.33 | - | - | - | - | - |
| | CAP | UTICON-A | 0.50 | - | - | - | - | - |
| | CAP | TRADE-A | 1.12 | - | - | - | - | - |
| | CAP | SER-A | 0.69 | - | - | - | - | - |
| YH | A-HHD | | 5316.62 | 0.807 | 0.570 | 0.541 | 0.196 | 2.629 |
| | G-HHD | | 4971.28 | 0.712 | 0.408 | 0.275 | 0.449 | 2.324 |
| | N-HHD | | 21389.80 | 0.816 | 0.644 | 0.557 | 0.202 | 2.672 |
| QE | PRIMA-C | | 2236.89 | 0.377 | (5.633) | (0.403) | (3.288) | (3.217) |
| | AINDUS-C | | 2909.02 | 7.225 | (5.125) | 0.185 | (0.972) | (1.210) |
| | MANU-C | | 16662.56 | (0.499) | 7.268 | 1.539 | 0.782 | 0.922 |
| | UTICON-C | | 113.66 | 0.013 | 0.185 | 9.269 | 0.487 | 2.580 |
| | TRADE-C | | 2898.91 | 0.091 | (1.183) | 1.486 | 3.222 | 2.185 |
| | SER-C | | 2416.15 | (0.021) | (3.070) | 0.823 | 0.071 | 12.865 |
| QM | PRIMA-C | | 1635.60 | 3.598 | 11.783 | 2.658 | 4.861 | 8.536 |
| | AINDUS-C | | 899.60 | (3.798) | 7.278 | 0.563 | 0.947 | 3.437 |
| | MANU-C | | 14825.23 | 0.645 | 2.152 | 1.821 | 0.337 | 3.170 |
| | UTICON-C | | 37.90 | 1.381 | 13.391 | (13.459) | 0.742 | 9.412 |
| | TRADE-C | | 710.78 | 0.983 | 10.413 | 1.222 | (3.827) | 1.849 |
| | SER-C | | 2534.31 | 0.457 | 7.568 | 0.571 | 0.653 | (8.573) |

***B. Simulations on Capital Allocations (Simulations 3 and 4)***

Simulations 3 and 4 also perform similar tasks. Each has six subordinate simulations assuming a number of net capital stock (new capital) increases in each sector. In Simulation 3, the amount of net capital stock injected is fixed at 100,000 million baht into each sector. 100,000 million baht is equated to 0.62 percent increase in total supply of capital ($QFS_{cap}$). In Simulation 4, the amount is fixed in percentage (25 percent) of existing net capital stock in each sector. The closures set capital to be activity-specific and fully utilized, and labor to be mobile and fully employed. Rent distortion factor ($WFDIST_{cap,a}$) is the market clearing variable, one for each segment of the capital market. This setting is done in order to capture the change in capital rent in each sector, which is recorded in the change in rent distortion factor (in each sector) as the total average rent is fixed, while letting the labor remain mobile. The saving-investment and the rest-of-world closures are set the same as those in Simulations 1 and 2.

When net capital stock increases in one sector, its productivity and rent in that sector are expected to decline. The relative wage rental ratio must also change. Since producers always maximize their profits, the labor usage will be adjusted in such a way to maximize their profit and to match with the new capital usage until both capital and labor usage are fixed again. From the simulations, we want to see to what extent the labor adjustment happens, how this net capital stock increase changes the relative prices, to what extent the price adjustment happens, and to what extent the quantity adjustment happens.

Results from both simulations are in the same directions, suggesting insensitivity towards the adjustment in quantities of the net capital stock. Results from Simulation 3 show that when 100,000 million baht of net capital stock is injected into primary agriculture, the GDP growth rate is the highest at 1.35 percent and the country’s welfare improves the most as private consumption increases by 1.31 percent. Injection of net capital stock into agro-industry results in higher GDP growth than when the same amount of net capital stock is injected into other industries. In Simulation 4, when the injection is subject to the percentage change of the existing net capital stock in the recipient sectors, GDP growth of primary agriculture also increases more than other sectors except the trade and transport sector. This suggests that capital is more productive if allocated to primary agriculture. The services also perform well in terms of GDP growth. GDP does not increase much in agro-industry due to the low amount of injection it receives proportionately. The utility and construction sector does not perform well after receiving the injection as private consumption and government consumption decline.

When new capital stock is injected into each sector, demand for labor ($QF_{lab}$) in these sectors declines in all scenarios. This is because the production function is the Cobb-Douglas one which allows substitution between labor and capital. When capital input increases, this capital can substitute for labor used in the sector resulting in the decline in labor demand. The increase in capital input drives up the country's average wage ($WF_{lab}$) of labor and drives down the capital rent ($WFDIST_{cap}$) in the recipient sectors, as capital becomes more abundant and relatively cheaper than labor. The change in real wage can be traced from $wfa_{lab}$ in each sector since $wfa_{lab} = WF_{lab} \cdot WFDIST_{lab}$. The real wage of all sectors increases quite significantly when new capital is injected into agro-industry. Overall, the real wage of primary agriculture increases in all scenarios, except in Simulations 3.4 and 4.4 when more capital is injected into utility and construction sector. Even though, labor demand declines in all scenarios due to the substitution between labor and capital, only Simulations 3.1 and 4.1 support our proposal to reallocate primary agricultural workers to agro-industry. As can be seen from $QF_{lab}$ in Table 5.11 and 5.12 that agro-industry absorbs more primary agricultural workers than other industries when more capital is injected into primary agriculture.

Household incomes (YH) increase in all scenarios except when the capital injection occurs in utility and construction. Household incomes increase the most in primary agriculture in both Simulations 3 and 4, and in trade and transport in Simulation 4 suggesting capital is the most productive if allocated to primary agriculture, which can bring about a large production expansion through new investment that results in higher household incomes and lower primary commodity prices (PD, PX). The country's average wage and household incomes increase, and the lower primary commodity price then leads to an increase in private consumption and domestic demand for all commodities.

The rise in net capital stock in primary agriculture, agro-industry, utility and construction, and services also results in an increase in quantity of exports (QE) from these sectors, as production in these sectors is expanded. There is a contraction in their quantity of imports (QM), since new capital can be substituted for labor to produce import-substitution products. Under the assumption of fixed current account balance (no capital flow) set by the rest-of-world closure, Thai baht depreciates in order to regain the balance when production and exports expand in these simulations, although, in reality, with expanding exports, currency should appreciate. In the case of other industries, Thai baht instead appreciates against foreign currency to regain the current account balance after the quantity of imports increases in this sector, although the quantity of exports also increases. This is because the new capital still cannot be used to produce high-technology industrial products to substitute imported inputs, which are heavily imported, since the simulations represent the short-to-medium run scenarios.

The results from Simulations 3 and 4 suggest that capital is more productive if allocated to sectors which lack capital investment, such as primary agriculture. The capital injection into primary agriculture can give high rates of return on capital and investment, increase capital-labor ratio, raise labor productivity, and lead to output expansion. Since most of agro-industry's inputs are from primary agriculture's outputs, the output expansion in primary agriculture through capital deepening can reduce the costs of agro-industry's intermediate inputs as a result of buying from primary agriculture. In addition, agro-industry can be expanded with the same technology by increasing its labor input drawing from primary agriculture. As results of Simulations 3.1 and 4.1 show that labor demand declines in primary agriculture when this sector receives more capital injection, and these redundant primary agricultural workers can be absorbed well by agro-industry. With all these relationships, our proposal and objective to shift labor from primary agriculture to agro-industry while maintaining the same speed of growth, increasing farmers' real wage, and increasing household incomes can be supported and achieved through this policy of allocating more capital into primary agriculture.

**Table 5.11—Results of Simulations 3.1 – 3.6**

| | | | BASE | SIM 3.1 Δ% | SIM 3.2 Δ% | SIM 3.3 Δ% | SIM 3.4 Δ% | SIM 3.5 Δ% | SIM 3.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 1.354 | 0.461 | 0.343 | 0.011 | 0.567 | 0.237 |
| | PRVCON | | 25292.80 | 1.309 | 0.389 | 0.268 | (0.031) | 0.637 | 0.213 |
| | GOVCON | | 5007.05 | 0.512 | 0.821 | 0.173 | (0.063) | 0.356 | (0.489) |
| | INVEST | | 8845.28 | 3.008 | 0.351 | 1.531 | 0.149 | 0.978 | 0.772 |
| | EXP | | 27237.19 | 0.873 | 0.757 | 0.167 | 0.187 | 0.501 | 0.241 |
| | IMP | | -20023.05 | 1.162 | 0.815 | 0.491 | 0.239 | 0.694 | 0.267 |
| EXR | PRIMA-A | | 1.00 | 0.070 | 0.596 | (0.734) | 0.041 | (0.036) | 0.168 |
| QF | LAB | PRIMA-A | 139410.00 | (2.174) | 1.397 | (0.379) | 0.210 | 0.269 | 0.066 |
| | LAB | AINDUS-A | 8490.00 | 5.024 | (8.613) | (1.034) | 0.034 | 0.614 | (0.021) |
| | LAB | MANU-A | 33960.00 | 0.488 | (1.515) | (1.532) | 0.497 | 0.961 | 0.029 |
| | LAB | UTICON-A | 18220.00 | 2.899 | (0.525) | 2.226 | (4.715) | 1.427 | 0.658 |
| | LAB | TRADE-A | 51750.00 | 2.487 | (0.603) | 1.489 | 0.540 | (2.358) | 0.324 |
| | LAB | SER-A | 54200.00 | 1.151 | (0.544) | (0.073) | 0.213 | 0.380 | (0.715) |
| | CAP | PRIMA-A | 12315.48 | 8.120 | - | - | - | - | - |
| | CAP | AINDUS-A | 6718.35 | 0.000 | 14.885 | - | - | - | - |
| | CAP | MANU-A | 22491.87 | 0.000 | - | 4.446 | - | - | - |
| | CAP | UTICON-A | 16829.92 | 0.000 | - | - | 5.942 | - | - |
| | CAP | TRADE-A | 44663.41 | 0.000 | - | - | - | 2.239 | - |
| | CAP | SER-A | 58248.63 | 0.000 | - | - | - | - | 1.717 |
| WF | LAB | | 0.05 | 0.210 | 1.343 | 0.294 | - | 0.651 | 0.315 |
| | CAP | | 0.17 | 0.000 | - | - | - | - | - |
| wfa | LAB | PRIMA-A | 0.0137 | 0.216 | 1.349 | 0.300 | 0.006 | 0.656 | 0.321 |
| | LAB | AINDUS-A | 0.1128 | 0.209 | 1.342 | 0.293 | (0.001) | 0.650 | 0.314 |
| | LAB | MANU-A | 0.1069 | 0.203 | 1.336 | 0.287 | (0.007) | 0.644 | 0.308 |
| | LAB | UTICON-A | 0.0747 | 0.207 | 1.341 | 0.291 | (0.003) | 0.648 | 0.312 |
| | LAB | TRADE-A | 0.0262 | 0.219 | 1.353 | 0.303 | 0.009 | 0.660 | 0.324 |

| | | | BASE | SIM 3.1 Δ% | SIM 3.2 Δ% | SIM 3.3 Δ% | SIM 3.4 Δ% | SIM 3.5 Δ% | SIM 3.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | SER-A | 0.0990 | 0.209 | 1.342 | 0.293 | (0.001) | 0.649 | 0.314 |
| WFDIST | CAP | PRIMA-A | 2.04 | (9.337) | 2.764 | (0.088) | 0.201 | 0.919 | 0.374 |
| | CAP | AINDUS-A | 1.17 | 5.237 | (19.382) | (0.744) | 0.025 | 1.266 | 0.286 |
| | CAP | MANU-A | 1.33 | 0.693 | (0.188) | (5.448) | 0.487 | 1.615 | 0.338 |
| | CAP | UTICON-A | 0.50 | 3.108 | 0.815 | 2.524 | (10.068) | 2.083 | 0.967 |
| | CAP | TRADE-A | 1.12 | 2.696 | 0.737 | 1.786 | 0.531 | (3.877) | 0.633 |
| | CAP | SER-A | 0.69 | 1.358 | 0.797 | 0.220 | 0.204 | 1.032 | (2.089) |
| YH | A-HHD | | 5316.62 | 1.287 | 0.407 | 0.273 | (0.012) | 0.575 | 0.220 |
| | G-HHD | | 4971.28 | 1.296 | 0.300 | 0.151 | (0.131) | 0.916 | 0.166 |
| | N-HHD | | 21389.80 | 1.321 | 0.405 | 0.297 | (0.013) | 0.590 | 0.223 |
| QE | PRIMA-C | | 2236.89 | 7.914 | (0.319) | (0.702) | 0.041 | (0.185) | (0.059) |
| | AINDUS-C | | 2909.02 | 2.488 | 6.678 | (1.057) | 0.052 | 0.112 | (0.068) |
| | MANU-C | | 16662.56 | (0.050) | (0.751) | 2.070 | 0.200 | 0.342 | (0.024) |
| | UTICON-C | | 113.66 | 0.790 | (0.549) | 0.112 | 2.389 | 0.405 | 0.160 |
| | TRADE-C | | 2898.91 | (0.960) | (0.258) | (1.130) | (0.094) | 3.274 | (0.091) |
| | SER-C | | 2416.15 | 0.181 | (0.421) | (0.779) | 0.164 | (0.222) | 1.222 |
| QM | PRIMA-C | | 1635.60 | (7.215) | 3.584 | 2.322 | 0.164 | 1.196 | 0.347 |
| | AINDUS-C | | 899.60 | 0.563 | (4.057) | 1.935 | (0.126) | 0.807 | 0.216 |
| | MANU-C | | 14825.23 | 1.827 | 0.069 | 0.755 | 0.265 | 0.785 | 0.239 |
| | UTICON-C | | 37.90 | 3.281 | 0.622 | 4.049 | (4.625) | 1.572 | 0.806 |
| | TRADE-C | | 710.78 | 4.453 | 0.450 | 4.420 | 0.599 | (3.477) | 0.466 |
| | SER-C | | 2534.31 | 1.437 | 0.261 | 2.089 | (0.099) | 1.272 | (1.020) |

## Table 5.12—Results of Simulations 4.1 – 4.6

| | | | BASE | SIM 4.1 Δ% | SIM 4.2 Δ% | SIM 4.3 Δ% | SIM 4.4 Δ% | SIM 4.5 Δ% | SIM 4.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 3.804 | 0.705 | 1.649 | 0.031 | 5.122 | 2.964 |
| | PRVCON | | 25292.80 | 3.665 | 0.590 | 1.252 | (0.124) | 5.772 | 2.652 |
| | GOVCON | | 5007.05 | 1.390 | 1.288 | 0.829 | (0.230) | 3.285 | (6.227) |
| | INVEST | | 8845.28 | 8.548 | 0.524 | 7.584 | 0.524 | 8.911 | 9.774 |
| | EXP | | 27237.19 | 2.554 | 1.192 | 0.861 | 0.681 | 4.795 | 3.104 |
| | IMP | | -20023.05 | 3.421 | 1.288 | 2.494 | 0.873 | 6.713 | 3.471 |
| EXR | PRIMA-A | | 1.00 | 0.147 | 0.926 | (3.671) | 0.150 | (0.529) | 2.085 |
| QF | LAB | PRIMA-A | 139410.00 | (6.372) | 2.229 | (1.912) | 0.767 | 2.097 | 0.858 |
| | LAB | AINDUS-A | 8490.00 | 14.560 | (13.735) | (5.098) | 0.114 | 5.376 | (0.259) |
| | LAB | MANU-A | 33960.00 | 1.391 | (2.409) | (8.437) | 1.813 | 8.112 | 0.195 |
| | LAB | UTICON-A | 18220.00 | 8.356 | (0.841) | 11.381 | (17.232) | 13.595 | 8.478 |
| | LAB | TRADE-A | 51750.00 | 7.419 | (0.960) | 7.913 | 1.983 | (20.615) | 4.087 |
| | LAB | SER-A | 54200.00 | 3.344 | (0.874) | (0.379) | 0.773 | 3.795 | (9.041) |
| | CAP | PRIMA-A | 12315.48 | 25.000 | - | - | - | - | - |
| | CAP | AINDUS-A | 6718.35 | - | 25.000 | - | - | - | - |
| | CAP | MANU-A | 22491.87 | - | - | 25.000 | - | - | - |
| | CAP | UTICON-A | 16829.92 | - | - | - | 25.000 | - | - |
| | CAP | TRADE-A | 44663.41 | - | - | - | - | 25.000 | - |
| | CAP | SER-A | 58248.63 | - | - | - | - | - | 25.000 |
| WF | LAB | | 0.05 | 0.420 | 2.141 | 1.427 | (0.042) | 5.751 | 3.925 |
| | CAP | | 0.17 | - | - | - | - | - | - |
| wfa | LAB | PRIMA-A | 0.0137 | 0.426 | 2.147 | 1.433 | (0.036) | 5.757 | 3.931 |
| | LAB | AINDUS-A | 0.1128 | 0.419 | 2.140 | 1.426 | (0.043) | 5.750 | 3.924 |
| | LAB | MANU-A | 0.1069 | 0.413 | 2.134 | 1.420 | (0.049) | 5.744 | 3.918 |

| | | | BASE | SIM 4.1 Δ% | SIM 4.2 Δ% | SIM 4.3 Δ% | SIM 4.4 Δ% | SIM 4.5 Δ% | SIM 4.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | UTICON-A | 0.0747 | 0.417 | 2.138 | 1.425 | (0.045) | 5.749 | 3.923 |
| | LAB | TRADE-A | 0.0262 | 0.429 | 2.151 | 1.437 | (0.032) | 5.762 | 3.935 |
| | LAB | SER-A | 0.0990 | 0.419 | 2.140 | 1.426 | (0.043) | 5.750 | 3.924 |
| WFDIST | CAP | PRIMA-A | 2.04 | (24.780) | 4.407 | (0.514) | 0.724 | 7.956 | 4.802 |
| | CAP | AINDUS-A | 1.17 | 15.045 | (29.517) | (3.746) | 0.072 | 11.424 | 3.641 |
| | CAP | MANU-A | 1.33 | 1.820 | (0.331) | (25.706) | 1.770 | 14.318 | 4.113 |
| | CAP | UTICON-A | 0.50 | 8.814 | 1.271 | 12.967 | (33.815) | 20.113 | 12.719 |
| | CAP | TRADE-A | 1.12 | 7.874 | 1.150 | 9.451 | 1.940 | (32.847) | 8.158 |
| | CAP | SER-A | 0.69 | 3.782 | 1.238 | 1.042 | 0.730 | 9.753 | (24.387) |
| YH | A-HHD | | 5316.62 | 3.607 | 0.619 | 1.286 | (0.055) | 5.195 | 2.742 |
| | G-HHD | | 4971.28 | 3.608 | 0.446 | 0.599 | (0.491) | 8.366 | 2.033 |
| | N-HHD | | 21389.80 | 3.703 | 0.617 | 1.407 | (0.056) | 5.328 | 2.776 |
| QE | PRIMA-C | | 2236.89 | 24.033 | (0.513) | (3.505) | 0.154 | (1.782) | (0.765) |
| | AINDUS-C | | 2909.02 | 7.008 | 10.728 | (5.220) | 0.186 | 0.786 | (0.894) |
| | MANU-C | | 16662.56 | (0.143) | (1.198) | 10.616 | 0.725 | 2.663 | (0.379) |
| | UTICON-C | | 113.66 | 2.233 | (0.875) | 0.380 | 9.122 | 3.421 | 1.941 |
| | TRADE-C | | 2898.91 | (2.715) | (0.410) | (5.662) | (0.342) | 37.136 | (1.192) |
| | SER-C | | 2416.15 | 0.549 | (0.676) | (3.868) | 0.598 | (2.045) | 16.997 |
| QM | PRIMA-C | | 1635.60 | (19.437) | 5.780 | 12.199 | 0.586 | 11.229 | 4.617 |
| | AINDUS-C | | 899.60 | 1.723 | (6.322) | 10.045 | (0.469) | 7.807 | 2.894 |
| | MANU-C | | 14825.23 | 5.265 | 0.108 | 3.810 | 0.968 | 7.648 | 3.036 |
| | UTICON-C | | 37.90 | 9.496 | 0.988 | 22.056 | (16.143) | 15.994 | 10.683 |
| | TRADE-C | | 710.78 | 13.235 | 0.718 | 24.449 | 2.195 | (29.476) | 6.131 |
| | SER-C | | 2534.31 | 4.105 | 0.419 | 10.909 | (0.369) | 12.779 | (12.395) |

***C. Simulations on Tax and Subsidy Policies (Simulations 5, 6 and 7)***

Simulations 5, 6 and 7 deal with tax policy, subsidy policy, and protective policy, respectively. Simulation 5 has two subordinate simulations assuming the sales tax ($tic_c$) is exempted in agro-industry in Simulation 5.1 and in other industries in Simulation 5.2. Simulation 6 also has two subordinate simulations assuming the export subsidy ($-te_c$) is given by 10 percent to agro-industry in Simulation 6.1 and to other industries in Simulation 6.2. Simulation 7 has two subordinate simulations assuming the import tariff ($tm_c$) is raised by 10 percent in agro-industry in Simulation 7.1 and in other industries in Simulation 7.2. Note that the original tariff of agro-industry is higher (7.3 percent) than that of other industries (3.5 percent). The closures set capital and labor to be mobile and fully employed. $WF_{cap}$ and $WF_{lab}$ is the market clearing variable for the unified capital and labor markets. Saving-driven investment (IADJ) is flexible, permitting investment quantity and value to adjust. Foreign saving is fixed, and a flexible exchange rate clears the current account of the balance of payments. This setting is done in order to capture the long-run change in the economy.

As stated in the objective of this CGE analysis and in the simulation design section, simulation on labor allocation is not applicable as a real policy implementation; simulations which are policy applicable and related to our strategy must then be conducted. The simulations on tax policy, subsidy policy, and protective policy are considered related to our strategy since they can be used as incentives under assumption that government would not collect sales tax, would give export subsidy, or would raise import tariff of agro-industrial products as incentives to encourage producers of these products to reallocate their investment to the rural areas and employ more agricultural workers. However, these policies cannot be strictly enforced in the simulation model. The simulations on tax policy, subsidy policy, and protective policy are also conducted on other industries in order to compare results.

When general tax policy is used, it is assumed that the price adjustment would dominate the economy. When sales tax is removed, the price that consumers pay for composite commodity declines (PQ). Sales tax exemption can also stimulate sale and production in that sector since consumers are willing to buy more when goods become cheaper. When export subsidy is given to an industry under the assumption of a small open economy, export price (PE) would increase and this would affect the quantity of exports (QE) and quantity of domestic output sold domestically and its price (QD, PD). The price and quantity adjustments of these PE, PD, QE, QD would later affect the quantity of domestic output and the producer price (QX, PX) according to their relationships in Equations 2 and 4. When import tariff is raised, import price (PM) increases, which discourages producers and consumers from importing that kind of goods and instead encourages them to buy more from domestic producers. With these three policies, producers would need to adjust their factor input usage in such a way to maximize their profit, and consumers would need to adjust their consumption pattern in such a way to maximize their utility. We are interested to see to what extent the factor inputs are adjusted in terms of their quantities and wages (rents).

Results from Simulations 5, 6 and 7 (Table 5.13) show that the labor adjustment ($QF_{lab}$) happens in such a way opposite to our expectation. When sales tax is exempted, or export subsidy is given, or import tariff is raised in agro-industry, instead of primary agricultural workers moving into agro-industry, workers from other industries and nontradable sectors move into agro-industry and primary agriculture. This is due to the fact that the production of agro-industry has close relations with the production of primary agriculture. When sales tax is exempted, or export subsidy is given, or import tariff is raised in agro-industry, demand for its domestically produced goods rises (demand for agro-industrial imports also rises in case of sale tax exemption), thus its production is increased. More labor and capital (QF) are demanded in both agro-industry and primary agriculture as a result of the rise in demands for their commodities. The capital adjustment also happens in the same way as the labor adjustment.

When sales tax is exempted in other industries (Simulation 5.2), more labor and capital are demanded in both other industries and agro-industry. This reflects the closeness of production structures of these two sectors, although the production of agro-industry also has close relations with the production of primary agriculture. The labor and capital that move into other industries and agro-industry are from the primary agriculture and other nontradable sectors. In Simulations 6.2 and 7.2, when export subsidy is given or import tariff is raised in other industries, more labor and capital are demanded in other industries, utility and construction, and trade and transport sectors. This suggests the export and import structures of these three sectors may be closely related. The labor and capital that move into these three sectors are from the primary agriculture and agro-industry.

Results from Simulation 5 show that when sales tax is removed, the price that consumers pay for composite commodity declines (PQ), and the composite supply (QQ) increases in sector that received the exemption. Sales tax exemption can also stimulate sales and production in that sector since consumers are willing to buy more when goods become cheaper. QX, QD, QE, and QM then increase, and PX and PD decline in sector which received the exemption. Total import, total export, and private consumption rise in both scenarios. GDP only rises when sales tax exemption is offered to agro-industry, but contracts when given to other industries since the exemption encourages too much total import. Average wage and rent, household incomes, and private consumption, however, increase in both scenarios.

Results from Simulation 6 show that when export subsidy is given to agro-industry, it leads to an increase in export price (PE) in all sectors and the most in agro-industry, which then leads to an increase in quantity of exports (QE), but in agro-industry and primary agriculture only. The increase in PE and in QE affects the domestic production since the quantity of domestic output of agro-industrial and of primary agricultural goods (QD) sold domestically also increases because the production is expanded. More production then made the domestic price of domestic output (PD) decline in agro-industry. The quantity adjustment of QE and QD made the domestic output QX increase. The price adjustment of PE and PD, however, made the producer price PX decline by little. However, in the case that export subsidy is given to other industries, the export price increases only in other industries, but declines in all other sectors. The adjustments in other quantities and prices happen in other industries the same way as happens to agro-industry when export subsidy is given to agro-industry. GDP only rises when export subsidy is made to agro-industry, but contracts when given to other industries since the subsidy encourages too much total import to be used in the expanded production. Average wage and rent, household incomes, and private consumption, however, increase in both scenarios.

Results from Simulation 7 show that labor and capital (QF) move into sectors for which import tariff was raised. This suggests that the increase in import price (PM) leads to a decline in import demand (QM) from producers and consumers, and to an increase in a substitution of imports with domestic production as the quantities of domestic production (QX, QD) increase in the sector where the tariff was raised and in sectors which have close production relations with those sectors. However, since the economy still depends so much on imported inputs from these two sectors simulated, when tariffs are raised, many sectors suffer, especially other industries as their quantity of exports declines in both Simulations 7.1 and 7.2. Therefore, the total production and total export in the economy decline in both scenarios. GDP, average wage and rent, household incomes, and private consumption also decline in both scenarios.

Agro-industry performs better than other industries in case of import substitution since the increase in domestic production in the former can substitute well with imports, and even have left over for exports. On the other hand, other industries cannot substitute domestic production well with imports, and their exports reduced from not having enough production to export.

The average wage and rent (WF) increase four times in Simulation 5.2 over that in Simulation 5.1. The average wage in Simulation 6.1 remains very close to that in Simulation 6.2, but contracts 13 times more in Simulation 7.2 compared to the reduce $WF_{lab}$ value in Simulation 7.1. The average rent in Simulation 5.2 is about seven times higher than that in Simulation 5.1, and is about four times higher in Simulation 6.2 than in Simulation 6.1. But the average rent in Simulation 7.2 contracts nine times more than that in Simulation 7.1.

The change in real wage can be traced from $wfa_{lab}$ in each sector since $wfa_{lab} = WF_{lab} \cdot WFDIST_{lab}$. Simulations 5 and 6 show an increase in wage rate in all sectors. Among all three production sectors, the highest increase in wage rate happens in agro-industry in Simulation 5 and in primary agriculture in Simulation 6, although all wage rates are not much deviated from each other. The capital rent also rises in every sector in Simulations 5 and 6, and the rents are not much deviated from each other. However, in Simulation 7, wages and rents contract in both scenarios, but they contract much more in Simulation 7.2 at around 14 and 9 times, respectively, more than those in Simulation 7.1.

Results from these three simulations cannot satisfy our hope to use tax policy, subsidy policy and protective policy as incentives to shift more labor from primary agriculture to agro-industry due to the fact that the policies would instead induce more labor into primary agriculture. The tax and subsidy incentives given to other industries instead can induce labor out of primary agriculture into this sector. We then question the applicability of tax, subsidy, and protective policies to reallocate labor in the way we wish in our proposed strategy, as far as we read the results from the simulations. The export subsidy policy is the best policy we found from these simulations since the wage rate of primary agricultural workers increases the most (in percentage change) compared to the percentage rise in wage rate in other sectors, in Simulation 6. The policy of import tariff increase is not good for the whole economy's output and welfare, though it may be good for a specific sector which received this incentive, since domestic production is not yet well substituted with imports, thus more expensive imports and imported inputs can become a burden to consumers and producers in other sectors.

**Table 5.13—Results of Simulations 5 – 7**

| | | | BASE | SIM 5.1 Δ% | SIM 5.2 Δ% | SIM 6.1 Δ% | SIM 6.2 Δ% | SIM 7.1 Δ% | SIM 7.2 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 0.096 | (0.044) | 0.318 | (0.470) | (0.193) | (0.202) |
| | PRVCON | | 25292.80 | 0.230 | 1.493 | 0.992 | 3.444 | (0.346) | (3.294) |
| | GOVCON | | 5007.05 | 0.195 | 0.662 | 0.941 | 1.093 | (0.248) | (1.784) |
| | INVEST | | 8845.28 | (0.423) | (4.481) | (2.171) | (8.490) | 0.453 | 11.553 |
| | EXP | | 27237.19 | 0.150 | 0.168 | 0.645 | 0.165 | (0.659) | (4.460) |
| | IMP | | -20023.05 | 0.135 | 0.401 | 0.671 | 2.187 | (0.748) | (5.103) |
| EXR | PRIMA-A | | 1.00 | 0.194 | (0.480) | 0.573 | (5.445) | (0.409) | (2.677) |
| QF | LAB | PRIMA-A | 139410.00 | 0.160 | (0.245) | 1.380 | (2.718) | 0.093 | (1.313) |
| | LAB | AINDUS-A | 8490.00 | 0.790 | 0.151 | 7.770 | (2.467) | 0.895 | (2.958) |

| | | | BASE | SIM 5.1 ∆% | SIM 5.2 ∆% | SIM 6.1 ∆% | SIM 6.2 ∆% | SIM 7.1 ∆% | SIM 7.2 ∆% |
|---|---|---|---|---|---|---|---|---|---|
| QF | LAB | MANU-A | 33960.00 | (0.302) | 1.509 | (3.052) | 9.796 | (0.384) | 2.112 |
| | LAB | UTICON-A | 18220.00 | (0.353) | (1.080) | (2.077) | (0.420) | 0.252 | 4.201 |
| | LAB | TRADE-A | 51750.00 | (0.171) | 0.043 | (1.420) | 1.577 | (0.073) | 1.181 |
| | LAB | SER-A | 54200.00 | (0.064) | (0.017) | (0.800) | (0.124) | (0.155) | (0.024) |
| | CAP | PRIMA-A | 12315.48 | 0.265 | (0.336) | 2.296 | (4.065) | 0.152 | (2.123) |
| | CAP | AINDUS-A | 6718.35 | 0.895 | 0.060 | 8.744 | (3.817) | 0.955 | (3.755) |
| | CAP | MANU-A | 22491.87 | (0.198) | 1.416 | (2.176) | 8.276 | (0.326) | 1.274 |
| | CAP | UTICON-A | 16829.92 | (0.249) | (1.170) | (1.192) | (1.798) | 0.311 | 3.346 |
| | CAP | TRADE-A | 44663.41 | (0.067) | (0.048) | (0.529) | 0.170 | (0.014) | 0.350 |
| | CAP | SER-A | 58248.63 | 0.041 | (0.108) | 0.096 | (1.507) | (0.096) | (0.845) |
| WF | LAB | | 0.048 | 0.315 | 1.343 | 1.742 | 1.826 | (0.294) | (3.967) |
| | CAP | | 0.168 | 0.203 | 1.420 | 0.818 | 3.246 | (0.352) | (3.181) |
| wfa | LAB | PRIMA-A | 0.0137 | 0.292 | 1.316 | 1.754 | 1.827 | (0.292) | (3.947) |
| | LAB | AINDUS-A | 0.1128 | 0.319 | 1.338 | 1.737 | 1.817 | (0.284) | (3.971) |
| | LAB | MANU-A | 0.1069 | 0.309 | 1.329 | 1.731 | 1.815 | (0.290) | (3.977) |
| | LAB | UTICON-A | 0.0747 | 0.308 | 1.339 | 1.740 | 1.820 | (0.281) | (3.975) |
| | LAB | TRADE-A | 0.0262 | 0.343 | 1.334 | 1.754 | 1.830 | (0.267) | (3.965) |
| | LAB | SER-A | 0.0990 | 0.313 | 1.333 | 1.737 | 1.818 | (0.283) | (3.969) |
| | CAP | PRIMA-A | 0.3425 | 0.207 | 1.425 | 0.823 | 3.247 | (0.347) | (3.177) |
| | CAP | AINDUS-A | 0.1966 | 0.209 | 1.425 | 0.819 | 3.246 | (0.346) | (3.180) |
| | CAP | MANU-A | 0.2224 | 0.207 | 1.425 | 0.823 | 3.246 | (0.346) | (3.179) |
| | CAP | UTICON-A | 0.0845 | 0.201 | 1.420 | 0.816 | 3.241 | (0.355) | (3.182) |
| | CAP | TRADE-A | 0.1870 | 0.203 | 1.423 | 0.818 | 3.246 | (0.348) | (3.182) |
| | CAP | SER-A | 0.1152 | 0.208 | 1.424 | 0.825 | 3.248 | (0.347) | (3.178) |
| YH | A-HHD | | 5316.62 | 0.227 | 1.446 | 0.977 | 3.247 | (0.345) | (3.267) |
| | G-HHD | | 4971.28 | 0.234 | 1.554 | 1.018 | 3.704 | (0.351) | (3.326) |
| | N-HHD | | 21389.80 | 0.229 | 1.496 | 0.990 | 3.453 | (0.345) | (3.297) |
| QE | PRIMA-C | | 2236.89 | 0.232 | (1.134) | 1.742 | (8.636) | 0.013 | (2.837) |
| | AINDUS-C | | 2909.02 | 1.030 | (0.708) | 17.588 | (8.426) | 0.572 | (4.671) |
| | MANU-C | | 16662.56 | (0.262) | 1.679 | (2.920) | 14.179 | (0.457) | (1.622) |
| | UTICON-C | | 113.66 | (0.331) | (1.542) | (2.059) | (5.297) | 0.186 | 1.889 |
| | TRADE-C | | 2898.91 | (0.100) | (0.969) | (0.970) | (5.100) | (0.102) | (0.317) |
| | SER-C | | 2416.15 | (0.005) | (1.102) | (0.586) | (6.381) | (0.255) | (0.927) |
| QM | PRIMA-C | | 1635.60 | 0.231 | 3.163 | 3.122 | 19.515 | 0.634 | 2.198 |
| | AINDUS-C | | 899.60 | 0.176 | 3.188 | (2.946) | 18.517 | (15.923) | 1.413 |
| | MANU-C | | 14825.23 | (0.116) | 0.047 | (0.146) | 4.223 | 0.328 | (4.120) |
| | UTICON-C | | 37.90 | (0.208) | 0.132 | (0.313) | 12.509 | 0.571 | 9.593 |
| | TRADE-C | | 710.78 | (0.025) | 2.888 | 0.325 | 18.922 | 0.226 | 2.909 |
| | SER-C | | 2534.31 | (0.008) | 2.890 | 0.493 | 16.083 | 0.250 | 0.780 |
| QX | PRIMA-C | | 11489.80 | 0.232 | (0.308) | 2.010 | (3.648) | 0.134 | (1.872) |
| | AINDUS-C | | 13628.78 | 0.851 | 0.099 | 8.334 | (3.252) | 0.930 | (3.421) |
| | MANU-C | | 43263.45 | (0.242) | 1.455 | (2.545) | 8.912 | (0.350) | 1.625 |
| | UTICON-C | | 7195.13 | (0.300) | (1.126) | (1.626) | (1.127) | 0.282 | 3.763 |
| | TRADE-C | | 16778.46 | (0.082) | (0.035) | (0.654) | 0.366 | (0.022) | 0.466 |
| | SER-C | | 21320.57 | (0.006) | (0.067) | (0.303) | (0.895) | (0.122) | (0.481) |
| PX | PRIMA-C | | 1.00 | 0.193 | 0.561 | 0.905 | 1.052 | (0.259) | (1.467) |
| | AINDUS-C | | 1.00 | (0.029) | 0.532 | (0.143) | 1.279 | 0.033 | (1.079) |
| | MANU-C | | 1.00 | 0.219 | (0.754) | 1.060 | (1.951) | (0.276) | 1.355 |
| | UTICON-C | | 1.00 | 0.232 | 0.045 | 1.130 | (0.212) | (0.290) | (0.435) |
| | TRADE-C | | 1.00 | 0.217 | 0.694 | 0.975 | 1.411 | (0.309) | (1.721) |
| | SER-C | | 1.00 | 0.193 | 0.824 | 0.931 | 1.531 | (0.244) | (2.129) |

***D. Simulation on Government Expenditure Policy (Simulation 8)***

Simulation 8 has six subordinate simulations assuming government demand for each commodity increases in each scenario by 25 percent. The closures set capital and labor to be mobile and fully employed. $WF_{cap}$ and $WF_{lab}$ is the market clearing variable for the unified capital and labor markets. Saving-driven investment (IADJ) is flexible, permitting investment quantity and value to adjust. Foreign saving is fixed, and a flexible exchange rate clears the current account of the balance of payments. This setting is done in order to capture the long-run change in the economy.

When government's demand for a specific good increases, what we can expect is to see the production of that good increases, but we are not sure to what extent the price adjustment will happen. The price of that good may be driven down due to the production increase. The economy will have to adjust through the government's new budget balance whether the government expenditures can drive up producers' profits through the increased demand or drive down private consumption through more tax collection to balance the fiscal expenditure.

Results from this simulation show that higher government demand on commodities does not improve GDP and welfare of Thai people, unlike the results found in the SAM or the input-output analyses. GDP and private consumption only increase (very little) when the government's demand for other industries' commodities increases. This is because the CGE analysis takes in to account the revenue side of the government and the relative price changes, unlike the SAM or the input-output analyses which only care for the exogenous quantity of government demand. In the CGE model, when more government demand is injected as a shock, it does not result in an increase in total output or GDP much because the economy is instead adjusted through the government budget channel. That is, when government demand increases, the government revenues must be increased to cope with the increased expenditures which can worsen the government budget. This then affects the tax collection from, and the government transfers to, other institutions as the new government revenues have to be financed by these institutions. This reduces other institutions' savings and disposable incomes. The results also show that increasing government demand does not affect prices and exchange rate much. Average wage and wage rate in each sector increase (very little) only in Simulation 8.3 when government increases its expenditure on other industrial commodities due to the originally highest government demand (qg) from this sector (among all tradable sectors) in the benchmark data, so that 25 percent of qg increase on other industrial goods requires more factor inputs than the same qg increase on other tradable sectors' goods. The increase in wage rate in each sector is, however, not much deviated from each other.

One reason the increase in government expenditures does not result in a rise in total output or GDP much may be due to the abnormally low government expenditures in the benchmark data of 1998 SAM as discussed before in Section 5.3.4.1. The impact of fiscal costs then dominates the adjustment in the economy through the government's fiscal balance to reach a new equilibrium given this benchmark data.

**Table 5.14—Results of Simulations 8.1 – 8.6**

| | | | BASE | SIM 8.1 Δ% | SIM 8.2 Δ% | SIM 8.3 Δ% | SIM 8.4 Δ% | SIM 8.5 Δ% | SIM 8.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | (0.001) | 0.000 | 0.016 | (0.007) | (0.007) | (0.200) |
| | PRVCON | | 25292.80 | (0.001) | (0.000) | 0.012 | (0.005) | (0.009) | (0.022) |
| | GOVCON | | 5007.05 | 0.042 | 0.003 | 1.104 | 0.368 | 0.655 | 22.819 |
| | INVEST | | 8845.28 | (0.028) | (0.001) | (0.571) | (0.233) | (0.383) | (13.996) |
| | EXP | | 27237.19 | (0.003) | (0.000) | 0.064 | (0.025) | (0.051) | (1.572) |
| | IMP | | -20023.05 | (0.004) | (0.000) | 0.088 | (0.034) | (0.069) | (2.179) |
| | NITAX | | 4756.36 | (0.003) | 0.000 | 0.053 | (0.017) | (0.047) | (1.034) |
| | GDPFC | | 41602.91 | (0.001) | (0.000) | 0.012 | (0.006) | (0.003) | (0.105) |
| | GDPMP2 | | 46359.27 | (0.001) | 0.000 | 0.016 | (0.007) | (0.007) | (0.200) |
| YG | | | 8524.54 | (0.002) | 0.000 | 0.035 | (0.012) | (0.025) | (0.648) |
| EG | | | 5710.03 | 0.037 | 0.002 | 0.968 | 0.322 | 0.574 | 20.010 |
| EXR | PRIMA-A | | 1.00 | - | - | (0.003) | 0.001 | (0.001) | 0.115 |
| QF | LAB | PRIMA-A | 139410.00 | 0.012 | 0.000 | 0.010 | (0.003) | (0.028) | 0.077 |
| | LAB | AINDUS-A | 8490.00 | (0.004) | 0.002 | 0.024 | 0.004 | 0.011 | 1.308 |
| | LAB | MANU-A | 33960.00 | (0.012) | (0.001) | 0.099 | (0.037) | (0.090) | (3.116) |

| | | | BASE | SIM 8.1 Δ% | SIM 8.2 Δ% | SIM 8.3 Δ% | SIM 8.4 Δ% | SIM 8.5 Δ% | SIM 8.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| QF | LAB | UTICON-A | 18220.00 | (0.018) | (0.001) | (0.231) | 0.162 | (0.171) | (5.723) |
| | LAB | TRADE-A | 51750.00 | (0.011) | (0.000) | (0.021) | (0.021) | 0.182 | (1.893) |
| | LAB | SER-A | 54200.00 | (0.007) | (0.000) | 0.006 | (0.005) | 0.009 | 5.280 |
| | CAP | PRIMA-A | 12315.48 | 0.021 | 0.001 | 0.023 | (0.007) | (0.049) | (0.333) |
| | CAP | AINDUS-A | 6718.35 | 0.004 | 0.002 | 0.036 | 0.000 | (0.011) | 0.893 |
| | CAP | MANU-A | 22491.87 | (0.004) | (0.000) | 0.111 | (0.042) | (0.111) | (3.513) |
| | CAP | UTICON-A | 16829.92 | (0.010) | (0.001) | (0.219) | 0.158 | (0.192) | (6.109) |
| | CAP | TRADE-A | 44663.41 | (0.003) | (0.000) | (0.009) | (0.025) | 0.161 | (2.295) |
| | CAP | SER-A | 58248.63 | 0.002 | 0.000 | 0.018 | (0.009) | (0.013) | 4.849 |
| WF | LAB | | 0.05 | - | - | 0.021 | - | - | (0.252) |
| | CAP | | 0.17 | (0.006) | - | (0.006) | - | 0.006 | 0.161 |
| wfa | LAB | PRIMA-A | 0.0137 | 0.006 | 0.006 | 0.027 | 0.006 | 0.006 | (0.246) |
| | LAB | AINDUS-A | 0.1128 | (0.001) | (0.001) | 0.020 | (0.001) | (0.001) | (0.253) |
| | LAB | MANU-A | 0.1069 | (0.007) | (0.007) | 0.014 | (0.007) | (0.007) | (0.259) |
| | LAB | UTICON-A | 0.0747 | (0.003) | (0.003) | 0.018 | (0.003) | (0.003) | (0.254) |
| | LAB | TRADE-A | 0.0262 | 0.009 | 0.009 | 0.030 | 0.009 | 0.009 | (0.242) |
| | LAB | SER-A | 0.0990 | (0.001) | (0.001) | 0.020 | (0.001) | (0.001) | (0.253) |
| | CAP | PRIMA-A | 0.3425 | (0.003) | 0.003 | (0.003) | 0.003 | 0.009 | 0.164 |
| | CAP | AINDUS-A | 0.1966 | (0.004) | 0.002 | (0.004) | 0.002 | 0.008 | 0.163 |
| | CAP | MANU-A | 0.2224 | (0.003) | 0.003 | (0.003) | 0.003 | 0.009 | 0.164 |
| | CAP | UTICON-A | 0.0845 | (0.005) | 0.001 | (0.005) | 0.001 | 0.007 | 0.162 |
| | CAP | TRADE-A | 0.1870 | (0.005) | 0.001 | (0.005) | 0.001 | 0.007 | 0.162 |
| | CAP | SER-A | 0.1152 | (0.002) | 0.004 | (0.002) | 0.004 | 0.010 | 0.165 |
| YH | A-HHD | | 5316.62 | (0.001) | (0.000) | 0.011 | (0.005) | (0.005) | (0.062) |
| | G-HHD | | 4971.28 | (0.001) | (0.000) | 0.013 | (0.002) | (0.028) | 0.218 |
| | N-HHD | | 21389.80 | (0.001) | (0.000) | 0.012 | (0.005) | (0.005) | (0.068) |
| PD | PRIMA-C | | 1.00 | - | - | - | - | 0.001 | 0.002 |
| | AINDUS-C | | 1.00 | - | - | 0.001 | - | - | (0.027) |
| | MANU-C | | 1.00 | - | - | 0.002 | (0.001) | - | (0.064) |
| | UTICON-C | | 1.00 | - | - | - | - | (0.001) | (0.010) |
| | TRADE-C | | 1.00 | (0.001) | - | (0.002) | 0.001 | 0.003 | 0.055 |
| | SER-C | | 1.00 | 0.001 | - | 0.001 | - | (0.001) | (0.026) |

## ***E. Simulation on Government Transfer Policy (Simulation 9)***

Simulation 9 has three subordinate simulations assuming the government transfer ($tr_{h,gov}$) to each household type increases by 25 percent in each scenario. The closures set capital and labor to be mobile and fully employed. All closures are set the same as those in Simulation 5 to 8 for the long run change in the economy.

When the government transfer to a household group increases, it is expected that household expenditures would increase. The quantity adjustment of goods that this household group tends to consume should increase, and there might also be a price adjustment following this quantity adjustment.

Results from this simulation show that there is no growth in GDP resulting from all three transfers. Private consumption increases the most if the transfer is made to the non-agricultural household. However, total investment, total export, and total import all contract. In the benchmark data, among the three kinds of household, government makes the biggest transfer to the non-agricultural household making the government expenditure made to this household the highest when transfers are made proportionally to the benchmark data. However, when household incomes increase, they are able to spend more and the commodity demands, both domestically produced and imported, increase as quantities imported show a small increase in some sectors. More factor inputs (QF) are then needed in some sectors to cope with the increased commodity demands. Later, when the production expanded (QX), extra quantities can be exported which makes the export quantities increase in some sectors (QE). These increased demands from all three kinds of household, and increased imports and exports happen only for goods in primary agriculture, agro-industry, and services. Quantity demanded for capital and labor also increases in only these three sectors, but contracts in other sectors. These factor input demands are, however, very small, and do not affect their average wage much (WF). For the effects on each sector's wage rate, the transfers result in a small increase in wage rate when made to agricultural and non-agricultural households. And among the tradable sectors, wage rate of primary agricultural workers increases the most in all scenarios. This is again due to the fact that the transfers made the demands and exports of primary agricultural and agro-industrial goods expand, which then results in the rise in demand on factor inputs (but very small). There is not much price adjustment after the quantity adjustment under this simulation.

When fiscal cost emerges, such as this transfer policy, it could squeeze investments in other places through S-I balance and flexible exchange rate closure (with no change in capital inflow) according to the model structure. Therefore, the increased government transfers reduce government's ability to consume commodities, and lead to a decline in composite commodities as QQ, QD, and QM decline in other industries, utility and construction, and trade and transport sectors. QQ, QD, and QM do not decline in primary agriculture, agro-industry, and services because these sectors received more demand from the increased income of households (as discussed above) and because transfers are assumed to firstly reach to the poor in each household group. Therefore, demand on food commodities should increase first when income of the poor increases, and the next household expenditure category may be on services instead of on manufacturing industrial goods.

The results from this simulation suggest that the government transfers to households may not be a good strategy to bring about growth in GDP, unlike the results from the SAM analysis, or an increase in wage rates. However, it can be a good strategy to reduce income gap between the rich and the poor if transfer is made directly to the poor. The transfers may help in stimulating production expansion of primary agriculture, agro-industry, and services. But at the same time the fiscal costs squeeze the government demand on goods from other industries, utility and construction, and trade and transport. These two effects cancel each other out which result in no change in GDP growth and the average wage. In addition, this simulation does not show any concrete impact on income distribution since YH only increases in households that received the transfers, but contracts in other households. However, the highest percentage change recorded in the real wage of primary agricultural workers after the transfers are made may be a good sign that government transfers at least have positive impacts on primary agricultural workers.

## Table 5.15—Results of Simulations 9.1 – 9.3

| | | | BASE | SIM 9.1 Δ% | SIM 9.2 Δ% | SIM 9.3 Δ% |
|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | (0.001) | (0.000) | (0.004) |
| | PRVCON | | 25292.80 | 0.125 | 0.023 | 0.252 |
| | GOVCON | | 5007.05 | 0.001 | 0.000 | 0.001 |
| | INVEST | | 8845.28 | (0.362) | (0.067) | (0.744) |
| | EXP | | 27237.19 | (0.014) | (0.004) | (0.045) |
| | IMP | | -20023.05 | (0.018) | (0.005) | (0.061) |
| | NITAX | | 4756.36 | 0.008 | (0.000) | (0.005) |
| YG | | | 8524.54 | 0.005 | 0.007 | 0.043 |
| EG | | | 5710.03 | 0.502 | 0.129 | 1.580 |
| EXR | PRIMA-A | | 1.00 | (0.002) | - | (0.001) |
| QF | LAB | PRIMA-A | 139410.00 | 0.046 | 0.005 | 0.061 |
| | LAB | AINDUS-A | 8490.00 | 0.125 | 0.019 | 0.204 |
| | LAB | MANU-A | 33960.00 | (0.067) | (0.013) | (0.145) |
| | LAB | UTICON-A | 18220.00 | (0.165) | (0.030) | (0.328) |
| | LAB | TRADE-A | 51750.00 | (0.048) | (0.006) | (0.066) |
| | LAB | SER-A | 54200.00 | 0.005 | 0.007 | 0.076 |
| | CAP | PRIMA-A | 12315.48 | 0.076 | 0.008 | 0.093 |
| | CAP | AINDUS-A | 6718.35 | 0.155 | 0.021 | 0.236 |
| | CAP | MANU-A | 22491.87 | (0.038) | (0.010) | (0.112) |
| | CAP | UTICON-A | 16829.92 | (0.135) | (0.027) | (0.296) |
| | CAP | TRADE-A | 44663.41 | (0.019) | (0.003) | (0.034) |
| | CAP | SER-A | 58248.63 | 0.034 | 0.010 | 0.108 |
| WF | LAB | | 0.05 | 0.021 | - | 0.021 |
| | CAP | | 0.17 | (0.012) | (0.006) | (0.012) |
| wfa | LAB | PRIMA-A | 0.0137 | 0.027 | 0.006 | 0.027 |
| | LAB | AINDUS-A | 0.1128 | 0.020 | (0.001) | 0.020 |
| | LAB | MANU-A | 0.1069 | 0.014 | (0.007) | 0.014 |
| | LAB | UTICON-A | 0.0747 | 0.018 | (0.003) | 0.018 |
| | LAB | TRADE-A | 0.0262 | 0.030 | 0.009 | 0.030 |
| | LAB | SER-A | 0.0990 | 0.020 | (0.001) | 0.020 |
| | CAP | PRIMA-A | 0.3425 | (0.009) | (0.003) | (0.009) |
| | CAP | AINDUS-A | 0.1966 | (0.010) | (0.004) | (0.010) |
| | CAP | MANU-A | 0.2224 | (0.009) | (0.003) | (0.009) |
| | CAP | UTICON-A | 0.0845 | (0.011) | (0.005) | (0.011) |
| | CAP | TRADE-A | 0.1870 | (0.011) | (0.005) | (0.011) |
| | CAP | SER-A | 0.1152 | (0.008) | (0.002) | (0.008) |
| YH | A-HHD | | 5316.62 | 0.536 | (0.000) | (0.004) |
| | G-HHD | | 4971.28 | (0.002) | 0.148 | (0.003) |
| | N-HHD | | 21389.80 | (0.002) | (0.000) | 0.417 |
| QE | PRIMA-C | | 2236.89 | 0.066 | 0.007 | 0.083 |
| | AINDUS-C | | 2909.02 | 0.141 | 0.020 | 0.222 |
| | MANU-C | | 16662.56 | (0.052) | (0.011) | (0.127) |
| | UTICON-C | | 113.66 | (0.152) | (0.028) | (0.313) |
| | TRADE-C | | 2898.91 | (0.021) | (0.003) | (0.036) |
| | SER-C | | 2416.15 | 0.019 | 0.008 | 0.091 |
| QM | PRIMA-C | | 1635.60 | 0.068 | 0.007 | 0.083 |
| | AINDUS-C | | 899.60 | 0.146 | 0.021 | 0.225 |
| | MANU-C | | 14825.23 | (0.043) | (0.011) | (0.120) |
| | UTICON-C | | 37.90 | (0.143) | (0.028) | (0.306) |

| | | BASE | SIM 9.1 Δ% | SIM 9.2 Δ% | SIM 9.3 Δ% |
|---|---|---|---|---|---|
| QM | TRADE-C | 710.78 | (0.029) | (0.004) | (0.046) |
| | SER-C | 2534.31 | 0.028 | 0.009 | 0.100 |
| QD | PRIMA-C | 9252.91 | 0.067 | 0.007 | 0.083 |
| | AINDUS-C | 10719.76 | 0.143 | 0.020 | 0.223 |
| | MANU-C | 26600.89 | (0.050) | (0.011) | (0.125) |
| | UTICON-C | 7081.47 | (0.150) | (0.028) | (0.311) |
| | TRADE-C | 13879.55 | (0.023) | (0.004) | (0.039) |
| | SER-C | 18904.42 | 0.022 | 0.009 | 0.094 |
| PD | PRIMA-C | 1.00 | (0.001) | - | (0.001) |
| | AINDUS-C | 1.00 | - | - | - |
| | MANU-C | 1.00 | 0.001 | - | 0.001 |
| | UTICON-C | 1.00 | 0.001 | - | 0.001 |
| | TRADE-C | 1.00 | (0.004) | - | (0.005) |
| | SER-C | 1.00 | 0.002 | - | 0.002 |

## ***F. Simulation on Change in Export Price (Simulation 10)***

Simulation 10 has six subordinate simulations which assume the export price of each commodity increases in each scenario by 25 percent. In this case, a shock is given directly to the world price of exports ($pwe_c$). This simulation of the change in export price in the CGE analysis may be equivalent to the simulation of the change in quantity of exports in the SAM analysis. It is not theoretically consistent to run a simulation on changes in quantity of exports with this CGE model since the model assumes Thailand to be a small open economy with supply-determined exports set by its production capacity and the CET function (quantity of exports is determined by relative prices of domestic and exported commodities). Therefore, we cannot shock the change in quantity of exports as if Thailand's exports were demand-determined, according to the model structure. The closures set capital and labor to be mobile and fully employed. All closures are set the same as those in Simulations 5 to 9 for the long run change in the economy.

When export price of a specific good increases, the price adjustment tends to dominate the quantity adjustment. The export price adjustment is expected to give impacts to quantity of exports, domestic production adjustment, factor usage, and even the quantity of imports to be used as intermediate inputs. These price and quantity adjustments then would affect household incomes, their welfare, and the GDP. These relationships are similar to what happened when export subsidy is given to a specific sector in Simulation 6.

Results from the simulation show that when export price (PE) increases in a specific sector, it leads to an increase in quantity of exports (QE) in that sector. The increase in PE and in QE affects the domestic production since the quantity of domestic output sold domestically (QD) also increases because the production is expanded. More production then made the domestic price of domestic output (PD) decline in that sector. The quantity adjustment of QE and QD made the domestic output QX increase. The price adjustment of PE and PD, however, made the producer price PX decline in some sectors and increase in some sectors. In each scenario, quantity of imports (QM) declines in sectors which received higher export price, but increases in other sectors. However, it is only in Simulation 10.3, when export price of other industrial goods increases, that the quantity of imported industrial goods and the quantity of all other imports increase. This is due to the fact that the induced production expansion from increased export price in this sector requires a lot of extra imported inputs. This suggests the high dependency of other industries on imported inputs.

Factor inputs (QF), average wage and rent, and each sector's wage and rent increase in sectors which received increased export price. Demand on labor input and demand on capital input increase (in percentage change) the most in agro-industry when this sector's export price increases, but the new workers do not move from primary agriculture to agro-industry as we expected. This result is the same as what we found after applying the tax, subsidy, protective policies. The average wage (WF), household incomes (YH), and private consumption increase in all scenarios and increase the most when export price of other industrial goods increases.

The results from this simulation point out the weakness of other industries, that their self-sufficiency is the lowest among all sectors as they depend so much on imported inputs even when the export opportunity expands. The expansion of exports caused by the increase in export price in agro-industry, however, does not help in moving labor out of primary agriculture into agro-industry. This labor allocation result is the same as what we found in Simulations 5 to 7 due to the fact that the production of agro-industry has close relations with the production of primary agriculture.

**Table 5.16—Results of Simulations 10.1 – 10.6**

| | | | BASE | SIM 10.1 Δ% | SIM 10.2 Δ% | SIM 10.3 Δ% | SIM 10.4 Δ% | SIM 10.5 Δ% | SIM 10.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 0.682 | 2.618 | 7.550 | 0.015 | 1.199 | 0.989 |
| | PRVCON | | 25292.80 | 0.831 | 2.373 | 7.503 | 0.019 | 1.162 | 1.131 |
| | GOVCON | | 5007.05 | 1.159 | 2.423 | 2.155 | (0.012) | 0.555 | (1.979) |
| | INVEST | | 8845.28 | 1.025 | 5.254 | 29.553 | 0.073 | 3.827 | 3.415 |
| | EXP | | 27237.19 | (0.145) | 3.090 | 6.881 | 0.037 | 0.556 | 0.496 |
| | IMP | | -20023.05 | 0.016 | 4.066 | 14.950 | 0.068 | 1.277 | 0.827 |
| EXR | PRIMA-A | | 1.00 | (0.591) | 0.383 | (15.515) | (0.051) | (1.447) | (0.422) |
| YF | LAB | | 14579.90 | 0.842 | 2.491 | 8.426 | 0.028 | 0.509 | 1.479 |
| | CAP | | 27023.01 | 0.903 | 2.420 | 7.816 | 0.014 | 1.898 | 0.912 |
| QF | LAB | PRIMA-A | 139410.00 | 5.720 | 3.226 | (8.913) | (0.042) | (1.732) | (0.925) |
| | LAB | AINDUS-A | 8490.00 | (0.112) | 21.358 | (8.621) | (0.032) | (0.393) | (0.107) |
| | LAB | MANU-A | 33960.00 | (7.800) | (9.152) | 18.931 | (0.087) | (2.997) | (3.650) |
| | LAB | UTICON-A | 18220.00 | (3.105) | (0.972) | 21.294 | 0.487 | 1.860 | 1.451 |
| | LAB | TRADE-A | 51750.00 | (5.335) | (3.278) | 6.636 | 0.003 | 6.027 | (0.645) |
| | LAB | SER-A | 54200.00 | (3.669) | (2.452) | (1.080) | 0.001 | 0.013 | 4.812 |
| | CAP | PRIMA-A | 12315.48 | 9.876 | 5.370 | (13.473) | (0.078) | (2.994) | (2.029) |
| | CAP | AINDUS-A | 6718.35 | 3.814 | 23.879 | (13.196) | (0.067) | (1.673) | (1.220) |
| | CAP | MANU-A | 22491.87 | (4.176) | (7.265) | 12.977 | (0.122) | (4.244) | (4.724) |
| | CAP | UTICON-A | 16829.92 | 0.705 | 1.085 | 15.221 | 0.451 | 0.551 | 0.321 |
| | CAP | TRADE-A | 44663.41 | (1.613) | (1.269) | 1.297 | (0.032) | 4.665 | (1.752) |
| | CAP | SER-A | 58248.63 | 0.118 | (0.425) | (6.033) | (0.034) | (1.272) | 3.644 |
| WF | LAB | | 0.05 | 4.324 | 4.324 | 3.086 | 0.021 | 0.777 | 0.672 |
| | CAP | | 0.17 | 0.376 | 2.190 | 8.510 | 0.042 | 2.077 | 1.796 |
| wfa | LAB | PRIMA-A | 0.0137 | 4.330 | 4.330 | 3.092 | 0.027 | 0.782 | 0.677 |
| | LAB | AINDUS-A | 0.1128 | 4.323 | 4.323 | 3.084 | 0.020 | 0.775 | 0.671 |
| | LAB | MANU-A | 0.1069 | 4.317 | 4.317 | 3.079 | 0.014 | 0.770 | 0.665 |
| | LAB | UTICON-A | 0.0747 | 4.321 | 4.321 | 3.083 | 0.018 | 0.774 | 0.669 |
| | LAB | TRADE-A | 0.0262 | 4.334 | 4.334 | 3.095 | 0.030 | 0.786 | 0.681 |
| | LAB | SER-A | 0.0990 | 4.323 | 4.323 | 3.084 | 0.020 | 0.775 | 0.670 |
| | CAP | PRIMA-A | 0.3425 | 0.379 | 2.193 | 8.513 | 0.045 | 2.080 | 1.799 |
| | CAP | AINDUS-A | 0.1966 | 0.378 | 2.193 | 8.512 | 0.044 | 2.079 | 1.799 |
| | CAP | MANU-A | 0.2224 | 0.379 | 2.194 | 8.513 | 0.045 | 2.080 | 1.800 |
| | CAP | UTICON-A | 0.0845 | 0.377 | 2.191 | 8.511 | 0.043 | 2.078 | 1.797 |

| | | | BASE | SIM 10.1 Δ% | SIM 10.2 Δ% | SIM 10.3 Δ% | SIM 10.4 Δ% | SIM 10.5 Δ% | SIM 10.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| wfa | CAP | TRADE-A | 0.1870 | 0.377 | 2.191 | 8.511 | 0.043 | 2.077 | 1.797 |
| | CAP | SER-A | 0.1152 | 0.380 | 2.194 | 8.514 | 0.045 | 2.080 | 1.800 |
| YH | A-HHD | | 5316.62 | 0.805 | 2.319 | 7.010 | 0.017 | 1.203 | 1.058 |
| | G-HHD | | 4971.28 | 0.834 | 2.451 | 8.112 | 0.025 | 0.672 | 1.382 |
| | N-HHD | | 21389.80 | 0.840 | 2.373 | 7.537 | 0.018 | 1.272 | 1.095 |
| QE | PRIMA-C | | 2236.89 | 28.382 | 3.074 | (24.800) | (0.119) | (4.196) | (2.823) |
| | AINDUS-C | | 2909.02 | 2.593 | 47.700 | (24.240) | (0.098) | (2.516) | (1.885) |
| | MANU-C | | 16662.56 | (6.803) | (9.784) | 24.694 | (0.144) | (4.698) | (5.171) |
| | UTICON-C | | 113.66 | (2.509) | (1.926) | 3.469 | 20.064 | (0.056) | (0.145) |
| | TRADE-C | | 2898.91 | (3.368) | (3.232) | (13.449) | (0.081) | 23.119 | (2.610) |
| | SER-C | | 2416.15 | (2.977) | (2.889) | (18.326) | (0.054) | (2.443) | 23.261 |
| QM | PRIMA-C | | 1635.60 | (9.444) | 11.629 | 62.685 | 0.149 | 4.210 | 3.121 |
| | AINDUS-C | | 899.60 | 0.470 | (5.988) | 55.825 | 0.122 | 4.207 | 3.608 |
| | MANU-C | | 14825.23 | 1.376 | 3.411 | 27.895 | 0.123 | 2.631 | 1.550 |
| | UTICON-C | | 37.90 | 2.932 | 6.320 | 75.740 | (0.821) | 5.020 | 3.985 |
| | TRADE-C | | 710.78 | 1.717 | 3.780 | 65.646 | 0.139 | (5.157) | 1.577 |
| | SER-C | | 2534.31 | 2.425 | 3.163 | 50.017 | 0.082 | 4.331 | (2.579) |
| QX | PRIMA-C | | 11489.80 | 8.564 | 4.698 | (12.078) | (0.067) | (2.603) | (1.686) |
| | AINDUS-C | | 13628.78 | 2.145 | 22.812 | (11.301) | (0.052) | (1.137) | (0.753) |
| | MANU-C | | 43263.45 | (5.717) | (8.063) | 15.443 | (0.107) | (3.722) | (4.274) |
| | UTICON-C | | 7195.13 | (1.176) | 0.074 | 18.152 | 0.469 | 1.189 | 0.872 |
| | TRADE-C | | 16778.46 | (2.142) | (1.552) | 2.027 | (0.027) | 4.854 | (1.598) |
| | SER-C | | 21320.57 | (1.583) | (1.331) | (3.863) | (0.019) | (0.702) | 4.161 |

***G. Simulation on Change in Import Price (Simulation 11)***

Simulation 11 has six subordinate simulations which assume the increase in import price of each commodity in each scenario by 25 percent. In this case, a shock is given directly to the world price of imports ($pwm_c$). Again simulations of changes in quantity of imports cannot be made under the model structure of Thailand as a small open economy since imports are demand-determined and the demand for imports is set by incomes of Thai people according to the CES function (quantity of imports is determined by relative prices of domestically produced goods and imported goods). It is theoretically inconsistent to assume Thailand as a big country whose demand for imports can be increased at will without worrying about the world's prices as if it were a dominant or sole buyer. Therefore, we cannot shock the change in quantity of imports as if Thailand's imports were supply-determined according to the model structure. The closures set capital and labor to be mobile and fully employed. All closures are set the same as those in Simulation 5 – 10 for the long run change in the economy.

When import price of a specific good increases, the price adjustment tends to dominate the quantity adjustment. The import price adjustment is expected to give impacts to quantity of imports, domestic production adjustment, factor usage, and even the quantity of exports following the change in domestic production. These price and quantity adjustments then would affect household incomes, their welfare, and the GDP. These relationships are similar to what happened when import tariff is raised in a specific sector in Simulation 7.

Results from this simulation show that the increase in import price hinders growth and welfare of Thai people as it results in negative GDP, consumptions, investment, total export and total import. A significant change can be observed in other industries since this sector depends so much on imports and imported inputs. Some of the imported goods are used as intermediate goods in the production process, therefore when import price increases, quantity of imports declines, which leads to a reduction in the import-dependent domestic production capacity.

In all scenarios, labor and capital (QF) move into sectors where import price was increased. The increase in import price leads to a decline in import demand (QM) from producers and consumers, and to an increase in substitution of imports with domestic production as the quantity of domestic productions (QX, QD) increases in the sector for which the import price was increased. Quantity of exports (QE) also increases in the sector which received the shock. However, looking at the overall economy, when import price was increased, many sectors suffer, especially other industries since their import dependency is high. Therefore, the expansion of domestic production caused by the effort to substitute imports cannot offset the production lost from its lack of imported inputs. The GDP, private consumption, government consumption, total export, and household incomes then contract in all scenarios, and reduce the most in other industries.

It is worth noting that the average wage (WF) and each sector's real wage (wfa) increase only when the shock happens to primary agriculture. This suggests this sector is highly self-sufficient since its domestic production can substitute well with imports, which then raises the demand for factor inputs. In other scenarios, the average wage and rent, each sector's wage and rent, and household incomes all contract.

The results from this simulation again point out the weakness of other industries, that their self-sufficiency is the lowest among all sectors as they depend so much on imported inputs. When imports are limited by their higher price, production and GDP of other industries reduce the most. The expansion of domestic production to offset the decline in imports in agro-industry, however, does not help in moving labor out of primary agriculture into agro-industry. Overall, the increase in import price hinders growth and welfare of Thai people as it results in negative GDP, consumption, investment, total export and total import.

**Table 5.17—Results of Simulations 11.1 – 11.6**

| | | | BASE | SIM 11.1 Δ% | SIM 11.2 Δ% | SIM 11.3 Δ% | SIM 11.4 Δ% | SIM 11.5 Δ% | SIM 11.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | (1.587) | (0.746) | (6.533) | (0.019) | (0.419) | (1.503) |
| | PRVCON | | 25292.80 | (1.524) | (0.768) | (7.149) | (0.017) | (0.449) | (1.399) |
| | GOVCON | | 5007.05 | (0.503) | (0.565) | (3.976) | (0.000) | (0.167) | 1.346 |
| | INVEST | | 8845.28 | (2.991) | (0.723) | (8.604) | (0.041) | (0.707) | (3.791) |
| | EXP | | 27237.19 | (2.638) | (1.193) | (3.766) | (0.046) | (0.751) | (2.880) |
| | IMP | | -20023.05 | (3.287) | (1.326) | (3.821) | (0.060) | (0.973) | (3.543) |
| EXR | PRIMA-A | | 1.00 | (0.839) | (0.823) | (3.612) | (0.008) | (0.136) | (1.040) |
| YF | LAB | | 14579.90 | (1.628) | (0.785) | (7.295) | (0.014) | (0.667) | (1.203) |
| | CAP | | 27023.01 | (1.505) | (0.776) | (7.386) | (0.021) | (0.278) | (1.638) |
| QF | LAB | PRIMA-A | 139410.00 | 3.648 | 0.327 | (1.100) | (0.009) | (0.322) | (0.282) |
| | LAB | AINDUS-A | 8490.00 | (3.926) | 2.307 | (3.678) | (0.014) | (0.283) | 0.026 |
| | LAB | MANU-A | 33960.00 | (3.831) | (0.829) | 6.711 | (0.039) | (0.812) | (2.403) |
| | LAB | UTICON-A | 18220.00 | (3.023) | (0.182) | (5.101) | 0.207 | (0.408) | (1.159) |
| | LAB | TRADE-A | 51750.00 | (3.164) | (0.288) | 0.594 | (0.010) | 1.536 | (0.974) |
| | LAB | SER-A | 54200.00 | (2.330) | (0.347) | 0.348 | (0.009) | 0.052 | 3.546 |
| | CAP | PRIMA-A | 12315.48 | 6.254 | 0.547 | (1.550) | (0.018) | (0.572) | (0.812) |
| | CAP | AINDUS-A | 6718.35 | (1.510) | 2.531 | (4.116) | (0.023) | (0.534) | (0.505) |
| | CAP | MANU-A | 22491.87 | (1.413) | (0.612) | 6.226 | (0.048) | (1.061) | (2.922) |

| | | | BASE | SIM 11.1 Δ% | SIM 11.2 Δ% | SIM 11.3 Δ% | SIM 11.4 Δ% | SIM 11.5 Δ% | SIM 11.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| QF | CAP | UTICON-A | 16829.92 | (0.584) | 0.037 | (5.532) | 0.198 | (0.659) | (1.685) |
| | CAP | TRADE-A | 44663.41 | (0.729) | (0.070) | 0.137 | (0.019) | 1.281 | (1.501) |
| | CAP | SER-A | 58248.63 | 0.126 | (0.129) | (0.108) | (0.018) | (0.200) | 2.995 |
| WF | LAB | | 0.05 | 0.567 | (0.588) | (8.207) | (0.021) | (0.525) | (1.658) |
| | CAP | | 0.17 | (1.916) | (0.824) | (7.788) | (0.012) | (0.280) | (1.146) |
| wfa | LAB | PRIMA-A | 0.0137 | 0.572 | (0.582) | (8.202) | (0.015) | (0.519) | (1.653) |
| | LAB | AINDUS-A | 0.1128 | 0.566 | (0.589) | (8.208) | (0.022) | (0.526) | (1.659) |
| | LAB | MANU-A | 0.1069 | 0.560 | (0.595) | (8.214) | (0.028) | (0.532) | (1.665) |
| | LAB | UTICON-A | 0.0747 | 0.564 | (0.590) | (8.210) | (0.024) | (0.527) | (1.661) |
| | LAB | TRADE-A | 0.0262 | 0.576 | (0.578) | (8.199) | (0.012) | (0.515) | (1.649) |
| | LAB | SER-A | 0.0990 | 0.566 | (0.589) | (8.209) | (0.022) | (0.526) | (1.659) |
| | CAP | PRIMA-A | 0.3425 | (1.913) | (0.821) | (7.785) | (0.009) | (0.278) | (1.143) |
| | CAP | AINDUS-A | 0.1966 | (1.913) | (0.821) | (7.786) | (0.010) | (0.278) | (1.143) |
| | CAP | MANU-A | 0.2224 | (1.912) | (0.820) | (7.785) | (0.009) | (0.277) | (1.143) |
| | CAP | UTICON-A | 0.0845 | (1.915) | (0.823) | (7.787) | (0.011) | (0.280) | (1.145) |
| | CAP | TRADE-A | 0.1870 | (1.915) | (0.823) | (7.787) | (0.011) | (0.280) | (1.145) |
| | CAP | SER-A | 0.1152 | (1.912) | (0.820) | (7.784) | (0.008) | (0.277) | (1.142) |
| YH | A-HHD | | 5316.62 | (1.495) | (0.764) | (7.052) | (0.018) | (0.415) | (1.415) |
| | G-HHD | | 4971.28 | (1.596) | (0.779) | (7.235) | (0.015) | (0.608) | (1.251) |
| | N-HHD | | 21389.80 | (1.517) | (0.767) | (7.164) | (0.018) | (0.422) | (1.432) |
| QE | PRIMA-C | | 2236.89 | 5.263 | 0.297 | (1.632) | (0.018) | (0.496) | (0.760) |
| | AINDUS-C | | 2909.02 | (3.616) | 1.698 | (4.701) | (0.025) | (0.496) | (0.487) |
| | MANU-C | | 16662.56 | (2.709) | (0.848) | 0.574 | (0.051) | (1.074) | (2.993) |
| | UTICON-C | | 113.66 | (2.075) | (0.195) | (7.508) | 0.196 | (0.589) | (1.589) |
| | TRADE-C | | 2898.91 | (0.784) | (0.182) | 0.564 | (0.021) | 1.311 | (1.726) |
| | SER-C | | 2416.15 | (1.254) | (0.441) | 1.086 | (0.019) | (0.030) | 3.113 |
| QM | PRIMA-C | | 1635.60 | (39.234) | 1.232 | (0.490) | (0.005) | (0.489) | (0.181) |
| | AINDUS-C | | 899.60 | 1.639 | (35.573) | (0.987) | (0.000) | (0.173) | 0.493 |
| | MANU-C | | 14825.23 | (0.703) | 0.217 | (19.751) | (0.003) | (0.213) | (0.860) |
| | UTICON-C | | 37.90 | (0.909) | 0.305 | 1.550 | (40.678) | (0.379) | (0.946) |
| | TRADE-C | | 710.78 | (1.960) | 0.153 | (0.910) | (0.008) | (33.682) | (0.503) |
| | SER-C | | 2534.31 | (0.183) | 0.380 | (2.643) | (0.000) | (0.249) | (32.203) |
| QX | PRIMA-C | | 11489.80 | 5.436 | 0.479 | (1.410) | (0.015) | (0.494) | (0.647) |
| | AINDUS-C | | 13628.78 | (2.533) | 2.437 | (3.932) | (0.019) | (0.429) | (0.282) |
| | MANU-C | | 43263.45 | (2.437) | (0.703) | 6.429 | (0.044) | (0.956) | (2.704) |
| | UTICON-C | | 7195.13 | (1.784) | (0.070) | (5.321) | 0.202 | (0.536) | (1.428) |
| | TRADE-C | | 16778.46 | (1.074) | (0.100) | 0.201 | (0.017) | 1.317 | (1.427) |
| | SER-C | | 21320.57 | (0.973) | (0.226) | 0.094 | (0.014) | (0.088) | 3.240 |
| QD | PRIMA-C | | 9252.91 | 5.478 | 0.523 | (1.356) | (0.015) | (0.494) | (0.620) |
| | AINDUS-C | | 10719.76 | (2.242) | 2.636 | (3.725) | (0.018) | (0.410) | (0.227) |
| | MANU-C | | 26600.89 | (2.267) | (0.612) | 9.900 | (0.040) | (0.883) | (2.523) |
| | UTICON-C | | 7081.47 | (1.780) | (0.068) | (5.287) | 0.202 | (0.535) | (1.426) |
| | TRADE-C | | 13879.55 | (1.134) | (0.083) | 0.125 | (0.017) | 1.318 | (1.365) |
| | SER-C | | 18904.42 | (0.938) | (0.198) | (0.033) | (0.013) | (0.095) | 3.256 |

***H. Simulations on Exchange Rate Policies (Simulations 12 and 13)***

Simulations 12 and 13 deal with the exchange rate policy. Simulation 12 assumes ten percent appreciation of Thai baht. Simulation 13 assumes ten percent depreciation of Thai baht. In this case, shocks are given directly to the foreign exchange rate (EXR). The closures set capital and labor to be mobile and fully employed. The rest-of-world closure sets foreign saving to be flexible as exchange rate is now fixed in these simulations. The saving-investment closure sets investment to be saving-driven, permitting investment quantity and value to adjust.

When exchange rate is manipulated, we expect to see an extensive effect from price adjustment and a smaller effect from quantity adjustment. From empirical studies, such as Schiff and Valdés (1992) on agricultural pricing policy, exchange rate depreciation is often good for the agricultural sector since it increases the producer price of this sector. On the contrary, exchange rate appreciation is an indirect way of taxing agricultural sector in favor of the manufacturing industrial sector.

Results from Simulation 12 show that GDP, private consumption, government consumption, and exports contract when the Thai baht appreciates. This is due to the fact that when the Thai baht appreciates, Thai exports become less attractive (more expensive) in foreign markets. At the same time, since Thailand still depends on a very large quantity of imports and imported inputs, especially high-technology goods from advanced countries, the baht appreciation makes these imported goods less expensive and makes industries dependent on imports. Since imports are relatively cheap compared to the domestically produced goods when Thai baht appreciates, industries tend to import more and this brings about a problem in the country's balance of payment and reduces the GDP growth. The welfare declines since exports contract and imports increase, and less labor and capital inputs are used for domestic production. However, quantity investment increases due to the increase in foreign saving as the Thai economy is more attractive to foreign investors through the high interest rates (interest rate is usually high in a country which has appreciated exchange rate or which applies fixed exchange rate).

This scenario of Thai baht appreciation can well explain the economy of Thailand before the crises in 1997. At that time, Thai baht was kept overvalued under a fixed exchange rate regime to make imported inputs cheap for industries. This burden was borne by the poor and people who engaged in primary agriculture since their income declines through contracted production expansion and exports. The average wage rate declines while the average return to capital rises, which only benefits investors, landlords, and industrialists. The country's huge dependency on foreign savings before the crises made the impacts from the crises even more severe as capital flight happened very rapidly and substantially. Therefore, the appreciation of Thai baht under the fixed exchange regime before the crises gave very negative effects to the Thai economy.

Results from Simulation 13 show that GDP, private consumption, government consumption, and exports expand when the Thai baht depreciates, although imports and investment contract. This is due to the fact that when the Thai baht depreciates, Thai exports become more attractive (cheaper) in foreign markets, and imports become less attractive to Thai industrialists. These industrialists then try to substitute imported inputs with domestically produced inputs since imports are now relatively more expensive. Thai consumers also purchase less imported products when they are more expensive in local currency. This brings about surplus in the country's balance of payments and increases the GDP growth. The welfare increases since exports expand and imports shrink, and more labor and capital inputs are required for domestic production. However, quantity of investment declines due to the outflow of foreign saving as the Thai economy may become less attractive to foreign investors through the lower interest rates.

This scenario of Thai baht depreciation has happened in the Thai economy since the crises in 1997. The Thai government since then has encouraged industries to expand their exports to bring in more foreign exchange. The Thai baht now depreciates against foreign currency under the managed-float exchange rate regime. This strategy actually benefits the poor and people engaged in primary agriculture since their incomes increase through production expansion and export expansion. Both the country's average wage and rent increase which benefits investors, laborers, and consumers. Contracted foreign savings may bring on an investment problem, but it is better for Thailand to receive more foreign investment in terms of foreign direct investment (FDI) instead of foreign capital investment which is more volatile. Therefore, the Thai economy actually performs well under baht depreciation since Thailand is an export-oriented country.

**Table 5.18—Results of Simulations 12 and 13**

| | | | BASE | SIM 12 Δ% | SIM 13 Δ% |
|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | (1.710) | 4.119 |
| | PRVCON | | 25292.80 | (2.111) | 4.596 |
| | GOVCON | | 5007.05 | (0.836) | 1.903 |
| | INVEST | | 8845.28 | 125.479 | (126.613) |
| | EXP | | 27237.19 | (23.580) | 27.710 |
| | IMP | | -20023.05 | 24.438 | (21.494) |
| YG | | | 8524.54 | (0.822) | 2.386 |
| EG | | | 5710.03 | (0.748) | 1.684 |
| IADJ | | | 1.00 | 127.392 | (126.693) |
| FSAV | | | 3903.00 | 301.604 | (259.235) |
| EXR | PRIMA-A | | 1.00 | (10.000) | 10.000 |
| YF | LAB | | 14579.90 | (2.028) | 4.618 |
| | CAP | | 27023.01 | (1.941) | 4.510 |
| QF | LAB | PRIMA-A | 139410.00 | (7.410) | 7.357 |
| | LAB | AINDUS-A | 8490.00 | (11.722) | 13.752 |
| | LAB | MANU-A | 33960.00 | (6.451) | 5.383 |
| | LAB | UTICON-A | 18220.00 | 56.086 | (53.083) |
| | LAB | TRADE-A | 51750.00 | 8.117 | (8.066) |
| | LAB | SER-A | 54200.00 | (1.666) | 1.097 |
| | CAP | PRIMA-A | 12315.48 | (12.275) | 13.595 |

| | | | BASE | SIM 12 ∆% | SIM 13 ∆% |
|---|---|---|---|---|---|
| QF | CAP | AINDUS-A | 6718.35 | (16.360) | 20.363 |
| | CAP | MANU-A | 22491.87 | (11.366) | 11.507 |
| | CAP | UTICON-A | 16829.92 | 47.885 | (50.356) |
| | CAP | TRADE-A | 44663.41 | 2.436 | (2.724) |
| | CAP | SER-A | 58248.63 | (6.833) | 6.972 |
| WF | LAB | | 0.05 | (3.967) | 6.864 |
| | CAP | | 0.17 | 1.343 | 0.991 |
| wfa | LAB | PRIMA-A | 0.0137 | (3.962) | 6.870 |
| | LAB | AINDUS-A | 0.1128 | (3.968) | 6.863 |
| | LAB | MANU-A | 0.1069 | (3.974) | 6.857 |
| | LAB | UTICON-A | 0.0747 | (3.970) | 6.861 |
| | LAB | TRADE-A | 0.0262 | (3.958) | 6.874 |
| | LAB | SER-A | 0.0990 | (3.968) | 6.863 |
| | CAP | PRIMA-A | 0.3425 | 1.346 | 0.993 |
| | CAP | AINDUS-A | 0.1966 | 1.345 | 0.993 |
| | CAP | MANU-A | 0.2224 | 1.346 | 0.994 |
| | CAP | UTICON-A | 0.0845 | 1.344 | 0.991 |
| | CAP | TRADE-A | 0.1870 | 1.343 | 0.991 |
| | CAP | SER-A | 0.1152 | 1.346 | 0.994 |
| YH | A-HHD | | 5316.62 | (2.233) | 4.659 |
| | G-HHD | | 4971.28 | (2.066) | 4.618 |
| | N-HHD | | 21389.80 | (2.075) | 4.567 |
| QE | PRIMA-C | | 2236.89 | (17.829) | 19.135 |
| | AINDUS-C | | 2909.02 | (21.556) | 26.542 |
| | MANU-C | | 16662.56 | (16.157) | 17.346 |
| | UTICON-C | | 113.66 | 40.466 | (48.429) |
| | TRADE-C | | 2898.91 | (5.254) | 3.189 |
| | SER-C | | 2416.15 | (11.811) | 10.646 |
| QM | PRIMA-C | | 1635.60 | 24.127 | (15.234) |
| | AINDUS-C | | 899.60 | 17.492 | (11.766) |
| | MANU-C | | 14825.23 | 44.580 | (34.326) |
| | UTICON-C | | 37.90 | 91.723 | (60.364) |
| | TRADE-C | | 710.78 | 33.482 | (21.822) |
| | SER-C | | 2534.31 | 18.706 | (11.747) |

## ***I. Simulation on Improvement in Production Technology (Simulation 14)***

Simulation 14 has six subordinate simulations assuming there is technological or productivity improvement in each sector's production by increasing the production function's efficiency parameters ($ad_a$) by 10 percent. The closures set capital and labor to be mobile and fully employed. All closures are set the same as those in Simulation 5 to 11 for the long run change in the economy.

When there is technological or productivity improvement in a sector's production, it is expected that labor or capital demand in that sector would decline while the same or higher amount of output is maintained. Productivity increase should lead to an increase in quantity adjustment, real wages, household incomes, overall welfare and GDP. It is also interesting to see to what extent there will be a price adjustment following the quantity adjustment.

Results from the simulations show that when there is an improvement in production technology or productivity in any sector, that sector will require less labor and capital (QF) for its production. The remaining labor is drawn into other sectors. The results also suggest if better technology is provided to primary agriculture, it will help by reducing labor demand in this sector as redundant workers will be reallocated to other sectors, especially to agro-industry, which is labor-intensive and has the closest technological use to primary agriculture. Moreover, technological or productivity improvement in each sector's production positively impacts on the real wage (wfa) of primary agricultural workers and all other workers when this improvement happens in any sector. Income of all three household types (YH) also increases quite significantly in all scenarios.

The improvement in production technology or productivity in each sector also leads to output expansion (QX, QQ, and QD) in that sector and its closely related sectors. Prices of PX, PQ, and PD decline in the targeted sectors. The output expansion leads to increases in quantity of exports (QE), not only in its own sector but also in its closely related sectors. However, export prices (PE) only rise when the targeted sectors are primary agriculture, agro-industry, and services. The output expansion leads to a decline in quantity of imports (QM) in its own sector, but the quantity of imports does not decline in other industries. This is due to the fact that other industries still have high dependency on imported inputs and the increased production technology may not be a new kind of technology which can allow this sector to produce new products to substitute with imported inputs. Overall, the GDP, private consumption, government consumption, and investment increase in all scenarios.

The results from this simulation suggest that technological or productivity improvement is the key to success. Higher productivity can reduce or maximize the amount of labor or capital used while producing a higher amount of output. Moreover, higher productivity in primary agriculture can prevent problems resulting from high food prices due to a decline in labor input. As stated before in Simulations 3 and 4 that most agro-industry's inputs are from primary agriculture's outputs. Therefore, if primary agriculture can expand its outputs through technological improvement, the costs of agro-industry's intermediate inputs from this sector can be reduced. Agro-industry can then be expanded with the same technology by increasing its labor input drawing from primary agriculture. Results of Simulation 14.1 (Table 5.19) indicate that labor demand declines in primary agriculture when production technology or productivity is improved in this sector, and these redundant primary agricultural workers can be absorbed well by agro-industry. Given these linkages, our proposal and objective of shifting labor from primary agriculture to agro-industry while maintaining the same speed of growth, increasing farmers' real wage, and increasing household incomes can be supported and achieved through this policy of improving primary agriculture's production technology and productivity.

**Table 5.19—Results of Simulations 14.1 – 14.6**

| | | | BASE | SIM 14.1 Δ% | SIM 14.2 Δ% | SIM 14.3 Δ% | SIM 14.4 Δ% | SIM 14.5 Δ% | SIM 14.6 Δ% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 1.940 | 0.660 | 1.083 | 0.586 | 2.214 | 2.774 |
| | PRVCON | | 25292.80 | 1.890 | 0.602 | 0.919 | 0.500 | 2.318 | 2.587 |
| | GOVCON | | 5007.05 | 0.924 | 0.691 | 0.605 | (0.030) | 0.881 | (3.191) |
| | INVEST | | 8845.28 | 3.962 | 0.875 | 4.543 | 1.708 | 4.735 | 8.101 |
| | EXP | | 27237.19 | 1.440 | 0.826 | 0.694 | 0.818 | 2.006 | 2.762 |
| | IMP | | -20023.05 | 1.836 | 0.917 | 1.756 | 1.133 | 2.843 | 3.383 |
| EXR | PRIMA-A | | 1.00 | 0.339 | 0.575 | (2.252) | (0.058) | (0.316) | 1.040 |
| YF | LAB | | 14579.90 | 1.959 | 0.535 | 0.718 | 0.334 | 3.184 | 2.300 |
| | CAP | | 27023.01 | 1.950 | 0.684 | 1.258 | 0.689 | 1.707 | 2.992 |
| QF | LAB | PRIMA-A | 139410.00 | (2.274) | 0.822 | (0.629) | 0.323 | 0.581 | 0.552 |
| | LAB | AINDUS-A | 8490.00 | 4.807 | (5.840) | (1.723) | 0.148 | 0.935 | 0.277 |

| | | | BASE | SIM 14.1 ∆% | SIM 14.2 ∆% | SIM 14.3 ∆% | SIM 14.4 ∆% | SIM 14.5 ∆% | SIM 14.6 ∆% |
|---|---|---|---|---|---|---|---|---|---|
| QF | LAB | MANU-A | 33960.00 | 0.876 | (0.881) | (3.271) | 0.968 | 2.104 | 0.933 |
| | LAB | UTICON-A | 18220.00 | 2.685 | (0.177) | 4.132 | (7.406) | 3.160 | 3.853 |
| | LAB | TRADE-A | 51750.00 | 2.215 | (0.321) | 2.380 | 0.700 | (5.027) | 1.442 |
| | LAB | SER-A | 54200.00 | 1.531 | (0.282) | 0.277 | 0.360 | 0.777 | (4.722) |
| | CAP | PRIMA-A | 12315.48 | (3.809) | 1.342 | (1.236) | 0.608 | 0.990 | 1.282 |
| | CAP | AINDUS-A | 6718.35 | 3.162 | (5.355) | (2.323) | 0.433 | 1.345 | 1.004 |
| | CAP | MANU-A | 22491.87 | (0.708) | (0.371) | (3.861) | 1.254 | 2.519 | 1.665 |
| | CAP | UTICON-A | 16829.92 | 1.073 | 0.337 | 3.497 | (7.143) | 3.580 | 4.606 |
| | CAP | TRADE-A | 44663.41 | 0.610 | 0.193 | 1.755 | 0.986 | (4.640) | 2.178 |
| | CAP | SER-A | 58248.63 | (0.063) | 0.232 | (0.336) | 0.645 | 1.187 | (4.031) |
| WF | LAB | | 0.05 | 0.693 | 1.196 | 1.029 | 0.546 | 2.393 | 3.254 |
| | CAP | | 0.17 | 2.298 | 0.668 | 1.641 | 0.251 | 1.975 | 2.506 |
| wfa | LAB | PRIMA-A | 0.0137 | 0.731 | 1.170 | 1.023 | 0.512 | 2.412 | 3.289 |
| | LAB | AINDUS-A | 0.1128 | 0.700 | 1.188 | 1.028 | 0.541 | 2.393 | 3.253 |
| | LAB | MANU-A | 0.1069 | 0.692 | 1.188 | 1.020 | 0.533 | 2.386 | 3.247 |
| | LAB | UTICON-A | 0.0747 | 0.696 | 1.191 | 1.017 | 0.535 | 2.396 | 3.253 |
| | LAB | TRADE-A | 0.0262 | 0.724 | 1.220 | 1.029 | 0.534 | 2.402 | 3.279 |
| | LAB | SER-A | 0.0990 | 0.697 | 1.192 | 1.020 | 0.535 | 2.393 | 3.252 |
| | CAP | PRIMA-A | 0.3425 | 2.301 | 0.672 | 1.644 | 0.251 | 1.977 | 2.508 |
| | CAP | AINDUS-A | 0.1966 | 2.300 | 0.672 | 1.643 | 0.249 | 1.974 | 2.508 |
| | CAP | MANU-A | 0.2224 | 2.302 | 0.670 | 1.646 | 0.252 | 1.978 | 2.509 |
| | CAP | UTICON-A | 0.0845 | 2.295 | 0.662 | 1.644 | 0.248 | 1.976 | 2.508 |
| | CAP | TRADE-A | 0.1870 | 2.300 | 0.668 | 1.642 | 0.251 | 1.973 | 2.508 |
| | CAP | SER-A | 0.1152 | 2.301 | 0.669 | 1.641 | 0.252 | 1.980 | 2.510 |
| YH | A-HHD | | 5316.62 | 1.851 | 0.609 | 0.895 | 0.511 | 2.157 | 2.592 |
| | G-HHD | | 4971.28 | 1.933 | 0.552 | 0.762 | 0.375 | 2.945 | 2.367 |
| | N-HHD | | 21389.80 | 1.894 | 0.613 | 0.970 | 0.527 | 2.218 | 2.641 |
| QE | PRIMA-C | | 2236.89 | 10.197 | 1.099 | (3.257) | 0.359 | (0.011) | 0.361 |
| | AINDUS-C | | 2909.02 | 4.996 | 5.844 | (4.336) | 0.222 | 0.649 | 0.118 |
| | MANU-C | | 16662.56 | (0.444) | (0.744) | 6.569 | 1.104 | 2.198 | 1.035 |
| | UTICON-C | | 113.66 | 1.419 | (0.114) | 2.008 | 5.014 | 2.867 | 3.646 |
| | TRADE-C | | 2898.91 | (0.234) | (0.012) | (0.573) | 0.810 | 8.625 | 1.787 |
| | SER-C | | 2416.15 | 0.183 | (0.083) | (2.495) | 0.453 | (0.152) | 9.284 |
| QM | PRIMA-C | | 1635.60 | (8.386) | 1.512 | 8.532 | 1.181 | 4.537 | 3.954 |
| | AINDUS-C | | 899.60 | (0.371) | (3.226) | 6.868 | 0.658 | 3.164 | 2.907 |
| | MANU-C | | 14825.23 | 2.499 | 0.422 | 2.638 | 1.321 | 3.272 | 3.410 |
| | UTICON-C | | 37.90 | 3.187 | 0.687 | 9.396 | (6.535) | 4.911 | 6.031 |
| | TRADE-C | | 710.78 | 4.179 | 0.532 | 9.594 | 1.365 | (6.141) | 2.966 |
| | SER-C | | 2534.31 | 1.940 | 0.245 | 7.052 | 0.702 | 4.315 | (5.447) |
| QX | PRIMA-C | | 11489.80 | 6.333 | 1.180 | (1.047) | 0.519 | 0.863 | 1.054 |
| | AINDUS-C | | 13628.78 | 3.850 | 3.885 | (2.071) | 0.313 | 1.172 | 0.698 |
| | MANU-C | | 43263.45 | (0.046) | (0.586) | 6.025 | 1.134 | 2.344 | 1.357 |
| | UTICON-C | | 7195.13 | 1.858 | 0.086 | 3.807 | 2.001 | 3.374 | 4.237 |
| | TRADE-C | | 16778.46 | 0.833 | 0.121 | 1.842 | 0.946 | 4.836 | 2.075 |
| | SER-C | | 21320.57 | 0.642 | 0.003 | (0.064) | 0.518 | 1.004 | 5.228 |
| | CAP | | 27023.01 | 1.950 | 0.684 | 1.258 | 0.689 | 1.707 | 2.992 |

## 5.4 Distributional Impacts of Simulations

This section summarizes the distributional impacts on labor demand, wage rate in primary agriculture, and household incomes from all 14 simulations presented in the previous section. First, the distributional impact on labor demand ($QF_{lab,a}$) is presented in Table 5.20. Figures in Simulations 1, 2, 8, 10, and 11 represent the impact on labor demand in their own sectors drawing the results from the subordinate simulations. Figures in Simulations 3.1 and 4.1 show the impact on labor demand in each sector resulting from the fixed amount and proportion of new capital input injected into primary agriculture. Figures in Simulations 5, 6, 7 show the impact on labor demand in agro-industry and other industries, drawing the results from their subordinate simulations. Figures in Simulations 9.1 to 9.3 indicate the impact on labor demand in each sector resulting from government transfers to each household type. Figures in Simulations 12 and 13 show the impact on labor demand in each sector resulting from exchange rate policies. Figures in Simulation 14 represent the impact on labor demand in each sector resulting from technological or productivity improvement of primary agriculture's production. Therefore, the total economy-wide change in labor demand presented in Simulations 3.1, 4.1, 5, 6, 7, 9, 12, 13, and 14 must be zero.

Although, labor demand declines in simulations on capital allocations (Simulations 3 and 4) in all scenarios due to the substitution between labor and capital under the Cobb-Douglas production function, results from Simulations 3.1 and 4.1 support our proposal to shift primary agricultural workers to the agro-industry. As can be seen in Table 5.20, agro-industry absorbs a greater number of primary agricultural workers than other industries when more capital is allocated to primary agriculture. In terms of policy implementation, tax policy, subsidy policy, and protective policy proposed in Simulations 5 to 7 cannot satisfy our hope to use them as incentives to divert more labor from primary agriculture into agro-industry due to the fact that these policies will instead result in shifting more labor into primary agriculture. In contrast, tax and subsidy incentives given to other industries can shift labor out of primary agriculture and into this sector. This is because agro-industry has strong backward linkages with primary agriculture. Therefore, when production and employment expand in the former sector, they also expand in the latter. In addition, we can conclude that these tax and subsidy policies, which can protect or promote final output of the targeted sectors, can create labor shifts between agricultural-related sectors and other industries, but cannot create labor shifts between primary agriculture and agro-industry because these two sectors are tightly related in terms of production linkages.

Simulations on government expenditure and transfer (Simulations 8 and 9) do not significantly impact labor demand. Simulations on increases in export and import prices (Simulations 10 and 11) show that labor demand increases in all targeted sectors because productions of these targeted sectors are expanded when the export and import prices of their own sectors are raised. Workers demanded in each targeted sector come from various sectors including primary agriculture. However, none of the workers demanded in agro-industry comes from primary agriculture. Again, this is due to the fact that agro-industry has strong backward linkages with primary agriculture. Exchange rate appreciation (Simulation 12) reduces labor demand in all production sectors and services, and channels them into utility and construction, and trade and transport. Exchange rate depreciation (Simulation 13) increases labor demand in all tradable sectors and services due to production expansion. Workers demanded in these sectors are drawn from utility and construction, and trade and transport. Technological or productivity improvement in primary agriculture production (Simulation 14) helps to achieve our objective to shift primary agricultural workers to agro-industry. Moreover, agro-industry absorbs more primary agricultural workers than other industries when the technology and productivity of primary agriculture is improved.

**Table 5.20—Distributional Impact on Labor Demand (persons)**

| Sector | SIM 1 | SIM 2 | SIM 3.1 | SIM 4.1 | SIM 5.1 | SIM 5.2 | SIM 6.1 | SIM 6.2 |
|---|---|---|---|---|---|---|---|---|
| PRIMA | -500,000 | (-1.52 ~ | -303,122 | -888,308 | 22,308 | -34,161 | 192,390 | -378,944 |
| | (-3.59) | - 9.72) | (-2.17) | (-6.37) | (0.16) | (-0.25) | (1.38) | (-2.72) |
| AINDUS | 500,000 | 212,250 | 42,651 | 123,613 | 6,703 | 1,286 | 65,970 | -20,944 |
| | (58.89) | (25.00) | (5.02) | (14.56) | (0.79) | (0.15) | (7.77) | (-2.47) |
| MANU | 500,000 | 849,000 | 16,582 | 47,244 | -10,258 | 51,229 | -103,640 | 332,668 |
| | (14.72) | (25.00) | (0.49) | (1.39) | (-0.30) | (1.51) | (-3.05) | (9.80) |
| UTICON | 500,000 | 455,500 | 52,813 | 152,254 | -6,437 | -19,683 | -37,841 | -7,646 |
| | (27.44) | (25.00) | (2.90) | (8.36) | (-0.35) | (-1.10) | (-2.08) | (-0.42) |
| TRADE | 500,000 | 1,293,750 | 128,699 | 383,959 | -8,868 | 2,225 | -73,494 | 81,598 |
| | (9.66) | (25.00) | (2.49) | (7.42) | (-0.17) | (0.04) | (-1.42) | (1.58) |
| SER | 500,000 | 1,355,000 | 62,377 | 181,238 | -3,447 | -895 | -43,386 | -6,732 |
| | (9.23) | (25.00) | (1.15) | (3.34) | (-0.06) | (-0.02) | (-0.80) | (-0.12) |
| Total | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Sector | SIM 7.1 | SIM 7.2 | SIM 8 | SIM 9.1 | SIM 9.2 | SIM 9.3 | SIM 10 | SIM 11 |
|---|---|---|---|---|---|---|---|---|
| PRIMA | 13,023 | -183,006 | 1,707 | 6,446 | 751 | 8,484 | 797,359 | 508,588 |
| | (0.09) | (-1.31) | (0.01) | (0.05) | (0.01) | (0.06) | (5.72) | (3.65) |
| AINDUS | 7,599 | -25,116 | 14 | 1,064 | 158 | 1,732 | 181,326 | 19,585 |
| | (0.90) | (-2.96) | (0.002) | (0.13) | (0.02) | (0.20) | (21.36) | (2.31) |
| MANU | -13,052 | 71,732 | 3,352 | -2,292 | -441 | -4,908 | 642,899♦ | 227,893♦ |
| | (-0.38) | (2.11) | (0.01) | (-0.07) | (-0.01) | (-0.15) | (18.93) | (6.71) |
| UTICON | 4,588 | 76,550 | 2,960♦ | -2,998 | -539 | -5,971 | 8,875♦ | 3,768♦ |
| | (0.25) | (4.20) | (0.16) | (-0.17) | (-0.03) | (-0.33) | (0.49) | (0.21) |
| TRADE | -3,760 | 61,131 | 9,440♦ | -2,494 | -305 | 3,433 | 311,900♦ | 79,489♦ |
| | (-0.07) | (1.18) | (0.18) | (-0.05) | (-0.01) | (-0.07) | (6.03) | (1.54) |
| SER | -8,398 | -1,291 | 286,170 | 274 | 376 | 4,096 | 260,793♦ | 192,186♦ |
| | (-0.16) | (-0.02) | (5.28) | (0.01) | (0.01) | (0.08) | (4.81) | (3.55) |
| Total | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | |

| Sector | SIM 12 | SIM 13 | SIM 14 |
|---|---|---|---|
| PRIMA | -1,033,035 | 1,025,593 | -317,054 |
| | (-7.41) | (7.36) | (-2.27) |
| AINDUS | -99,520 | 116,756 | 40,815 |
| | (-11.72) | (13.75) | (4.81) |
| MANU | -219,060 | 182,813 | 29,734 |
| | (-6.45) | (5.38) | (0.88) |
| UTICON | 1,021,887 | -967,168 | 48,924 |
| | (56.09) | (-53.08) | (2.69) |
| TRADE | 420,050 | -417,432 | 114,613 |
| | (8.12) | (-8.07) | (2.22) |
| SER | -90,321 | 59,438 | 82,968 |
| | (-1.67) | (1.10) | (1.53) |
| Total | 0.00 | 0.00 | 0.00 |

Notes: figures in ( ) are in percentage change from the original workers in each sector in the base run.
♦ Primary agricultural workers decline in this scenario.

Second is the distributional impact on wage rate in primary agriculture ($WFDIST_{lab,a}$ or $wfa_{lab,a}$), which is presented in Table 5.21. In simulations on labor allocation, the wage rate of primary agricultural workers increases significantly in Simulation 1 when 500,000 primary agricultural workers are moved into agro-industry. Simulation 2 shows that when there is a proportionate increase in labor from the original figures (that is sectors which originally have more workers receive more new workers, i.e. other industries, trade and transport, and services), the more this labor expands, the more these sectors can pull new workers from primary agriculture, resulting in a higher wage for the remaining primary agricultural workers. In Simulations 3 and 4, the wage rate in primary agriculture also increases more when capital is allocated to agro-industry than when it is allocated to other industries. It can be concluded that if a fixed amount of labor or capital (Simulations 1 and 3) must be moved, it should be moved into agro-industry. This results in a large positive impact on the real wage of the remaining primary agricultural workers.

For policy implementation, the sales tax exemption (Simulation 5) given to other industries has a larger impact on the real wage in primary agriculture than when it is given to agro-industry. The export subsidy (Simulation 6) given to agro-industry and other industries yield positive impact on the real wage of primary agricultural workers. However, when import tariff is raised, the real wage of primary agricultural workers declines in both agro-industry and other industries scenarios. Thus, protective policies are counterproductive in protecting the real wage of farmers. It can be concluded that although sales tax exemption and export subsidy policies are productive in increasing the real wage of primary agricultural workers, they are not effective in shifting labor from primary agriculture into agro-industry, although they are effective in shifting this labor into other industries.

Simulations on government expenditures and transfers (Simulations 8 and 9) do not show any significant impact on real wages. In simulations with changes in the macro economic environment, increases in export price (Simulation 10) and exchange rate depreciation policy (Simulation 13) have a positive impact on the real wage of primary agricultural workers. Moreover, from Simulation 11, it can be seen that only the protection of primary agriculture through increasing in its import price (in the domestic market) can lead to an increase in real wage in this sector. This suggests this sector is highly self-sufficient since its domestic production can be substituted well with imports, which then raises the demand for factor inputs. The exchange rate appreciation policy (Simulation 12) negatively impacts the real wage of every sector. Technological or productivity improvement in each sector's production (Simulation 14) positively impacts the real wage of primary agricultural workers (and all other workers) when improvements take place in any sector.

**Table 5.21—Distributional Impact on Wage Rate in Primary Agriculture (percentage change from base run)**

| Effect from Sector | SIM 1 | SIM 2 | SIM 3 | SIM 4 | SIM 5 | SIM 6 | SIM 7 | SIM 8 |
|---|---|---|---|---|---|---|---|---|
| PRIMA | .. | .. | 0.22 | 0.43 | .. | .. | .. | 0.01 |
| AINDUS | 10.27 | 4.66 | 1.35 | 2.15 | 0.29 | 1.75 | -0.29 | 0.01 |
| MANU | 4.17 | 7.28 | 0.30 | 1.43 | 1.32 | 1.83 | -3.95 | 0.03 |
| UTICON | 5.65 | 5.15 | 0.01 | -0.04 | .. | .. | .. | 0.01 |
| TRADE | 4.48 | 12.25 | 0.66 | 5.76 | .. | .. | .. | 0.01 |
| SER | 6.02 | 17.07 | 0.32 | 3.93 | .. | .. | .. | -0.25 |
| Effect from Sector | SIM 9.1 | SIM 9.2 | SIM 9.3 | SIM 10 | SIM 11 | SIM 12 | SIM 13 | SIM 14 |
| PRIMA | 0.03 | 0.01 | 0.03 | 4.33 | 0.57 | -3.96 | 6.87 | 0.73 |
| AINDUS | 0.02 | -0.001 | 0.02 | 4.33 | -0.58 | -3.97 | 6.86 | 1.17 |
| MANU | 0.01 | -0.02 | 0.01 | 3.09 | -8.20 | -3.97 | 6.86 | 1.02 |
| UTICON | 0.02 | -0.003 | 0.02 | 0.03 | -0.02 | -3.97 | 6.86 | 0.51 |
| TRADE | 0.03 | 0.02 | 0.03 | 0.78 | -0.52 | -3.96 | 6.87 | 2.41 |
| SER | 0.02 | -0.001 | 0.02 | 0.68 | -1.65 | -3.97 | 6.86 | 3.29 |

Third is the distributional impact on income of three household types ($YH_h$), which is presented in Table 5.22. It must be noted that in the benchmark data, income share of the agricultural household is 16.78 percent, the government-employed household is 15.69 percent, and the non-agricultural household is 67.52 percent. Since changes in income share among these three household types are not significant in the simulation results, these shares are not shown in Table 5.21. Income of all three household types increases quite significantly when half a million primary agricultural workers are moved into agro-industry in Simulation 1. Moreover, income of all three household types increases quite significantly when labor or capital is allocated to agro-industry and primary agriculture in Simulations 2 to 4.

For the policy implementation, sales tax exemption and export subsidy (Simulations 5 and 6) given to other industries resulted in a better impact on household incomes than when they are given to agro-industry. However, when import tariff is raised to protect agro-industry or other industries, household incomes decline in both scenarios (Simulation 7). Therefore, protective policies are not beneficial in terms of increasing household incomes (as it increases production costs), or the real wage of farmers. The simulation on government expenditures (Simulation 8) does not show any significant result in household incomes. The government transfer policy in Simulation 9 increases income directly to receiving households. For simulations with changes in the macro economic environment, the increase in export price (Simulation 10) and the exchange rate depreciation policy (Simulation 13) positively impact household incomes. The increase in import price (Simulation 11) and the exchange rate appreciation policy (Simulation 12) negatively impact income of all household types. Income of all three household types increases quite significantly when there is a technological or productivity improvement in each sector's production (Simulation 14).

**Table 5.22—Distributional Impact on Household incomes**

**(percentage change from base run)**

| Effect from Sector | House-hold | SIM 1 | SIM 2 | SIM 3 | SIM 4 | SIM 5 | SIM 6 | SIM 7 | SIM 8 |
|---|---|---|---|---|---|---|---|---|---|
| PRIMA | A-HHD | .. | .. | 1.29 | 3.61 | .. | .. | .. | -0.001 |
| | G-HHD | .. | .. | 1.30 | 3.61 | .. | .. | .. | -0.001 |
| | N-HHD | .. | .. | 1.32 | 3.70 | .. | .. | .. | -0.001 |
| AINDUS | A-HHD | 1.56 | 0.81 | 0.41 | 0.62 | 0.23 | 0.98 | -0.35 | -0.00 |
| | G-HHD | 1.36 | 0.71 | 0.30 | 0.45 | 0.23 | 1.02 | -0.35 | -0.00 |
| | N-HHD | 1.58 | 0.82 | 0.41 | 0.62 | 0.23 | 0.99 | -0.35 | -0.00 |
| MANU | A-HHD | 0.37 | 0.57 | 0.27 | 1.29 | 1.45 | 3.25 | -3.27 | 0.011 |
| | G-HHD | 0.27 | 0.41 | 0.15 | 0.60 | 1.55 | 3.70 | -3.33 | 0.013 |
| | N-HHD | 0.42 | 0.64 | 0.30 | 1.41 | 1.50 | 3.45 | -3.30 | 0.012 |
| UTICON | A-HHD | 0.58 | 0.54 | -0.01 | -0.06 | .. | .. | .. | -0.005 |
| | G-HHD | 0.29 | 0.28 | -0.13 | -0.49 | .. | .. | .. | -0.002 |
| | N-HHD | 0.60 | 0.56 | -0.01 | -0.06 | .. | .. | .. | -0.005 |
| TRADE | A-HHD | 0.10 | 0.20 | 0.58 | 5.12 | .. | .. | .. | -0.005 |
| | G-HHD | 0.21 | 0.45 | 0.92 | 8.37 | .. | .. | .. | -0.028 |
| | N-HHD | 0.11 | 0.20 | 0.59 | 5.33 | .. | .. | .. | -0.005 |
| SER | A-HHD | 1.08 | 2.63 | 0.22 | 2.74 | .. | .. | .. | -0.062 |
| | G-HHD | 0.97 | 2.32 | 0.17 | 2.03 | .. | .. | .. | 0.218 |
| | N-HHD | 1.10 | 2.67 | 0.22 | 2.78 | .. | .. | .. | -0.068 |
| **Effect from Sector** | **House-hold** | **SIM 9.1** | **SIM 9.2** | **SIM 9.3** | **SIM 10** | **SIM 11** | **SIM 12** | **SIM 13** | **SIM 14** |
| PRIMA | A-HHD | .. | .. | .. | 0.81 | -1.50 | .. | .. | 1.85 |
| | G-HHD | .. | .. | .. | 0.83 | -1.60 | .. | .. | 1.93 |
| | N-HHD | .. | .. | .. | 0.84 | -1.52 | .. | .. | 1.89 |
| AINDUS | A-HHD | .. | .. | .. | 2.32 | -0.76 | .. | .. | 0.61 |
| | G-HHD | .. | .. | .. | 2.45 | -0.78 | .. | .. | 0.55 |
| | N-HHD | .. | .. | .. | 2.37 | -0.77 | .. | .. | 0.61 |
| MANU | A-HHD | .. | .. | .. | 7.01 | -7.05 | .. | .. | 0.89 |
| | G-HHD | .. | .. | .. | 8.11 | -7.24 | .. | .. | 0.76 |
| | N-HHD | .. | .. | .. | 7.54 | -7.16 | .. | .. | 0.97 |
| UTICON | A-HHD | .. | .. | .. | 0.02 | -0.02 | .. | .. | 0.51 |
| | G-HHD | .. | .. | .. | 0.03 | -0.02 | .. | .. | 0.38 |
| | N-HHD | .. | .. | .. | 0.02 | -0.02 | .. | .. | 0.53 |
| TRADE | A-HHD | .. | .. | .. | 1.20 | -0.42 | .. | .. | 2.16 |
| | G-HHD | .. | .. | .. | 0.67 | -0.61 | .. | .. | 2.95 |
| | N-HHD | .. | .. | .. | 1.27 | -0.42 | .. | .. | 2.22 |
| SER | A-HHD | .. | .. | .. | 1.06 | -1.42 | .. | .. | 2.59 |
| | G-HHD | .. | .. | .. | 1.38 | -1.25 | .. | .. | 2.37 |
| | N-HHD | .. | .. | .. | 1.10 | -1.43 | .. | .. | 2.64 |
| Other Effects* | A-HHD | 0.54 | -0.000 | -0.004 | .. | .. | -2.23 | 4.66 | |
| | G-HHD | -0.002 | 0.15 | -0.003 | .. | .. | -2.07 | 4.62 | |
| | N-HHD | -0.002 | -0.000 | 0.42 | .. | .. | -2.06 | 4.57 | |

Note: * Other effects are effects resulting from government transfer made to each household type in Simulation 9, and the change in foreign currency rate in Simulations 12 and 13

A summary of the distributional impacts of simulations is presented in Table 5.23. In order to create labor movement from primary agriculture into agro-industry, increase the real wage of the remaining farmers, and increase household incomes, the best policy is to allocate more new capital into primary agriculture and to improve the technology or productivity of primary agriculture's production. The capital injection into primary agriculture can give high rates of return on capital and investment, increase capital-labor ratio, raise labor productivity, and lead to output expansion. Higher productivity can save or maximize the amount of labor or capital used while producing higher amount of output. Moreover, higher productivity in primary agriculture can prevent problems resulting from high food prices due to a decline in labor input. Since most agro-industry's inputs are from primary agriculture's outputs because of their strong sectoral linkages, the output expansion in primary agriculture through capital deepening or technological improvement can reduce the costs of agro-industry's intermediate inputs as a result of buying from primary agriculture. In addition, agro-industry can be expanded with the same technology by shifting labor input from primary agriculture. Results of Simulations 3.1, 4.1, and 14.1 show that labor demand declines in primary agriculture when this sector receives more capital injection or its production technology improves, and these redundant primary agricultural workers can be absorbed well by agro-industry. In consideration of these relationships, our proposed strategy and objective of shifting labor from primary agriculture to agro-industry (through promotional not protective strategy) while maintaining the same speed of growth, and increasing farmers' real wage and household incomes, can be supported and achieved through the policy of allocating more capital into primary agriculture, and policies for improving primary agriculture's production technology or productivity.

It is also possible to use sales tax exemption policy, export subsidy policy, and increased export prices to create labor movement from primary agriculture, increase the real wage of the remaining farmers, and increase household incomes. However, these tax and subsidy policies and increased export prices cannot create a pinpoint labor shift from primary agriculture into agro-industry because labor and output demands of these two sectors are closely related, although these policies can shift the labor between the agricultural-related group (i.e. primary agriculture and agro-industry) and the other industries group. Thus, a more targeted policy to reduce the cost of labor movement between primary agriculture and agro-industry, such as an employment tax exemption or labor training subsidy for agro-industry, is required in order to create incentives to move or hire more farmers in agro-industry. These targeted policies can also be used as incentives for producers to set up or relocate agro-industry to rural areas. It can be concluded that if a fixed amount of labor or capital (Simulations 1 and 3) must be reallocated, it should be shifted into agro-industry, so that there is a large positive impact on the real wage of the remaining primary agricultural workers. On the contrary, protective policies, i.e. the increase in tariff and the increase in import price, will actually lower the real wage of primary agricultural workers and household income of all three categories. The government expenditure policy is not effective in achieving any objectives. The government transfer policy provides a direct income increase to receiving households, but it is not able to achieve other objectives. The exchange rate depreciation policy is better than the exchange rate appreciation policy in increasing farmers' real wage and household incomes.

**Table 5.23—Summary of Distributional Impacts of Simulations**

| Objective | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Labor movement from PRIMA to AINDUS | ● | ● | ○ | ○ | x | x | x | x | x | x | x | x | x | ○ |
| Labor movement from PRIMA to MANU | ● | ● | ○ | ○ | ○ | ○ | ○ | x | x | ○ | ○ | x | x | ○ |
| Increase in real wage of PRIMA | ○ | ○ | ○ | ○ | ○ | ○ | x | ♠ | ♠ | ○ | x | x | ○ | ○ |
| Increase in household incomes | ○ | ○ | ○ | ○ | ○ | ○ | x | x | ○ | ○ | x | x | ○ | ○ |

Notes: ● = forced change, ○ = yes, x = no, ♠ = yes, but less than 0.05 percentage change

## 5.5 Concluding Remarks

This chapter has proposed a new development strategy for Thailand to move agricultural labor out of primary agriculture and channel it into other production sectors, and to improve real wages and welfare of the poor who are predominantly situated in the rural agricultural sector. The new strategy is believed to help in speeding up the process of structural transformation in Thailand to move unproductive labor from primary agriculture to a more productive sector. The need to speed up this labor allocation arises as Thailand's past development has not been able to increase the average wage of workers in primary agriculture, or to create enough new jobs in manufacturing industrial sectors to absorb these workers. The manufacturing industrial sectors are limited in absorbing this labor since their production systems cannot be changed easily in the short- to medium-run due to their technological limitations. The Thai government seems to have no concrete action plans to transform Thai manufacturing industries into world-class high-technology rather than the status quo of assembly lines for FDI enterprises. Nevertheless, Thai assembly lines are capital-intensive with a heavy dependency on imported inputs. The new strategy recognizes the potential of agro-industry to fulfill the role of absorbing labor from primary agriculture as most agro-industries are labor-intensive and use domestically-produced inputs.

The CGE analysis was conducted to determine whether agro-industry is really the most appropriate sector to absorb this primary agricultural labor, and whether this proposed new strategy is applicable to the Thai economy to bring about a better income distribution effect while maintaining the same speed of growth. The CGE analysis results allow us to achieve the set objective and confirm our proposal: to reallocate labor from primary agriculture to agro-industry (through promotional not protective strategy) while maintaining the same speed of growth, increasing farmers' real wage, and increasing household incomes. All of these can be achieved through the policy of allocating more capital into primary agriculture, and the policy of improving primary agriculture's production technology or productivity. Agro-industry can be expanded with the same technology by increasing its labor input drawing from primary agriculture. The capital injection into primary agriculture can give high rates of return on capital and investment, increase capital-labor ratio, raise labor productivity, and lead to output expansion. Higher productivity translates into reducing or maximizing labor or capital used while producing higher amount of output. Moreover, higher productivity in primary agriculture can prevent problems resulting from high food prices due to a decline in labor input. Since most agro-industry's inputs are from primary agriculture's outputs because of their strong sectoral linkages, the output expansion in primary agriculture through capital deepening or technological improvement can reduce the costs of agro-industry's intermediate inputs as a result of buying from primary agriculture.

In addition, if a fixed amount of primary agricultural workers must be reallocated, the most promising sector to absorb these workers is agro-industry, which can perform this job more efficiently than the manufacturing industrial sector because there is a large positive impact on the real wage of the remaining primary agricultural workers. GDP growth and improved welfare of Thai people can also be achieved through labor allocation and job creation in agro-industry since primary agricultural labor can be more easily absorbed into the labor-intensive agro-industry than more capital-intensive manufacturing industrial sectors.

Policy simulations related to our strategy were also conducted to confirm the applicability of other policies. The results from the tax and subsidy policy simulations cannot satisfy our hope to use these policies as incentives to shift more labor from primary agriculture into agro-industry due to the fact that it will instead induce more labor into primary agriculture. One a way to disconnect the close output relationship between primary agriculture and agro-industry, so that the labor movement between these two sectors can happen easily, is to increase agricultural productivity. Higher productivity in primary agriculture can reduce or maximize the amount of labor or capital used in this sector while producing higher amount of output, so that redundant workers can be moved to agro-industry. The export subsidy policy is the best policy we found from the simulations since the wage rate of primary agricultural workers increases the most (in percentage change), compared to the percentage rise in wage rate in other sectors. The policy of import tariff increase is not good for the whole economy's output and welfare, though it may be good for the specific sector which receives this incentive, since domestic production has not yet well substituted with imports, thus more expensive imports and imported inputs have become a burden to consumers and other sectors' producers.

In terms of government expenditure policy, higher government demand for commodities does not improve the GDP and welfare of Thai people much, unlike the results found in the SAM or the input-output analyses. Government transfers to households may not be a good strategy to bring about growth in GDP, but it can be a good strategy to reduce income gap between the rich and the poor if transfers are made directly to the poor. The transfer helps in stimulating production expansion and increases welfare of the receiving households. These results are the same as those from the SAM simulations. Although simulation results show that transfers help in stimulating production expansion of primary agriculture, agro-industry, and services, this incurs rises in fiscal cost which squeezes the government demand on goods from other industries, utility and construction, and trade and transport. These two effects cancel each other out, resulting in no change in GDP growth or the average wage. Moreover, results from the government expenditure simulations do not show any concrete impact on income distribution.

Simulations were also conducted with changes in the macro economic environment, which may affect our strategy, of export and import price changes. The results from these two simulations point out the weakness of other industries, in that their self-sufficiency is the lowest among all sectors as they depend so much on imported inputs. When imports are limited by their higher prices, production and GDP of other industries contract the most. Overall, the increase in import price hinders growth and welfare of Thai people as it results in negative GDP, consumption, investment, total export and total import. The exchange rate policy simulation confirms that the exchange rate depreciation policy benefits exports, agricultural sector, farmers, and the balance of payments.

This CGE model still has limitations for testing the sector-specific employment policy or policy to reduce cost of labor movement between primary agriculture and agro-industry. This is because the SAM used as benchmark data for the CGE analysis does not have information on sector-specific labor market taxes. Therefore, future studies should be designed to overcome this problem, and enable direct testing of policies on employment directly, such as sector-specific employment tax or subsidy incentives, or policies on sector-specific training subsidy or tax discount for agro-industry (within the scope allowed under the WTO framework) in order to create incentives to move or hire more farmers in agro-industry. These targeted policies can also be used as incentives for producers to set up or relocate agro-industry to rural areas.

Furthermore, the future research should take into account the robustness of the CGE model, which is to incorporate the consumers' utility function for testing implications of different income elasticities across sectors. This is because in the traditional agricultural-nonagricultural sectors model, the differences in income elasticities played a key role in determining the demands for agricultural or non-agricultural commodities when the average income increased. This can be done by mobilizing more flexible utility functions such as the CES (Constant Elasticity of Substitution) or Stone-Geary for Linear Expenditure System instead of the current Cobb-Douglas production function that imposes the restriction of a unit elasticity.

# Chapter VI— Conclusion and Policy Implications

Thailand's economic development has been quite successful in terms of achieving high growth rate and reasonable per capita income. The country's economic performance in terms of the transformation of production and exports are tending toward the normal pattern of increasing share of manufactured products. However, the major problems Thailand is still facing are the late reduction of its agricultural labor force, inequality that has occurred as a result of the development process, and problems in potential of manufacturing industrial sectors. These three issues were made the main discussions of this dissertation. Objective and hypothesis were set in order to address these three problems. In addition, structural transformation in Thailand has posed many difficulties for the development of Thai agriculture, which is closely related to the welfare of the poor in the rural areas. Therefore, to tackle income distribution problems directly requires that farmers be given new opportunities. Agro-industry and high value-added agricultural sectors were proposed as the key sectors to improve inequality problems, smoothen employment transformation, generate high growth and induce high output production, and act as a bridge connecting Thai primary agriculture with the modern sectors. Agro-industry was proposed to be promoted in the rural areas for closer input locations, to shift agricultural workers from primary agriculture, to improve the real wage of farmers, and to prevent extensive urban migration. Qualitative analysis, input-output analysis, SAM analysis, and CGE analysis were applied to aid the discussions, prove the hypothesis, and achieve the objective.

Results from the input-output analysis show clearly that agro-industry and livestock sector (representing high value-added agricultural sector), and other agricultural-related sectors ranked higher as key sectors than non-agricultural sectors. This means investing more in these sectors will help to stimulate the economy better through backward and forward linkage effects.

Compared to the non-agricultural manufacturing industries, agro-industry and livestock sector in Thailand have higher potential to increase domestic production through backward linkage effects. Likewise, agricultural service and agricultural machinery have higher potential to increase other sectors' demand on their increased output through forward linkage effects. With the key sectors listed, it may now become easier for the government to set economic policies and plans to promote the best interindustry integration.

For the sectoral multiplier effects, results from the SAM analysis prove that Thai agricultural and agricultural-processing sectors have better linkage or multiplier effects than Thai non-agricultural manufacturing industries to induce more production in the economy, generate more income to different households, create better income distribution in the country, and induce more savings in Thailand. In addition, results from the sectoral multiplier effect analysis based on seven years of input-output tables (during 1975-2000) show similar results to those based on SAM. This helps in confirming that, even when looking at the longer time span or adjusting the sectoral aggregation, Thai agricultural and agricultural related sectors still give the highest output multiplier effects and inducement of income from operating surplus. These findings form an argument against those who ignore the importance of basing a development strategy on agricultural-related sectors, in the erroneous belief that with scarce resources, investment should be concentrated on selected non-agricultural manufacturing industries which are believed to have high multipliers.

Both the size effect (high share in export and GDP) and the per-unit-of-value-added effect (high linkage and multipliers) of the agricultural-related sectors should produce remarkable growth if they are seriously promoted. On the contrary, non-agricultural manufacturing industries may have high output growth, but have neither impressive linkage effects nor multiplier effects. Their domestic up-stream industries are not well-developed and they rely too much on imported inputs. Limits in ability to develop manufacturing industrial technology will reduce Thailand's potential to compete for the near future. Therefore, non-agricultural manufacturing industries cannot be relied on as a sustainable engine of growth in the Thai economy as long as these conditions still remain.

Following the findings and confirmation of the potential of agro-industry and agricultural-related sectors, a new development strategy for Thailand is proposed to move agricultural workers out of primary agriculture and channel them into other production sectors, and to improve the real wage and welfare of the poor who are dominantly situated in the rural agricultural sector. The potential of this new development strategy was examined with the help of a CGE model because the SAM and input-output analyses have weaknesses in real world analysis, since they do not incorporate relative price movements and their input coefficients are always fixed. Moreover, they cannot explicitly examine the effects resulting from factor input movements that should be tested under the proposed new development strategy.

The CGE model was used to, first, test the impacts from the labor input movements. Simulations on labor allocation were conducted. However, since the labor movement simulations are not applicable as a real policy implementation, other kinds of policy simulations related to the new development strategy were also conducted. These policies are related to the relative price adjustments to create incentives for producers to act in the real economy. These simulations are capital allocation policy, tax and subsidy incentive policies, protective policies, exchange rate policies, improvement in production technology policy, and changes in rest-of-world environment such as changes in export and import prices. In addition, simulations related to government expenditures, which involve the increase in government demand for specific commodities, and government transfer to a specific household group, are also tested since they are directly applicable as a policy related to the income distribution issue.

The CGE analysis results allow us to achieve the set objective and confirm our proposal: to reallocate labor from primary agriculture to agro-industry (through promotional not protective strategy), while maintaining the same speed of growth, increasing farmers' real wage, and increasing household incomes. All of these can be achieved through the policy of allocating more capital into primary agriculture, and improving primary agriculture's production technology or productivity. Agro-industry can be expanded with the same technology by increasing its labor input drawing from primary agriculture. The capital injection into primary agriculture can provide high rates of return on capital and investment, increase capital-labor ratio, raise labor productivity, and lead to output expansion. Higher productivity can save or maximize the amount of labor or capital used while producing higher amount of output. Moreover, higher productivity in primary agriculture can prevent problems resulting from high food prices due to a decline in labor input. Since most agro-industry's inputs are from primary agriculture's outputs because of their strong sectoral linkages, the output expansion in primary agriculture through capital deepening or technological improvement can reduce the costs of agro-industry's intermediate inputs as a result of buying from primary agriculture.

In addition, if a fixed amount of primary agricultural workers must be reallocated, the most promising sector to absorb these workers is agro-industry, which can perform this job more efficiently than the non-agricultural manufacturing industries because there is a large positive impact on the real wage of the remaining primary agricultural workers. GDP growth and improved welfare of Thai people can also be achieved through labor reallocation and job creation in agro-industry since primary agricultural workers can be more easily absorbed into the labor-intensive agro-industry than more capital-intensive non-agricultural manufacturing industries.

It is possible to use sales tax exemption policy, export subsidy policy, and increased export price to create labor movement out of primary agriculture, increase the real wage of the remaining farmers, and increase household incomes. However, these tax and subsidy policies and increased export prices cannot create a pinpoint labor shift from primary agriculture into agro-industry because the labor demand and output demand of these two sectors are closely related. Nevertheless, these policies can shift labor between the agricultural-related group (i.e. primary agriculture and agro-industry) and the other industries group. Therefore, a way to disconnect the close output relationship between primary agriculture and agro-industry, so that the labor movement between these two sectors can happen easily, is to increase agricultural productivity. This is because higher productivity in primary agriculture can reduce or maximize the amount of labor or capital used in this sector while producing higher amount of output, so that redundant workers can be moved to agro-industry.

In contrast, protective policies, i.e. increases in tariffs and in import prices, will actually deteriorate the real wage of primary agricultural workers and household income of all three categories. The simulation on import price increase points out the weakness of the non-agricultural manufacturing industries, as their self-sufficiency is the lowest among all sectors due to their excessive dependence on imported inputs. When imports are limited by their higher prices, production and GDP of the manufacturing industries contract the most. Overall, the increase in import prices in domestic markets hinders the growth and welfare of Thai people as it results in reduced GDP, consumption, investment, and lower total export and total import. The government expenditure policy is not effective in achieving any objectives such as the results found in the SAM or the input-output analyses. The government transfer policy provides a direct income increase effect for receiving households (this result is similar to that of the SAM analysis), but it is not able to achieve other objectives, such as an increase in the real wage of farmers. The exchange rate depreciation policy is more effective than the exchange rate appreciation policy for increasing farmers' real wage and household incomes, benefiting exports, agricultural sector, and the balance of payments.

These findings suggest the possibility for Thailand to become a NIE basing its growth strategies on the development of agro-industry and high value-added agricultural sectors, especially in the rural areas. Technological development in agricultural-related sectors could be easily improved if encouragements are given. Thai agricultural-related sectors have the potential to induce growth through exports and their demand for domestic intermediate inputs. In the long-run Thailand aims to be an industrialized country, and in the short-run agricultural development is needed to lift up rural poverty. Therefore, agro-industry can be a bridge connecting these two phases. If workers are reallocated from primary agriculture to agro-industry, the real wage of primary agricultural workers would increase due to the higher productivity of labor when workers become less abundant. The wage rate in the recipient sector is projected to decline but not excessively. Moreover, if capital is reallocated from urban industries to rural agro-industry, its capital productivity would increase because capital is scarce in rural areas. The total capital productivity should be maintained or even be raised by means of higher capital productivity in rural areas. The increased capital intensity and the dynamics of food production itself will raise the real wage of farmers, and will not only equalize real wages of urban and rural workers, but also allow Thailand to maintain the same speed of economic growth.

This study still has limitations for testing the sector-specific employment policy or policy to reduce cost of labor movement between primary agriculture and agro-industry. This is because the SAM used as benchmark data for the CGE analysis does not have information on sector-specific labor market taxes. Therefore, future studies should be designed to overcome this problem, and enable direct testing of policies on employment, such as sector-specific employment tax or subsidy incentives, or policies on sector-specific training subsidy or tax discount for agro-industry (within the scope allowed under the WTO framework) in order to create incentives to move or hire more farmers in agro-industry. These targeted policies can also be used as incentives for producers to set up or relocate agro-industry to rural areas.

Furthermore, the future research should take into account the robustness of the CGE model, which is to incorporate the consumers' utility function for testing implications of different income elasticities across sectors. This is because in the traditional agricultural-nonagricultural sectors model, the differences in income elasticities played a key role in determining the demands for agricultural or non-agricultural commodities when the average income increased. This can be done by mobilizing more flexible utility functions such as the CES (Constant Elasticity of Substitution) or Stone-Geary for Linear Expenditure System instead of the current Cobb-Douglas production function that imposes the restriction of a unit elasticity.

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## Appendix A—Thai Migrant Labors Statistics, 1998-2005 (persons)

| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005[a] |
|---|---|---|---|---|---|---|---|---|
| Total number received permit | 91,364 | 159,566 | 177,709 | 165,047 | 160,807 | 147,769 | 148,596 | 105,301 |
| Remittance by Bank Transfer (million baht) | 58,845 | 56,910 | 67,936 | 55,606 | 59,251 | 66,297 | 65,124 | 24,056[b] |
| % of GDP | 1.27 | 1.23 | 1.38 | 1.08 | 1.09 | 1.12 | 0.99 | 0.70[b] |
| By Education | | | | | | | | |
| Four-year Elementary | 4,308 | 119 | 267 | 206 | 244 | 172 | 251 | 197 |
| Six-year Elementary | 75,404 | 128,475 | 137,810 | 118,029 | 107,226 | 89,263 | 83,645 | 57,233 |
| Lower Secondary | 8,443 | 19,351 | 24,165 | 28,484 | 34,087 | 35,413 | 32,183 | 22,439 |
| Upper Secondary | 1,528 | 4,296 | 6,200 | 8,099 | 8,789 | 11,144 | 15,641 | 11,874 |
| Vocational Education | 494 | 2,056 | 2,259 | 2,555 | 2,302 | 2,877 | 4,182 | 3,148 |
| Upper Vocational Education | 299 | 2,038 | 2,990 | 2,953 | 3,183 | 3,341 | 5,555 | 4,406 |
| Technical Vocational Education | 26 | 121 | 139 | 143 | 142 | 499 | 208 | 135 |
| Four-year College | 504 | 3,098 | 3,850 | 4,561 | 4,814 | 5,041 | 6,912 | 5,853 |
| Graduate Level (Master's) | 98 | - | - | - | - | - | - | - |
| Others | 260 | 12 | 29 | 17 | 20 | 19 | 19 | 16 |
| By Region | | | | | | | | |
| Greater Bangkok[c] | 2,152 | 7,502 | 8,653 | 11,660 | 12,034 | 9,858 | 10,241 | 7,846 |
| Central | 2,821 | 7,062 | 8,703 | 8,319 | 8,179 | 7,989 | 8,707 | 6,813 |
| Northeast | 65,761 | 110,898 | 123,307 | 111,197 | 108,274 | 97,475 | 96,373 | 66,632 |
| North | 20,387 | 33,404 | 35,900 | 32,159 | 30,580 | 30,646 | 31,357 | 22,383 |
| South | 243 | 700 | 1,146 | 1,712 | 1,740 | 1,801 | 1,918 | 1,627 |

[a] from Jan-Sep
[b] from Jan-June
[c] Bangkok, Nonthaburi, Pathumthani, Nakornpathom, Samutprakarn, Samutsakorn

## Appendix A—Thai Migrant Labors Statistics, 1998-2005 (cont.)

| Year | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | | 2004 | | 2005[a] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| By Occupation | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |
| Professional | 445 | 127 | 2,354 | 612 | 2,996 | 653 | 2,988 | 836 | 2,965 | 940 | 3,407 | 1,042 | 3,568 | 1,437 | 1,925 | 665 |
| Management | - | - | 629 | 163 | 730 | 199 | 629 | 206 | 845 | 304 | 666 | 203 | 749 | 239 | 724 | 249 |
| Clerk | 502 | 58 | 977 | 585 | 928 | 591 | 1,148 | 586 | 403 | 353 | 580 | 397 | 674 | 481 | 376 | 374 |
| Trading related | 23 | 42 | 58 | 119 | 83 | 167 | 86 | 152 | 211 | 146 | 181 | 143 | 154 | 163 | 1,477 | 925 |
| Services | 869 | 2,100 | 3,466 | 7,051 | 4,914 | 9,894 | 5,069 | 8,970 | 4,570 | 8,694 | 4,701 | 8,923 | 5,458 | 9,435 | 4,038 | 5,596 |
| Agriculture, Forestry, Fishery | 2,946 | 94 | 535 | 59 | 1,075 | 106 | 664 | 139 | 12,554 | 692 | 6,079 | 613 | 11,426 | 1,537 | 185 | 46 |
| Manufacturing | 23,260 | 5,114 | 34,827 | 7,331 | 37,091 | 5,147 | 30,574 | 3,666 | 11,505 | 1,526 | 10,297 | 1,462 | 9,502 | 1,388 | 26,095 | 5,000 |
| Skilled-labor, Transport | 16,872 | 3,711 | 22,049 | 6,021 | 25,644 | 8,092 | 26,256 | 6,705 | 56,852 | 9,702 | 60,165 | 9,815 | 56,162 | 10,272 | 25,633 | 1,862 |
| Unskilled-labor | 34,721 | 480 | 69,840 | 2,890 | 75,986 | 3,413 | 72,690 | 3,683 | 46,293 | 2,252 | 36,622 | 2,473 | 33,507 | 2,444 | 26,633 | 3,498 |

Source: Department of Employment, Ministry of Labor
[a] from Jan-Sep
Remark 1: Employment in Food industry in 1998 = 647,153; 1999 = 691,444; 2000 = 758,818
Remark 2: Migrant workers from neighboring countries registered to work in Thailand in 2004 = 1.2 million persons.

## Appendix B—Competitive-Import Type Input-Output Table of Thailand, 2000 (thousand baht)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Paddy | Other crops | Livestock | Agricultural Service | Forestry | Fishing | Mining | Agro-industry | Beverage & Tobacco | Textile & Leather | Wood, Paper, Rubber |
| 1 | Paddy | 4004814 | 465323 | 2322180 | 0 | 0 | 0 | 0 | 113399291 | 0 | 0 | 135672 |
| 2 | Other crops | 0 | 12064345 | 1091896 | 0 | 0 | 0 | 0 | 99425943 | 2929052 | 19951559 | 40561275 |
| 3 | Livestock | 0 | 0 | 3123966 | 0 | 0 | 0 | 0 | 83733616 | 0 | 3691094 | 0 |
| 4 | Agricultural service | 8612205 | 14997753 | 128366 | 0 | 105792 | 225564 | 0 | 0 | 0 | 0 | 0 |
| 5 | Forestry | 3613 | 61644 | 78585 | 0 | 174855 | 796 | 81909 | 672424 | 30707 | 9745 | 12783890 |
| 6 | Fishing | 0 | 0 | 2249946 | 0 | 0 | 2417506 | 0 | 79799993 | 0 | 0 | 0 |
| 7 | Mining | 0 | 18143 | 41387 | 0 | 0 | 2762 | 3341001 | 1058614 | 82747 | 184310 | 628591 |
| 8 | Agro-industry | 0 | 21875 | 37362517 | 0 | 35 | 15070431 | 0 | 157119074 | 10564271 | 6892304 | 1364018 |
| 9 | Beverage & Tobacco | 0 | 0 | 0 | 109 | 0 | 132 | 0 | 87442 | 18194205 | 0 | 0 |
| 10 | Textile & Leather | 23426 | 522481 | 23261 | 0 | 25716 | 427646 | 13504 | 510912 | 111143 | 308102224 | 6292757 |
| 11 | Wood, Paper, Rubber | 1587 | 917082 | 160126 | 937 | 35420 | 44171 | 100225 | 6023897 | 3998617 | 11074038 | 76892405 |
| 12 | Agricultural Machinery | 359670 | 1774540 | 120406 | 674437 | 9658 | 776958 | 64 | 1491 | 0 | 0 | 0 |
| 13 | Other Manufacturing | 15381437 | 26454392 | 2692807 | 6136066 | 404667 | 26179549 | 16660896 | 43986631 | 29335144 | 110832437 | 34662663 |
| 14 | Infrastructure | 8625 | 168208 | 744802 | 110546 | 2375 | 336037 | 1299572 | 12426567 | 1107464 | 32854615 | 7469670 |
| 15 | Construction | 7592 | 48778 | 156691 | 1477 | 3354 | 127944 | 127853 | 344040 | 13899 | 245565 | 109230 |
| 16 | Trade | 4053823 | 13139461 | 9310391 | 625804 | 118178 | 5915608 | 1327930 | 56900535 | 6318545 | 59450132 | 33448369 |
| 17 | Transport | 966743 | 4337180 | 996068 | 170867 | 43790 | 1114121 | 3525106 | 13767561 | 3028776 | 9482757 | 6142254 |
| 18 | Services | 1734719 | 7503595 | 1321485 | 512820 | 181990 | 1535561 | 19964811 | 16129051 | 5315693 | 25083587 | 7300153 |
| 19 | Unclassified | 1372 | 1095190 | 227419 | 4850 | 5039 | 1508172 | 87873 | 4194594 | 1592043 | 3473699 | 638374 |
| | **Total intermediate transaction** | 35159626 | 83589990 | 62152299 | 8237913 | 1110869 | 55682958 | 46530744 | 689581676 | 82622306 | 591328066 | 228429321 |
| | Wages and Salaries | 27509443 | 44427112 | 8985531 | 3309271 | 1977296 | 16994879 | 26409536 | 68336960 | 13665090 | 98575817 | 34018275 |
| | Operating Surplus | 50468136 | 121590058 | 37393720 | 10281853 | 3416895 | 46753738 | 48815711 | 129414461 | 26327732 | 137617157 | 76207229 |
| | Depreciation | 2338354 | 12286316 | 1958419 | 2240643 | 174438 | 10684136 | 19280668 | 21237741 | 8845688 | 45692700 | 15765876 |
| | Indirect taxes less subsidies | 11262 | 228358 | 11570 | 0 | 138890 | 22448 | 14356999 | 4517104 | 62478085 | 9707600 | 3275694 |
| | **Total value added** | 80327195 | 178531844 | 48349240 | 15831767 | 5707519 | 74455201 | 108862914 | 223506266 | 111316595 | 291593274 | 129267074 |
| | **Total supply** | 115486821 | 262121834 | 110501539 | 24069680 | 6818388 | 130138159 | 155393658 | 913087942 | 193938901 | 882921340 | 357696395 |

## Appendix B—Competitive-Import Type Input-Output Table of Thailand, 2000 (cont.)

| | | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | ∑ 1-19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural Machinery | Other Manufac-turing | Utilities | Construction | Trade | Transport | Services | Unclassified | **Total intermediate transaction** | Private consumption expenditure |
| 1 | Paddy | 0 | 408684 | 0 | 0 | 0 | 0 | 2916 | 67795 | 120806675 | 74931 |
| 2 | Other crops | 0 | 2663658 | 23 | 86590 | 3464 | 479774 | 31337723 | 4642340 | 215237642 | 75406436 |
| 3 | Livestock | 0 | 1592935 | 0 | 0 | 0 | 0 | 1694171 | 503123 | 94338905 | 15660237 |
| 4 | Agricultural service | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24069680 | 0 |
| 5 | Forestry | 0 | 1500887 | 0 | 1167264 | 0 | 2630 | 1055604 | 80336 | 17704889 | 1979897 |
| 6 | Fishing | 0 | 1981166 | 0 | 0 | 0 | 6131 | 16198228 | 45664 | 102698634 | 27190488 |
| 7 | Mining | 0 | 330926149 | 71728514 | 21647335 | 0 | 76586 | 22022 | 881073 | 430639234 | 92894 |
| 8 | Agro-industry | 0 | 8524233 | 0 | 0 | 1670532 | 1032686 | 86488895 | 5442158 | 331553029 | 294418794 |
| 9 | Beverage & Tobacco | 0 | 38249 | 0 | 0 | 544380 | 1910468 | 40085243 | 2482815 | 63343043 | 204439539 |
| 10 | Textile & Leather | 570 | 23115113 | 102544 | 289004 | 12648193 | 3545144 | 10668370 | 5465072 | 371887080 | 314615499 |
| 11 | Wood, Paper, Rubber | 16749 | 50409769 | 381939 | 8835980 | 5076043 | 16633096 | 31064887 | 16208940 | 227875908 | 32823839 |
| 12 | Agricultural Machinery | 601805 | 2507 | 0 | 0 | 0 | 0 | 49277 | 211867 | 4582680 | 416035 |
| 13 | Other Manufacturing | 802300 | 1703879728 | 32704186 | 167796031 | 41313278 | 189327998 | 204491530 | 31577571 | 2684619311 | 429182016 |
| 14 | Infrastructure | 93938 | 78229236 | 76511336 | 821881 | 27661172 | 8731741 | 56806697 | 799127 | 306183609 | 92144392 |
| 15 | Construction | 737 | 886819 | 248646 | 190786 | 752771 | 356955 | 2073334 | 117688 | 5814159 | 903920 |
| 16 | Trade | 326915 | 223265788 | 2599898 | 35749238 | 9861467 | 20975759 | 80672270 | 8787360 | 572847471 | 523655193 |
| 17 | Transport | 89213 | 51299041 | 2967978 | 44358514 | 44316585 | 86444346 | 38697635 | 6610258 | 318358793 | 262096092 |
| 18 | Services | 96619 | 65113795 | 14087776 | 12264212 | 109963095 | 122511303 | 103458339 | 10376946 | 524455550 | 823891302 |
| 19 | Unclassified | 9114 | 4258459 | 594417 | 381958 | 18781665 | 6937598 | 7020823 | 3880292 | 54692951 | 70629647 |
| | **Total intermediate transaction** | 2037960 | 2548096216 | 201927257 | 293588793 | 272592645 | 458972215 | 711887964 | 98180425 | 6471709243 | 3169621151 |
| | Wages and Salaries | 446839 | 217693429 | 73141362 | 43699449 | 196692718 | 115911961 | 615483195 | 2174915 | 1609453078 | |
| | Operating Surplus | 386886 | 384153229 | 63944824 | 55842752 | 813783287 | 130118354 | 354371757 | 2310525 | 2493198304 | |
| | Depreciation | 186221 | 143778009 | 56918604 | 25557424 | 110587147 | 67171071 | 182442888 | 6929704 | 734076047 | |
| | Indirect taxes less subsidies | 10976 | 99525017 | 15602212 | 7462928 | 81091462 | 5237700 | 77248364 | 3211089 | 384137758 | |
| | **Total value added** | 1030922 | 845149684 | 209607002 | 132562553 | 1202154614 | 318439086 | 1229546204 | 14626233 | 5220865187 | |
| | **Total supply** | 3068882 | 3393245900 | 411534259 | 426151346 | 1474747259 | 777411301 | 1941434168 | 112806658 | 11692574430 | |

## Appendix B—Competitive-Import Type Input-Output Table of Thailand, 2000 (cont.)

| | | 21 | 22 | 23 | 24 | 25 | ∑ 20-25 | ∑ 1-25 | 26 | ∑ 1-26 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Government consumption expenditure | Gross Fixed Capital Formation | Increase in Stock | Export (FOB) | Special export | **Total final demand** | **Total demand** | Total import | **Total Domestic production** |
| 1 | Paddy | 103083 | 0 | -5497946 | 116 | 0 | -5319816 | 115486859 | -38 | 115486821 |
| 2 | Other crops | 587710 | 0 | -3694988 | 19805415 | 1202638 | 93307211 | 308544853 | -46423019 | 262121834 |
| 3 | Livestock | 226951 | 791480 | 302901 | 2011903 | 20996 | 19014468 | 113353373 | -2851834 | 110501539 |
| 4 | Agricultural service | 0 | 0 | 0 | 0 | 0 | 0 | 24069680 | 0 | 24069680 |
| 5 | Forestry | 0 | 0 | -3926293 | 1841340 | 21466 | -83590 | 17621299 | -10802911 | 6818388 |
| 6 | Fishing | 370796 | 0 | 0 | 1314719 | 43674 | 28919677 | 131618311 | -1480152 | 130138159 |
| 7 | Mining | 0 | 19275 | -14323512 | 18858517 | 0 | 4647174 | 435286408 | -279892750 | 155393658 |
| 8 | Agro-industry | 2017962 | 0 | 9094173 | 362308140 | 7275939 | 675115008 | 1006668037 | -93580095 | 913087942 |
| 9 | Beverage & Tobacco | 4373 | 0 | -44245546 | 4491051 | 13456146 | 178145563 | 241488606 | -47549705 | 193938901 |
| 10 | Textile & Leather | 390128 | 1129857 | 6672269 | 275585904 | 36863782 | 635257439 | 1007144519 | -124223179 | 882921340 |
| 11 | Wood, Paper, Rubber | 8423380 | 19361255 | -6681998 | 148244722 | 2175210 | 204346408 | 432222316 | -74525921 | 357696395 |
| 12 | Agricultural Machinery | 1141049 | 9138178 | -6838714 | 1294440 | 0 | 5150988 | 9733668 | -6664786 | 3068882 |
| 13 | Other Manufacturing | 39430857 | 612934561 | 77879656 | 1656055371 | 69706992 | 2885189453 | 5569808764 | -2176562864 | 3393245900 |
| 14 | Infrastructure | 12726979 | 0 | 216490 | 11210230 | 76455 | 116374546 | 422558155 | -11023896 | 411534259 |
| 15 | Construction | 1358844 | 417769999 | 0 | 494427 | 0 | 420527190 | 426341349 | -190003 | 426151346 |
| 16 | Trade | 9737971 | 165341118 | 13961668 | 145260104 | 43943734 | 901899788 | 1474747259 | 0 | 1474747259 |
| 17 | Transport | 11079798 | 27041268 | 2960733 | 40947717 | 172011013 | 516136621 | 834495414 | -57084113 | 777411301 |
| 18 | Services | 500222980 | 1494267 | 0 | 0 | 200251097 | 1525859646 | 2050315196 | -108881028 | 1941434168 |
| 19 | Unclassified | 912135 | 0 | 0 | 83438 | 8955858 | 80581078 | 135274029 | -22467371 | 112806658 |
| | **Total intermediate transaction** | 588734996 | 1255021258 | 25878893 | 2689807554 | 556005000 | 8285068852 | 14756778095 | -3064203665 | 11692574430 |
| | Wages and Salaries | | | | | | | | | |
| | Operating Surplus | | | | | | | | | |
| | Depreciation | | | | | | | | | |
| | Indirect taxes less subsidies | | | | | | | | | |
| | **Total value added** | | | | | | | | | |
| | **Total supply** | | | | | | | | | |

Source: The National Economic and Social Development Board of Thailand (NESDB)

# Appendix C—Noncompetitive-Import Type Input-Output Table of Thailand, 2000 (thousand baht)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Paddy | Other crops | Livestock | Agricultural service | Forestry | Fishing | Mining | Agro-industry | Beverage & Tobacco | Textile & Leather | Wood, Paper, Rubber |
| 1 | Paddy | 4004793 | 465323 | 2322180 | 0 | 0 | 0 | 0 | 113399291 | 0 | 0 | 135672 |
| 2 | Other crops | 0 | 9628459 | 1087742 | 0 | 0 | 0 | 0 | 83672321 | 2535690 | 1196134 | 40523373 |
| 3 | Livestock | 0 | 0 | 3102867 | 0 | 0 | 0 | 0 | 83077434 | 0 | 1757133 | 0 |
| 4 | Agricultural service | 8612205 | 14997753 | 128366 | 0 | 105792 | 225564 | 0 | 0 | 0 | 0 | 0 |
| 5 | Forestry | 3613 | 61644 | 78585 | 0 | 174855 | 796 | 81909 | 652792 | 30707 | 9745 | 3478030 |
| 6 | Fishing | 0 | 0 | 2249946 | 0 | 0 | 2411548 | 0 | 79798673 | 0 | 0 | 0 |
| 7 | Mining | 0 | 18143 | 41387 | 0 | 0 | 2762 | 3302697 | 1058614 | 82747 | 165527 | 499965 |
| 8 | Agro-industry | 0 | 21875 | 37362517 | 0 | 35 | 15070431 | 0 | 109661903 | 10259852 | 1054732 | 1364018 |
| 9 | Beverage & Tobacco | 0 | 0 | 0 | 109 | 0 | 132 | 0 | 87442 | 13578842 | 0 | 0 |
| 10 | Textile & Leather | 23426 | 522481 | 23261 | 0 | 25716 | 408193 | 13504 | 392681 | 111143 | 237563609 | 2522126 |
| 11 | Wood, Paper, Rubber | 1587 | 917082 | 160126 | 937 | 35420 | 44171 | 100225 | 5888610 | 3640089 | 10215429 | 34238347 |
| 12 | Agricultural Machinery | 359670 | 1774540 | 120406 | 674437 | 9658 | 776958 | 64 | 1491 | 0 | 0 | 0 |
| 13 | Other Manufacturing | 2661600 | 11751078 | 2234744 | 5879871 | 396287 | 22061151 | 15651089 | 19698892 | 8028620 | 81023519 | 12047911 |
| 14 | Infrastructure | 8625 | 168208 | 744802 | 110546 | 2375 | 336037 | 1299572 | 12426567 | 1107464 | 32854615 | 7469670 |
| 15 | Construction | 7592 | 48778 | 156691 | 1477 | 3354 | 127944 | 127853 | 344040 | 13899 | 245565 | 109230 |
| 16 | Trade | 4053823 | 13139461 | 9310391 | 625804 | 118178 | 5915608 | 1327930 | 56900535 | 6318545 | 59450132 | 33448369 |
| 17 | Transport | 966743 | 4337180 | 996068 | 170867 | 43790 | 1114121 | 3525106 | 13767561 | 3028776 | 9482757 | 6142254 |
| 18 | Services | 1734719 | 7503595 | 1321485 | 512820 | 181990 | 1535561 | 19964811 | 16129051 | 5315693 | 25083587 | 7300153 |
| 19 | Unclassified | 1372 | 1095190 | 227419 | 4850 | 5039 | 1508172 | 87873 | 4194594 | 1592043 | 3473699 | 638374 |
| | **Total intermediate transaction** | 22439768 | 66450790 | 61668983 | 7981718 | 1102489 | 51539149 | 45482633 | 601152492 | 55644110 | 463576183 | 149917492 |
| | Import | 12719858 | 17139200 | 483316 | 256195 | 8380 | 4143809 | 1048111 | 88429184 | 26978196 | 127751883 | 78511829 |
| | Wages and Salaries | 27509443 | 44427112 | 8985531 | 3309271 | 1977296 | 16994879 | 26409536 | 68336960 | 13665090 | 98575817 | 34018275 |
| | Operating Surplus | 50468136 | 121590058 | 37393720 | 10281853 | 3416895 | 46753738 | 48815711 | 129414461 | 26327732 | 137617157 | 76207229 |
| | Depreciation | 2338354 | 12286316 | 1958419 | 2240643 | 174438 | 10684136 | 19280668 | 21237741 | 8845688 | 45692700 | 15765876 |
| | Indirect taxes less subsidies | 11262 | 228358 | 11570 | 0 | 138890 | 22448 | 14356999 | 4517104 | 62478085 | 9707600 | 3275694 |
| | **Total value added** | 80327195 | 178531844 | 48349240 | 15831767 | 5707519 | 74455201 | 108862914 | 223506266 | 111316595 | 291593274 | 129267074 |
| | **Total supply** | 115486821 | 262121834 | 110501539 | 24069680 | 6818388 | 130138159 | 155393658 | 913087942 | 193938901 | 882921340 | 357696395 |

# Appendix C—Noncompetitive-Import Type Input-Output Table of Thailand, 2000 (cont.)

| | | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | ∑ 1-19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural Machinery | Other Manufacturing | Infrastructure | Construction | Trade | Transport | Services | Unclassified | **Total intermediate transaction** | Private consumption expenditure |
| 1 | Paddy | 0 | 408684 | 0 | 0 | 0 | 0 | 2916 | 67795 | 120806654 | 74914 |
| 2 | Other crops | 0 | 1921176 | 23 | 86590 | 3464 | 479774 | 29246977 | 4354662 | 174736385 | 69484674 |
| 3 | Livestock | 0 | 1537778 | 0 | 0 | 0 | 0 | 1694171 | 500673 | 91670056 | 15592021 |
| 4 | Agricultural service | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24069680 | 0 |
| 5 | Forestry | 0 | 691738 | 0 | 1167264 | 0 | 2630 | 846221 | 80336 | 7360865 | 1521010 |
| 6 | Fishing | 0 | 1195777 | 0 | 0 | 0 | 6131 | 15676636 | 45664 | 101384375 | 27024595 |
| 7 | Mining | 0 | 53609185 | 70453786 | 20613075 | 0 | 76586 | 14248 | 877815 | 150816537 | 22841 |
| 8 | Agro-industry | 0 | 7715218 | 0 | 0 | 1670532 | 1032686 | 75654795 | 5430617 | 266299211 | 266092517 |
| 9 | Beverage & Tobacco | 0 | 38249 | 0 | 0 | 544380 | 1910468 | 34527836 | 2482815 | 53170273 | 167062604 |
| 10 | Textile & Leather | 570 | 16525540 | 102544 | 289004 | 12259754 | 3540914 | 10431644 | 5356350 | 290112460 | 272628753 |
| 11 | Wood, Paper, Rubber | 16749 | 41631947 | 381939 | 2663822 | 4999957 | 16632236 | 27466288 | 7972157 | 157007118 | 30088394 |
| 12 | Agricultural Machinery | 350762 | 2507 | 0 | 0 | 0 | 0 | 49277 | 211867 | 4331637 | 403951 |
| 13 | Other Manufacturing | 442494 | 424125383 | 29592687 | 103842887 | 28563017 | 176276194 | 132777977 | 16813977 | 1093869378 | 267220899 |
| 14 | Infrastructure | 93938 | 73529084 | 72312336 | 821881 | 27661172 | 8731741 | 56806697 | 799127 | 297284457 | 90019648 |
| 15 | Construction | 737 | 886819 | 248646 | 190786 | 752771 | 356955 | 2073334 | 117688 | 5814159 | 903920 |
| 16 | Trade | 326915 | 223265788 | 2599898 | 35749238 | 9861467 | 20975759 | 80672270 | 8787360 | 572847471 | 523655193 |
| 17 | Transport | 89213 | 51299041 | 2964865 | 44358514 | 44316585 | 84772507 | 38697635 | 6610258 | 316683841 | 206686931 |
| 18 | Services | 96619 | 65113795 | 14087776 | 12264212 | 109963095 | 122511303 | 103458339 | 8692326 | 522770930 | 716694894 |
| 19 | Unclassified | 9114 | 4258459 | 594417 | 381958 | 18781665 | 6937598 | 7020823 | 1594122 | 52406781 | 50448446 |
| | **Total intermediate transaction** | 1427111 | 967756168 | 193338917 | 222429231 | 259377859 | 444243482 | 617118084 | 70795609 | 4303442268 | 2705626205 |
| | Import | 610849 | 1580340048 | 8588340 | 71159562 | 13214786 | 14728733 | 94769880 | 27384816 | 2168266975 | 463994946 |
| | Wages and Salaries | 446839 | 217693429 | 73141362 | 43699449 | 196692718 | 115911961 | 615483195 | 2174915 | 1609453078 | |
| | Operating Surplus | 386886 | 384153229 | 63944824 | 55842752 | 813783287 | 130118354 | 354371757 | 2310525 | 2493198304 | |
| | Depreciation | 186221 | 143778009 | 56918604 | 25557424 | 110587147 | 67171071 | 182442888 | 6929704 | 734076047 | |
| | Indirect taxes less subsidies | 10976 | 99525017 | 15602212 | 7462928 | 81091462 | 5237700 | 77248364 | 3211089 | 384137758 | |
| | **Total value added** | 1030922 | 845149684 | 209607002 | 132562553 | 1202154614 | 318439086 | 1229546204 | 14626233 | 5220865187 | |
| | **Total supply** | 3068882 | 3393245900 | 411534259 | 426151346 | 1474747259 | 777411301 | 1941434168 | 112806658 | 11692574430 | |

## Appendix C—Noncompetitive-Import Type Input-Output Table of Thailand, 2000 (cont.)

| | | 21 | 22 | 23 | 24 | 25 | ∑ 20-25 | ∑ 1-25 |
|---|---|---|---|---|---|---|---|---|
| | | Govt consumption expenditure | Gross Fixed Capital Formation | Increase in Stock | Export | Special export | **Total final demand** | **Total domestic production** |
| 1 | Paddy | 103083 | 0 | -5497946 | 116 | 0 | -5319833 | 115486821 |
| 2 | Other crops | 587710 | 0 | -3694988 | 19805415 | 1202638 | 87385449 | 262121834 |
| 3 | Livestock | 226951 | 676711 | 302901 | 2011903 | 20996 | 18831483 | 110501539 |
| 4 | Agricultural service | 0 | 0 | 0 | 0 | 0 | 0 | 24069680 |
| 5 | Forestry | 0 | 0 | -3926293 | 1841340 | 21466 | -542477 | 6818388 |
| 6 | Fishing | 370796 | 0 | 0 | 1314719 | 43674 | 28753784 | 130138159 |
| 7 | Mining | 0 | 19275 | -14323512 | 18858517 | 0 | 4577121 | 155393658 |
| 8 | Agro-industry | 2017962 | 0 | 9094173 | 362308140 | 7275939 | 646788731 | 913087942 |
| 9 | Beverage & Tobacco | 4373 | 0 | -44245546 | 4491051 | 13456146 | 140768628 | 193938901 |
| 10 | Textile & Leather | 390128 | 668044 | 6672269 | 275585904 | 36863782 | 592808880 | 882921340 |
| 11 | Wood, Paper, Rubber | 8423380 | 18439569 | -6681998 | 148244722 | 2175210 | 200689277 | 357696395 |
| 12 | Agricultural Machinery | 1141049 | 2736519 | -6838714 | 1294440 | 0 | -1262755 | 3068882 |
| 13 | Other Manufacturing | 39430857 | 189082747 | 77879656 | 1656055371 | 69706992 | 2299376522 | 3393245900 |
| 14 | Infrastructure | 12726979 | 0 | 216490 | 11210230 | 76455 | 114249802 | 411534259 |
| 15 | Construction | 1358844 | 417579996 | 0 | 494427 | 0 | 420337187 | 426151346 |
| 16 | Trade | 9737971 | 165341118 | 13961668 | 145260104 | 43943734 | 901899788 | 1474747259 |
| 17 | Transport | 11079798 | 27041268 | 2960733 | 40947717 | 172011013 | 460727460 | 777411301 |
| 18 | Services | 500222980 | 1494267 | 0 | 0 | 200251097 | 1418663238 | 1941434168 |
| 19 | Unclassified | 912135 | 0 | 0 | 83438 | 8955858 | 60399877 | 112806658 |
| | **Total intermediate transaction** | 588734996 | 823079514 | 25878893 | 2689807554 | 556005000 | 7389132162 | 11692574430 |
| | Import | 0 | 431941744 | 0 | 0 | 0 | 895936690 | 3064203665 |
| | Wages and Salaries | | | | | | | |
| | Operating Surplus | | | | | | | |
| | Depreciation | | | | | | | |
| | Indirect taxes less subsidies | | | | | | | |
| | **Total value added** | | | | | | | |
| | **Total supply** | | | | | | | |

Source: The National Economic and Social Development Board of Thailand (NESDB)

## Appendix D—Import Matrix from Input-Output Table of Thailand, 2000 (thousand baht)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Paddy | Other crops | Livestock | Agricultural service | Forestry | Fishing | Mining | Agro-industry | Beverage & Tobacco | Textile & Leather | Wood, Paper, Rubber |
| 1 | Paddy | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Other crops | 0 | 2435886 | 4154 | 0 | 0 | 0 | 0 | 15753622 | 393362 | 18755425 | 37902 |
| 3 | Livestock | 0 | 0 | 21099 | 0 | 0 | 0 | 0 | 656182 | 0 | 1933961 | 0 |
| 4 | Agricultural service | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | Forestry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19632 | 0 | 0 | 9305860 |
| 6 | Fishing | 0 | 0 | 0 | 0 | 0 | 5958 | 0 | 1320 | 0 | 0 | 0 |
| 7 | Mining | 0 | 0 | 0 | 0 | 0 | 0 | 38304 | 0 | 0 | 18783 | 128626 |
| 8 | Agro-industry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47457171 | 304419 | 5837572 | 0 |
| 9 | Beverage & Tobacco | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4615363 | 0 | 0 |
| 10 | Textile & Leather | 0 | 0 | 0 | 0 | 0 | 19453 | 0 | 118231 | 0 | 70538615 | 3770631 |
| 11 | Wood, Paper, Rubber | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 135287 | 358528 | 858609 | 42654058 |
| 12 | Agricultural Machinery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | Other Manufacturing | 12719837 | 14703314 | 458063 | 256195 | 8380 | 4118398 | 1009807 | 24287739 | 21306524 | 29808918 | 22614752 |
| 14 | Infrastructure | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | Construction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | Trade | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | Transport | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | Services | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | Unclassified | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total import for intermediate use | 12719858 | 17139200 | 483316 | 256195 | 8380 | 4143809 | 1048111 | 88429184 | 26978196 | 127751883 | 78511829 |

## Appendix D—Import Matrix from Input-Output Table of Thailand, 2000 (cont.)

| | | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | ∑ 1-19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural Machinery | Other Manufacturing | Infrastructure | Construction | Trade | Transport | Services | Unclassified | **Total import for intermediate use** | Private consumption expenditure |
| 1 | Paddy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 17 |
| 2 | Other crops | 0 | 742482 | 0 | 0 | 0 | 0 | 2090746 | 287678 | 40501257 | 5921762 |
| 3 | Livestock | 0 | 55157 | 0 | 0 | 0 | 0 | 0 | 2450 | 2668849 | 68216 |
| 4 | Agricultural service | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | Forestry | 0 | 809149 | 0 | 0 | 0 | 0 | 209383 | 0 | 10344024 | 458887 |
| 6 | Fishing | 0 | 785389 | 0 | 0 | 0 | 0 | 521592 | 0 | 1314259 | 165893 |
| 7 | Mining | 0 | 277316964 | 1274728 | 1034260 | 0 | 0 | 7774 | 3258 | 279822697 | 70053 |
| 8 | Agro-industry | 0 | 809015 | 0 | 0 | 0 | 0 | 10834100 | 11541 | 65253818 | 28326277 |
| 9 | Beverage & Tobacco | 0 | 0 | 0 | 0 | 0 | 0 | 5557407 | 0 | 10172770 | 37376935 |
| 10 | Textile & Leather | 0 | 6589573 | 0 | 0 | 388439 | 4230 | 236726 | 108722 | 81774620 | 41986746 |
| 11 | Wood, Paper, Rubber | 0 | 8777822 | 0 | 6172158 | 76086 | 860 | 3598599 | 8236783 | 70868790 | 2735445 |
| 12 | Agricultural Machinery | 251043 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 251043 | 12084 |
| 13 | Other Manufacturing | 359806 | 1279754345 | 3111499 | 63953144 | 12750261 | 13051804 | 71713553 | 14763594 | 1590749933 | 161961117 |
| 14 | Infrastructure | 0 | 4700152 | 4199000 | 0 | 0 | 0 | 0 | 0 | 8899152 | 2124744 |
| 15 | Construction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | Trade | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | Transport | 0 | 0 | 3113 | 0 | 0 | 1671839 | 0 | 0 | 1674952 | 55409161 |
| 18 | Services | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1684620 | 1684620 | 107196408 |
| 19 | Unclassified | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2286170 | 2286170 | 20181201 |
| | Total import for intermediate use | 610849 | 1580340048 | 8588340 | 71159562 | 13214786 | 14728733 | 94769880 | 27384816 | 2168266975 | 463994946 |

## Appendix D—Import Matrix from Input-Output Table of Thailand, 2000 (cont.)

| | | 21 | 22 | 23 | 24 | 25 | ∑ 20-25 | ∑ 1-25 | 26 | 27 | 28 | 29 | ∑ 26-29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Govt consumption expenditure | Gross Fixed Capital Formation | Increase in Stock | Export | Special export | **Total import for final demand** | **Total import demand** | Import (CIF) | Import tariff | Import-related tax | Special import | **Total import** |
| 1 | Paddy | 0 | 0 | 0 | 0 | 0 | 17 | 38 | -22 | 0 | 0 | -16 | -38 |
| 2 | Other crops | 0 | 0 | 0 | 0 | 0 | 5921762 | 46423019 | -42499234 | -1569126 | -100423 | -2254236 | -46423019 |
| 3 | Livestock | 0 | 114769 | 0 | 0 | 0 | 182985 | 2851834 | -2677694 | -52982 | -69519 | -51639 | -2851834 |
| 4 | Agricultural service | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | Forestry | 0 | 0 | 0 | 0 | 0 | 458887 | 10802911 | -6639996 | -181799 | -403669 | -3577447 | -10802911 |
| 6 | Fishing | 0 | 0 | 0 | 0 | 0 | 165893 | 1480152 | -1280363 | -47712 | -818 | -151259 | -1480152 |
| 7 | Mining | 0 | 0 | 0 | 0 | 0 | 70053 | 279892750 | -261552481 | -290679 | -18049503 | -87 | -279892750 |
| 8 | Agro-industry | 0 | 0 | 0 | 0 | 0 | 28326277 | 93580095 | -80031801 | -4757623 | -1928126 | -6862545 | -93580095 |
| 9 | Beverage & Tobacco | 0 | 0 | 0 | 0 | 0 | 37376935 | 47549705 | -10578939 | -3082643 | -9367335 | -24520788 | -47549705 |
| 10 | Textile & Leather | 0 | 461813 | 0 | 0 | 0 | 42448559 | 124223179 | -88041140 | -3111004 | -3036223 | -30034812 | -124223179 |
| 11 | Wood, Paper, Rubber | 0 | 921686 | 0 | 0 | 0 | 3657131 | 74525921 | -64105236 | -3761178 | -3703575 | -2955932 | -74525921 |
| 12 | Agricultural Machinery | 0 | 6401659 | 0 | 0 | 0 | 6413743 | 6664786 | -5903884 | -348569 | -409322 | -3011 | -6664786 |
| 13 | Other Manufacturing | 0 | 423851814 | 0 | 0 | 0 | 585812931 | 2176562864 | -1946522197 | -70668880 | -67601444 | -91770343 | -2176562864 |
| 14 | Infrastructure | 0 | 0 | 0 | 0 | 0 | 2124744 | 11023896 | -8593832 | -989 | -307532 | -2121543 | -11023896 |
| 15 | Construction | 0 | 190003 | 0 | 0 | 0 | 190003 | 190003 | -182867 | -3423 | -3713 | 0 | -190003 |
| 16 | Trade | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | Transport | 0 | 0 | 0 | 0 | 0 | 55409161 | 57084113 | 0 | 0 | 0 | -57084113 | -57084113 |
| 18 | Services | 0 | 0 | 0 | 0 | 0 | 107196408 | 108881028 | 0 | 0 | 0 | -108881028 | -108881028 |
| 19 | Unclassified | 0 | 0 | 0 | 0 | 0 | 20181201 | 22467371 | -10479217 | -65491 | -96462 | -11826201 | -22467371 |
| | Total import for intermediate use | 0 | 431941744 | 0 | 0 | 0 | 895936690 | 3064203665 | -2529088903 | -87942098 | -105077664 | -342095000 | -3064203665 |

Source: The National Economic and Social Development Board of Thailand (NESDB)

# Appendix E—Social Accounting Matrix Multipliers, Thailand, 1998

| | | 1<br>Paddy | 2<br>Other crops | 3<br>Vegetable and fruits | 4<br>Other raw agri pdt. | 5<br>Livestock | 6<br>Fishing | 7<br>Forestry | 8<br>Mining | 9<br>Rice and flour | 10<br>Meat | 11<br>Canned food | 12<br>Other food | 13<br>Other agri pdt | 14<br>Beverage | 15<br>Tobacco |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Paddy | 1.09 | 0.05 | 0.05 | 0.05 | 0.14 | 0.05 | 0.02 | 0.02 | 0.61 | 0.11 | 0.04 | 0.07 | 0.06 | 0.03 | 0.03 |
| 2 | Other crops | 0.00 | 1.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | Vegetable and fruits | 0.10 | 0.08 | 1.07 | 0.08 | 0.13 | 0.09 | 0.03 | 0.03 | 0.08 | 0.11 | 0.16 | 0.08 | 0.07 | 0.04 | 0.03 |
| 4 | Other raw agri prod. | 0.07 | 0.13 | 0.12 | 1.04 | 0.04 | 0.03 | 0.01 | 0.01 | 0.06 | 0.04 | 0.03 | 0.11 | 0.15 | 0.02 | 0.06 |
| 5 | Livestock | 0.05 | 0.04 | 0.04 | 0.04 | 1.12 | 0.05 | 0.02 | 0.01 | 0.05 | 0.82 | 0.03 | 0.08 | 0.03 | 0.02 | 0.02 |
| 6 | Fishing | 0.04 | 0.03 | 0.03 | 0.03 | 0.10 | 1.10 | 0.01 | 0.01 | 0.04 | 0.08 | 0.30 | 0.09 | 0.03 | 0.02 | 0.01 |
| 7 | Forestry | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| 8 | Mining | 0.05 | 0.04 | 0.07 | 0.05 | 0.06 | 0.11 | 0.02 | 1.05 | 0.06 | 0.05 | 0.06 | 0.06 | 0.05 | 0.04 | 0.03 |
| 9 | Rice and flour | 0.11 | 0.09 | 0.08 | 0.09 | 0.26 | 0.11 | 0.04 | 0.03 | 1.27 | 0.20 | 0.07 | 0.14 | 0.13 | 0.06 | 0.06 |
| 10 | Meat | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.02 | 0.01 | 0.04 | 1.04 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 |
| 11 | Canned food | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.01 | 0.01 | 0.04 | 0.03 | 1.70 | 0.07 | 0.03 | 0.02 | 0.01 |
| 12 | Other food | 0.04 | 0.04 | 0.03 | 0.04 | 0.17 | 0.11 | 0.02 | 0.01 | 0.05 | 0.13 | 0.05 | 1.07 | 0.03 | 0.06 | 0.01 |
| 13 | Other agri prod. | 0.07 | 0.06 | 0.05 | 0.06 | 0.11 | 0.08 | 0.02 | 0.02 | 0.11 | 0.09 | 0.07 | 0.39 | 1.57 | 0.07 | 0.61 |
| 14 | Beverage | 0.09 | 0.08 | 0.07 | 0.08 | 0.08 | 0.08 | 0.03 | 0.03 | 0.08 | 0.07 | 0.06 | 0.05 | 0.06 | 1.05 | 0.03 |
| 15 | Tobacco | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 1.01 |
| 16 | Fuel | 0.07 | 0.07 | 0.12 | 0.08 | 0.10 | 0.21 | 0.02 | 0.06 | 0.09 | 0.09 | 0.10 | 0.09 | 0.08 | 0.06 | 0.04 |
| 17 | Other manufacturing | 0.85 | 0.76 | 0.97 | 0.72 | 0.72 | 0.69 | 0.28 | 0.29 | 0.79 | 0.66 | 0.58 | 0.69 | 0.63 | 0.67 | 0.37 |
| 18 | Infrastructure | 0.05 | 0.04 | 0.05 | 0.04 | 0.07 | 0.05 | 0.02 | 0.02 | 0.08 | 0.06 | 0.04 | 0.07 | 0.06 | 0.04 | 0.03 |
| 19 | Construction | 0.05 | 0.06 | 0.06 | 0.04 | 0.09 | 0.04 | 0.02 | 0.03 | 0.06 | 0.07 | 0.04 | 0.05 | 0.05 | 0.03 | 0.03 |
| 20 | Trade &Transport | 0.35 | 0.29 | 0.46 | 0.30 | 0.50 | 0.37 | 0.11 | 0.13 | 0.45 | 0.46 | 0.33 | 0.39 | 0.37 | 0.29 | 0.20 |
| 21 | Services | 0.54 | 0.43 | 0.48 | 0.44 | 0.53 | 0.48 | 0.18 | 0.24 | 0.56 | 0.50 | 0.39 | 0.43 | 0.45 | 0.34 | 0.22 |
| 22 | Labor | 0.81 | 0.43 | 0.34 | 0.44 | 0.58 | 0.40 | 0.14 | 0.16 | 0.64 | 0.55 | 0.39 | 0.39 | 0.47 | 0.29 | 0.22 |
| 23 | Agri capital | 0.37 | 0.54 | 0.40 | 0.54 | 0.31 | 0.59 | 0.27 | 0.02 | 0.24 | 0.24 | 0.22 | 0.15 | 0.13 | 0.04 | 0.05 |
| 24 | Non-agri capital | 0.47 | 0.39 | 0.51 | 0.39 | 0.56 | 0.48 | 0.15 | 0.41 | 0.59 | 0.61 | 0.56 | 0.57 | 0.68 | 0.47 | 0.33 |
| 25 | Agri household | 0.35 | 0.39 | 0.30 | 0.39 | 0.28 | 0.42 | 0.18 | 0.05 | 0.25 | 0.24 | 0.20 | 0.16 | 0.16 | 0.08 | 0.07 |
| 26 | Govt-employed household | 0.25 | 0.14 | 0.12 | 0.15 | 0.19 | 0.14 | 0.05 | 0.06 | 0.20 | 0.18 | 0.13 | 0.13 | 0.16 | 0.10 | 0.07 |
| 27 | Non-agri household | 0.73 | 0.48 | 0.48 | 0.48 | 0.64 | 0.51 | 0.17 | 0.30 | 0.68 | 0.64 | 0.52 | 0.53 | 0.63 | 0.41 | 0.30 |
| 28 | Public enterprise | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 | 0.03 | 0.01 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 | 0.02 |
| 29 | Private enterprise | 0.30 | 0.33 | 0.32 | 0.33 | 0.31 | 0.38 | 0.15 | 0.15 | 0.29 | 0.30 | 0.27 | 0.25 | 0.28 | 0.18 | 0.13 |
| | Total Production | 3.74 | 3.40 | 3.82 | 3.27 | 4.31 | 3.75 | 1.88 | 2.04 | 4.55 | 4.65 | 4.10 | 3.99 | 3.92 | 2.91 | 2.81 |
| | Total household income | 1.33 | 1.01 | 0.90 | 1.02 | 1.10 | 1.06 | 0.40 | 0.41 | 1.14 | 1.06 | 0.86 | 0.82 | 0.95 | 0.59 | 0.44 |

## Appendix E—Social Accounting Matrix Multipliers, Thailand, 1998 (cont.)

| | 16 Fuel | 17 Other manufac-turing | 18 Infra-structure | 19 Construc-tion | 20 Trade & Transport | 21 Services | 22 Labor | 23 Agri capital | 24 Non-agri capital | 25 Agri household | 26 Govt-employed household | 27 Non-agri household | 28 Public enterprise | 29 Private enterprise |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Paddy | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.06 | 0.06 | 0.03 | 0.10 | 0.06 | 0.05 | 0.00 | 0.00 |
| 2 Other crops | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 Vegetable and fruits | 0.03 | 0.04 | 0.06 | 0.06 | 0.06 | 0.11 | 0.11 | 0.11 | 0.06 | 0.17 | 0.10 | 0.09 | 0.00 | 0.00 |
| 4 Other raw agri prod. | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.01 | 0.04 | 0.03 | 0.02 | 0.00 | 0.00 |
| 5 Livestock | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.03 | 0.09 | 0.05 | 0.05 | 0.00 | 0.00 |
| 6 Fishing | 0.01 | 0.02 | 0.03 | 0.03 | 0.03 | 0.05 | 0.04 | 0.04 | 0.02 | 0.07 | 0.04 | 0.04 | 0.00 | 0.00 |
| 7 Forestry | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 Mining | 0.52 | 0.05 | 0.23 | 0.09 | 0.08 | 0.04 | 0.04 | 0.04 | 0.02 | 0.06 | 0.04 | 0.04 | 0.00 | 0.00 |
| 9 Rice and flour | 0.04 | 0.04 | 0.07 | 0.07 | 0.07 | 0.08 | 0.12 | 0.12 | 0.07 | 0.20 | 0.12 | 0.11 | 0.00 | 0.00 |
| 10 Meat | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.06 | 0.06 | 0.03 | 0.09 | 0.05 | 0.05 | 0.00 | 0.00 |
| 11 Canned food | 0.01 | 0.02 | 0.02 | 0.03 | 0.03 | 0.06 | 0.04 | 0.03 | 0.02 | 0.05 | 0.04 | 0.04 | 0.00 | 0.00 |
| 12 Other food | 0.01 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.05 | 0.05 | 0.03 | 0.08 | 0.05 | 0.04 | 0.00 | 0.00 |
| 13 Other agri prod. | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.06 | 0.07 | 0.07 | 0.04 | 0.11 | 0.07 | 0.07 | 0.00 | 0.00 |
| 14 Beverage | 0.03 | 0.03 | 0.06 | 0.05 | 0.05 | 0.06 | 0.11 | 0.11 | 0.06 | 0.17 | 0.10 | 0.09 | 0.00 | 0.00 |
| 15 Tobacco | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.05 | 0.03 | 0.03 | 0.00 | 0.00 |
| 16 Fuel | 1.14 | 0.06 | 0.17 | 0.08 | 0.15 | 0.07 | 0.07 | 0.06 | 0.04 | 0.10 | 0.07 | 0.06 | 0.00 | 0.00 |
| 17 Other manufacturing | 0.30 | 1.91 | 0.54 | 1.02 | 0.52 | 0.61 | 0.75 | 0.72 | 0.40 | 1.16 | 0.73 | 0.65 | 0.00 | 0.00 |
| 18 Infrastructure | 0.03 | 0.05 | 1.13 | 0.05 | 0.04 | 0.06 | 0.05 | 0.05 | 0.03 | 0.08 | 0.05 | 0.05 | 0.00 | 0.00 |
| 19 Construction | 0.03 | 0.04 | 0.07 | 1.05 | 0.04 | 0.07 | 0.04 | 0.04 | 0.02 | 0.06 | 0.04 | 0.04 | 0.00 | 0.00 |
| 20 Trade&Transport | 0.14 | 0.30 | 0.26 | 0.45 | 1.32 | 0.30 | 0.34 | 0.28 | 0.19 | 0.44 | 0.35 | 0.31 | 0.00 | 0.00 |
| 21 Services | 0.24 | 0.33 | 0.44 | 0.47 | 0.50 | 1.47 | 0.60 | 0.44 | 0.34 | 0.68 | 0.63 | 0.57 | 0.00 | 0.00 |
| 22 Labor | 0.23 | 0.27 | 0.46 | 0.46 | 0.32 | 0.48 | 1.32 | 0.27 | 0.17 | 0.43 | 0.32 | 0.29 | 0.00 | 0.00 |
| 23 Agri capital | 0.03 | 0.04 | 0.05 | 0.05 | 0.05 | 0.08 | 0.09 | 1.09 | 0.05 | 0.14 | 0.09 | 0.08 | 0.00 | 0.00 |
| 24 Non-agri capital | 0.42 | 0.45 | 0.71 | 0.66 | 0.89 | 0.69 | 0.48 | 0.40 | 1.26 | 0.62 | 0.48 | 0.44 | 0.00 | 0.00 |
| 25 Agri household | 0.06 | 0.07 | 0.12 | 0.12 | 0.11 | 0.14 | 0.25 | 0.69 | 0.10 | 1.17 | 0.11 | 0.10 | 0.00 | 0.00 |
| 26 Govt-employed household | 0.08 | 0.09 | 0.15 | 0.15 | 0.12 | 0.16 | 0.40 | 0.11 | 0.08 | 0.14 | 1.11 | 0.10 | 0.00 | 0.00 |
| 27 Non-agri household | 0.35 | 0.39 | 0.63 | 0.61 | 0.65 | 0.64 | 1.00 | 0.42 | 0.76 | 0.58 | 0.44 | 1.40 | 0.00 | 0.00 |
| 28 Public enterprise | 0.02 | 0.02 | 0.04 | 0.04 | 0.05 | 0.04 | 0.03 | 0.02 | 0.07 | 0.03 | 0.03 | 0.02 | 1.00 | 0.00 |
| 29 Private enterprise | 0.16 | 0.17 | 0.26 | 0.25 | 0.32 | 0.27 | 0.21 | 0.52 | 0.45 | 0.27 | 0.23 | 0.19 | 0.00 | 1.00 |
| Total Production | 2.64 | 3.04 | 3.27 | 3.65 | 3.08 | 3.23 | 2.68 | 2.41 | 1.46 | 3.82 | 2.67 | 2.40 | 0.00 | 0.00 |
| Total household income | 0.49 | 0.55 | 0.91 | 0.88 | 0.88 | 0.94 | 1.65 | 1.22 | 0.94 | 1.89 | 1.66 | 1.59 | 0.00 | 0.00 |

## Appendix F—Agro-Industry According to Regions, 2004

| | Number of factory | % | Number of workers | % | Gross investment (baht) | % |
|---|---|---|---|---|---|---|
| **All Agricultural Industries (exclude Beverage and Processed Tobacco)** | | | | | | |
| GBK | 2,263 | 18.2 | 160,801 | **35.4** | 147,627,704,034 | **38** |
| Central | 3,389 | **27.2** | 140,862 | 31 | 116,234,100,840 | 29.9 |
| Northeast | 3,285 | 26.4 | 51,411 | 11.3 | 54,105,727,581 | 13.9 |
| North | 2,604 | 20.9 | 52,992 | 11.7 | 53,649,432,900 | 13.8 |
| South | 897 | 7.2 | 48,468 | 10.7 | 16,586,933,165 | 4.3 |
| Total | 12,438 | 100 | 454,534 | 100 | 388,203,898,520 | 100 |
| **001 Tea and Tobacco Leaves Curing** | | | | | | |
| North | 90 | 100 | 2,919 | 100 | 1,423,695,361 | 100 |
| Total | 90 | 100 | 2,919 | 100 | 1,423,695,361 | 100 |
| **002 Agricultural Produce Basic Processing** | | | | | | |
| GBK | 125 | 10.8 | 3,875 | 19.5 | 6,042,846,724 | 19.3 |
| Central | 270 | 23.2 | 5,052 | 25.5 | 12,956,988,479 | **41.3** |
| Northeast | 234 | 20.1 | 3,967 | 20 | 3,368,454,182 | 10.7 |
| North | 497 | **42.8** | 6,146 | **31** | 8,066,796,428 | 25.7 |
| South | 36 | 3.1 | 784 | 4 | 910,290,955 | 2.9 |
| Total | 1,162 | 100 | 19,824 | 100 | 31,345,376,768 | 100 |
| **004 Animal Slaughtering** | | | | | | |
| GBK | 227 | **30.6** | 24,957 | 30.4 | 69,125,156,458 | **75.3** |
| Central | 144 | 19.4 | 34,335 | **41.8** | 13,268,971,987 | 14.5 |
| Northeast | 187 | 25.2 | 10,348 | 12.6 | 2,992,521,938 | 3.3 |
| North | 140 | 18.9 | 11,790 | 14.4 | 5,731,742,646 | 6.2 |
| South | 44 | 5.9 | 648 | 0.8 | 687,589,882 | 0.7 |
| Total | 742 | 100 | 82,078 | 100 | 91,805,982,911 | 100 |
| **005 Dairy Product** | | | | | | |
| GBK | 19 | 10.9 | 1,721 | 25.3 | 3,401,383,883 | 17.9 |
| Central | 46 | 26.4 | 2,888 | **42.4** | 12,358,557,162 | **65.1** |
| Northeast | 63 | **36.2** | 1,257 | 18.5 | 1,911,228,625 | 10.1 |
| North | 35 | 20.1 | 857 | 12.6 | 1,108,830,442 | 5.8 |
| South | 11 | 6.3 | 87 | 1.3 | 204,076,452 | 1.1 |
| Total | 174 | 100 | 6,810 | 100 | 18,984,076,564 | 100 |
| **006 Marine Product Processing** | | | | | | |
| GBK | 263 | **45.2** | 53,258 | **51** | 13,925,307,687 | **53.6** |
| Central | 110 | 18.9 | 19,064 | 18.2 | 6,804,340,028 | 26.2 |
| Northeast | 28 | 4.8 | 335 | 0.3 | 26,741,000 | 0.1 |
| North | 15 | 2.6 | 201 | 0.2 | 37,857,000 | 0.1 |
| South | 166 | 28.5 | 31,647 | 30.3 | 5,171,007,612 | 19.9 |
| Total | 582 | 100 | 104,505 | 100 | 25,965,253,327 | 100 |
| **007 Vegetable and Animal Oil** | | | | | | |
| GBK | 64 | 25.9 | 5,143 | **46.2** | 5,531,749,719 | 41 |
| Central | 75 | 30.4 | 1,982 | 17.8 | 1,139,607,000 | 8.5 |
| Northeast | 14 | 5.7 | 199 | 1.8 | 179,401,000 | 1.3 |
| North | 7 | 2.8 | 197 | 1.8 | 446,908,550 | 3.3 |
| South | 87 | **35.2** | 3,604 | 32.4 | 6,184,331,545 | **45.9** |
| Total | 247 | 100 | 11,125 | 100 | 13,481,997,814 | 100 |

## Appendix F—Agro-Industry According to Regions, 2004 (cont.)

| | Number of factory | % | Number of workers | % | Gross investment (baht) | % |
|---|---|---|---|---|---|---|
| **008 Vegetable and Fruit Processing** | | | | | | |
| GBK | 146 | 25.9 | 18,426 | 29.5 | 5,981,793,996 | 27.6 |
| Central | 217 | **38.5** | 28,136 | **45** | 11,426,279,899 | **52.7** |
| Northeast | 35 | 6.2 | 2,191 | 3.5 | 845,326,655 | 3.9 |
| North | 148 | 26.2 | 11,761 | 18.8 | 3,356,721,062 | 15.5 |
| South | 18 | 3.2 | 2,000 | 3.2 | 89,795,000 | 0.4 |
| Total | 564 | 100 | 62,514 | 100 | 21,699,916,612 | 100 |
| **009 (1) Rice Milling** | | | | | | |
| GBK | 227 | 7.46 | 3,111 | 13 | 4,566,235,018 | 12.7 |
| Central | 893 | 29.34 | 8,003 | **33.4** | 11,254,141,730 | **31.3** |
| Northeast | 771 | 25.33 | 6,845 | 28.6 | 9,972,356,858 | 27.7 |
| North | 980 | **32.19** | 5,251 | 21.9 | 9,643,448,353 | 26.8 |
| South | 173 | 5.68 | 730 | 3 | 541,086,260 | 1.5 |
| Total | 3,044 | 100 | 23,940 | 100 | 35,977,268,219 | 100 |
| **009(2) Flour** | | | | | | |
| GBK | 163 | 5.6 | 7,031 | 20.4 | 6,507,963,600 | 24.1 |
| Central | 874 | 29.9 | 9,147 | 26.6 | 8,708,316,244 | 32.2 |
| Northeast | 1,514 | **51.8** | 15,129 | **44** | 9,787,839,413 | **36.2** |
| North | 363 | 12.4 | 3,005 | 8.7 | 2,012,413,150 | 7.4 |
| South | 10 | 0.3 | 74 | 0.2 | 12,376,000 | 0 |
| Total | 2,924 | 100 | 34,386 | 100 | 27,028,908,407 | 100 |
| **010 Processed Food from Flour** | | | | | | |
| GBK | 435 | **34.3** | 22,597 | **58.1** | 18,489,949,113 | **69.7** |
| Central | 287 | 22.6 | 10,634 | 27.3 | 6,129,934,722 | 23.1 |
| Northeast | 214 | 16.9 | 2,338 | 6 | 973,711,165 | 3.7 |
| North | 162 | 12.8 | 2,067 | 5.3 | 591,103,534 | 2.2 |
| South | 171 | 13.5 | 1,262 | 3.2 | 353,317,500 | 1.3 |
| Total | 1,269 | 100 | 38,898 | 100 | 26,538,016,034 | 100 |
| **011 Sugar and Syrup** | | | | | | |
| GBK | 18 | 14.6 | 424 | 1.8 | 257,020,757 | 0.5 |
| Central | 54 | **43.9** | 10,202 | **44.2** | 17,610,540,937 | 32 |
| Northeast | 31 | 25.2 | 5,851 | 25.3 | 20,801,500,143 | **37.8** |
| North | 19 | 15.4 | 6,601 | 28.6 | 16,385,839,748 | 29.8 |
| South | 1 | 0.8 | 8 | 0 | 800,000 | 0 |
| Total | 123 | 100 | 23,086 | 100 | 55,055,701,585 | 100 |
| **012 Processed Tea, Coffee, Coco, Chocolate, Sweets** | | | | | | |
| GBK | 196 | **40.7** | 6,932 | **66.7** | 5,907,171,252 | **64.6** |
| Central | 61 | 12.7 | 1,381 | 13.3 | 2,539,380,100 | 27.8 |
| Northeast | 94 | 19.5 | 731 | 7 | 159,141,000 | 1.7 |
| North | 88 | 18.3 | 834 | 8 | 349,816,241 | 3.8 |
| South | 42 | 8.7 | 512 | 4.9 | 183,713,466 | 2 |
| Total | 481 | 100 | 10,390 | 100 | 9,139,222,059 | 100 |

## Appendix F—Agro-Industry According to Regions, 2004 (cont.)

| | | | | | | |
|---|---|---|---|---|---|---|
| **013 Food Seasoning** | | | | | | |
| GBK | 182 | **44.7** | 6,748 | **56.2** | 2,785,987,142 | 32.3 |
| Central | 149 | 36.6 | 3,947 | 32.8 | 3,226,104,700 | **37.4** |
| Northeast | 27 | 6.6 | 480 | 4 | 533,249,000 | 6.2 |
| North | 24 | 5.9 | 666 | 5.5 | 2,035,605,820 | 23.6 |
| South | 25 | 6.1 | 175 | 1.5 | 36,909,000 | 0.4 |
| Total | 407 | 100 | 12,016 | 100 | 8,617,855,662 | 100 |
| **015 Animal Feed** | | | | | | |
| GBK | 198 | 31.5 | 6,578 | **29.8** | 5,105,138,685 | 24.1 |
| Central | 209 | **33.2** | 6,091 | 27.6 | 8,810,937,852 | **41.7** |
| Northeast | 73 | 11.6 | 1,740 | 7.9 | 2,554,256,602 | 12.1 |
| North | 36 | 5.7 | 697 | 3.2 | 2,458,654,565 | 11.6 |
| South | 113 | 18 | 6,937 | 31.5 | 2,211,639,493 | 10.5 |
| Total | 629 | 100 | 22,043 | 100 | 21,140,627,197 | 100 |

Source: Author, using data from the Department of Industrial Works

# Appendix G—Simulation Results from CGE Analysis

## Results of Simulations 1.1 – 1.5

| | | | BASE | SIM 1.1 | Δ% | SIM 1.2 | Δ% | SIM 1.3 | Δ% | SIM 1.4 | Δ% | SIM 1.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 47159.55 | 1.726 | 46584.61 | 0.486 | 46683.86 | 0.700 | 46405.11 | 0.099 | 46896.25 | 1.158 |
| | PRVCON | | 25292.80 | 25682.28 | 1.540 | 25389.63 | 0.383 | 25431.04 | 0.547 | 25323.22 | 0.120 | 25564.70 | 1.075 |
| | GOVCON | | 5007.05 | 5085.07 | 1.558 | 5026.49 | 0.388 | 4998.39 | (0.173) | 5007.33 | 0.006 | 4913.22 | (1.874) |
| | INVEST | | 8845.28 | 9089.85 | 2.765 | 9070.15 | 2.542 | 9038.75 | 2.187 | 8864.10 | 0.213 | 9162.48 | 3.586 |
| | EXP | | 27237.19 | 27858.19 | 2.280 | 27298.14 | 0.224 | 27595.77 | 1.317 | 27276.23 | 0.143 | 27564.41 | 1.201 |
| | IMP | | -20023.05 | -20555.83 | 2.661 | -20199.80 | 0.883 | -20380.10 | 1.783 | -20065.77 | 0.213 | -20308.56 | 1.426 |
| | NITAX | | 4756.36 | 4874.89 | 2.492 | 4783.69 | 0.575 | 4808.93 | 1.105 | 4761.45 | 0.107 | 4816.79 | 1.271 |
| | GDPFC | | 41602.91 | 42284.66 | 1.639 | 41800.92 | 0.476 | 41874.93 | 0.654 | 41643.66 | 0.098 | 42079.45 | 1.145 |
| | GDPMP2 | | 46359.27 | 47159.55 | 1.726 | 46584.61 | 0.486 | 46683.86 | 0.700 | 46405.11 | 0.099 | 46896.25 | 1.158 |
| YG | | | 8524.54 | 8705.26 | 2.120 | 8564.85 | 0.473 | 8602.64 | 0.916 | 8531.84 | 0.086 | 8627.44 | 1.207 |
| EG | | | 5710.03 | 5788.15 | 1.368 | 5729.33 | 0.338 | 5701.37 | (0.152) | 5710.30 | 0.005 | 5616.25 | (1.642) |
| IADJ | | | 1.00 | 1.01 | 0.726 | 1.03 | 3.401 | 1.05 | 4.820 | 1.00 | 0.370 | 1.03 | 2.619 |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| YF | LAB | | 14579.90 | 14769.16 | 1.298 | 14615.28 | 0.243 | 14609.95 | 0.206 | 14615.08 | 0.241 | 14715.44 | 0.930 |
| | CAP | | 27023.01 | 27515.50 | 1.822 | 27185.64 | 0.602 | 27264.98 | 0.895 | 27028.58 | 0.021 | 27364.01 | 1.262 |
| QF | LAB | PRIMA-A | 139410.00 | 134410.00 | (3.587) | 134410.00 | (3.587) | 134410.00 | (3.587) | 134410.00 | (3.587) | 134410.00 | (3.587) |
| | LAB | AINDUS-A | 8490.00 | 13490.00 | 58.893 | 8490.00 | - | 8490.00 | - | 8490.00 | - | 8490.00 | - |
| | LAB | MANU-A | 33960.00 | 33960.00 | - | 38960.00 | 14.723 | 33960.00 | - | 33960.00 | - | 33960.00 | - |
| | LAB | UTICON-A | 18220.00 | 18220.00 | - | 18220.00 | - | 23220.00 | 27.442 | 18220.00 | - | 18220.00 | - |
| | LAB | TRADE-A | 51750.00 | 51750.00 | - | 51750.00 | - | 51750.00 | - | 56750.00 | 9.662 | 51750.00 | - |
| | LAB | SER-A | 54200.00 | 54200.00 | - | 54200.00 | - | 54200.00 | - | 54200.00 | - | 59200.00 | 9.225 |
| | CAP | PRIMA-A | 12315.48 | 12872.55 | 4.523 | 12254.44 | (0.496) | 12555.33 | 1.948 | 12403.66 | 0.716 | 12463.10 | 1.199 |
| | CAP | AINDUS-A | 6718.35 | 5647.10 | (15.945) | 6531.30 | (2.784) | 6750.74 | 0.482 | 6695.43 | (0.341) | 6711.40 | (0.103) |
| | CAP | MANU-A | 22491.87 | 22226.63 | (1.179) | 21795.39 | (3.097) | 23158.59 | 2.964 | 22605.77 | 0.506 | 22684.75 | 0.858 |
| | CAP | UTICON-A | 16829.92 | 17063.21 | 1.386 | 17518.42 | 4.091 | 14231.25 | (15.441) | 16909.60 | 0.473 | 17401.20 | 3.394 |
| | CAP | TRADE-A | 44663.41 | 44991.98 | 0.736 | 45161.51 | 1.115 | 45462.35 | 1.789 | 44306.24 | (0.800) | 45103.85 | 0.986 |
| | CAP | SER-A | 58248.63 | 58466.20 | 0.374 | 58006.60 | (0.416) | 59109.39 | 1.478 | 58346.95 | 0.169 | 56903.36 | (2.310) |
| WF | LAB | | 0.05 | 0.05 | - | 0.05 | - | 0.05 | - | 0.05 | - | 0.05 | - |
| | CAP | | 0.17 | 0.17 | 1.719 | 0.17 | 0.931 | 0.17 | (0.090) | 0.17 | 0.012 | 0.17 | 1.009 |

| | | | BASE | SIM 1.1 | Δ% | SIM 1.2 | Δ% | SIM 1.3 | Δ% | SIM 1.4 | Δ% | SIM 1.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WFDIST | LAB | PRIMA-A | 0.29 | 0.32 | 10.273 | 0.30 | 4.168 | 0.30 | 5.648 | 0.30 | 4.475 | 0.30 | 6.021 |
| | LAB | AINDUS-A | 2.37 | 1.27 | (46.190) | 2.32 | (1.876) | 2.38 | 0.395 | 2.36 | (0.329) | 2.39 | 0.904 |
| | LAB | MANU-A | 2.24 | 2.25 | 0.520 | 1.91 | (14.743) | 2.31 | 2.875 | 2.25 | 0.519 | 2.28 | 1.875 |
| | LAB | UTICON-A | 1.57 | 1.62 | 3.129 | 1.65 | 5.064 | 1.04 | (33.707) | 1.58 | 0.485 | 1.64 | 4.437 |
| | LAB | TRADE-A | 0.55 | 0.56 | 2.466 | 0.56 | 2.059 | 0.56 | 1.700 | 0.50 | (9.529) | 0.56 | 2.003 |
| | LAB | SER-A | 2.08 | 2.12 | 2.099 | 2.09 | 0.515 | 2.11 | 1.389 | 2.08 | 0.181 | 1.88 | (9.659) |
| | CAP | PRIMA-A | 2.04 | 2.04 | - | 2.04 | - | 2.04 | - | 2.04 | - | 2.04 | - |
| | CAP | AINDUS-A | 1.17 | 1.17 | - | 1.17 | - | 1.17 | - | 1.17 | - | 1.17 | - |
| | CAP | MANU-A | 1.33 | 1.33 | - | 1.33 | - | 1.33 | - | 1.33 | - | 1.33 | - |
| | CAP | UTICON-A | 0.50 | 0.50 | - | 0.50 | - | 0.50 | - | 0.50 | - | 0.50 | - |
| | CAP | TRADE-A | 1.12 | 1.12 | - | 1.12 | - | 1.12 | - | 1.12 | - | 1.12 | - |
| | CAP | SER-A | 0.69 | 0.69 | - | 0.69 | - | 0.69 | - | 0.69 | - | 0.69 | - |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 2051.04 | 1.298 | 2029.67 | 0.243 | 2028.93 | 0.206 | 2029.65 | 0.241 | 2043.58 | 0.930 |
| | A-HHD | CAP | 2979.23 | 3033.53 | 1.822 | 2997.16 | 0.602 | 3005.91 | 0.895 | 2979.84 | 0.021 | 3016.82 | 1.262 |
| | G-HHD | LAB | 4254.63 | 4309.86 | 1.298 | 4264.95 | 0.243 | 4263.40 | 0.206 | 4264.90 | 0.241 | 4294.18 | 0.930 |
| | G-HHD | CAP | 648.94 | 660.77 | 1.822 | 652.85 | 0.602 | 654.75 | 0.895 | 649.07 | 0.021 | 657.13 | 1.262 |
| | N-HHD | LAB | 8300.51 | 8408.26 | 1.298 | 8320.65 | 0.243 | 8317.62 | 0.206 | 8320.54 | 0.241 | 8377.68 | 0.930 |
| | N-HHD | CAP | 12376.62 | 12602.18 | 1.822 | 12451.11 | 0.602 | 12487.44 | 0.895 | 12379.17 | 0.021 | 12532.80 | 1.262 |
| | ENT-G | CAP | 1244.96 | 1267.65 | 1.822 | 1252.45 | 0.602 | 1256.11 | 0.895 | 1245.22 | 0.021 | 1260.67 | 1.262 |
| | ENT-P | CAP | 8979.21 | 9142.85 | 1.822 | 9033.25 | 0.602 | 9059.61 | 0.895 | 8981.06 | 0.021 | 9092.52 | 1.262 |
| QINV | PRIMA-C | | 155.02 | 156.14 | 0.726 | 160.29 | 3.401 | 162.49 | 4.820 | 155.59 | 0.370 | 159.08 | 2.619 |
| | AINDUS-C | | -241.50 | -243.25 | 0.726 | -249.71 | 3.401 | -253.14 | 4.820 | -242.39 | 0.370 | -247.83 | 2.619 |
| | MANU-C | | 4849.76 | 4884.97 | 0.726 | 5014.71 | 3.401 | 5083.52 | 4.820 | 4867.71 | 0.370 | 4976.80 | 2.619 |
| | UTICON-C | | 2955.06 | 2976.52 | 0.726 | 3055.57 | 3.401 | 3097.50 | 4.820 | 2966.00 | 0.370 | 3032.47 | 2.619 |
| | TRADE-C | | 1009.26 | 1016.59 | 0.726 | 1043.59 | 3.401 | 1057.91 | 4.820 | 1012.99 | 0.370 | 1035.70 | 2.619 |
| | SER-C | | 36.68 | 36.95 | 0.726 | 37.93 | 3.401 | 38.45 | 4.820 | 36.82 | 0.370 | 37.64 | 2.619 |
| YH | A-HHD | | 5316.62 | 5399.62 | 1.561 | 5336.28 | 0.370 | 5347.51 | 0.581 | 5322.02 | 0.102 | 5374.18 | 1.083 |
| | G-HHD | | 4971.28 | 5038.80 | 1.358 | 4984.90 | 0.274 | 4985.87 | 0.293 | 4981.66 | 0.209 | 5019.24 | 0.965 |
| | N-HHD | | 21389.80 | 21727.41 | 1.578 | 21478.78 | 0.416 | 21517.80 | 0.598 | 21412.20 | 0.105 | 21625.18 | 1.100 |
| QH | PRIMA-C | A-HHD | 700.14 | 690.26 | (1.412) | 695.54 | (0.657) | 698.08 | (0.294) | 695.68 | (0.637) | 695.98 | (0.594) |
| | PRIMA-C | G-HHD | 274.35 | 269.94 | (1.609) | 272.29 | (0.752) | 272.76 | (0.579) | 272.90 | (0.530) | 272.40 | (0.710) |
| | PRIMA-C | N-HHD | 1129.02 | 1113.27 | (1.395) | 1122.13 | (0.611) | 1125.90 | (0.277) | 1121.87 | (0.634) | 1122.51 | (0.577) |

| | | | BASE | SIM 1.1 | Δ% | SIM 1.2 | Δ% | SIM 1.3 | Δ% | SIM 1.4 | Δ% | SIM 1.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | A-HHD | 1881.42 | 2017.49 | 7.232 | 1874.95 | (0.344) | 1889.54 | 0.432 | 1880.00 | (0.076) | 1880.58 | (0.044) |
| | AINDUS-C | G-HHD | 920.08 | 984.65 | 7.018 | 916.04 | (0.439) | 921.41 | 0.144 | 920.37 | 0.032 | 918.60 | (0.161) |
| | AINDUS-C | N-HHD | 3545.28 | 3802.33 | 7.251 | 3534.72 | (0.298) | 3561.19 | 0.449 | 3542.71 | (0.072) | 3544.33 | (0.027) |
| | MANU-C | A-HHD | 1743.73 | 1742.47 | (0.072) | 1788.42 | 2.563 | 1752.57 | 0.507 | 1746.86 | 0.180 | 1749.60 | 0.337 |
| | MANU-C | G-HHD | 852.75 | 850.43 | (0.272) | 873.77 | 2.465 | 854.62 | 0.219 | 855.19 | 0.287 | 854.62 | 0.220 |
| | MANU-C | N-HHD | 3285.84 | 3284.01 | (0.056) | 3371.61 | 2.610 | 3303.06 | 0.524 | 3291.84 | 0.183 | 3297.48 | 0.354 |
| | UTICON-C | A-HHD | 97.86 | 97.35 | (0.518) | 97.44 | (0.429) | 106.57 | 8.907 | 97.96 | 0.105 | 97.53 | (0.333) |
| | UTICON-C | G-HHD | 47.86 | 47.52 | (0.717) | 47.61 | (0.524) | 51.98 | 8.596 | 47.97 | 0.213 | 47.65 | (0.449) |
| | UTICON-C | N-HHD | 184.43 | 183.50 | (0.501) | 183.72 | (0.383) | 200.89 | 8.926 | 184.63 | 0.109 | 183.84 | (0.315) |
| | TRADE-C | A-HHD | 347.20 | 346.26 | (0.272) | 345.67 | (0.440) | 349.50 | 0.663 | 351.26 | 1.169 | 349.03 | 0.527 |
| | TRADE-C | G-HHD | 427.95 | 425.94 | (0.471) | 425.66 | (0.535) | 429.56 | 0.376 | 433.42 | 1.278 | 429.70 | 0.410 |
| | TRADE-C | N-HHD | 1656.57 | 1652.35 | (0.255) | 1650.04 | (0.394) | 1667.85 | 0.681 | 1675.99 | 1.172 | 1665.60 | 0.545 |
| | SER-C | A-HHD | 1147.00 | 1147.28 | 0.025 | 1145.62 | (0.120) | 1154.46 | 0.651 | 1147.72 | 0.063 | 1184.65 | 3.283 |
| | SER-C | G-HHD | 1413.70 | 1411.23 | (0.175) | 1410.66 | (0.215) | 1418.83 | 0.363 | 1416.10 | 0.170 | 1458.41 | 3.162 |
| | SER-C | N-HHD | 5472.33 | 5474.62 | 0.042 | 5468.28 | (0.074) | 5508.89 | 0.668 | 5475.93 | 0.066 | 5652.97 | 3.301 |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1267.65 | 1.822 | 1252.45 | 0.602 | 1256.11 | 0.895 | 1245.22 | 0.021 | 1260.67 | 1.262 |
| | ENT-P | | 10396.40 | 10576.30 | 1.730 | 10439.38 | 0.413 | 10479.16 | 0.796 | 10398.45 | 0.020 | 10518.90 | 1.178 |
| ENTSAV | ENT-G | | 902.97 | 919.43 | 1.822 | 908.40 | 0.602 | 911.06 | 0.895 | 903.16 | 0.021 | 914.36 | 1.262 |
| | ENT-P | | 6326.21 | 6451.04 | 1.973 | 6413.46 | 1.379 | 6400.02 | 1.167 | 6329.60 | 0.054 | 6418.91 | 1.465 |
| QE | PRIMA-C | | 2236.89 | 2249.68 | 0.572 | 2159.87 | (3.443) | 2226.69 | (0.456) | 2209.15 | (1.240) | 2211.29 | (1.145) |
| | AINDUS-C | | 2909.02 | 3341.39 | 14.863 | 2816.38 | (3.185) | 2914.60 | 0.192 | 2898.75 | (0.353) | 2896.48 | (0.431) |
| | MANU-C | | 16662.56 | 16496.76 | (0.995) | 17406.06 | 4.462 | 16940.25 | 1.667 | 16714.84 | 0.314 | 16724.14 | 0.370 |
| | UTICON-C | | 113.66 | 113.69 | 0.028 | 113.81 | 0.135 | 125.10 | 10.065 | 113.89 | 0.204 | 114.85 | 1.051 |
| | TRADE-C | | 2898.91 | 2904.97 | 0.209 | 2877.45 | (0.740) | 2945.57 | 1.610 | 2936.85 | 1.309 | 2924.00 | 0.866 |
| | SER-C | | 2416.15 | 2415.15 | (0.041) | 2369.90 | (1.914) | 2437.69 | 0.892 | 2416.67 | 0.021 | 2535.19 | 4.927 |
| PE | PRIMA-C | | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | AINDUS-C | | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | MANU-C | | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | UTICON-C | | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | TRADE-C | | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | SER-C | | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |

| | | BASE | SIM 1.1 | Δ% | SIM 1.2 | Δ% | SIM 1.3 | Δ% | SIM 1.4 | Δ% | SIM 1.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | PRIMA-C | 1635.60 | 1761.30 | 7.685 | 1750.85 | 7.046 | 1682.99 | 2.898 | 1665.79 | 1.846 | 1687.31 | 3.161 |
| | AINDUS-C | 899.60 | 832.98 | (7.406) | 939.64 | 4.451 | 905.07 | 0.608 | 903.10 | 0.389 | 911.74 | 1.349 |
| | MANU-C | 14825.23 | 15016.48 | 1.290 | 15023.24 | 1.336 | 15116.73 | 1.966 | 14849.41 | 0.163 | 15017.75 | 1.299 |
| | UTICON-C | 37.90 | 38.95 | 2.768 | 40.97 | 8.101 | 32.41 | (14.493) | 38.03 | 0.354 | 39.32 | 3.755 |
| | TRADE-C | 710.78 | 724.62 | 1.946 | 755.89 | 6.347 | 720.11 | 1.313 | 699.74 | (1.553) | 716.41 | 0.792 |
| | SER-C | 2534.31 | 2557.33 | 0.908 | 2651.70 | 4.632 | 2549.84 | 0.613 | 2541.84 | 0.297 | 2446.28 | (3.474) |
| PM | PRIMA-C | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | AINDUS-C | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | MANU-C | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | UTICON-C | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | TRADE-C | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| | SER-C | 1.00 | 1.01 | 1.223 | 0.98 | (1.605) | 1.00 | 0.021 | 1.00 | (0.051) | 1.01 | 0.578 |
| QX | PRIMA-C | 11489.80 | 11711.25 | 1.927 | 11321.06 | (1.469) | 11511.75 | 0.191 | 11415.81 | (0.644) | 11453.45 | (0.316) |
| | AINDUS-C | 13628.78 | 14972.13 | 9.857 | 13407.56 | (1.623) | 13666.82 | 0.279 | 13601.82 | (0.198) | 13620.61 | (0.060) |
| | MANU-C | 43263.45 | 42967.01 | (0.685) | 45007.20 | 4.031 | 44002.16 | 1.707 | 43390.29 | 0.293 | 43478.10 | 0.496 |
| | UTICON-C | 7195.13 | 7245.93 | 0.706 | 7344.07 | 2.070 | 7435.54 | 3.341 | 7212.52 | 0.242 | 7318.92 | 1.720 |
| | TRADE-C | 16778.46 | 16884.58 | 0.632 | 16939.29 | 0.959 | 17036.31 | 1.537 | 16879.26 | 0.601 | 16920.68 | 0.848 |
| | SER-C | 21320.57 | 21364.77 | 0.207 | 21271.31 | (0.231) | 21495.03 | 0.818 | 21340.56 | 0.094 | 21887.43 | 2.659 |
| PX | PRIMA-C | 1.00 | 1.03 | 2.931 | 1.01 | 0.916 | 1.01 | 0.835 | 1.01 | 0.704 | 1.02 | 1.633 |
| | AINDUS-C | 1.00 | 0.96 | (4.262) | 1.00 | 0.382 | 1.00 | 0.130 | 1.00 | 0.144 | 1.01 | 1.047 |
| | MANU-C | 1.00 | 1.02 | 1.619 | 0.98 | (2.113) | 1.00 | 0.072 | 1.00 | (0.077) | 1.01 | 0.737 |
| | UTICON-C | 1.00 | 1.02 | 2.081 | 1.01 | 0.777 | 0.92 | (7.557) | 1.00 | (0.004) | 1.01 | 1.411 |
| | TRADE-C | 1.00 | 1.02 | 1.758 | 1.01 | 0.504 | 1.00 | (0.068) | 0.99 | (0.923) | 1.01 | 0.556 |
| | SER-C | 1.00 | 1.02 | 1.538 | 1.01 | 0.510 | 1.00 | (0.070) | 1.00 | 0.039 | 0.98 | (2.132) |
| QQ | PRIMA-C | 10888.51 | 11221.78 | 3.061 | 10909.61 | 0.194 | 10967.81 | 0.728 | 10872.24 | (0.149) | 10929.06 | 0.372 |
| | AINDUS-C | 11619.36 | 12453.63 | 7.180 | 11529.65 | (0.772) | 11657.29 | 0.326 | 11606.15 | (0.114) | 11635.80 | 0.142 |
| | MANU-C | 41426.12 | 41486.03 | 0.145 | 42623.11 | 2.889 | 42178.63 | 1.817 | 41524.85 | 0.238 | 41771.58 | 0.834 |
| | UTICON-C | 7119.37 | 7171.18 | 0.728 | 7271.18 | 2.132 | 7342.27 | 3.131 | 7136.66 | 0.243 | 7243.38 | 1.742 |
| | TRADE-C | 14590.33 | 14704.16 | 0.780 | 14816.67 | 1.551 | 14810.84 | 1.511 | 14641.97 | 0.354 | 14713.10 | 0.841 |
| | SER-C | 21438.73 | 21506.92 | 0.318 | 21551.39 | 0.525 | 21607.17 | 0.786 | 21465.72 | 0.126 | 21795.64 | 1.665 |
| PQ | PRIMA-C | 1.01 | 1.04 | 3.016 | 1.02 | 1.033 | 1.02 | 0.878 | 1.02 | 0.744 | 1.03 | 1.687 |
| | AINDUS-C | 1.01 | 0.95 | (5.289) | 1.01 | 0.716 | 1.01 | 0.149 | 1.01 | 0.177 | 1.02 | 1.128 |
| | MANU-C | 1.02 | 1.03 | 1.635 | 0.99 | (2.138) | 1.02 | 0.074 | 1.02 | (0.078) | 1.02 | 0.744 |
| | UTICON-C | 1.00 | 1.02 | 2.091 | 1.01 | 0.802 | 0.92 | (7.645) | 1.00 | (0.004) | 1.01 | 1.420 |

| | | | BASE | SIM 1.1 | Δ% | SIM 1.2 | Δ% | SIM 1.3 | Δ% | SIM 1.4 | Δ% | SIM 1.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PQ | TRADE-C | | 1.00 | 1.02 | 1.838 | 1.01 | 0.814 | 1.00 | (0.082) | 0.99 | (1.055) | 1.01 | 0.552 |
| | SER-C | | 1.00 | 1.02 | 1.536 | 1.01 | 0.490 | 1.00 | (0.070) | 1.00 | 0.039 | 0.98 | (2.131) |
| QD | PRIMA-C | | 9252.91 | 9461.26 | 2.252 | 9160.51 | (0.999) | 9284.99 | 0.347 | 9206.60 | (0.501) | 9242.04 | (0.117) |
| | AINDUS-C | | 10719.76 | 11625.37 | 8.448 | 10590.61 | (1.205) | 10752.22 | 0.303 | 10703.06 | (0.156) | 10724.10 | 0.040 |
| | MANU-C | | 26600.89 | 26470.09 | (0.492) | 27600.84 | 3.759 | 27061.91 | 1.733 | 26675.45 | 0.280 | 26753.92 | 0.575 |
| | UTICON-C | | 7081.47 | 7132.23 | 0.717 | 7230.23 | 2.101 | 7310.13 | 3.229 | 7098.63 | 0.242 | 7204.06 | 1.731 |
| | TRADE-C | | 13879.55 | 13979.57 | 0.721 | 14061.22 | 1.309 | 14090.73 | 1.522 | 13942.31 | 0.452 | 13996.68 | 0.844 |
| | SER-C | | 18904.42 | 18949.61 | 0.239 | 18900.93 | (0.018) | 19057.33 | 0.809 | 18923.89 | 0.103 | 19351.38 | 2.364 |
| PD | PRIMA-C | | 1.00 | 1.03 | 3.341 | 1.02 | 1.518 | 1.01 | 1.031 | 1.01 | 0.885 | 1.02 | 1.886 |
| | AINDUS-C | | 1.00 | 0.94 | (5.794) | 1.01 | 0.916 | 1.00 | 0.160 | 1.00 | 0.196 | 1.01 | 1.174 |
| | MANU-C | | 1.00 | 1.02 | 1.867 | 0.98 | (2.432) | 1.00 | 0.103 | 1.00 | (0.093) | 1.01 | 0.836 |
| | UTICON-C | | 1.00 | 1.02 | 2.095 | 1.01 | 0.815 | 0.92 | (7.683) | 1.00 | (0.004) | 1.01 | 1.425 |
| | TRADE-C | | 1.00 | 1.02 | 1.869 | 1.01 | 0.940 | 1.00 | (0.087) | 0.99 | (1.106) | 1.01 | 0.551 |
| | SER-C | | 1.00 | 1.02 | 1.578 | 1.01 | 0.778 | 1.00 | (0.081) | 1.00 | 0.051 | 0.98 | (2.483) |
| QA | PRIMA-A | | 11489.80 | 11711.25 | 1.927 | 11321.06 | (1.469) | 11511.75 | 0.191 | 11415.81 | (0.644) | 11453.45 | (0.316) |
| | AINDUS-A | | 13628.78 | 14972.13 | 9.857 | 13407.56 | (1.623) | 13666.82 | 0.279 | 13601.82 | (0.198) | 13620.61 | (0.060) |
| | MANU-A | | 43263.45 | 42967.01 | (0.685) | 45007.20 | 4.031 | 44002.16 | 1.707 | 43390.29 | 0.293 | 43478.10 | 0.496 |
| | UTICON-A | | 7195.13 | 7245.93 | 0.706 | 7344.07 | 2.070 | 7435.54 | 3.341 | 7212.52 | 0.242 | 7318.92 | 1.720 |
| | TRADE-A | | 16778.46 | 16884.58 | 0.632 | 16939.29 | 0.959 | 17036.31 | 1.537 | 16879.26 | 0.601 | 16920.68 | 0.848 |
| | SER-A | | 21320.57 | 21364.77 | 0.207 | 21271.31 | (0.231) | 21495.03 | 0.818 | 21340.56 | 0.094 | 21887.43 | 2.659 |
| PA | PRIMA-A | | 1.00 | 1.03 | 2.931 | 1.01 | 0.916 | 1.01 | 0.835 | 1.01 | 0.704 | 1.02 | 1.633 |
| | AINDUS-A | | 1.00 | 0.96 | (4.262) | 1.00 | 0.382 | 1.00 | 0.130 | 1.00 | 0.144 | 1.01 | 1.047 |
| | MANU-A | | 1.00 | 1.02 | 1.619 | 0.98 | (2.113) | 1.00 | 0.072 | 1.00 | (0.077) | 1.01 | 0.737 |
| | UTICON-A | | 1.00 | 1.02 | 2.081 | 1.01 | 0.777 | 0.92 | (7.557) | 1.00 | (0.004) | 1.01 | 1.411 |
| | TRADE-A | | 1.00 | 1.02 | 1.758 | 1.01 | 0.504 | 1.00 | (0.068) | 0.99 | (0.923) | 1.01 | 0.556 |
| | SER-A | | 1.00 | 1.02 | 1.538 | 1.01 | 0.510 | 1.00 | (0.070) | 1.00 | 0.039 | 0.98 | (2.132) |
| PVA | PRIMA-A | | 0.53 | 0.56 | 4.311 | 0.54 | 1.932 | 0.54 | 1.666 | 0.54 | 1.381 | 0.55 | 2.544 |
| | AINDUS-A | | 0.17 | 0.13 | (22.169) | 0.17 | (0.257) | 0.17 | 0.120 | 0.17 | (0.132) | 0.17 | 0.969 |
| | MANU-A | | 0.20 | 0.20 | 1.213 | 0.19 | (5.980) | 0.20 | 1.148 | 0.20 | 0.226 | 0.20 | 1.373 |
| | UTICON-A | | 0.39 | 0.40 | 2.406 | 0.40 | 2.931 | 0.32 | (18.247) | 0.39 | 0.243 | 0.40 | 2.670 |
| | TRADE-A | | 0.58 | 0.59 | 1.823 | 0.58 | 1.092 | 0.58 | 0.161 | 0.57 | (1.379) | 0.59 | 1.147 |
| | SER-A | | 0.57 | 0.58 | 1.887 | 0.57 | 0.747 | 0.57 | 0.567 | 0.57 | 0.087 | 0.54 | (3.881) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 935.37 | 1.927 | 904.21 | (1.469) | 919.44 | 0.191 | 911.78 | (0.644) | 914.78 | (0.316) |
| | PRIMA-C | AINDUS-A | 3594.75 | 3949.08 | 9.857 | 3536.40 | (1.623) | 3604.79 | 0.279 | 3587.64 | (0.198) | 3592.60 | (0.060) |

| | | | BASE | SIM 1.1 | Δ% | SIM 1.2 | Δ% | SIM 1.3 | Δ% | SIM 1.4 | Δ% | SIM 1.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | MANU-A | 2330.82 | 2314.85 | (0.685) | 2424.77 | 4.031 | 2370.62 | 1.707 | 2337.65 | 0.293 | 2342.39 | 0.496 |
| | PRIMA-C | UTICON-A | 492.64 | 496.12 | 0.706 | 502.84 | 2.070 | 509.10 | 3.341 | 493.83 | 0.242 | 501.12 | 1.720 |
| | PRIMA-C | TRADE-A | 3.42 | 3.44 | 0.632 | 3.45 | 0.958 | 3.47 | 1.537 | 3.44 | 0.601 | 3.45 | 0.847 |
| | PRIMA-C | SER-A | 1282.41 | 1285.07 | 0.207 | 1279.45 | (0.231) | 1292.91 | 0.818 | 1283.62 | 0.094 | 1316.51 | 2.659 |
| | AINDUS-C | PRIMA-A | 457.75 | 466.57 | 1.927 | 451.02 | (1.469) | 458.62 | 0.191 | 454.80 | (0.644) | 456.30 | (0.316) |
| | AINDUS-C | AINDUS-A | 3741.97 | 4110.81 | 9.857 | 3681.23 | (1.623) | 3752.42 | 0.279 | 3734.57 | (0.198) | 3739.73 | (0.060) |
| | AINDUS-C | MANU-A | 233.97 | 232.37 | (0.685) | 243.40 | 4.031 | 237.97 | 1.707 | 234.66 | 0.293 | 235.13 | 0.496 |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.70 | 0.632 | 7.72 | 0.959 | 7.77 | 1.537 | 7.69 | 0.601 | 7.71 | 0.848 |
| | AINDUS-C | SER-A | 1072.20 | 1074.42 | 0.207 | 1069.72 | (0.231) | 1080.97 | 0.818 | 1073.20 | 0.094 | 1100.70 | 2.659 |
| | MANU-C | PRIMA-A | 1872.79 | 1908.88 | 1.927 | 1845.28 | (1.469) | 1876.36 | 0.191 | 1860.73 | (0.644) | 1866.86 | (0.316) |
| | MANU-C | AINDUS-A | 1100.51 | 1208.99 | 9.857 | 1082.65 | (1.623) | 1103.58 | 0.279 | 1098.33 | (0.198) | 1099.85 | (0.060) |
| | MANU-C | MANU-A | 21464.91 | 21317.84 | (0.685) | 22330.07 | 4.031 | 21831.42 | 1.707 | 21527.84 | 0.293 | 21571.41 | 0.496 |
| | MANU-C | UTICON-A | 2040.52 | 2054.93 | 0.706 | 2082.76 | 2.070 | 2108.70 | 3.341 | 2045.45 | 0.242 | 2075.63 | 1.720 |
| | MANU-C | TRADE-A | 2334.07 | 2348.83 | 0.632 | 2356.44 | 0.959 | 2369.93 | 1.537 | 2348.09 | 0.601 | 2353.85 | 0.848 |
| | MANU-C | SER-A | 1663.74 | 1667.19 | 0.207 | 1659.89 | (0.231) | 1677.35 | 0.818 | 1665.30 | 0.094 | 1707.97 | 2.659 |
| | UTICON-C | PRIMA-A | 210.22 | 214.27 | 1.927 | 207.14 | (1.469) | 210.62 | 0.191 | 208.87 | (0.644) | 209.56 | (0.316) |
| | UTICON-C | AINDUS-A | 301.60 | 331.33 | 9.857 | 296.70 | (1.623) | 302.44 | 0.279 | 301.00 | (0.198) | 301.42 | (0.060) |
| | UTICON-C | MANU-A | 1306.30 | 1297.35 | (0.685) | 1358.95 | 4.031 | 1328.60 | 1.707 | 1310.13 | 0.293 | 1312.78 | 0.496 |
| | UTICON-C | UTICON-A | 369.25 | 371.86 | 0.706 | 376.90 | 2.070 | 381.59 | 3.341 | 370.14 | 0.242 | 375.60 | 1.720 |
| | UTICON-C | TRADE-A | 336.12 | 338.24 | 0.632 | 339.34 | 0.959 | 341.28 | 1.537 | 338.14 | 0.601 | 338.97 | 0.848 |
| | UTICON-C | SER-A | 1237.04 | 1239.60 | 0.207 | 1234.18 | (0.231) | 1247.16 | 0.818 | 1238.20 | 0.094 | 1269.93 | 2.659 |
| | TRADE-C | PRIMA-A | 1059.51 | 1079.93 | 1.927 | 1043.95 | (1.469) | 1061.53 | 0.191 | 1052.69 | (0.644) | 1056.16 | (0.316) |
| | TRADE-C | AINDUS-A | 1105.89 | 1214.89 | 9.857 | 1087.94 | (1.623) | 1108.98 | 0.279 | 1103.70 | (0.198) | 1105.23 | (0.060) |
| | TRADE-C | MANU-A | 5085.91 | 5051.06 | (0.685) | 5290.90 | 4.031 | 5172.75 | 1.707 | 5100.82 | 0.293 | 5111.14 | 0.496 |
| | TRADE-C | UTICON-A | 882.07 | 888.30 | 0.706 | 900.33 | 2.070 | 911.54 | 3.341 | 884.20 | 0.242 | 897.25 | 1.720 |
| | TRADE-C | TRADE-A | 1621.83 | 1632.09 | 0.632 | 1637.38 | 0.959 | 1646.75 | 1.537 | 1631.57 | 0.601 | 1635.58 | 0.848 |
| | TRADE-C | SER-A | 1262.78 | 1265.40 | 0.207 | 1259.86 | (0.231) | 1273.11 | 0.818 | 1263.96 | 0.094 | 1296.35 | 2.659 |
| | SER-C | PRIMA-A | 667.53 | 680.40 | 1.927 | 657.73 | (1.469) | 668.81 | 0.191 | 663.23 | (0.644) | 665.42 | (0.316) |
| | SER-C | AINDUS-A | 521.52 | 572.92 | 9.857 | 513.05 | (1.623) | 522.97 | 0.279 | 520.48 | (0.198) | 521.20 | (0.060) |
| | SER-C | MANU-A | 2753.93 | 2735.06 | (0.685) | 2864.93 | 4.031 | 2800.95 | 1.707 | 2762.00 | 0.293 | 2767.59 | 0.496 |
| | SER-C | UTICON-A | 423.34 | 426.33 | 0.706 | 432.10 | 2.070 | 437.48 | 3.341 | 424.36 | 0.242 | 430.62 | 1.720 |
| | SER-C | TRADE-A | 2407.69 | 2422.92 | 0.632 | 2430.77 | 0.959 | 2444.70 | 1.537 | 2422.16 | 0.601 | 2428.10 | 0.848 |
| | SER-C | SER-A | 2031.46 | 2035.67 | 0.207 | 2026.76 | (0.231) | 2048.08 | 0.818 | 2033.36 | 0.094 | 2085.47 | 2.659 |

## Results of Simulations 2.1 – 2.5

| | | | BASE | SIM 2.1 | Δ% | SIM 2.2 | Δ% | SIM 2.3 | Δ% | SIM 2.4 | Δ% | SIM 2.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 46770.77 | 0.888 | 46710.96 | 0.759 | 46661.11 | 0.651 | 46446.52 | 0.188 | 47666.15 | 2.819 |
| | PRVCON | | 25292.80 | 25494.57 | 0.798 | 25441.95 | 0.590 | 25421.58 | 0.509 | 25353.32 | 0.239 | 25952.26 | 2.607 |
| | GOVCON | | 5007.05 | 5047.00 | 0.798 | 5037.60 | 0.610 | 4999.14 | (0.158) | 5005.91 | (0.023) | 4770.93 | (4.716) |
| | INVEST | | 8845.28 | 8969.60 | 1.405 | 9204.07 | 4.056 | 9024.81 | 2.030 | 8882.70 | 0.423 | 9626.74 | 8.835 |
| | EXP | | 27237.19 | 27547.33 | 1.139 | 27338.12 | 0.371 | 27569.11 | 1.219 | 27325.15 | 0.323 | 28052.20 | 2.992 |
| | IMP | | -20023.05 | -20287.73 | 1.322 | -20310.78 | 1.437 | -20353.52 | 1.650 | -20120.56 | 0.487 | -20735.99 | 3.561 |
| | NITAX | | 4756.36 | 4815.71 | 1.248 | 4799.98 | 0.917 | 4805.08 | 1.024 | 4766.76 | 0.219 | 4905.33 | 3.132 |
| | GDPFC | | 41602.91 | 41955.05 | 0.846 | 41910.97 | 0.740 | 41856.03 | 0.608 | 41679.76 | 0.185 | 42760.82 | 2.783 |
| | GDPMP2 | | 46359.27 | 46770.77 | 0.888 | 46710.96 | 0.759 | 46661.11 | 0.651 | 46446.52 | 0.188 | 47666.15 | 2.819 |
| YG | | | 8524.54 | 8615.93 | 1.072 | 8588.23 | 0.747 | 8597.00 | 0.850 | 8538.51 | 0.164 | 8776.92 | 2.961 |
| EG | | | 5710.03 | 5750.03 | 0.701 | 5740.36 | 0.531 | 5702.12 | (0.139) | 5708.88 | (0.020) | 5474.03 | (4.133) |
| IADJ | | | 1.00 | 1.00 | 0.371 | 1.05 | 5.464 | 1.04 | 4.459 | 1.01 | 0.835 | 1.06 | 6.381 |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| YF | LAB | | 14579.90 | 14679.50 | 0.683 | 14631.77 | 0.356 | 14608.28 | 0.195 | 14656.50 | 0.525 | 14905.38 | 2.232 |
| | CAP | | 27023.01 | 27275.55 | 0.935 | 27279.20 | 0.948 | 27247.74 | 0.832 | 27023.26 | 0.001 | 27855.44 | 3.080 |
| QF | LAB | PRIMA-A | 139410.00 | 137287.50 | (1.522) | 130920.00 | (6.090) | 134855.00 | (3.267) | 126472.50 | (9.280) | 125860.00 | (9.720) |
| | LAB | AINDUS-A | 8490.00 | 10612.50 | 25.000 | 8490.00 | - | 8490.00 | - | 8490.00 | - | 8490.00 | - |
| | LAB | MANU-A | 33960.00 | 33960.00 | - | 42450.00 | 25.000 | 33960.00 | - | 33960.00 | - | 33960.00 | - |
| | LAB | UTICON-A | 18220.00 | 18220.00 | - | 18220.00 | - | 22775.00 | 25.000 | 18220.00 | - | 18220.00 | - |
| | LAB | TRADE-A | 51750.00 | 51750.00 | - | 51750.00 | - | 51750.00 | - | 64687.50 | 25.000 | 51750.00 | - |
| | LAB | SER-A | 54200.00 | 54200.00 | - | 54200.00 | - | 54200.00 | - | 54200.00 | - | 67750.00 | 25.000 |
| | CAP | PRIMA-A | 12315.48 | 12581.47 | 2.160 | 12225.37 | (0.732) | 12536.06 | 1.791 | 12545.76 | 1.870 | 12708.79 | 3.194 |
| | CAP | AINDUS-A | 6718.35 | 6198.79 | (7.733) | 6416.51 | (4.493) | 6749.00 | 0.456 | 6652.13 | (0.986) | 6689.35 | (0.432) |
| | CAP | MANU-A | 22491.87 | 22358.90 | (0.591) | 21346.20 | (5.094) | 23107.72 | 2.738 | 22772.52 | 1.248 | 22970.22 | 2.127 |
| | CAP | UTICON-A | 16829.92 | 16946.38 | 0.692 | 17946.07 | 6.632 | 14427.91 | (14.272) | 17011.79 | 1.081 | 18257.18 | 8.480 |
| | CAP | TRADE-A | 44663.41 | 44823.72 | 0.359 | 45473.62 | 1.814 | 45402.19 | 1.654 | 43801.87 | (1.929) | 45757.07 | 2.449 |
| | CAP | SER-A | 58248.63 | 58358.40 | 0.188 | 57859.89 | (0.667) | 59044.78 | 1.367 | 58483.59 | 0.403 | 54885.04 | (5.775) |
| WF | LAB | | 0.05 | 0.05 | - | 0.05 | - | 0.05 | - | 0.05 | - | 0.05 | - |
| | CAP | | 0.17 | 0.17 | 0.889 | 0.17 | 1.486 | 0.17 | (0.078) | 0.17 | (0.036) | 0.17 | 2.423 |
| WFDIST | LAB | PRIMA-A | 0.29 | 0.30 | 4.663 | 0.31 | 7.278 | 0.30 | 5.147 | 0.32 | 12.251 | 0.34 | 17.074 |
| | LAB | AINDUS-A | 2.37 | 1.76 | (25.530) | 2.30 | (3.071) | 2.38 | 0.380 | 2.34 | (1.020) | 2.42 | 1.982 |

| | | | BASE | SIM 2.1 | Δ% | SIM 2.2 | Δ% | SIM 2.3 | Δ% | SIM 2.4 | Δ% | SIM 2.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WFDIST | LAB | MANU-A | 2.24 | 2.25 | 0.294 | 1.73 | (22.945) | 2.30 | 2.661 | 2.27 | 1.213 | 2.35 | 4.602 |
| | LAB | UTICON-A | 1.57 | 1.59 | 1.588 | 1.70 | 8.219 | 1.07 | (31.470) | 1.58 | 1.046 | 1.74 | 11.110 |
| | LAB | TRADE-A | 0.55 | 0.56 | 1.251 | 0.57 | 3.329 | 0.56 | 1.576 | 0.43 | (21.571) | 0.58 | 4.931 |
| | LAB | SER-A | 2.08 | 2.10 | 1.080 | 2.10 | 0.811 | 2.11 | 1.290 | 2.09 | 0.369 | 1.60 | (22.793) |
| | CAP | PRIMA-A | 2.04 | 2.04 | - | 2.04 | - | 2.04 | - | 2.04 | - | 2.04 | - |
| | CAP | AINDUS-A | 1.17 | 1.17 | - | 1.17 | - | 1.17 | - | 1.17 | - | 1.17 | - |
| | CAP | MANU-A | 1.33 | 1.33 | - | 1.33 | - | 1.33 | - | 1.33 | - | 1.33 | - |
| | CAP | UTICON-A | 0.50 | 0.50 | - | 0.50 | - | 0.50 | - | 0.50 | - | 0.50 | - |
| | CAP | TRADE-A | 1.12 | 1.12 | - | 1.12 | - | 1.12 | - | 1.12 | - | 1.12 | - |
| | CAP | SER-A | 0.69 | 0.69 | - | 0.69 | - | 0.69 | - | 0.69 | - | 0.69 | - |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 2038.59 | 0.683 | 2031.96 | 0.356 | 2028.70 | 0.195 | 2035.40 | 0.525 | 2069.96 | 2.232 |
| | A-HHD | CAP | 2979.23 | 3007.07 | 0.935 | 3007.47 | 0.948 | 3004.01 | 0.832 | 2979.26 | 0.001 | 3071.00 | 3.080 |
| | G-HHD | LAB | 4254.63 | 4283.70 | 0.683 | 4269.77 | 0.356 | 4262.91 | 0.195 | 4276.98 | 0.525 | 4349.61 | 2.232 |
| | G-HHD | CAP | 648.94 | 655.00 | 0.935 | 655.09 | 0.948 | 654.34 | 0.832 | 648.95 | 0.001 | 668.93 | 3.080 |
| | N-HHD | LAB | 8300.51 | 8357.21 | 0.683 | 8330.04 | 0.356 | 8316.67 | 0.195 | 8344.12 | 0.525 | 8485.81 | 2.232 |
| | N-HHD | CAP | 12376.62 | 12492.28 | 0.935 | 12493.96 | 0.948 | 12479.55 | 0.832 | 12376.73 | 0.001 | 12757.87 | 3.080 |
| | ENT-G | CAP | 1244.96 | 1256.59 | 0.935 | 1256.76 | 0.948 | 1255.31 | 0.832 | 1244.97 | 0.001 | 1283.31 | 3.080 |
| | ENT-P | CAP | 8979.21 | 9063.12 | 0.935 | 9064.34 | 0.948 | 9053.88 | 0.832 | 8979.29 | 0.001 | 9255.81 | 3.080 |
| QINV | PRIMA-C | | 155.02 | 155.59 | 0.371 | 163.49 | 5.464 | 161.93 | 4.459 | 156.31 | 0.835 | 164.91 | 6.381 |
| | AINDUS-C | | -241.50 | -242.39 | 0.371 | -254.69 | 5.464 | -252.27 | 4.459 | -243.52 | 0.835 | -256.91 | 6.381 |
| | MANU-C | | 4849.76 | 4867.74 | 0.371 | 5114.75 | 5.464 | 5066.01 | 4.459 | 4890.26 | 0.835 | 5159.24 | 6.381 |
| | UTICON-C | | 2955.06 | 2966.02 | 0.371 | 3116.53 | 5.464 | 3086.83 | 4.459 | 2979.74 | 0.835 | 3143.64 | 6.381 |
| | TRADE-C | | 1009.26 | 1013.00 | 0.371 | 1064.41 | 5.464 | 1054.26 | 4.459 | 1017.69 | 0.835 | 1073.66 | 6.381 |
| | SER-C | | 36.68 | 36.82 | 0.371 | 38.69 | 5.464 | 38.32 | 4.459 | 36.99 | 0.835 | 39.02 | 6.381 |
| YH | A-HHD | | 5316.62 | 5359.54 | 0.807 | 5346.94 | 0.570 | 5345.38 | 0.541 | 5327.02 | 0.196 | 5456.40 | 2.629 |
| | G-HHD | | 4971.28 | 5006.65 | 0.712 | 4991.58 | 0.408 | 4984.97 | 0.275 | 4993.59 | 0.449 | 5086.79 | 2.324 |
| | N-HHD | | 21389.80 | 21564.39 | 0.816 | 21527.55 | 0.644 | 21508.96 | 0.557 | 21433.06 | 0.202 | 21961.33 | 2.672 |
| QH | PRIMA-C | A-HHD | 700.14 | 695.70 | (0.635) | 692.18 | (1.137) | 698.33 | (0.259) | 688.00 | (1.734) | 688.00 | (1.734) |
| | PRIMA-C | G-HHD | 274.35 | 272.35 | (0.729) | 270.80 | (1.297) | 272.92 | (0.522) | 270.28 | (1.486) | 268.79 | (2.027) |
| | PRIMA-C | N-HHD | 1129.02 | 1121.96 | (0.626) | 1117.00 | (1.065) | 1126.28 | (0.243) | 1109.52 | (1.728) | 1109.91 | (1.693) |
| | AINDUS-C | A-HHD | 1881.42 | 1948.78 | 3.580 | 1870.55 | (0.578) | 1889.03 | 0.404 | 1876.49 | (0.262) | 1877.24 | (0.222) |
| | AINDUS-C | G-HHD | 920.08 | 952.11 | 3.482 | 913.29 | (0.738) | 921.36 | 0.139 | 919.99 | (0.010) | 915.30 | (0.519) |

| | | | BASE | SIM 2.1 | Δ% | SIM 2.2 | Δ% | SIM 2.3 | Δ% | SIM 2.4 | Δ% | SIM 2.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3672.53 | 3.589 | 3527.39 | (0.505) | 3560.19 | 0.420 | 3536.23 | (0.255) | 3538.88 | (0.180) |
| | MANU-C | A-HHD | 1743.73 | 1743.24 | (0.028) | 1816.12 | 4.151 | 1751.94 | 0.471 | 1750.84 | 0.408 | 1757.70 | 0.801 |
| | MANU-C | G-HHD | 852.75 | 851.70 | (0.123) | 886.72 | 3.984 | 854.50 | 0.206 | 858.39 | 0.661 | 857.02 | 0.501 |
| | MANU-C | N-HHD | 3285.84 | 3285.21 | (0.019) | 3424.76 | 4.228 | 3301.85 | 0.487 | 3299.45 | 0.414 | 3313.54 | 0.843 |
| | UTICON-C | A-HHD | 97.86 | 97.61 | (0.253) | 97.16 | (0.715) | 105.89 | 8.204 | 98.10 | 0.248 | 97.03 | (0.842) |
| | UTICON-C | G-HHD | 47.86 | 47.70 | (0.348) | 47.45 | (0.875) | 51.65 | 7.918 | 48.10 | 0.501 | 47.32 | (1.137) |
| | UTICON-C | N-HHD | 184.43 | 183.98 | (0.244) | 183.24 | (0.642) | 199.59 | 8.221 | 184.90 | 0.255 | 182.95 | (0.801) |
| | TRADE-C | A-HHD | 347.20 | 346.73 | (0.137) | 344.73 | (0.711) | 349.33 | 0.613 | 357.14 | 2.862 | 351.76 | 1.315 |
| | TRADE-C | G-HHD | 427.95 | 426.96 | (0.232) | 424.22 | (0.871) | 429.44 | 0.347 | 441.31 | 3.122 | 432.29 | 1.013 |
| | TRADE-C | N-HHD | 1656.57 | 1654.45 | (0.128) | 1645.99 | (0.638) | 1666.99 | 0.629 | 1704.09 | 2.869 | 1679.05 | 1.357 |
| | SER-C | A-HHD | 1147.00 | 1147.23 | 0.020 | 1144.69 | (0.202) | 1153.92 | 0.603 | 1148.59 | 0.139 | 1243.75 | 8.435 |
| | SER-C | G-HHD | 1413.70 | 1412.64 | (0.075) | 1408.58 | (0.362) | 1418.47 | 0.337 | 1419.24 | 0.392 | 1528.38 | 8.112 |
| | SER-C | N-HHD | 5472.33 | 5473.93 | 0.029 | 5465.31 | (0.128) | 5506.22 | 0.619 | 5480.28 | 0.145 | 5936.40 | 8.480 |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1256.59 | 0.935 | 1256.76 | 0.948 | 1255.31 | 0.832 | 1244.97 | 0.001 | 1283.31 | 3.080 |
| | ENT-P | | 10396.40 | 10488.72 | 0.888 | 10463.56 | 0.646 | 10473.28 | 0.739 | 10396.66 | 0.003 | 10695.38 | 2.876 |
| ENTSAV | ENT-G | | 902.97 | 911.41 | 0.935 | 911.53 | 0.948 | 910.48 | 0.832 | 902.98 | 0.001 | 930.79 | 3.080 |
| | ENT-P | | 6326.21 | 6390.19 | 1.011 | 6465.00 | 2.194 | 6394.76 | 1.084 | 6330.45 | 0.067 | 6552.35 | 3.575 |
| QE | PRIMA-C | | 2236.89 | 2245.32 | 0.377 | 2110.88 | (5.633) | 2227.88 | (0.403) | 2163.34 | (3.288) | 2164.92 | (3.217) |
| | AINDUS-C | | 2909.02 | 3119.20 | 7.225 | 2759.92 | (5.125) | 2914.40 | 0.185 | 2880.73 | (0.972) | 2873.81 | (1.210) |
| | MANU-C | | 16662.56 | 16579.45 | (0.499) | 17873.57 | 7.268 | 16919.08 | 1.539 | 16792.89 | 0.782 | 16816.24 | 0.922 |
| | UTICON-C | | 113.66 | 113.67 | 0.013 | 113.87 | 0.185 | 124.20 | 9.269 | 114.21 | 0.487 | 116.59 | 2.580 |
| | TRADE-C | | 2898.91 | 2901.53 | 0.091 | 2864.60 | (1.183) | 2941.99 | 1.486 | 2992.32 | 3.222 | 2962.26 | 2.185 |
| | SER-C | | 2416.15 | 2415.65 | (0.021) | 2341.97 | (3.070) | 2436.04 | 0.823 | 2417.87 | 0.071 | 2727.00 | 12.865 |
| PE | PRIMA-C | | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | AINDUS-C | | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | MANU-C | | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | UTICON-C | | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | TRADE-C | | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | SER-C | | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| QM | PRIMA-C | | 1635.60 | 1694.45 | 3.598 | 1828.33 | 11.783 | 1679.07 | 2.658 | 1715.11 | 4.861 | 1775.22 | 8.536 |
| | AINDUS-C | | 899.60 | 865.43 | (3.798) | 965.08 | 7.278 | 904.67 | 0.563 | 908.12 | 0.947 | 930.52 | 3.437 |

| | | BASE | SIM 2.1 | Δ% | SIM 2.2 | Δ% | SIM 2.3 | Δ% | SIM 2.4 | Δ% | SIM 2.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 14920.90 | 0.645 | 15144.25 | 2.152 | 15095.23 | 1.821 | 14875.22 | 0.337 | 15295.25 | 3.170 |
| | UTICON-C | 37.90 | 38.42 | 1.381 | 42.98 | 13.391 | 32.80 | (13.459) | 38.18 | 0.742 | 41.47 | 9.412 |
| | TRADE-C | 710.78 | 717.77 | 0.983 | 784.79 | 10.413 | 719.47 | 1.222 | 683.58 | (3.827) | 723.92 | 1.849 |
| | SER-C | 2534.31 | 2545.88 | 0.457 | 2726.10 | 7.568 | 2548.78 | 0.571 | 2550.86 | 0.653 | 2317.04 | (8.573) |
| PM | PRIMA-C | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | AINDUS-C | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | MANU-C | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | UTICON-C | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | TRADE-C | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| | SER-C | 1.00 | 1.01 | 0.630 | 0.97 | (2.589) | 1.00 | 0.020 | 1.00 | (0.132) | 1.01 | 1.415 |
| QX | PRIMA-C | 11489.80 | 11604.54 | 0.999 | 11210.34 | (2.432) | 11511.42 | 0.188 | 11289.68 | (1.742) | 11373.29 | (1.014) |
| | AINDUS-C | 13628.78 | 14286.98 | 4.829 | 13270.48 | (2.629) | 13664.78 | 0.264 | 13550.76 | (0.572) | 13594.66 | (0.250) |
| | MANU-C | 43263.45 | 43115.03 | (0.343) | 46100.39 | 6.557 | 43946.12 | 1.578 | 43575.51 | 0.721 | 43794.37 | 1.227 |
| | UTICON-C | 7195.13 | 7220.53 | 0.353 | 7435.15 | 3.336 | 7417.36 | 3.089 | 7234.76 | 0.551 | 7500.74 | 4.247 |
| | TRADE-C | 16778.46 | 16830.25 | 0.309 | 17039.94 | 1.558 | 17016.91 | 1.421 | 17022.61 | 1.455 | 17131.26 | 2.103 |
| | SER-C | 21320.57 | 21342.88 | 0.105 | 21241.41 | (0.371) | 21481.97 | 0.757 | 21368.30 | 0.224 | 22778.36 | 6.837 |
| PX | PRIMA-C | 1.00 | 1.01 | 1.410 | 1.02 | 1.558 | 1.01 | 0.763 | 1.02 | 1.867 | 1.04 | 4.309 |
| | AINDUS-C | 1.00 | 0.98 | (2.172) | 1.01 | 0.625 | 1.00 | 0.119 | 1.00 | 0.372 | 1.03 | 2.648 |
| | MANU-C | 1.00 | 1.01 | 0.827 | 0.97 | (3.395) | 1.00 | 0.067 | 1.00 | (0.208) | 1.02 | 1.798 |
| | UTICON-C | 1.00 | 1.01 | 1.058 | 1.01 | 1.255 | 0.93 | (7.001) | 1.00 | (0.053) | 1.03 | 3.479 |
| | TRADE-C | 1.00 | 1.01 | 0.904 | 1.01 | 0.801 | 1.00 | (0.060) | 0.98 | (2.265) | 1.01 | 1.313 |
| | SER-C | 1.00 | 1.01 | 0.788 | 1.01 | 0.813 | 1.00 | (0.062) | 1.00 | 0.058 | 0.95 | (5.310) |
| QQ | PRIMA-C | 10888.51 | 11053.44 | 1.515 | 10921.18 | 0.300 | 10962.41 | 0.679 | 10839.96 | (0.446) | 10980.56 | 0.845 |
| | AINDUS-C | 11619.36 | 12030.74 | 3.540 | 11472.59 | (1.263) | 11655.05 | 0.307 | 11578.08 | (0.355) | 11650.93 | 0.272 |
| | MANU-C | 41426.12 | 41456.30 | 0.073 | 43367.70 | 4.687 | 42122.27 | 1.680 | 41657.82 | 0.559 | 42272.72 | 2.044 |
| | UTICON-C | 7119.37 | 7145.28 | 0.364 | 7364.11 | 3.438 | 7325.46 | 2.895 | 7158.73 | 0.553 | 7425.57 | 4.301 |
| | TRADE-C | 14590.33 | 14646.47 | 0.385 | 14957.37 | 2.516 | 14794.39 | 1.399 | 14712.76 | 0.839 | 14892.93 | 2.074 |
| | SER-C | 21438.73 | 21473.10 | 0.160 | 21621.02 | 0.850 | 21594.70 | 0.728 | 21501.28 | 0.292 | 22349.79 | 4.250 |
| PQ | PRIMA-C | 1.01 | 1.02 | 1.452 | 1.03 | 1.727 | 1.02 | 0.802 | 1.03 | 1.964 | 1.05 | 4.440 |
| | AINDUS-C | 1.01 | 0.98 | (2.677) | 1.02 | 1.155 | 1.01 | 0.136 | 1.01 | 0.458 | 1.03 | 2.857 |
| | MANU-C | 1.02 | 1.03 | 0.835 | 0.98 | (3.439) | 1.02 | 0.070 | 1.01 | (0.211) | 1.04 | 1.813 |
| | UTICON-C | 1.00 | 1.01 | 1.063 | 1.01 | 1.295 | 0.93 | (7.082) | 1.00 | (0.052) | 1.04 | 3.501 |
| | TRADE-C | 1.00 | 1.01 | 0.945 | 1.01 | 1.291 | 1.00 | (0.072) | 0.97 | (2.592) | 1.01 | 1.297 |
| | SER-C | 1.00 | 1.01 | 0.787 | 1.01 | 0.773 | 1.00 | (0.062) | 1.00 | 0.057 | 0.95 | (5.354) |

| | | | BASE | SIM 2.1 | Δ% | SIM 2.2 | Δ% | SIM 2.3 | Δ% | SIM 2.4 | Δ% | SIM 2.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 9359.16 | 1.148 | 9097.66 | (1.678) | 9283.49 | 0.330 | 9125.91 | (1.372) | 9207.53 | (0.490) |
| | AINDUS-C | | 10719.76 | 11166.51 | 4.168 | 10509.09 | (1.965) | 10750.38 | 0.286 | 10669.99 | (0.464) | 10720.63 | 0.008 |
| | MANU-C | | 26600.89 | 26535.54 | (0.246) | 28226.01 | 6.109 | 27027.04 | 1.602 | 26782.61 | 0.683 | 26977.98 | 1.418 |
| | UTICON-C | | 7081.47 | 7106.85 | 0.358 | 7321.21 | 3.385 | 7292.89 | 2.986 | 7120.55 | 0.552 | 7384.13 | 4.274 |
| | TRADE-C | | 13879.55 | 13928.71 | 0.354 | 14173.73 | 2.119 | 14074.92 | 1.408 | 14029.62 | 1.081 | 14169.00 | 2.085 |
| | SER-C | | 18904.42 | 18927.22 | 0.121 | 18898.20 | (0.033) | 19045.92 | 0.749 | 18950.43 | 0.243 | 20045.49 | 6.036 |
| PD | PRIMA-C | | 1.00 | 1.02 | 1.598 | 1.03 | 2.541 | 1.01 | 0.942 | 1.02 | 2.346 | 1.05 | 4.999 |
| | AINDUS-C | | 1.00 | 0.97 | (2.944) | 1.01 | 1.483 | 1.00 | 0.146 | 1.01 | 0.509 | 1.03 | 2.981 |
| | MANU-C | | 1.00 | 1.01 | 0.950 | 0.96 | (3.903) | 1.00 | 0.097 | 1.00 | (0.255) | 1.02 | 2.037 |
| | UTICON-C | | 1.00 | 1.01 | 1.065 | 1.01 | 1.316 | 0.93 | (7.117) | 1.00 | (0.052) | 1.04 | 3.512 |
| | TRADE-C | | 1.00 | 1.01 | 0.962 | 1.01 | 1.497 | 1.00 | (0.076) | 0.97 | (2.715) | 1.01 | 1.291 |
| | SER-C | | 1.00 | 1.01 | 0.808 | 1.01 | 1.241 | 1.00 | (0.073) | 1.00 | 0.082 | 0.94 | (6.197) |
| QA | PRIMA-A | | 11489.80 | 11604.54 | 0.999 | 11210.34 | (2.432) | 11511.42 | 0.188 | 11289.68 | (1.742) | 11373.29 | (1.014) |
| | AINDUS-A | | 13628.78 | 14286.98 | 4.829 | 13270.48 | (2.629) | 13664.78 | 0.264 | 13550.76 | (0.572) | 13594.66 | (0.250) |
| | MANU-A | | 43263.45 | 43115.03 | (0.343) | 46100.39 | 6.557 | 43946.12 | 1.578 | 43575.51 | 0.721 | 43794.37 | 1.227 |
| | UTICON-A | | 7195.13 | 7220.53 | 0.353 | 7435.15 | 3.336 | 7417.36 | 3.089 | 7234.76 | 0.551 | 7500.74 | 4.247 |
| | TRADE-A | | 16778.46 | 16830.25 | 0.309 | 17039.94 | 1.558 | 17016.91 | 1.421 | 17022.61 | 1.455 | 17131.26 | 2.103 |
| | SER-A | | 21320.57 | 21342.88 | 0.105 | 21241.41 | (0.371) | 21481.97 | 0.757 | 21368.30 | 0.224 | 22778.36 | 6.837 |
| PA | PRIMA-A | | 1.00 | 1.01 | 1.410 | 1.02 | 1.558 | 1.01 | 0.763 | 1.02 | 1.867 | 1.04 | 4.309 |
| | AINDUS-A | | 1.00 | 0.98 | (2.172) | 1.01 | 0.625 | 1.00 | 0.119 | 1.00 | 0.372 | 1.03 | 2.648 |
| | MANU-A | | 1.00 | 1.01 | 0.827 | 0.97 | (3.395) | 1.00 | 0.067 | 1.00 | (0.208) | 1.02 | 1.798 |
| | UTICON-A | | 1.00 | 1.01 | 1.058 | 1.01 | 1.255 | 0.93 | (7.001) | 1.00 | (0.053) | 1.03 | 3.479 |
| | TRADE-A | | 1.00 | 1.01 | 0.904 | 1.01 | 0.801 | 1.00 | (0.060) | 0.98 | (2.265) | 1.01 | 1.313 |
| | SER-A | | 1.00 | 1.01 | 0.788 | 1.01 | 0.813 | 1.00 | (0.062) | 1.00 | 0.058 | 0.95 | (5.310) |
| PVA | PRIMA-A | | 0.53 | 0.54 | 2.050 | 0.55 | 3.258 | 0.54 | 1.523 | 0.55 | 3.639 | 0.57 | 6.778 |
| | AINDUS-A | | 0.17 | 0.15 | (11.198) | 0.17 | (0.455) | 0.17 | 0.120 | 0.17 | (0.449) | 0.17 | 2.237 |
| | MANU-A | | 0.20 | 0.20 | 0.642 | 0.18 | (9.609) | 0.20 | 1.068 | 0.20 | 0.491 | 0.21 | 3.333 |
| | UTICON-A | | 0.39 | 0.39 | 1.230 | 0.41 | 4.725 | 0.32 | (16.903) | 0.39 | 0.491 | 0.41 | 6.583 |
| | TRADE-A | | 0.58 | 0.58 | 0.942 | 0.59 | 1.744 | 0.58 | 0.154 | 0.56 | (3.368) | 0.59 | 2.772 |
| | SER-A | | 0.57 | 0.57 | 0.975 | 0.57 | 1.187 | 0.57 | 0.528 | 0.57 | 0.145 | 0.51 | (9.667) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 926.85 | 0.999 | 895.37 | (2.432) | 919.41 | 0.188 | 901.70 | (1.742) | 908.38 | (1.014) |
| | PRIMA-C | AINDUS-A | 3594.75 | 3768.36 | 4.829 | 3500.24 | (2.629) | 3604.25 | 0.264 | 3574.17 | (0.572) | 3585.75 | (0.250) |
| | PRIMA-C | MANU-A | 2330.82 | 2322.83 | (0.343) | 2483.66 | 6.557 | 2367.60 | 1.578 | 2347.63 | 0.721 | 2359.42 | 1.227 |
| | PRIMA-C | UTICON-A | 492.64 | 494.38 | 0.353 | 509.08 | 3.336 | 507.86 | 3.089 | 495.36 | 0.551 | 513.57 | 4.247 |

| | | | BASE | SIM 2.1 | Δ% | SIM 2.2 | Δ% | SIM 2.3 | Δ% | SIM 2.4 | Δ% | SIM 2.5 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.43 | 0.308 | 3.47 | 1.558 | 3.47 | 1.421 | 3.47 | 1.455 | 3.49 | 2.103 |
| | PRIMA-C | SER-A | 1282.41 | 1283.76 | 0.105 | 1277.65 | (0.371) | 1292.12 | 0.757 | 1285.28 | 0.224 | 1370.10 | 6.837 |
| | AINDUS-C | PRIMA-A | 457.75 | 462.32 | 0.999 | 446.61 | (2.432) | 458.61 | 0.188 | 449.77 | (1.742) | 453.10 | (1.014) |
| | AINDUS-C | AINDUS-A | 3741.97 | 3922.69 | 4.829 | 3643.60 | (2.629) | 3751.86 | 0.264 | 3720.55 | (0.572) | 3732.61 | (0.250) |
| | AINDUS-C | MANU-A | 233.97 | 233.17 | (0.343) | 249.31 | 6.557 | 237.66 | 1.578 | 235.66 | 0.721 | 236.84 | 1.227 |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.67 | 0.309 | 7.77 | 1.558 | 7.76 | 1.421 | 7.76 | 1.455 | 7.81 | 2.103 |
| | AINDUS-C | SER-A | 1072.20 | 1073.32 | 0.105 | 1068.21 | (0.371) | 1080.31 | 0.757 | 1074.60 | 0.224 | 1145.51 | 6.837 |
| | MANU-C | PRIMA-A | 1872.79 | 1891.49 | 0.999 | 1827.24 | (2.432) | 1876.31 | 0.188 | 1840.17 | (1.742) | 1853.80 | (1.014) |
| | MANU-C | AINDUS-A | 1100.51 | 1153.66 | 4.829 | 1071.58 | (2.629) | 1103.42 | 0.264 | 1094.21 | (0.572) | 1097.76 | (0.250) |
| | MANU-C | MANU-A | 21464.91 | 21391.28 | (0.343) | 22872.44 | 6.557 | 21803.62 | 1.578 | 21619.74 | 0.721 | 21728.33 | 1.227 |
| | MANU-C | UTICON-A | 2040.52 | 2047.72 | 0.353 | 2108.59 | 3.336 | 2103.54 | 3.089 | 2051.76 | 0.551 | 2127.19 | 4.247 |
| | MANU-C | TRADE-A | 2334.07 | 2341.27 | 0.309 | 2370.44 | 1.558 | 2367.24 | 1.421 | 2368.03 | 1.455 | 2383.14 | 2.103 |
| | MANU-C | SER-A | 1663.74 | 1665.48 | 0.105 | 1657.56 | (0.371) | 1676.33 | 0.757 | 1667.46 | 0.224 | 1777.50 | 6.837 |
| | UTICON-C | PRIMA-A | 210.22 | 212.32 | 0.999 | 205.11 | (2.432) | 210.62 | 0.188 | 206.56 | (1.742) | 208.09 | (1.014) |
| | UTICON-C | AINDUS-A | 301.60 | 316.17 | 4.829 | 293.67 | (2.629) | 302.40 | 0.264 | 299.87 | (0.572) | 300.85 | (0.250) |
| | UTICON-C | MANU-A | 1306.30 | 1301.82 | (0.343) | 1391.96 | 6.557 | 1326.91 | 1.578 | 1315.72 | 0.721 | 1322.33 | 1.227 |
| | UTICON-C | UTICON-A | 369.25 | 370.56 | 0.353 | 381.57 | 3.336 | 380.66 | 3.089 | 371.29 | 0.551 | 384.94 | 4.247 |
| | UTICON-C | TRADE-A | 336.12 | 337.15 | 0.309 | 341.35 | 1.558 | 340.89 | 1.421 | 341.01 | 1.455 | 343.18 | 2.103 |
| | UTICON-C | SER-A | 1237.04 | 1238.33 | 0.105 | 1232.45 | (0.371) | 1246.40 | 0.757 | 1239.81 | 0.224 | 1321.62 | 6.837 |
| | TRADE-C | PRIMA-A | 1059.51 | 1070.09 | 0.999 | 1033.74 | (2.432) | 1061.50 | 0.188 | 1041.06 | (1.742) | 1048.77 | (1.014) |
| | TRADE-C | AINDUS-A | 1105.89 | 1159.30 | 4.829 | 1076.82 | (2.629) | 1108.81 | 0.264 | 1099.56 | (0.572) | 1103.12 | (0.250) |
| | TRADE-C | MANU-A | 5085.91 | 5068.46 | (0.343) | 5419.41 | 6.557 | 5166.16 | 1.578 | 5122.60 | 0.721 | 5148.32 | 1.227 |
| | TRADE-C | UTICON-A | 882.07 | 885.18 | 0.353 | 911.49 | 3.336 | 909.31 | 3.089 | 886.93 | 0.551 | 919.54 | 4.247 |
| | TRADE-C | TRADE-A | 1621.83 | 1626.84 | 0.309 | 1647.10 | 1.558 | 1644.88 | 1.421 | 1645.43 | 1.455 | 1655.93 | 2.103 |
| | TRADE-C | SER-A | 1262.78 | 1264.10 | 0.105 | 1258.09 | (0.371) | 1272.34 | 0.757 | 1265.61 | 0.224 | 1349.12 | 6.837 |
| | SER-C | PRIMA-A | 667.53 | 674.20 | 0.999 | 651.30 | (2.432) | 668.79 | 0.188 | 655.91 | (1.742) | 660.76 | (1.014) |
| | SER-C | AINDUS-A | 521.52 | 546.70 | 4.829 | 507.81 | (2.629) | 522.89 | 0.264 | 518.53 | (0.572) | 520.21 | (0.250) |
| | SER-C | MANU-A | 2753.93 | 2744.48 | (0.343) | 2934.51 | 6.557 | 2797.38 | 1.578 | 2773.79 | 0.721 | 2787.72 | 1.227 |
| | SER-C | UTICON-A | 423.34 | 424.83 | 0.353 | 437.46 | 3.336 | 436.41 | 3.089 | 425.67 | 0.551 | 441.32 | 4.247 |
| | SER-C | TRADE-A | 2407.69 | 2415.13 | 0.309 | 2445.22 | 1.558 | 2441.91 | 1.421 | 2442.73 | 1.455 | 2458.32 | 2.103 |
| | SER-C | SER-A | 2031.46 | 2033.58 | 0.105 | 2023.91 | (0.371) | 2046.84 | 0.757 | 2036.00 | 0.224 | 2170.36 | 6.837 |

# Results of Simulations 3.1-3.6

| | | | BASE | SIM 3.1 | Δ% | SIM 3.2 | Δ% | SIM 3.3 | Δ% | SIM 3.4 | Δ% | SIM 3.5 | Δ% | SIM 3.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 46987.09 | 1.354 | 46572.82 | 0.461 | 46518.36 | 0.343 | 46364.29 | 0.011 | 46622.20 | 0.567 | 46469.16 | 0.237 |
| | PRVCON | | 25292.80 | 25623.92 | 1.309 | 25391.23 | 0.389 | 25360.68 | 0.268 | 25284.88 | (0.031) | 25454.01 | 0.637 | 25346.79 | 0.213 |
| | GOVCON | | 5007.05 | 5032.66 | 0.512 | 5048.14 | 0.821 | 5015.71 | 0.173 | 5003.89 | (0.063) | 5024.85 | 0.356 | 4982.59 | (0.489) |
| | INVEST | | 8845.28 | 9111.34 | 3.008 | 8876.32 | 0.351 | 8980.74 | 1.531 | 8858.42 | 0.149 | 8931.79 | 0.978 | 8913.54 | 0.772 |
| | EXP | | 27237.19 | 27474.89 | 0.873 | 27443.44 | 0.757 | 27282.61 | 0.167 | 27288.00 | 0.187 | 27373.57 | 0.501 | 27302.78 | 0.241 |
| | IMP | | -20023.05 | -20255.72 | 1.162 | -20186.31 | 0.815 | -20121.39 | 0.491 | -20070.90 | 0.239 | -20162.02 | 0.694 | -20076.53 | 0.267 |
| | NITAX | | 4756.36 | 4813.84 | 1.209 | 4794.63 | 0.805 | 4775.04 | 0.393 | 4761.78 | 0.114 | 4779.71 | 0.491 | 4768.74 | 0.260 |
| | GDPFC | | 41602.91 | 42173.25 | 1.371 | 41778.19 | 0.421 | 41743.31 | 0.337 | 41602.51 | (0.001) | 41842.49 | 0.576 | 41700.42 | 0.234 |
| | GDPMP2 | | 46359.27 | 46987.09 | 1.354 | 46572.82 | 0.461 | 46518.36 | 0.343 | 46364.29 | 0.011 | 46622.20 | 0.567 | 46469.16 | 0.237 |
| YG | | | 8524.54 | 8629.66 | 1.233 | 8580.11 | 0.652 | 8554.08 | 0.347 | 8531.20 | 0.078 | 8564.44 | 0.468 | 8546.04 | 0.252 |
| EG | | | 5710.03 | 5735.65 | 0.449 | 5751.17 | 0.721 | 5718.63 | 0.151 | 5706.87 | (0.055) | 5727.83 | 0.312 | 5685.58 | (0.428) |
| IADJ | | | 1.00 | 1.02 | 2.313 | 0.99 | (0.582) | 1.02 | 1.778 | 1.01 | 0.818 | 1.01 | 1.116 | 1.00 | 0.490 |
| FSAV | | | 3903.00 | 3903.00 | 0.000 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| YF | LAB | | 14579.90 | 14769.30 | 1.299 | 14618.94 | 0.268 | 14596.31 | 0.113 | 14555.51 | (0.167) | 14728.45 | 1.019 | 14601.82 | 0.150 |
| | CAP | | 27023.01 | 27403.95 | 1.410 | 27159.25 | 0.504 | 27147.00 | 0.459 | 27047.00 | 0.089 | 27114.04 | 0.337 | 27098.60 | 0.280 |
| QF | LAB | PRIMA-A | 139410.00 | 136378.78 | (2.174) | 141358.14 | 1.397 | 138881.66 | (0.379) | 139702.53 | 0.210 | 139785.42 | 0.269 | 139502.01 | 0.066 |
| | LAB | AINDUS-A | 8490.00 | 8916.51 | 5.024 | 7758.73 | (8.613) | 8402.25 | (1.034) | 8492.91 | 0.034 | 8542.13 | 0.614 | 8488.22 | (0.021) |
| | LAB | MANU-A | 33960.00 | 34125.82 | 0.488 | 33445.59 | (1.515) | 33439.70 | (1.532) | 34128.73 | 0.497 | 34286.35 | 0.961 | 33969.95 | 0.029 |
| | LAB | UTICON-A | 18220.00 | 18748.13 | 2.899 | 18124.26 | (0.525) | 18625.53 | 2.226 | 17360.94 | (4.715) | 18480.01 | 1.427 | 18339.92 | 0.658 |
| | LAB | TRADE-A | 51750.00 | 53036.99 | 2.487 | 51437.90 | (0.603) | 52520.68 | 1.489 | 52029.45 | 0.540 | 50529.99 | (2.358) | 51917.56 | 0.324 |
| | LAB | SER-A | 54200.00 | 54823.77 | 1.151 | 53905.38 | (0.544) | 54160.17 | (0.073) | 54315.44 | 0.213 | 54406.10 | 0.380 | 53812.35 | (0.715) |
| | CAP | PRIMA-A | 12315.48 | 13315.48 | 8.120 | 12315.48 | - | 12315.48 | - | 12315.48 | - | 12315.48 | - | 12315.48 | - |
| | CAP | AINDUS-A | 6718.35 | 6718.35 | 0.000 | 7718.35 | 14.885 | 6718.35 | - | 6718.35 | - | 6718.35 | - | 6718.35 | - |
| | CAP | MANU-A | 22491.87 | 22491.87 | 0.000 | 22491.87 | - | 23491.87 | 4.446 | 22491.87 | - | 22491.87 | - | 22491.87 | - |
| | CAP | UTICON-A | 16829.92 | 16829.92 | 0.000 | 16829.92 | - | 16829.92 | - | 17829.92 | 5.942 | 16829.92 | - | 16829.92 | - |
| | CAP | TRADE-A | 44663.41 | 44663.41 | 0.000 | 44663.41 | - | 44663.41 | - | 44663.41 | - | 45663.41 | 2.239 | 44663.41 | - |
| | CAP | SER-A | 58248.63 | 58248.63 | 0.000 | 58248.63 | - | 58248.63 | - | 58248.63 | - | 58248.63 | - | 59248.63 | 1.717 |
| WF | LAB | | 0.05 | 0.05 | 0.210 | 0.05 | 1.343 | 0.05 | 0.294 | 0.05 | - | 0.05 | 0.651 | 0.05 | 0.315 |
| | CAP | | 0.17 | 0.17 | 0.000 | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | - |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01371 | 0.216 | 0.01386 | 1.349 | 0.01372 | 0.300 | 0.01368 | 0.006 | 0.01377 | 0.656 | 0.01372 | 0.321 |
| | LAB | AINDUS-A | 0.1128 | 0.11306 | 0.209 | 0.11433 | 1.342 | 0.11315 | 0.293 | 0.11282 | (0.001) | 0.11355 | 0.650 | 0.11317 | 0.314 |

| | | | BASE | SIM 3.1 | Δ% | SIM 3.2 | Δ% | SIM 3.3 | Δ% | SIM 3.4 | Δ% | SIM 3.5 | Δ% | SIM 3.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | MANU-A | 0.1069 | 0.10708 | 0.203 | 0.10829 | 1.336 | 0.10717 | 0.287 | 0.10685 | (0.007) | 0.10755 | 0.644 | 0.10719 | 0.308 |
| | LAB | UTICON-A | 0.0747 | 0.07486 | 0.207 | 0.07571 | 1.341 | 0.07493 | 0.291 | 0.07471 | (0.003) | 0.07519 | 0.648 | 0.07494 | 0.312 |
| | LAB | TRADE-A | 0.0262 | 0.02629 | 0.219 | 0.02658 | 1.353 | 0.02631 | 0.303 | 0.02623 | 0.009 | 0.02640 | 0.660 | 0.02632 | 0.324 |
| | LAB | SER-A | 0.0990 | 0.09923 | 0.209 | 0.10035 | 1.342 | 0.09931 | 0.293 | 0.09902 | (0.001) | 0.09966 | 0.649 | 0.09933 | 0.314 |
| WFDIST | CAP | PRIMA-A | 2.04 | 1.85 | (9.337) | 2.10 | 2.764 | 2.04 | (0.088) | 2.05 | 0.201 | 2.06 | 0.919 | 2.05 | 0.374 |
| | CAP | AINDUS-A | 1.17 | 1.23 | 5.237 | 0.95 | (19.382) | 1.16 | (0.744) | 1.17 | 0.025 | 1.19 | 1.266 | 1.18 | 0.286 |
| | CAP | MANU-A | 1.33 | 1.34 | 0.693 | 1.32 | (0.188) | 1.26 | (5.448) | 1.33 | 0.487 | 1.35 | 1.615 | 1.33 | 0.338 |
| | CAP | UTICON-A | 0.50 | 0.52 | 3.108 | 0.51 | 0.815 | 0.52 | 2.524 | 0.45 | (10.068) | 0.51 | 2.083 | 0.51 | 0.967 |
| | CAP | TRADE-A | 1.12 | 1.15 | 2.696 | 1.12 | 0.737 | 1.14 | 1.786 | 1.12 | 0.531 | 1.07 | (3.877) | 1.12 | 0.633 |
| | CAP | SER-A | 0.69 | 0.70 | 1.358 | 0.69 | 0.797 | 0.69 | 0.220 | 0.69 | 0.204 | 0.69 | 1.032 | 0.67 | (2.089) |
| QFS | LAB | | 306030.00 | 306030.00 | 0.000 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 162267.66 | 0.620 | 162267.66 | 0.620 | 162267.66 | 0.620 | 162267.66 | 0.620 | 162267.66 | 0.620 | 162267.66 | 0.620 |
| YFID | A-HHD | LAB | 2024.76 | 2051.06 | 1.299 | 2030.18 | 0.268 | 2027.04 | 0.113 | 2021.37 | (0.167) | 2045.39 | 1.019 | 2027.80 | 0.150 |
| | A-HHD | CAP | 2979.23 | 3021.23 | 1.410 | 2994.25 | 0.504 | 2992.90 | 0.459 | 2981.88 | 0.089 | 2989.27 | 0.337 | 2987.56 | 0.280 |
| | G-HHD | LAB | 4254.63 | 4309.90 | 1.299 | 4266.02 | 0.268 | 4259.42 | 0.113 | 4247.51 | (0.167) | 4297.98 | 1.019 | 4261.03 | 0.150 |
| | G-HHD | CAP | 648.94 | 658.09 | 1.410 | 652.21 | 0.504 | 651.92 | 0.459 | 649.52 | 0.089 | 651.13 | 0.337 | 650.76 | 0.280 |
| | N-HHD | LAB | 8300.51 | 8408.34 | 1.299 | 8322.74 | 0.268 | 8309.85 | 0.113 | 8286.62 | (0.167) | 8385.08 | 1.019 | 8312.99 | 0.150 |
| | N-HHD | CAP | 12376.62 | 12551.09 | 1.410 | 12439.02 | 0.504 | 12433.41 | 0.459 | 12387.61 | 0.089 | 12418.31 | 0.337 | 12411.24 | 0.280 |
| | ENT-G | CAP | 1244.96 | 1262.51 | 1.410 | 1251.24 | 0.504 | 1250.67 | 0.459 | 1246.07 | 0.089 | 1249.15 | 0.337 | 1248.44 | 0.280 |
| | ENT-P | CAP | 8979.21 | 9105.79 | 1.410 | 9024.48 | 0.504 | 9020.41 | 0.459 | 8987.18 | 0.089 | 9009.46 | 0.337 | 9004.33 | 0.280 |
| QINV | PRIMA-C | | 155.02 | 158.60 | 2.313 | 154.11 | (0.582) | 157.77 | 1.778 | 156.28 | 0.818 | 156.74 | 1.116 | 155.77 | 0.490 |
| | AINDUS-C | | -241.50 | -247.08 | 2.313 | -240.09 | (0.582) | -245.79 | 1.778 | -243.47 | 0.818 | -244.19 | 1.116 | -242.68 | 0.490 |
| | MANU-C | | 4849.76 | 4961.93 | 2.313 | 4821.53 | (0.582) | 4936.02 | 1.778 | 4889.42 | 0.818 | 4903.87 | 1.116 | 4873.50 | 0.490 |
| | UTICON-C | | 2955.06 | 3023.41 | 2.313 | 2937.86 | (0.582) | 3007.62 | 1.778 | 2979.23 | 0.818 | 2988.03 | 1.116 | 2969.53 | 0.490 |
| | TRADE-C | | 1009.26 | 1032.60 | 2.313 | 1003.38 | (0.582) | 1027.21 | 1.778 | 1017.51 | 0.818 | 1020.52 | 1.116 | 1014.20 | 0.490 |
| | SER-C | | 36.68 | 37.53 | 2.313 | 36.47 | (0.582) | 37.33 | 1.778 | 36.98 | 0.818 | 37.09 | 1.116 | 36.86 | 0.490 |
| YH | A-HHD | | 5316.62 | 5385.06 | 1.287 | 5338.24 | 0.407 | 5331.12 | 0.273 | 5315.96 | (0.012) | 5347.21 | 0.575 | 5328.33 | 0.220 |
| | G-HHD | | 4971.28 | 5035.72 | 1.296 | 4986.17 | 0.300 | 4978.77 | 0.151 | 4964.75 | (0.131) | 5016.80 | 0.916 | 4979.56 | 0.166 |
| | N-HHD | | 21389.80 | 21672.34 | 1.321 | 21476.52 | 0.405 | 21453.35 | 0.297 | 21387.05 | (0.013) | 21515.93 | 0.590 | 21437.49 | 0.223 |
| QH | PRIMA-C | A-HHD | 700.14 | 736.91 | 5.252 | 691.96 | (1.169) | 701.80 | 0.237 | 699.55 | (0.085) | 701.94 | 0.256 | 699.78 | (0.052) |
| | PRIMA-C | G-HHD | 274.35 | 288.79 | 5.261 | 270.86 | (1.274) | 274.67 | 0.115 | 273.79 | (0.204) | 275.99 | 0.596 | 274.06 | (0.106) |
| | PRIMA-C | N-HHD | 1129.02 | 1188.71 | 5.287 | 1115.81 | (1.170) | 1131.98 | 0.262 | 1128.06 | (0.085) | 1132.08 | 0.271 | 1128.47 | (0.049) |
| | AINDUS-C | A-HHD | 1881.42 | 1915.45 | 1.809 | 1940.25 | 3.127 | 1883.17 | 0.093 | 1881.44 | 0.001 | 1888.91 | 0.398 | 1880.76 | (0.035) |
| | AINDUS-C | G-HHD | 920.08 | 936.80 | 1.818 | 947.83 | 3.017 | 919.81 | (0.029) | 918.99 | (0.118) | 926.86 | 0.738 | 919.26 | (0.089) |

| | | | BASE | SIM 3.1 | Δ% | SIM 3.2 | Δ% | SIM 3.3 | Δ% | SIM 3.4 | Δ% | SIM 3.5 | Δ% | SIM 3.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3610.61 | 1.843 | 3656.08 | 3.125 | 3549.44 | 0.117 | 3545.30 | 0.001 | 3559.90 | 0.412 | 3544.13 | (0.032) |
| | MANU-C | A-HHD | 1743.73 | 1759.11 | 0.882 | 1737.90 | (0.334) | 1765.49 | 1.248 | 1742.59 | (0.065) | 1753.02 | 0.533 | 1743.83 | 0.006 |
| | MANU-C | G-HHD | 852.75 | 860.35 | 0.891 | 848.99 | (0.441) | 862.34 | 1.125 | 851.18 | (0.184) | 860.19 | 0.873 | 852.34 | (0.048) |
| | MANU-C | N-HHD | 3285.84 | 3315.92 | 0.916 | 3274.81 | (0.336) | 3327.65 | 1.272 | 3283.68 | (0.066) | 3303.81 | 0.547 | 3286.11 | 0.008 |
| | UTICON-C | A-HHD | 97.86 | 98.29 | 0.439 | 97.31 | (0.556) | 97.65 | (0.209) | 100.02 | 2.212 | 98.10 | 0.245 | 97.71 | (0.150) |
| | UTICON-C | G-HHD | 47.86 | 48.08 | 0.448 | 47.55 | (0.662) | 47.71 | (0.331) | 48.86 | 2.090 | 48.14 | 0.584 | 47.77 | (0.204) |
| | UTICON-C | N-HHD | 184.43 | 185.30 | 0.473 | 183.40 | (0.557) | 184.08 | (0.185) | 188.50 | 2.211 | 184.90 | 0.259 | 184.15 | (0.148) |
| | TRADE-C | A-HHD | 347.20 | 344.90 | (0.663) | 345.68 | (0.436) | 344.04 | (0.911) | 346.17 | (0.296) | 357.75 | 3.038 | 346.70 | (0.143) |
| | TRADE-C | G-HHD | 427.95 | 425.15 | (0.654) | 425.63 | (0.543) | 423.54 | (1.031) | 426.17 | (0.415) | 442.44 | 3.387 | 427.11 | (0.197) |
| | TRADE-C | N-HHD | 1656.57 | 1646.14 | (0.629) | 1649.32 | (0.438) | 1641.89 | (0.886) | 1651.65 | (0.297) | 1707.14 | 3.053 | 1654.24 | (0.141) |
| | SER-C | A-HHD | 1147.00 | 1156.24 | 0.806 | 1142.29 | (0.410) | 1147.90 | 0.079 | 1147.37 | 0.033 | 1148.43 | 0.125 | 1156.03 | 0.787 |
| | SER-C | G-HHD | 1413.70 | 1425.22 | 0.815 | 1406.40 | (0.516) | 1413.09 | (0.043) | 1412.48 | (0.086) | 1420.25 | 0.463 | 1424.06 | 0.733 |
| | SER-C | N-HHD | 5472.33 | 5518.26 | 0.839 | 5449.82 | (0.411) | 5477.97 | 0.103 | 5474.09 | 0.032 | 5479.94 | 0.139 | 5515.55 | 0.790 |
| MPS | A-HHD | | -0.13 | -0.13 | 0.000 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | 0.000 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | 0.000 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1262.51 | 1.410 | 1251.24 | 0.504 | 1250.67 | 0.459 | 1246.07 | 0.089 | 1249.15 | 0.337 | 1248.44 | 0.280 |
| | ENT-P | | 10396.40 | 10529.27 | 1.278 | 10448.00 | 0.496 | 10432.90 | 0.351 | 10404.48 | 0.078 | 10429.40 | 0.317 | 10423.74 | 0.263 |
| ENTSAV | ENT-G | | 902.97 | 915.70 | 1.410 | 907.52 | 0.504 | 907.11 | 0.459 | 903.77 | 0.089 | 906.01 | 0.337 | 905.50 | 0.280 |
| | ENT-P | | 6326.21 | 6443.63 | 1.856 | 6354.60 | 0.449 | 6381.25 | 0.870 | 6332.23 | 0.095 | 6356.98 | 0.486 | 6345.73 | 0.308 |
| QE | PRIMA-C | | 2236.89 | 2413.91 | 7.914 | 2229.76 | (0.319) | 2221.18 | (0.702) | 2237.82 | 0.041 | 2232.76 | (0.185) | 2235.58 | (0.059) |
| | AINDUS-C | | 2909.02 | 2981.41 | 2.488 | 3103.29 | 6.678 | 2878.27 | (1.057) | 2910.52 | 0.052 | 2912.29 | 0.112 | 2907.03 | (0.068) |
| | MANU-C | | 16662.56 | 16654.26 | (0.050) | 16537.36 | (0.751) | 17007.50 | 2.070 | 16695.82 | 0.200 | 16719.63 | 0.342 | 16658.64 | (0.024) |
| | UTICON-C | | 113.66 | 114.56 | 0.790 | 113.04 | (0.549) | 113.79 | 0.112 | 116.38 | 2.389 | 114.12 | 0.405 | 113.84 | 0.160 |
| | TRADE-C | | 2898.91 | 2871.08 | (0.960) | 2891.44 | (0.258) | 2866.16 | (1.130) | 2896.18 | (0.094) | 2993.82 | 3.274 | 2896.27 | (0.091) |
| | SER-C | | 2416.15 | 2420.53 | 0.181 | 2405.99 | (0.421) | 2397.33 | (0.779) | 2420.11 | 0.164 | 2410.80 | (0.222) | 2445.67 | 1.222 |
| PE | PRIMA-C | | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | AINDUS-C | | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | MANU-C | | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | UTICON-C | | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | TRADE-C | | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | SER-C | | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| QM | PRIMA-C | | 1635.60 | 1517.60 | (7.215) | 1694.22 | 3.584 | 1673.57 | 2.322 | 1638.28 | 0.164 | 1655.17 | 1.196 | 1641.28 | 0.347 |
| | AINDUS-C | | 899.60 | 904.67 | 0.563 | 863.10 | (4.057) | 917.01 | 1.935 | 898.47 | (0.126) | 906.86 | 0.807 | 901.54 | 0.216 |

| | | BASE | SIM 3.1 | Δ% | SIM 3.2 | Δ% | SIM 3.3 | Δ% | SIM 3.4 | Δ% | SIM 3.5 | Δ% | SIM 3.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 15096.04 | 1.827 | 14835.41 | 0.069 | 14937.23 | 0.755 | 14864.57 | 0.265 | 14941.66 | 0.785 | 14860.68 | 0.239 |
| | UTICON-C | 37.90 | 39.14 | 3.281 | 38.14 | 0.622 | 39.43 | 4.049 | 36.15 | (4.625) | 38.50 | 1.572 | 38.21 | 0.806 |
| | TRADE-C | 710.78 | 742.43 | 4.453 | 713.98 | 0.450 | 742.20 | 4.420 | 715.03 | 0.599 | 686.07 | (3.477) | 714.09 | 0.466 |
| | SER-C | 2534.31 | 2570.74 | 1.437 | 2540.93 | 0.261 | 2587.25 | 2.089 | 2531.79 | (0.099) | 2566.54 | 1.272 | 2508.47 | (1.020) |
| PM | PRIMA-C | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | AINDUS-C | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | MANU-C | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | UTICON-C | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | TRADE-C | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| | SER-C | 1.00 | 1.00 | 0.070 | 1.01 | 0.596 | 0.99 | (0.734) | 1.00 | 0.041 | 1.00 | (0.036) | 1.00 | 0.168 |
| QX | PRIMA-C | 11489.80 | 12041.68 | 4.803 | 11539.56 | 0.433 | 11476.22 | (0.118) | 11497.30 | 0.065 | 11499.43 | 0.084 | 11492.16 | 0.021 |
| | AINDUS-C | 13628.78 | 13912.54 | 2.082 | 14221.25 | 4.347 | 13569.38 | (0.436) | 13630.74 | 0.014 | 13663.90 | 0.258 | 13627.58 | (0.009) |
| | MANU-C | 43263.45 | 43352.14 | 0.205 | 42986.72 | (0.640) | 44081.01 | 1.890 | 43353.69 | 0.209 | 43437.76 | 0.403 | 43268.78 | 0.012 |
| | UTICON-C | 7195.13 | 7296.37 | 1.407 | 7176.62 | (0.257) | 7273.00 | 1.082 | 7237.56 | 0.590 | 7245.16 | 0.695 | 7218.25 | 0.321 |
| | TRADE-C | 16778.46 | 16836.19 | 0.344 | 16764.27 | (0.085) | 16813.18 | 0.207 | 16791.10 | 0.075 | 17044.14 | 1.583 | 16786.05 | 0.045 |
| | SER-C | 21320.57 | 21429.28 | 0.510 | 21268.98 | (0.242) | 21313.60 | (0.033) | 21340.74 | 0.095 | 21356.57 | 0.169 | 21454.58 | 0.629 |
| PX | PRIMA-C | 1.00 | 0.96 | (3.523) | 1.02 | 1.545 | 1.00 | (0.003) | 1.00 | 0.071 | 1.00 | 0.300 | 1.00 | 0.267 |
| | AINDUS-C | 1.00 | 1.00 | (0.426) | 0.98 | (2.144) | 1.00 | 0.046 | 1.00 | (0.005) | 1.00 | 0.145 | 1.00 | 0.243 |
| | MANU-C | 1.00 | 1.00 | 0.389 | 1.01 | 0.737 | 0.99 | (0.953) | 1.00 | 0.052 | 1.00 | 0.039 | 1.00 | 0.213 |
| | UTICON-C | 1.00 | 1.01 | 0.836 | 1.01 | 0.964 | 1.00 | 0.470 | 0.98 | (2.152) | 1.00 | 0.326 | 1.00 | 0.369 |
| | TRADE-C | 1.00 | 1.02 | 1.720 | 1.01 | 0.814 | 1.01 | 0.947 | 1.00 | 0.253 | 0.98 | (2.077) | 1.00 | 0.338 |
| | SER-C | 1.00 | 1.00 | 0.480 | 1.01 | 0.822 | 1.00 | 0.201 | 1.00 | (0.045) | 1.00 | 0.453 | 0.99 | (0.566) |
| QQ | PRIMA-C | 10888.51 | 11140.18 | 2.311 | 11003.68 | 1.058 | 10928.41 | 0.366 | 10897.76 | 0.085 | 10921.79 | 0.306 | 10897.86 | 0.086 |
| | AINDUS-C | 11619.36 | 11835.73 | 1.862 | 11978.71 | 3.093 | 11607.94 | (0.098) | 11618.69 | (0.006) | 11658.46 | 0.336 | 11622.09 | 0.023 |
| | MANU-C | 41426.12 | 41793.44 | 0.887 | 41284.68 | (0.341) | 42010.52 | 1.411 | 41522.44 | 0.233 | 41659.77 | 0.564 | 41470.82 | 0.108 |
| | UTICON-C | 7119.37 | 7220.95 | 1.427 | 7101.72 | (0.248) | 7198.63 | 1.113 | 7157.29 | 0.533 | 7169.53 | 0.705 | 7142.61 | 0.326 |
| | TRADE-C | 14590.33 | 14706.92 | 0.799 | 14586.80 | (0.024) | 14688.55 | 0.673 | 14609.94 | 0.134 | 14735.37 | 0.994 | 14603.85 | 0.093 |
| | SER-C | 21438.73 | 21579.43 | 0.656 | 21403.90 | (0.162) | 21503.19 | 0.301 | 21452.43 | 0.064 | 21512.22 | 0.343 | 21517.17 | 0.366 |
| PQ | PRIMA-C | 1.01 | 0.97 | (3.767) | 1.02 | 1.594 | 1.01 | 0.036 | 1.01 | 0.072 | 1.01 | 0.318 | 1.01 | 0.273 |
| | AINDUS-C | 1.01 | 1.00 | (0.512) | 0.98 | (2.638) | 1.01 | 0.180 | 1.01 | (0.014) | 1.01 | 0.177 | 1.01 | 0.256 |
| | MANU-C | 1.02 | 1.02 | 0.401 | 1.02 | 0.744 | 1.01 | (0.963) | 1.02 | 0.052 | 1.02 | 0.042 | 1.02 | 0.214 |
| | UTICON-C | 1.00 | 1.01 | 0.844 | 1.01 | 0.968 | 1.00 | 0.483 | 0.98 | (2.176) | 1.00 | 0.330 | 1.00 | 0.371 |
| | TRADE-C | 1.00 | 1.02 | 1.963 | 1.01 | 0.847 | 1.01 | 1.194 | 1.00 | 0.285 | 0.98 | (2.390) | 1.00 | 0.364 |
| | SER-C | 1.00 | 1.01 | 0.477 | 1.01 | 0.819 | 1.00 | 0.194 | 1.00 | (0.045) | 1.01 | 0.450 | 1.00 | (0.563) |

| | | | BASE | SIM 3.1 | Δ% | SIM 3.2 | Δ% | SIM 3.3 | Δ% | SIM 3.4 | Δ% | SIM 3.5 | Δ% | SIM 3.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 9626.15 | 4.034 | 9309.70 | 0.614 | 9254.98 | 0.022 | 9259.49 | 0.071 | 9266.65 | 0.149 | 9256.58 | 0.040 |
| | AINDUS-C | | 10719.76 | 10931.10 | 1.971 | 11116.75 | 3.703 | 10691.03 | (0.268) | 10720.22 | 0.004 | 10751.60 | 0.297 | 10720.55 | 0.007 |
| | MANU-C | | 26600.89 | 26697.76 | 0.364 | 26449.34 | (0.570) | 27073.46 | 1.777 | 26657.87 | 0.214 | 26718.13 | 0.441 | 26610.14 | 0.035 |
| | UTICON-C | | 7081.47 | 7181.81 | 1.417 | 7063.58 | (0.253) | 7159.20 | 1.098 | 7121.16 | 0.560 | 7131.04 | 0.700 | 7104.40 | 0.324 |
| | TRADE-C | | 13879.55 | 13964.74 | 0.614 | 13872.83 | (0.048) | 13946.62 | 0.483 | 13894.91 | 0.111 | 14049.70 | 1.226 | 13889.77 | 0.074 |
| | SER-C | | 18904.42 | 19008.74 | 0.552 | 18862.99 | (0.219) | 18916.18 | 0.062 | 18920.63 | 0.086 | 18945.74 | 0.219 | 19008.85 | 0.552 |
| PD | PRIMA-C | | 1.00 | 0.96 | (4.407) | 1.02 | 1.773 | 1.00 | 0.173 | 1.00 | 0.078 | 1.00 | 0.381 | 1.00 | 0.291 |
| | AINDUS-C | | 1.00 | 0.99 | (0.561) | 0.97 | (2.899) | 1.00 | 0.257 | 1.00 | (0.018) | 1.00 | 0.195 | 1.00 | 0.263 |
| | MANU-C | | 1.00 | 1.01 | 0.588 | 1.01 | 0.826 | 0.99 | (1.090) | 1.00 | 0.059 | 1.00 | 0.086 | 1.00 | 0.241 |
| | UTICON-C | | 1.00 | 1.01 | 0.848 | 1.01 | 0.970 | 1.00 | 0.489 | 0.98 | (2.188) | 1.00 | 0.332 | 1.00 | 0.372 |
| | TRADE-C | | 1.00 | 1.02 | 2.062 | 1.01 | 0.860 | 1.01 | 1.295 | 1.00 | 0.297 | 0.97 | (2.508) | 1.00 | 0.374 |
| | SER-C | | 1.00 | 1.01 | 0.533 | 1.01 | 0.850 | 1.00 | 0.320 | 1.00 | (0.056) | 1.01 | 0.516 | 0.99 | (0.660) |
| QA | PRIMA-A | | 11489.80 | 12041.68 | 4.803 | 11539.56 | 0.433 | 11476.22 | (0.118) | 11497.30 | 0.065 | 11499.43 | 0.084 | 11492.16 | 0.021 |
| | AINDUS-A | | 13628.78 | 13912.54 | 2.082 | 14221.25 | 4.347 | 13569.38 | (0.436) | 13630.74 | 0.014 | 13663.90 | 0.258 | 13627.58 | (0.009) |
| | MANU-A | | 43263.45 | 43352.14 | 0.205 | 42986.72 | (0.640) | 44081.01 | 1.890 | 43353.69 | 0.209 | 43437.76 | 0.403 | 43268.78 | 0.012 |
| | UTICON-A | | 7195.13 | 7296.37 | 1.407 | 7176.62 | (0.257) | 7273.00 | 1.082 | 7237.56 | 0.590 | 7245.16 | 0.695 | 7218.25 | 0.321 |
| | TRADE-A | | 16778.46 | 16836.19 | 0.344 | 16764.27 | (0.085) | 16813.18 | 0.207 | 16791.10 | 0.075 | 17044.14 | 1.583 | 16786.05 | 0.045 |
| | SER-A | | 21320.57 | 21429.28 | 0.510 | 21268.98 | (0.242) | 21313.60 | (0.033) | 21340.74 | 0.095 | 21356.57 | 0.169 | 21454.58 | 0.629 |
| PA | PRIMA-A | | 1.00 | 0.96 | (3.523) | 1.02 | 1.545 | 1.00 | (0.003) | 1.00 | 0.071 | 1.00 | 0.300 | 1.00 | 0.267 |
| | AINDUS-A | | 1.00 | 1.00 | (0.426) | 0.98 | (2.144) | 1.00 | 0.046 | 1.00 | (0.005) | 1.00 | 0.145 | 1.00 | 0.243 |
| | MANU-A | | 1.00 | 1.00 | 0.389 | 1.01 | 0.737 | 0.99 | (0.953) | 1.00 | 0.052 | 1.00 | 0.039 | 1.00 | 0.213 |
| | UTICON-A | | 1.00 | 1.01 | 0.836 | 1.01 | 0.964 | 1.00 | 0.470 | 0.98 | (2.152) | 1.00 | 0.326 | 1.00 | 0.369 |
| | TRADE-A | | 1.00 | 1.02 | 1.720 | 1.01 | 0.814 | 1.01 | 0.947 | 1.00 | 0.253 | 0.98 | (2.077) | 1.00 | 0.338 |
| | SER-A | | 1.00 | 1.00 | 0.480 | 1.01 | 0.822 | 1.00 | 0.201 | 1.00 | (0.045) | 1.00 | 0.453 | 0.99 | (0.566) |
| PVA | PRIMA-A | | 0.53 | 0.50 | (6.468) | 0.55 | 2.320 | 0.53 | 0.030 | 0.53 | 0.135 | 0.54 | 0.835 | 0.53 | 0.355 |
| | AINDUS-A | | 0.17 | 0.17 | 3.093 | 0.15 | (11.240) | 0.17 | (0.305) | 0.17 | 0.012 | 0.17 | 1.005 | 0.17 | 0.299 |
| | MANU-A | | 0.20 | 0.20 | 0.486 | 0.20 | 0.456 | 0.19 | (3.073) | 0.20 | 0.281 | 0.20 | 1.208 | 0.20 | 0.326 |
| | UTICON-A | | 0.39 | 0.39 | 1.677 | 0.39 | 1.075 | 0.39 | 1.427 | 0.37 | (5.283) | 0.39 | 1.378 | 0.39 | 0.644 |
| | TRADE-A | | 0.58 | 0.59 | 2.343 | 0.58 | 0.823 | 0.59 | 1.576 | 0.58 | 0.456 | 0.56 | (3.256) | 0.58 | 0.588 |
| | SER-A | | 0.57 | 0.57 | 0.842 | 0.57 | 1.040 | 0.57 | 0.251 | 0.57 | 0.109 | 0.57 | 0.860 | 0.56 | (1.031) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 961.77 | 4.803 | 921.66 | 0.433 | 916.60 | (0.118) | 918.29 | 0.065 | 918.46 | 0.084 | 917.88 | 0.021 |
| | PRIMA-C | AINDUS-A | 3594.75 | 3669.60 | 2.082 | 3751.02 | 4.347 | 3579.08 | (0.436) | 3595.27 | 0.014 | 3604.01 | 0.258 | 3594.43 | (0.009) |
| | PRIMA-C | MANU-A | 2330.82 | 2335.60 | 0.205 | 2315.91 | (0.640) | 2374.87 | 1.890 | 2335.68 | 0.209 | 2340.21 | 0.403 | 2331.11 | 0.012 |
| | PRIMA-C | UTICON-A | 492.64 | 499.57 | 1.407 | 491.37 | (0.257) | 497.97 | 1.082 | 495.55 | 0.590 | 496.07 | 0.695 | 494.22 | 0.321 |

| | | | BASE | SIM 3.1 | Δ% | SIM 3.2 | Δ% | SIM 3.3 | Δ% | SIM 3.4 | Δ% | SIM 3.5 | Δ% | SIM 3.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.43 | 0.344 | 3.42 | (0.085) | 3.43 | 0.207 | 3.42 | 0.075 | 3.48 | 1.583 | 3.42 | 0.045 |
| | PRIMA-C | SER-A | 1282.41 | 1288.95 | 0.510 | 1279.31 | (0.242) | 1281.99 | (0.033) | 1283.63 | 0.095 | 1284.58 | 0.169 | 1290.47 | 0.629 |
| | AINDUS-C | PRIMA-A | 457.75 | 479.73 | 4.803 | 459.73 | 0.433 | 457.21 | (0.118) | 458.05 | 0.065 | 458.13 | 0.084 | 457.84 | 0.021 |
| | AINDUS-C | AINDUS-A | 3741.97 | 3819.89 | 2.082 | 3904.65 | 4.347 | 3725.66 | (0.436) | 3742.51 | 0.014 | 3751.62 | 0.258 | 3741.64 | (0.009) |
| | AINDUS-C | MANU-A | 233.97 | 234.45 | 0.205 | 232.47 | (0.640) | 238.39 | 1.890 | 234.46 | 0.209 | 234.91 | 0.403 | 234.00 | 0.012 |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | 0.000 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.67 | 0.344 | 7.64 | (0.085) | 7.66 | 0.207 | 7.65 | 0.075 | 7.77 | 1.584 | 7.65 | 0.045 |
| | AINDUS-C | SER-A | 1072.20 | 1077.66 | 0.510 | 1069.60 | (0.242) | 1071.85 | (0.033) | 1073.21 | 0.095 | 1074.01 | 0.169 | 1078.94 | 0.629 |
| | MANU-C | PRIMA-A | 1872.79 | 1962.74 | 4.803 | 1880.90 | 0.433 | 1870.57 | (0.118) | 1874.01 | 0.065 | 1874.36 | 0.084 | 1873.17 | 0.021 |
| | MANU-C | AINDUS-A | 1100.51 | 1123.43 | 2.082 | 1148.35 | 4.347 | 1095.72 | (0.436) | 1100.67 | 0.014 | 1103.35 | 0.258 | 1100.42 | (0.009) |
| | MANU-C | MANU-A | 21464.91 | 21508.91 | 0.205 | 21327.61 | (0.640) | 21870.54 | 1.890 | 21509.69 | 0.209 | 21551.40 | 0.403 | 21467.56 | 0.012 |
| | MANU-C | UTICON-A | 2040.52 | 2069.23 | 1.407 | 2035.27 | (0.257) | 2062.60 | 1.082 | 2052.55 | 0.590 | 2054.71 | 0.695 | 2047.08 | 0.321 |
| | MANU-C | TRADE-A | 2334.07 | 2342.10 | 0.344 | 2332.09 | (0.085) | 2338.89 | 0.207 | 2335.82 | 0.075 | 2371.02 | 1.583 | 2335.12 | 0.045 |
| | MANU-C | SER-A | 1663.74 | 1672.22 | 0.510 | 1659.71 | (0.242) | 1663.19 | (0.033) | 1665.31 | 0.095 | 1666.55 | 0.169 | 1674.20 | 0.629 |
| | UTICON-C | PRIMA-A | 210.22 | 220.32 | 4.803 | 211.13 | 0.433 | 209.97 | (0.118) | 210.36 | 0.065 | 210.40 | 0.084 | 210.27 | 0.021 |
| | UTICON-C | AINDUS-A | 301.60 | 307.88 | 2.082 | 314.71 | 4.347 | 300.29 | (0.436) | 301.64 | 0.014 | 302.38 | 0.258 | 301.57 | (0.009) |
| | UTICON-C | MANU-A | 1306.30 | 1308.98 | 0.205 | 1297.94 | (0.640) | 1330.98 | 1.890 | 1309.02 | 0.209 | 1311.56 | 0.403 | 1306.46 | 0.012 |
| | UTICON-C | UTICON-A | 369.25 | 374.45 | 1.407 | 368.30 | (0.257) | 373.25 | 1.082 | 371.43 | 0.590 | 371.82 | 0.695 | 370.44 | 0.321 |
| | UTICON-C | TRADE-A | 336.12 | 337.27 | 0.344 | 335.83 | (0.085) | 336.81 | 0.207 | 336.37 | 0.075 | 341.44 | 1.583 | 336.27 | 0.045 |
| | UTICON-C | SER-A | 1237.04 | 1243.35 | 0.510 | 1234.05 | (0.242) | 1236.63 | (0.033) | 1238.21 | 0.095 | 1239.13 | 0.169 | 1244.81 | 0.629 |
| | TRADE-C | PRIMA-A | 1059.51 | 1110.40 | 4.803 | 1064.10 | 0.433 | 1058.26 | (0.118) | 1060.20 | 0.065 | 1060.40 | 0.084 | 1059.73 | 0.021 |
| | TRADE-C | AINDUS-A | 1105.89 | 1128.92 | 2.082 | 1153.97 | 4.347 | 1101.07 | (0.436) | 1106.05 | 0.014 | 1108.74 | 0.258 | 1105.79 | (0.009) |
| | TRADE-C | MANU-A | 5085.91 | 5096.34 | 0.205 | 5053.38 | (0.640) | 5182.02 | 1.890 | 5096.52 | 0.209 | 5106.40 | 0.403 | 5086.54 | 0.012 |
| | TRADE-C | UTICON-A | 882.07 | 894.48 | 1.407 | 879.80 | (0.257) | 891.62 | 1.082 | 887.27 | 0.590 | 888.20 | 0.695 | 884.90 | 0.321 |
| | TRADE-C | TRADE-A | 1621.83 | 1627.41 | 0.344 | 1620.46 | (0.085) | 1625.19 | 0.207 | 1623.05 | 0.075 | 1647.51 | 1.583 | 1622.56 | 0.045 |
| | TRADE-C | SER-A | 1262.78 | 1269.22 | 0.510 | 1259.72 | (0.242) | 1262.37 | (0.033) | 1263.97 | 0.095 | 1264.91 | 0.169 | 1270.72 | 0.629 |
| | SER-C | PRIMA-A | 667.53 | 699.60 | 4.803 | 670.42 | 0.433 | 666.74 | (0.118) | 667.97 | 0.065 | 668.09 | 0.084 | 667.67 | 0.021 |
| | SER-C | AINDUS-A | 521.52 | 532.37 | 2.082 | 544.19 | 4.347 | 519.24 | (0.436) | 521.59 | 0.014 | 522.86 | 0.258 | 521.47 | (0.009) |
| | SER-C | MANU-A | 2753.93 | 2759.57 | 0.205 | 2736.31 | (0.640) | 2805.97 | 1.890 | 2759.67 | 0.209 | 2765.02 | 0.403 | 2754.27 | 0.012 |
| | SER-C | UTICON-A | 423.34 | 429.30 | 1.407 | 422.25 | (0.257) | 427.92 | 1.082 | 425.84 | 0.590 | 426.28 | 0.695 | 424.70 | 0.321 |
| | SER-C | TRADE-A | 2407.69 | 2415.98 | 0.344 | 2405.66 | (0.085) | 2412.68 | 0.207 | 2409.51 | 0.075 | 2445.82 | 1.583 | 2408.78 | 0.045 |
| | SER-C | SER-A | 2031.46 | 2041.82 | 0.510 | 2026.54 | (0.242) | 2030.79 | (0.033) | 2033.38 | 0.095 | 2034.89 | 0.169 | 2044.23 | 0.629 |

# Results of Simulations 4.1-4.6

| | | | BASE | SIM 4.1 | Δ% | SIM 4.2 | Δ% | SIM 4.3 | Δ% | SIM 4.4 | Δ% | SIM 4.5 | Δ% | SIM 4.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 48122.68 | 3.804 | 46686.29 | 0.705 | 47123.51 | 1.649 | 46373.49 | 0.031 | 48733.77 | 5.122 | 47733.16 | 2.964 |
| | PRVCON | | 25292.80 | 26219.90 | 3.665 | 25442.10 | 0.590 | 25609.52 | 1.252 | 25261.44 | (0.124) | 26752.81 | 5.772 | 25963.57 | 2.652 |
| | GOVCON | | 5007.05 | 5076.67 | 1.390 | 5071.56 | 1.288 | 5048.56 | 0.829 | 4995.51 | (0.230) | 5171.55 | 3.285 | 4695.28 | (6.227) |
| | INVEST | | 8845.28 | 9601.38 | 8.548 | 8891.67 | 0.524 | 9516.13 | 7.584 | 8891.60 | 0.524 | 9633.45 | 8.911 | 9709.79 | 9.774 |
| | EXP | | 27237.19 | 27932.85 | 2.554 | 27561.90 | 1.192 | 27471.75 | 0.861 | 27422.70 | 0.681 | 28543.15 | 4.795 | 28082.66 | 3.104 |
| | IMP | | -20023.05 | -20708.11 | 3.421 | -20280.95 | 1.288 | -20522.44 | 2.494 | -20197.76 | 0.873 | -21367.20 | 6.713 | -20718.13 | 3.471 |
| | NITAX | | 4756.36 | 4919.41 | 3.428 | 4816.53 | 1.265 | 4848.80 | 1.943 | 4776.02 | 0.413 | 4969.04 | 4.471 | 4914.08 | 3.316 |
| | GDPFC | | 41602.91 | 43203.27 | 3.847 | 41869.76 | 0.641 | 42274.72 | 1.615 | 41597.48 | (0.013) | 43764.73 | 5.196 | 42819.08 | 2.923 |
| | GDPMP2 | | 46359.27 | 48122.68 | 3.804 | 46686.29 | 0.705 | 47123.51 | 1.649 | 46373.49 | 0.031 | 48733.77 | 5.122 | 47733.16 | 2.964 |
| YG | | | 8524.54 | 8821.37 | 3.482 | 8611.21 | 1.017 | 8669.48 | 1.700 | 8548.41 | 0.280 | 8885.02 | 4.229 | 8796.32 | 3.188 |
| EG | | | 5710.03 | 5779.66 | 1.219 | 5774.62 | 1.131 | 5751.22 | 0.721 | 5698.51 | (0.202) | 5874.48 | 2.880 | 5398.44 | (5.457) |
| IADJ | | | 1.00 | 1.07 | 6.534 | 0.99 | (0.933) | 1.09 | 8.829 | 1.03 | 2.984 | 1.10 | 10.230 | 1.06 | 5.985 |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| YF | LAB | | 14579.90 | 15105.92 | 3.608 | 14637.35 | 0.394 | 14636.07 | 0.385 | 14489.10 | (0.623) | 15939.84 | 9.328 | 14845.24 | 1.820 |
| | CAP | | 27023.01 | 28097.35 | 3.976 | 27232.41 | 0.775 | 27638.64 | 2.278 | 27108.38 | 0.316 | 27824.88 | 2.967 | 27973.84 | 3.519 |
| QF | LAB | PRIMA-A | 139410.00 | 130526.92 | (6.372) | 142517.83 | 2.229 | 136744.52 | (1.912) | 140479.09 | 0.767 | 142332.76 | 2.097 | 140605.90 | 0.858 |
| | LAB | AINDUS-A | 8490.00 | 9726.13 | 14.560 | 7323.93 | (13.735) | 8057.19 | (5.098) | 8499.68 | 0.114 | 8946.44 | 5.376 | 8468.01 | (0.259) |
| | LAB | MANU-A | 33960.00 | 34432.44 | 1.391 | 33141.75 | (2.409) | 31094.77 | (8.437) | 34575.56 | 1.813 | 36714.98 | 8.112 | 34026.30 | 0.195 |
| | LAB | UTICON-A | 18220.00 | 19742.54 | 8.356 | 18066.68 | (0.841) | 20293.62 | 11.381 | 15080.31 | (17.232) | 20697.00 | 13.595 | 19764.75 | 8.478 |
| | LAB | TRADE-A | 51750.00 | 55589.59 | 7.419 | 51253.35 | (0.960) | 55845.19 | 7.913 | 52776.29 | 1.983 | 41081.79 | (20.615) | 53865.26 | 4.087 |
| | LAB | SER-A | 54200.00 | 56012.38 | 3.344 | 53726.46 | (0.874) | 53994.71 | (0.379) | 54619.07 | 0.773 | 56257.03 | 3.795 | 49299.78 | (9.041) |
| | CAP | PRIMA-A | 12315.48 | 15394.35 | 25.000 | 12315.48 | - | 12315.48 | - | 12315.48 | - | 12315.48 | - | 12315.48 | - |
| | CAP | AINDUS-A | 6718.35 | 6718.35 | - | 8397.94 | 25.000 | 6718.35 | - | 6718.35 | - | 6718.35 | - | 6718.35 | - |
| | CAP | MANU-A | 22491.87 | 22491.87 | - | 22491.87 | - | 28114.84 | 25.000 | 22491.87 | - | 22491.87 | - | 22491.87 | - |
| | CAP | UTICON-A | 16829.92 | 16829.92 | - | 16829.92 | - | 16829.92 | - | 21037.40 | 25.000 | 16829.92 | - | 16829.92 | - |
| | CAP | TRADE-A | 44663.41 | 44663.41 | - | 44663.41 | - | 44663.41 | - | 44663.41 | - | 55829.26 | 25.000 | 44663.41 | - |
| | CAP | SER-A | 58248.63 | 58248.63 | - | 58248.63 | - | 58248.63 | - | 58248.63 | - | 58248.63 | - | 72810.79 | 25.000 |
| WF | LAB | | 0.05 | 0.05 | 0.420 | 0.05 | 2.141 | 0.05 | 1.427 | 0.05 | (0.042) | 0.05 | 5.751 | 0.05 | 3.925 |
| | CAP | | 0.17 | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | - |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01374 | 0.426 | 0.01397 | 2.147 | 0.01388 | 1.433 | 0.01368 | (0.036) | 0.01447 | 5.757 | 0.01422 | 3.931 |
| | LAB | AINDUS-A | 0.1128 | 0.11329 | 0.419 | 0.11523 | 2.140 | 0.11443 | 1.426 | 0.11277 | (0.043) | 0.11931 | 5.750 | 0.11725 | 3.924 |

| | | | BASE | SIM 4.1 | Δ% | SIM 4.2 | Δ% | SIM 4.3 | Δ% | SIM 4.4 | Δ% | SIM 4.5 | Δ% | SIM 4.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | MANU-A | 0.1069 | 0.10730 | 0.413 | 0.10914 | 2.134 | 0.10838 | 1.420 | 0.10681 | (0.049) | 0.11300 | 5.744 | 0.11105 | 3.918 |
| | LAB | UTICON-A | 0.0747 | 0.07502 | 0.417 | 0.07631 | 2.138 | 0.07577 | 1.425 | 0.07468 | (0.045) | 0.07900 | 5.749 | 0.07764 | 3.923 |
| | LAB | TRADE-A | 0.0262 | 0.02634 | 0.429 | 0.02679 | 2.151 | 0.02661 | 1.437 | 0.02622 | (0.032) | 0.02774 | 5.762 | 0.02726 | 3.935 |
| | LAB | SER-A | 0.0990 | 0.09943 | 0.419 | 0.10114 | 2.140 | 0.10043 | 1.426 | 0.09898 | (0.043) | 0.10471 | 5.750 | 0.10291 | 3.924 |
| WFDIST | CAP | PRIMA-A | 2.04 | 1.54 | (24.780) | 2.13 | 4.407 | 2.03 | (0.514) | 2.06 | 0.724 | 2.21 | 7.956 | 2.14 | 4.802 |
| | CAP | AINDUS-A | 1.17 | 1.35 | 15.045 | 0.83 | (29.517) | 1.13 | (3.746) | 1.17 | 0.072 | 1.31 | 11.424 | 1.22 | 3.641 |
| | CAP | MANU-A | 1.33 | 1.35 | 1.820 | 1.32 | (0.331) | 0.99 | (25.706) | 1.35 | 1.770 | 1.52 | 14.318 | 1.38 | 4.113 |
| | CAP | UTICON-A | 0.50 | 0.55 | 8.814 | 0.51 | 1.271 | 0.57 | 12.967 | 0.33 | (33.815) | 0.61 | 20.113 | 0.57 | 12.719 |
| | CAP | TRADE-A | 1.12 | 1.20 | 7.874 | 1.13 | 1.150 | 1.22 | 9.451 | 1.14 | 1.940 | 0.75 | (32.847) | 1.21 | 8.158 |
| | CAP | SER-A | 0.69 | 0.71 | 3.782 | 0.70 | 1.238 | 0.69 | 1.042 | 0.69 | 0.730 | 0.75 | 9.753 | 0.52 | (24.387) |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 164346.53 | 1.909 | 162947.25 | 1.041 | 166890.63 | 3.487 | 165475.14 | 2.609 | 172433.51 | 6.924 | 175829.82 | 9.030 |
| YFID | A-HHD | LAB | 2024.76 | 2097.81 | 3.608 | 2032.74 | 0.394 | 2032.56 | 0.385 | 2012.15 | (0.623) | 2213.62 | 9.328 | 2061.61 | 1.820 |
| | A-HHD | CAP | 2979.23 | 3097.67 | 3.976 | 3002.32 | 0.775 | 3047.10 | 2.278 | 2988.64 | 0.316 | 3067.63 | 2.967 | 3084.06 | 3.519 |
| | G-HHD | LAB | 4254.63 | 4408.13 | 3.608 | 4271.39 | 0.394 | 4271.02 | 0.385 | 4228.13 | (0.623) | 4651.48 | 9.328 | 4332.06 | 1.820 |
| | G-HHD | CAP | 648.94 | 674.74 | 3.976 | 653.97 | 0.775 | 663.72 | 2.278 | 650.99 | 0.316 | 668.20 | 2.967 | 671.77 | 3.519 |
| | N-HHD | LAB | 8300.51 | 8599.98 | 3.608 | 8333.22 | 0.394 | 8332.49 | 0.385 | 8248.81 | (0.623) | 9074.74 | 9.328 | 8451.57 | 1.820 |
| | N-HHD | CAP | 12376.62 | 12868.67 | 3.976 | 12472.52 | 0.775 | 12658.58 | 2.278 | 12415.72 | 0.316 | 12743.88 | 2.967 | 12812.10 | 3.519 |
| | ENT-G | CAP | 1244.96 | 1294.46 | 3.976 | 1254.61 | 0.775 | 1273.32 | 2.278 | 1248.89 | 0.316 | 1281.90 | 2.967 | 1288.77 | 3.519 |
| | ENT-P | CAP | 8979.21 | 9336.19 | 3.976 | 9048.79 | 0.775 | 9183.77 | 2.278 | 9007.58 | 0.316 | 9245.66 | 2.967 | 9295.15 | 3.519 |
| QINV | PRIMA-C | | 155.02 | 165.14 | 6.534 | 153.57 | (0.933) | 168.70 | 8.829 | 159.64 | 2.984 | 170.87 | 10.230 | 164.29 | 5.985 |
| | AINDUS-C | | -241.50 | -257.28 | 6.534 | -239.25 | (0.933) | -262.82 | 8.829 | -248.71 | 2.984 | -266.20 | 10.230 | -255.95 | 5.985 |
| | MANU-C | | 4849.76 | 5166.62 | 6.534 | 4804.50 | (0.933) | 5277.94 | 8.829 | 4994.50 | 2.984 | 5345.87 | 10.230 | 5140.00 | 5.985 |
| | UTICON-C | | 2955.06 | 3148.13 | 6.534 | 2927.48 | (0.933) | 3215.96 | 8.829 | 3043.26 | 2.984 | 3257.35 | 10.230 | 3131.91 | 5.985 |
| | TRADE-C | | 1009.26 | 1075.20 | 6.534 | 999.84 | (0.933) | 1098.37 | 8.829 | 1039.38 | 2.984 | 1112.50 | 10.230 | 1069.66 | 5.985 |
| | SER-C | | 36.68 | 39.08 | 6.534 | 36.34 | (0.933) | 39.92 | 8.829 | 37.78 | 2.984 | 40.43 | 10.230 | 38.88 | 5.985 |
| YH | A-HHD | | 5316.62 | 5508.41 | 3.607 | 5349.52 | 0.619 | 5385.02 | 1.286 | 5313.72 | (0.055) | 5592.84 | 5.195 | 5462.43 | 2.742 |
| | G-HHD | | 4971.28 | 5150.64 | 3.608 | 4993.43 | 0.446 | 5001.05 | 0.599 | 4946.89 | (0.491) | 5387.19 | 8.366 | 5072.34 | 2.033 |
| | N-HHD | | 21389.80 | 22181.84 | 3.703 | 21521.67 | 0.617 | 21690.82 | 1.407 | 21377.73 | (0.056) | 22529.43 | 5.328 | 21983.68 | 2.776 |
| QH | PRIMA-C | A-HHD | 700.14 | 810.73 | 15.795 | 687.09 | (1.864) | 708.28 | 1.163 | 697.94 | (0.315) | 717.19 | 2.435 | 695.15 | (0.713) |
| | PRIMA-C | G-HHD | 274.35 | 317.69 | 15.795 | 268.78 | (2.033) | 275.66 | 0.476 | 272.30 | (0.750) | 289.50 | 5.523 | 270.52 | (1.399) |
| | PRIMA-C | N-HHD | 1129.02 | 1308.56 | 15.902 | 1107.96 | (1.866) | 1143.51 | 1.283 | 1125.45 | (0.316) | 1157.97 | 2.564 | 1121.35 | (0.680) |
| | AINDUS-C | A-HHD | 1881.42 | 1977.01 | 5.080 | 1974.92 | 4.970 | 1889.66 | 0.438 | 1881.37 | (0.003) | 1948.96 | 3.590 | 1871.84 | (0.509) |
| | AINDUS-C | G-HHD | 920.08 | 966.83 | 5.081 | 964.14 | 4.789 | 917.83 | (0.244) | 916.04 | (0.439) | 981.84 | 6.712 | 909.07 | (1.196) |

| | | | BASE | SIM 4.1 | Δ% | SIM 4.2 | Δ% | SIM 4.3 | Δ% | SIM 4.4 | Δ% | SIM 4.5 | Δ% | SIM 4.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3728.83 | 5.177 | 3721.38 | 4.967 | 3565.05 | 0.558 | 3545.12 | (0.004) | 3677.18 | 3.720 | 3528.39 | (0.476) |
| | MANU-C | A-HHD | 1743.73 | 1787.17 | 2.491 | 1734.36 | (0.537) | 1854.47 | 6.351 | 1739.42 | (0.247) | 1828.62 | 4.868 | 1744.48 | 0.043 |
| | MANU-C | G-HHD | 852.75 | 873.99 | 2.492 | 846.70 | (0.709) | 900.75 | 5.629 | 846.93 | (0.682) | 921.22 | 8.029 | 847.22 | (0.648) |
| | MANU-C | N-HHD | 3285.84 | 3370.80 | 2.586 | 3268.10 | (0.540) | 3498.69 | 6.478 | 3277.66 | (0.249) | 3450.15 | 5.001 | 3288.34 | 0.076 |
| | UTICON-C | A-HHD | 97.86 | 99.07 | 1.237 | 96.99 | (0.889) | 96.73 | (1.147) | 106.13 | 8.453 | 99.81 | 1.993 | 95.96 | (1.937) |
| | UTICON-C | G-HHD | 47.86 | 48.46 | 1.238 | 47.36 | (1.060) | 46.99 | (1.818) | 51.68 | 7.979 | 50.29 | 5.067 | 46.61 | (2.614) |
| | UTICON-C | N-HHD | 184.43 | 186.88 | 1.331 | 182.78 | (0.891) | 182.53 | (1.029) | 200.01 | 8.451 | 188.34 | 2.121 | 180.91 | (1.904) |
| | TRADE-C | A-HHD | 347.20 | 340.51 | (1.927) | 344.77 | (0.700) | 331.20 | (4.610) | 343.44 | (1.084) | 464.68 | 33.836 | 340.75 | (1.858) |
| | TRADE-C | G-HHD | 427.95 | 419.71 | (1.926) | 424.22 | (0.871) | 405.45 | (5.257) | 421.47 | (1.515) | 590.02 | 37.870 | 417.10 | (2.536) |
| | TRADE-C | N-HHD | 1656.57 | 1626.15 | (1.836) | 1644.94 | (0.702) | 1582.09 | (4.496) | 1638.59 | (1.086) | 2219.88 | 34.005 | 1626.33 | (1.825) |
| | SER-C | A-HHD | 1147.00 | 1173.25 | 2.288 | 1139.42 | (0.661) | 1151.16 | 0.363 | 1148.27 | 0.111 | 1158.60 | 1.011 | 1269.45 | 10.676 |
| | SER-C | G-HHD | 1413.70 | 1446.06 | 2.289 | 1401.94 | (0.832) | 1409.19 | (0.319) | 1409.10 | (0.325) | 1471.04 | 4.056 | 1553.81 | 9.911 |
| | SER-C | N-HHD | 5472.33 | 5602.72 | 2.383 | 5436.05 | (0.663) | 5498.72 | 0.482 | 5478.32 | 0.109 | 5534.65 | 1.139 | 6058.54 | 10.712 |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1294.46 | 3.976 | 1254.61 | 0.775 | 1273.32 | 2.278 | 1248.89 | 0.316 | 1281.90 | 2.967 | 1288.77 | 3.519 |
| | ENT-P | | 10396.40 | 10770.61 | 3.599 | 10475.75 | 0.763 | 10576.99 | 1.737 | 10425.10 | 0.276 | 10686.19 | 2.787 | 10739.92 | 3.304 |
| ENTSAV | ENT-G | | 902.97 | 938.87 | 3.976 | 909.97 | 0.775 | 923.54 | 2.278 | 905.82 | 0.316 | 929.76 | 2.967 | 934.74 | 3.519 |
| | ENT-P | | 6326.21 | 6658.41 | 5.251 | 6369.57 | 0.685 | 6599.78 | 4.324 | 6347.50 | 0.336 | 6602.94 | 4.374 | 6572.15 | 3.888 |
| QE | PRIMA-C | | 2236.89 | 2774.47 | 24.033 | 2225.40 | (0.513) | 2158.49 | (3.505) | 2240.33 | 0.154 | 2197.02 | (1.782) | 2219.77 | (0.765) |
| | AINDUS-C | | 2909.02 | 3112.89 | 7.008 | 3221.09 | 10.728 | 2757.16 | (5.220) | 2914.42 | 0.186 | 2931.89 | 0.786 | 2883.02 | (0.894) |
| | MANU-C | | 16662.56 | 16638.66 | (0.143) | 16462.98 | (1.198) | 18431.49 | 10.616 | 16783.34 | 0.725 | 17106.37 | 2.663 | 16599.36 | (0.379) |
| | UTICON-C | | 113.66 | 116.20 | 2.233 | 112.67 | (0.875) | 114.09 | 0.380 | 124.03 | 9.122 | 117.55 | 3.421 | 115.87 | 1.941 |
| | TRADE-C | | 2898.91 | 2820.22 | (2.715) | 2887.01 | (0.410) | 2734.76 | (5.662) | 2889.00 | (0.342) | 3975.46 | 37.136 | 2864.35 | (1.192) |
| | SER-C | | 2416.15 | 2429.42 | 0.549 | 2399.82 | (0.676) | 2322.69 | (3.868) | 2430.59 | 0.598 | 2366.75 | (2.045) | 2826.82 | 16.997 |
| PE | PRIMA-C | | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | AINDUS-C | | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | MANU-C | | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | UTICON-C | | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | TRADE-C | | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | SER-C | | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| QM | PRIMA-C | | 1635.60 | 1317.69 | (19.437) | 1730.14 | 5.780 | 1835.12 | 12.199 | 1645.19 | 0.586 | 1819.26 | 11.229 | 1711.12 | 4.617 |
| | AINDUS-C | | 899.60 | 915.10 | 1.723 | 842.73 | (6.322) | 989.96 | 10.045 | 895.38 | (0.469) | 969.83 | 7.807 | 925.64 | 2.894 |

| | | BASE | SIM 4.1 | Δ% | SIM 4.2 | Δ% | SIM 4.3 | Δ% | SIM 4.4 | Δ% | SIM 4.5 | Δ% | SIM 4.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 15605.79 | 5.265 | 14841.22 | 0.108 | 15390.07 | 3.810 | 14968.77 | 0.968 | 15959.00 | 7.648 | 15275.28 | 3.036 |
| | UTICON-C | 37.90 | 41.50 | 9.496 | 38.27 | 0.988 | 46.26 | 22.056 | 31.78 | (16.143) | 43.96 | 15.994 | 41.95 | 10.683 |
| | TRADE-C | 710.78 | 804.85 | 13.235 | 715.89 | 0.718 | 884.56 | 24.449 | 726.38 | 2.195 | 501.27 | (29.476) | 754.36 | 6.131 |
| | SER-C | 2534.31 | 2638.35 | 4.105 | 2544.93 | 0.419 | 2810.77 | 10.909 | 2524.96 | (0.369) | 2858.17 | 12.779 | 2220.19 | (12.395) |
| PM | PRIMA-C | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | AINDUS-C | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | MANU-C | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | UTICON-C | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | TRADE-C | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| | SER-C | 1.00 | 1.00 | 0.147 | 1.01 | 0.926 | 0.96 | (3.671) | 1.00 | 0.150 | 0.99 | (0.529) | 1.02 | 2.085 |
| QX | PRIMA-C | 11489.80 | 13126.27 | 14.243 | 11568.96 | 0.689 | 11420.94 | (0.599) | 11517.17 | 0.238 | 11564.28 | 0.648 | 11520.40 | 0.266 |
| | AINDUS-C | 13628.78 | 14430.30 | 5.881 | 14576.34 | 6.953 | 13332.24 | (2.176) | 13635.31 | 0.048 | 13932.16 | 2.226 | 13613.93 | (0.109) |
| | MANU-C | 43263.45 | 43515.47 | 0.583 | 42822.10 | (1.020) | 47445.45 | 9.666 | 43591.42 | 0.758 | 44705.72 | 3.334 | 43298.94 | 0.082 |
| | UTICON-C | 7195.13 | 7483.11 | 4.002 | 7165.46 | (0.412) | 7584.52 | 5.412 | 7351.87 | 2.178 | 7657.87 | 6.431 | 7487.22 | 4.060 |
| | TRADE-C | 16778.46 | 16947.21 | 1.006 | 16755.85 | (0.135) | 16958.09 | 1.071 | 16824.59 | 0.275 | 19683.05 | 17.311 | 16872.71 | 0.562 |
| | SER-C | 21320.57 | 21634.56 | 1.473 | 21237.57 | (0.389) | 21284.64 | (0.169) | 21393.68 | 0.343 | 21676.51 | 1.669 | 23138.92 | 8.529 |
| PX | PRIMA-C | 1.00 | 0.90 | (9.634) | 1.02 | 2.453 | 1.00 | (0.032) | 1.00 | 0.255 | 1.03 | 2.557 | 1.03 | 3.413 |
| | AINDUS-C | 1.00 | 0.99 | (1.170) | 0.97 | (3.357) | 1.00 | 0.212 | 1.00 | (0.022) | 1.01 | 1.250 | 1.03 | 3.096 |
| | MANU-C | 1.00 | 1.01 | 1.058 | 1.01 | 1.153 | 0.95 | (4.704) | 1.00 | 0.191 | 1.00 | 0.283 | 1.03 | 2.676 |
| | UTICON-C | 1.00 | 1.02 | 2.319 | 1.02 | 1.515 | 1.02 | 2.402 | 0.92 | (7.752) | 1.03 | 3.103 | 1.05 | 4.744 |
| | TRADE-C | 1.00 | 1.05 | 4.957 | 1.01 | 1.275 | 1.05 | 4.998 | 1.01 | 0.925 | 0.82 | (18.167) | 1.04 | 4.355 |
| | SER-C | 1.00 | 1.01 | 1.298 | 1.01 | 1.290 | 1.01 | 0.985 | 1.00 | (0.167) | 1.04 | 4.207 | 0.93 | (7.066) |
| QQ | PRIMA-C | 10888.51 | 11626.42 | 6.777 | 11072.82 | 1.693 | 11092.26 | 1.871 | 10922.02 | 0.308 | 11182.87 | 2.703 | 11011.11 | 1.126 |
| | AINDUS-C | 11619.36 | 12231.97 | 5.272 | 12192.03 | 4.929 | 11560.52 | (0.506) | 11616.27 | (0.027) | 11969.15 | 3.010 | 11656.25 | 0.318 |
| | MANU-C | 41426.12 | 42478.77 | 2.541 | 41200.11 | (0.546) | 44398.22 | 7.174 | 41776.85 | 0.847 | 43555.18 | 5.139 | 41973.31 | 1.321 |
| | UTICON-C | 7119.37 | 7408.36 | 4.059 | 7091.07 | (0.398) | 7516.32 | 5.576 | 7259.00 | 1.961 | 7584.16 | 6.529 | 7413.24 | 4.128 |
| | TRADE-C | 14590.33 | 14926.71 | 2.305 | 14584.70 | (0.039) | 15090.64 | 3.429 | 14661.84 | 0.490 | 16096.03 | 10.320 | 14761.59 | 1.174 |
| | SER-C | 21438.73 | 21842.99 | 1.886 | 21382.63 | (0.262) | 21764.13 | 1.518 | 21488.01 | 0.230 | 22159.43 | 3.362 | 22497.13 | 4.937 |
| PQ | PRIMA-C | 1.01 | 0.90 | (10.525) | 1.03 | 2.530 | 1.01 | 0.123 | 1.01 | 0.261 | 1.04 | 2.695 | 1.04 | 3.480 |
| | AINDUS-C | 1.01 | 0.99 | (1.402) | 0.96 | (4.145) | 1.01 | 0.845 | 1.00 | (0.052) | 1.02 | 1.550 | 1.04 | 3.268 |
| | MANU-C | 1.02 | 1.03 | 1.089 | 1.03 | 1.163 | 0.97 | (4.762) | 1.02 | 0.193 | 1.02 | 0.312 | 1.04 | 2.698 |
| | UTICON-C | 1.00 | 1.02 | 2.341 | 1.02 | 1.522 | 1.02 | 2.462 | 0.92 | (7.844) | 1.03 | 3.140 | 1.05 | 4.771 |
| | TRADE-C | 1.00 | 1.06 | 5.643 | 1.01 | 1.328 | 1.06 | 6.181 | 1.01 | 1.040 | 0.79 | (21.400) | 1.05 | 4.687 |
| | SER-C | 1.00 | 1.01 | 1.290 | 1.01 | 1.288 | 1.01 | 0.920 | 1.00 | (0.166) | 1.04 | 4.141 | 0.93 | (7.169) |

| | | | BASE | SIM 4.1 | Δ% | SIM 4.2 | Δ% | SIM 4.3 | Δ% | SIM 4.4 | Δ% | SIM 4.5 | Δ% | SIM 4.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 10336.75 | 11.714 | 9343.30 | 0.977 | 9260.99 | 0.087 | 9276.83 | 0.259 | 9366.24 | 1.225 | 9300.44 | 0.514 |
| | AINDUS-C | | 10719.76 | 11317.13 | 5.573 | 11352.12 | 5.899 | 10572.92 | (1.370) | 10720.89 | 0.011 | 10999.80 | 2.612 | 10730.76 | 0.103 |
| | MANU-C | | 26600.89 | 26875.93 | 1.034 | 26359.06 | (0.909) | 29012.56 | 9.066 | 26808.08 | 0.779 | 27598.62 | 3.751 | 26699.22 | 0.370 |
| | UTICON-C | | 7081.47 | 7366.89 | 4.030 | 7052.79 | (0.405) | 7470.26 | 5.490 | 7227.50 | 2.062 | 7540.26 | 6.479 | 7371.32 | 4.093 |
| | TRADE-C | | 13879.55 | 14124.03 | 1.761 | 13868.82 | (0.077) | 14213.71 | 2.408 | 13935.51 | 0.403 | 15629.78 | 12.610 | 14007.70 | 0.923 |
| | SER-C | | 18904.42 | 19205.00 | 1.590 | 18837.74 | (0.353) | 18959.64 | 0.292 | 18963.08 | 0.310 | 19307.46 | 2.132 | 20300.63 | 7.386 |
| PD | PRIMA-C | | 1.00 | 0.88 | (12.128) | 1.03 | 2.820 | 1.01 | 0.832 | 1.00 | 0.281 | 1.03 | 3.292 | 1.04 | 3.732 |
| | AINDUS-C | | 1.00 | 0.98 | (1.530) | 0.95 | (4.545) | 1.01 | 1.245 | 1.00 | (0.069) | 1.02 | 1.729 | 1.03 | 3.369 |
| | MANU-C | | 1.00 | 1.02 | 1.625 | 1.01 | 1.295 | 0.95 | (5.355) | 1.00 | 0.217 | 1.01 | 0.789 | 1.03 | 3.045 |
| | UTICON-C | | 1.00 | 1.02 | 2.353 | 1.02 | 1.525 | 1.02 | 2.497 | 0.92 | (7.883) | 1.03 | 3.160 | 1.05 | 4.786 |
| | TRADE-C | | 1.00 | 1.06 | 5.939 | 1.01 | 1.348 | 1.07 | 6.737 | 1.01 | 1.086 | 0.78 | (22.245) | 1.05 | 4.824 |
| | SER-C | | 1.00 | 1.01 | 1.444 | 1.01 | 1.337 | 1.02 | 1.568 | 1.00 | (0.208) | 1.05 | 4.800 | 0.92 | (8.288) |
| QA | PRIMA-A | | 11489.80 | 13126.27 | 14.243 | 11568.96 | 0.689 | 11420.94 | (0.599) | 11517.17 | 0.238 | 11564.28 | 0.648 | 11520.40 | 0.266 |
| | AINDUS-A | | 13628.78 | 14430.30 | 5.881 | 14576.34 | 6.953 | 13332.24 | (2.176) | 13635.31 | 0.048 | 13932.16 | 2.226 | 13613.93 | (0.109) |
| | MANU-A | | 43263.45 | 43515.47 | 0.583 | 42822.10 | (1.020) | 47445.45 | 9.666 | 43591.42 | 0.758 | 44705.72 | 3.334 | 43298.94 | 0.082 |
| | UTICON-A | | 7195.13 | 7483.11 | 4.002 | 7165.46 | (0.412) | 7584.52 | 5.412 | 7351.87 | 2.178 | 7657.87 | 6.431 | 7487.22 | 4.060 |
| | TRADE-A | | 16778.46 | 16947.21 | 1.006 | 16755.85 | (0.135) | 16958.09 | 1.071 | 16824.59 | 0.275 | 19683.05 | 17.311 | 16872.71 | 0.562 |
| | SER-A | | 21320.57 | 21634.56 | 1.473 | 21237.57 | (0.389) | 21284.64 | (0.169) | 21393.68 | 0.343 | 21676.51 | 1.669 | 23138.92 | 8.529 |
| PA | PRIMA-A | | 1.00 | 0.90 | (9.634) | 1.02 | 2.453 | 1.00 | (0.032) | 1.00 | 0.255 | 1.03 | 2.557 | 1.03 | 3.413 |
| | AINDUS-A | | 1.00 | 0.99 | (1.170) | 0.97 | (3.357) | 1.00 | 0.212 | 1.00 | (0.022) | 1.01 | 1.250 | 1.03 | 3.096 |
| | MANU-A | | 1.00 | 1.01 | 1.058 | 1.01 | 1.153 | 0.95 | (4.704) | 1.00 | 0.191 | 1.00 | 0.283 | 1.03 | 2.676 |
| | UTICON-A | | 1.00 | 1.02 | 2.319 | 1.02 | 1.515 | 1.02 | 2.402 | 0.92 | (7.752) | 1.03 | 3.103 | 1.05 | 4.744 |
| | TRADE-A | | 1.00 | 1.05 | 4.957 | 1.01 | 1.275 | 1.05 | 4.998 | 1.01 | 0.925 | 0.82 | (18.167) | 1.04 | 4.355 |
| | SER-A | | 1.00 | 1.01 | 1.298 | 1.01 | 1.290 | 1.01 | 0.985 | 1.00 | (0.167) | 1.04 | 4.207 | 0.93 | (7.066) |
| PVA | PRIMA-A | | 0.53 | 0.44 | (17.697) | 0.55 | 3.694 | 0.53 | 0.086 | 0.54 | 0.486 | 0.57 | 7.262 | 0.56 | 4.525 |
| | AINDUS-A | | 0.17 | 0.18 | 8.656 | 0.14 | (17.623) | 0.16 | (1.603) | 0.17 | 0.024 | 0.18 | 8.997 | 0.17 | 3.757 |
| | MANU-A | | 0.20 | 0.20 | 1.233 | 0.20 | 0.697 | 0.17 | (15.318) | 0.20 | 1.002 | 0.22 | 10.631 | 0.21 | 4.030 |
| | UTICON-A | | 0.39 | 0.40 | 4.626 | 0.39 | 1.690 | 0.41 | 7.167 | 0.31 | (19.033) | 0.44 | 12.856 | 0.42 | 8.322 |
| | TRADE-A | | 0.58 | 0.62 | 6.800 | 0.59 | 1.287 | 0.63 | 8.292 | 0.59 | 1.661 | 0.41 | (28.445) | 0.62 | 7.554 |
| | SER-A | | 0.57 | 0.58 | 2.274 | 0.58 | 1.633 | 0.57 | 1.211 | 0.57 | 0.385 | 0.61 | 7.949 | 0.49 | (12.912) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 1048.39 | 14.243 | 924.01 | 0.689 | 912.19 | (0.599) | 919.87 | 0.238 | 923.64 | 0.648 | 920.13 | 0.266 |
| | PRIMA-C | AINDUS-A | 3594.75 | 3806.16 | 5.881 | 3844.68 | 6.953 | 3516.54 | (2.176) | 3596.47 | 0.048 | 3674.77 | 2.226 | 3590.83 | (0.109) |
| | PRIMA-C | MANU-A | 2330.82 | 2344.40 | 0.583 | 2307.04 | (1.020) | 2556.13 | 9.666 | 2348.49 | 0.758 | 2408.52 | 3.334 | 2332.73 | 0.082 |
| | PRIMA-C | UTICON-A | 492.64 | 512.36 | 4.002 | 490.61 | (0.412) | 519.30 | 5.412 | 503.37 | 2.178 | 524.33 | 6.431 | 512.64 | 4.060 |

| | | | BASE | SIM 4.1 | Δ% | SIM 4.2 | Δ% | SIM 4.3 | Δ% | SIM 4.4 | Δ% | SIM 4.5 | Δ% | SIM 4.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.46 | 1.006 | 3.42 | (0.135) | 3.46 | 1.070 | 3.43 | 0.275 | 4.01 | 17.311 | 3.44 | 0.562 |
| | PRIMA-C | SER-A | 1282.41 | 1301.30 | 1.473 | 1277.42 | (0.389) | 1280.25 | (0.169) | 1286.81 | 0.343 | 1303.82 | 1.669 | 1391.79 | 8.529 |
| | AINDUS-C | PRIMA-A | 457.75 | 522.94 | 14.243 | 460.90 | 0.689 | 455.00 | (0.599) | 458.84 | 0.238 | 460.71 | 0.648 | 458.97 | 0.266 |
| | AINDUS-C | AINDUS-A | 3741.97 | 3962.04 | 5.881 | 4002.14 | 6.953 | 3660.56 | (2.176) | 3743.77 | 0.048 | 3825.27 | 2.226 | 3737.90 | (0.109) |
| | AINDUS-C | MANU-A | 233.97 | 235.33 | 0.583 | 231.58 | (1.020) | 256.59 | 9.666 | 235.74 | 0.758 | 241.77 | 3.334 | 234.16 | 0.082 |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.73 | 1.006 | 7.64 | (0.135) | 7.73 | 1.071 | 7.67 | 0.275 | 8.97 | 17.311 | 7.69 | 0.562 |
| | AINDUS-C | SER-A | 1072.20 | 1087.99 | 1.473 | 1068.02 | (0.389) | 1070.39 | (0.169) | 1075.87 | 0.343 | 1090.10 | 1.669 | 1163.64 | 8.529 |
| | MANU-C | PRIMA-A | 1872.79 | 2139.52 | 14.243 | 1885.69 | 0.689 | 1861.56 | (0.599) | 1877.25 | 0.238 | 1884.93 | 0.648 | 1877.77 | 0.266 |
| | MANU-C | AINDUS-A | 1100.51 | 1165.23 | 5.881 | 1177.03 | 6.953 | 1076.57 | (2.176) | 1101.04 | 0.048 | 1125.01 | 2.226 | 1099.31 | (0.109) |
| | MANU-C | MANU-A | 21464.91 | 21589.95 | 0.583 | 21245.94 | (1.020) | 23539.79 | 9.666 | 21627.63 | 0.758 | 22180.49 | 3.334 | 21482.52 | 0.082 |
| | MANU-C | UTICON-A | 2040.52 | 2122.19 | 4.002 | 2032.11 | (0.412) | 2150.95 | 5.412 | 2084.97 | 2.178 | 2171.75 | 6.431 | 2123.36 | 4.060 |
| | MANU-C | TRADE-A | 2334.07 | 2357.54 | 1.006 | 2330.92 | (0.135) | 2359.05 | 1.071 | 2340.48 | 0.275 | 2738.13 | 17.311 | 2347.18 | 0.562 |
| | MANU-C | SER-A | 1663.74 | 1688.24 | 1.473 | 1657.26 | (0.389) | 1660.93 | (0.169) | 1669.44 | 0.343 | 1691.51 | 1.669 | 1805.63 | 8.529 |
| | UTICON-C | PRIMA-A | 210.22 | 240.16 | 14.243 | 211.67 | 0.689 | 208.96 | (0.599) | 210.72 | 0.238 | 211.59 | 0.648 | 210.78 | 0.266 |
| | UTICON-C | AINDUS-A | 301.60 | 319.34 | 5.881 | 322.57 | 6.953 | 295.04 | (2.176) | 301.75 | 0.048 | 308.31 | 2.226 | 301.27 | (0.109) |
| | UTICON-C | MANU-A | 1306.30 | 1313.91 | 0.583 | 1292.97 | (1.020) | 1432.57 | 9.666 | 1316.20 | 0.758 | 1349.85 | 3.334 | 1307.37 | 0.082 |
| | UTICON-C | UTICON-A | 369.25 | 384.03 | 4.002 | 367.73 | (0.412) | 389.24 | 5.412 | 377.30 | 2.178 | 393.00 | 6.431 | 384.24 | 4.060 |
| | UTICON-C | TRADE-A | 336.12 | 339.50 | 1.006 | 335.66 | (0.135) | 339.71 | 1.071 | 337.04 | 0.275 | 394.30 | 17.311 | 338.00 | 0.562 |
| | UTICON-C | SER-A | 1237.04 | 1255.26 | 1.473 | 1232.22 | (0.389) | 1234.95 | (0.169) | 1241.28 | 0.343 | 1257.69 | 1.669 | 1342.54 | 8.529 |
| | TRADE-C | PRIMA-A | 1059.51 | 1210.41 | 14.243 | 1066.81 | 0.689 | 1053.16 | (0.599) | 1062.03 | 0.238 | 1066.38 | 0.648 | 1062.33 | 0.266 |
| | TRADE-C | AINDUS-A | 1105.89 | 1170.93 | 5.881 | 1182.78 | 6.953 | 1081.83 | (2.176) | 1106.42 | 0.048 | 1130.51 | 2.226 | 1104.68 | (0.109) |
| | TRADE-C | MANU-A | 5085.91 | 5115.54 | 0.583 | 5034.03 | (1.020) | 5577.53 | 9.666 | 5124.47 | 0.758 | 5255.46 | 3.334 | 5090.08 | 0.082 |
| | TRADE-C | UTICON-A | 882.07 | 917.37 | 4.002 | 878.43 | (0.412) | 929.81 | 5.412 | 901.29 | 2.178 | 938.80 | 6.431 | 917.88 | 4.060 |
| | TRADE-C | TRADE-A | 1621.83 | 1638.14 | 1.006 | 1619.64 | (0.135) | 1639.19 | 1.071 | 1626.29 | 0.275 | 1902.59 | 17.311 | 1630.94 | 0.562 |
| | TRADE-C | SER-A | 1262.78 | 1281.38 | 1.473 | 1257.86 | (0.389) | 1260.65 | (0.169) | 1267.11 | 0.343 | 1283.86 | 1.669 | 1370.48 | 8.529 |
| | SER-C | PRIMA-A | 667.53 | 762.61 | 14.243 | 672.13 | 0.689 | 663.53 | (0.599) | 669.12 | 0.238 | 671.86 | 0.648 | 669.31 | 0.266 |
| | SER-C | AINDUS-A | 521.52 | 552.19 | 5.881 | 557.78 | 6.953 | 510.17 | (2.176) | 521.77 | 0.048 | 533.13 | 2.226 | 520.95 | (0.109) |
| | SER-C | MANU-A | 2753.93 | 2769.97 | 0.583 | 2725.83 | (1.020) | 3020.13 | 9.666 | 2774.81 | 0.758 | 2845.74 | 3.334 | 2756.19 | 0.082 |
| | SER-C | UTICON-A | 423.34 | 440.28 | 4.002 | 421.59 | (0.412) | 446.25 | 5.412 | 432.56 | 2.178 | 450.57 | 6.431 | 440.53 | 4.060 |
| | SER-C | TRADE-A | 2407.69 | 2431.91 | 1.006 | 2404.45 | (0.135) | 2433.47 | 1.071 | 2414.31 | 0.275 | 2824.50 | 17.311 | 2421.22 | 0.562 |
| | SER-C | SER-A | 2031.46 | 2061.37 | 1.473 | 2023.55 | (0.389) | 2028.03 | (0.169) | 2038.42 | 0.343 | 2065.37 | 1.669 | 2204.71 | 8.529 |

# Results of Simulations 5-7

| | | | BASE | SIM 5.1 | Δ% | SIM 5.2 | Δ% | SIM 6.1 | Δ% | SIM 6.2 | Δ% | SIM 7.1 | Δ% | SIM 7.2 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 46403.72 | 0.096 | 46339.07 | (0.044) | 46506.51 | 0.318 | 46141.23 | (0.470) | 46269.84 | (0.193) | 46265.52 | (0.202) |
| | PRVCON | | 25292.80 | 25350.87 | 0.230 | 25670.44 | 1.493 | 25543.58 | 0.992 | 26163.83 | 3.444 | 25205.29 | (0.346) | 24459.64 | (3.294) |
| | GOVCON | | 5007.05 | 5016.83 | 0.195 | 5040.20 | 0.662 | 5054.15 | 0.941 | 5061.75 | 1.093 | 4994.63 | (0.248) | 4917.71 | (1.784) |
| | INVEST | | 8845.28 | 8807.89 | (0.423) | 8448.94 | (4.481) | 8653.28 | (2.171) | 8094.34 | (8.490) | 8885.31 | 0.453 | 9867.16 | 11.553 |
| | EXP | | 27237.19 | 27278.16 | 0.150 | 27282.87 | 0.168 | 27412.82 | 0.645 | 27282.22 | 0.165 | 27057.78 | (0.659) | 26022.28 | (4.460) |
| | IMP | | -20023.05 | -20050.03 | 0.135 | -20103.37 | 0.401 | -20157.32 | 0.671 | -20460.91 | 2.187 | -19873.18 | (0.748) | -19001.29 | (5.103) |
| | NITAX | | 4756.36 | 4703.63 | (1.109) | 4090.15 | (14.007) | 4482.01 | (5.768) | 3019.69 | (36.513) | 4812.52 | 1.181 | 6063.03 | 27.472 |
| | GDPFC | | 41602.91 | 41700.09 | 0.234 | 42248.92 | 1.553 | 42024.50 | 1.013 | 43121.54 | 3.650 | 41457.32 | (0.350) | 40202.49 | (3.366) |
| | GDPMP2 | | 46359.27 | 46403.72 | 0.096 | 46339.07 | (0.044) | 46506.51 | 0.318 | 46141.23 | (0.470) | 46269.84 | (0.193) | 46265.52 | (0.202) |
| YG | | | 8524.54 | 8480.38 | (0.518) | 7909.79 | (7.211) | 8286.52 | (2.792) | 6894.88 | (19.117) | 8567.49 | 0.504 | 9707.64 | 13.879 |
| EG | | | 5710.03 | 5719.82 | 0.171 | 5743.14 | 0.580 | 5757.18 | 0.826 | 5764.26 | 0.950 | 5697.58 | (0.218) | 5620.46 | (1.569) |
| IADJ | | | 1.00 | 0.99 | (0.668) | 0.97 | (3.301) | 0.97 | (3.331) | 0.94 | (5.664) | 1.01 | 0.762 | 1.09 | 8.977 |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.002 | 0.194 | 0.995 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| YF | LAB | | 14579.90 | 14614.43 | 0.237 | 14811.07 | 1.586 | 14730.29 | 1.032 | 15139.04 | 3.835 | 14528.46 | (0.353) | 14091.95 | (3.347) |
| | CAP | | 27023.01 | 27085.66 | 0.232 | 27437.86 | 1.535 | 27294.21 | 1.004 | 27982.49 | 3.551 | 26928.86 | (0.348) | 26110.53 | (3.377) |
| QF | LAB | PRIMA-A | 139410.00 | 139633.08 | 0.160 | 139068.39 | (0.245) | 141333.90 | 1.380 | 135620.56 | (2.718) | 139540.23 | 0.093 | 137579.94 | (1.313) |
| | LAB | AINDUS-A | 8490.00 | 8557.03 | 0.790 | 8502.86 | 0.151 | 9149.70 | 7.770 | 8280.56 | (2.467) | 8565.99 | 0.895 | 8238.84 | (2.958) |
| | LAB | MANU-A | 33960.00 | 33857.42 | (0.302) | 34472.29 | 1.509 | 32923.60 | (3.052) | 37286.68 | 9.796 | 33829.48 | (0.384) | 34677.32 | 2.112 |
| | LAB | UTICON-A | 18220.00 | 18155.63 | (0.353) | 18023.17 | (1.080) | 17841.59 | (2.077) | 18143.54 | (0.420) | 18265.88 | 0.252 | 18985.50 | 4.201 |
| | LAB | TRADE-A | 51750.00 | 51661.32 | (0.171) | 51772.25 | 0.043 | 51015.06 | (1.420) | 52565.98 | 1.577 | 51712.40 | (0.073) | 52361.31 | 1.181 |
| | LAB | SER-A | 54200.00 | 54165.53 | (0.064) | 54191.05 | (0.017) | 53766.14 | (0.800) | 54132.68 | (0.124) | 54116.02 | (0.155) | 54187.09 | (0.024) |
| | CAP | PRIMA-A | 12315.48 | 12348.07 | 0.265 | 12274.11 | (0.336) | 12598.28 | 2.296 | 11814.85 | (4.065) | 12334.26 | 0.152 | 12053.99 | (2.123) |
| | CAP | AINDUS-A | 6718.35 | 6778.47 | 0.895 | 6722.40 | 0.060 | 7305.83 | 8.744 | 6461.89 | (3.817) | 6782.48 | 0.955 | 6466.06 | (3.755) |
| | CAP | MANU-A | 22491.87 | 22447.35 | (0.198) | 22810.36 | 1.416 | 22002.54 | (2.176) | 24353.25 | 8.276 | 22418.65 | (0.326) | 22778.33 | 1.274 |
| | CAP | UTICON-A | 16829.92 | 16787.97 | (0.249) | 16632.94 | (1.170) | 16629.34 | (1.192) | 16527.26 | (1.798) | 16882.26 | 0.311 | 17392.99 | 3.346 |
| | CAP | TRADE-A | 44663.41 | 44633.44 | (0.067) | 44641.90 | (0.048) | 44427.06 | (0.529) | 44739.55 | 0.170 | 44657.30 | (0.014) | 44819.84 | 0.350 |
| | CAP | SER-A | 58248.63 | 58272.37 | 0.041 | 58185.95 | (0.108) | 58304.61 | 0.096 | 57370.85 | (1.507) | 58192.71 | (0.096) | 57756.46 | (0.845) |
| WF | LAB | | 0.05 | 0.048 | 0.315 | 0.048 | 1.343 | 0.05 | 1.742 | 0.05 | 1.826 | 0.05 | (0.294) | 0.05 | (3.967) |
| | CAP | | 0.17 | 0.168 | 0.203 | 0.170 | 1.420 | 0.17 | 0.818 | 0.17 | 3.246 | 0.17 | (0.352) | 0.16 | (3.181) |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01372 | 0.292 | 0.01386 | 1.316 | 0.01392 | 1.754 | 0.01393 | 1.827 | 0.01364 | (0.292) | 0.01314 | (3.947) |
| | LAB | AINDUS-A | 0.1128 | 0.11318 | 0.319 | 0.11433 | 1.338 | 0.11478 | 1.737 | 0.11487 | 1.817 | 0.11250 | (0.284) | 0.10834 | (3.971) |

| | | | BASE | SIM 5.1 | Δ% | SIM 5.2 | Δ% | SIM 6.1 | Δ% | SIM 6.2 | Δ% | SIM 7.1 | Δ% | SIM 7.2 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | MANU-A | 0.1069 | 0.10719 | 0.309 | 0.10828 | 1.329 | 0.10871 | 1.731 | 0.10880 | 1.815 | 0.10655 | (0.290) | 0.10261 | (3.977) |
| | LAB | UTICON-A | 0.0747 | 0.07494 | 0.308 | 0.07571 | 1.339 | 0.07601 | 1.740 | 0.07607 | 1.820 | 0.07450 | (0.281) | 0.07174 | (3.975) |
| | LAB | TRADE-A | 0.0262 | 0.02632 | 0.343 | 0.02658 | 1.334 | 0.02669 | 1.754 | 0.02671 | 1.830 | 0.02616 | (0.267) | 0.02519 | (3.965) |
| | LAB | SER-A | 0.0990 | 0.09933 | 0.313 | 0.10034 | 1.333 | 0.10074 | 1.737 | 0.10082 | 1.818 | 0.09874 | (0.283) | 0.09509 | (3.969) |
| | CAP | PRIMA-A | 0.3425 | 0.34318 | 0.207 | 0.34735 | 1.425 | 0.34529 | 0.823 | 0.35359 | 3.247 | 0.34128 | (0.347) | 0.33159 | (3.177) |
| | CAP | AINDUS-A | 0.1966 | 0.19696 | 0.209 | 0.19935 | 1.425 | 0.19816 | 0.819 | 0.20293 | 3.246 | 0.19587 | (0.346) | 0.19030 | (3.180) |
| | CAP | MANU-A | 0.2224 | 0.22288 | 0.207 | 0.22559 | 1.425 | 0.22425 | 0.823 | 0.22964 | 3.246 | 0.22165 | (0.346) | 0.21535 | (3.179) |
| | CAP | UTICON-A | 0.0845 | 0.08470 | 0.201 | 0.08573 | 1.420 | 0.08522 | 0.816 | 0.08727 | 3.241 | 0.08423 | (0.355) | 0.08184 | (3.182) |
| | CAP | TRADE-A | 0.1870 | 0.18737 | 0.203 | 0.18965 | 1.423 | 0.18852 | 0.818 | 0.19306 | 3.246 | 0.18634 | (0.348) | 0.18104 | (3.182) |
| | CAP | SER-A | 0.1152 | 0.11540 | 0.208 | 0.11680 | 1.424 | 0.11611 | 0.825 | 0.11890 | 3.248 | 0.11476 | (0.347) | 0.11150 | (3.178) |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 2029.56 | 0.237 | 2056.86 | 1.586 | 2045.65 | 1.032 | 2102.41 | 3.835 | 2017.62 | (0.353) | 1957.00 | (3.347) |
| | A-HHD | CAP | 2979.23 | 2986.14 | 0.232 | 3024.97 | 1.535 | 3009.13 | 1.004 | 3085.01 | 3.551 | 2968.85 | (0.348) | 2878.63 | (3.377) |
| | G-HHD | LAB | 4254.63 | 4264.71 | 0.237 | 4322.09 | 1.586 | 4298.52 | 1.032 | 4417.80 | 3.835 | 4239.62 | (0.353) | 4112.24 | (3.347) |
| | G-HHD | CAP | 648.94 | 650.44 | 0.232 | 658.90 | 1.535 | 655.45 | 1.004 | 671.98 | 3.551 | 646.68 | (0.348) | 627.03 | (3.377) |
| | N-HHD | LAB | 8300.51 | 8320.17 | 0.237 | 8432.12 | 1.586 | 8386.13 | 1.032 | 8618.84 | 3.835 | 8271.22 | (0.353) | 8022.72 | (3.347) |
| | N-HHD | CAP | 12376.62 | 12405.31 | 0.232 | 12566.62 | 1.535 | 12500.83 | 1.004 | 12816.07 | 3.551 | 12333.50 | (0.348) | 11958.70 | (3.377) |
| | ENT-G | CAP | 1244.96 | 1247.85 | 0.232 | 1264.07 | 1.535 | 1257.45 | 1.004 | 1289.16 | 3.551 | 1240.62 | (0.348) | 1202.92 | (3.377) |
| | ENT-P | CAP | 8979.21 | 9000.03 | 0.232 | 9117.06 | 1.535 | 9069.32 | 1.004 | 9298.03 | 3.551 | 8947.93 | (0.348) | 8676.01 | (3.377) |
| QINV | PRIMA-C | | 155.02 | 153.98 | (0.668) | 149.90 | (3.301) | 149.85 | (3.331) | 146.24 | (5.664) | 156.20 | 0.762 | 168.93 | 8.977 |
| | AINDUS-C | | -241.50 | -239.89 | (0.668) | -233.53 | (3.301) | -233.46 | (3.331) | -227.82 | (5.664) | -243.34 | 0.762 | -263.18 | 8.977 |
| | MANU-C | | 4849.76 | 4817.38 | (0.668) | 4689.69 | (3.301) | 4688.22 | (3.331) | 4575.07 | (5.664) | 4886.72 | 0.762 | 5285.10 | 8.977 |
| | UTICON-C | | 2955.06 | 2935.33 | (0.668) | 2857.53 | (3.301) | 2856.64 | (3.331) | 2787.69 | (5.664) | 2977.58 | 0.762 | 3220.33 | 8.977 |
| | TRADE-C | | 1009.26 | 1002.52 | (0.668) | 975.95 | (3.301) | 975.64 | (3.331) | 952.10 | (5.664) | 1016.95 | 0.762 | 1099.86 | 8.977 |
| | SER-C | | 36.68 | 36.44 | (0.668) | 35.47 | (3.301) | 35.46 | (3.331) | 34.60 | (5.664) | 36.96 | 0.762 | 39.97 | 8.977 |
| YH | A-HHD | | 5316.62 | 5328.71 | 0.227 | 5393.51 | 1.446 | 5368.54 | 0.977 | 5489.26 | 3.247 | 5298.29 | (0.345) | 5142.95 | (3.267) |
| | G-HHD | | 4971.28 | 4982.93 | 0.234 | 5048.52 | 1.554 | 5021.90 | 1.018 | 5155.40 | 3.704 | 4953.85 | (0.351) | 4805.95 | (3.326) |
| | N-HHD | | 21389.80 | 21438.83 | 0.229 | 21709.72 | 1.496 | 21601.65 | 0.990 | 22128.41 | 3.453 | 21315.95 | (0.345) | 20684.67 | (3.297) |
| QH | PRIMA-C | A-HHD | 700.14 | 700.38 | 0.034 | 705.93 | 0.827 | 700.52 | 0.053 | 713.88 | 1.962 | 699.48 | (0.095) | 686.92 | (1.888) |
| | PRIMA-C | G-HHD | 274.35 | 274.47 | 0.041 | 276.91 | 0.933 | 274.61 | 0.095 | 280.97 | 2.413 | 274.08 | (0.100) | 269.01 | (1.948) |
| | PRIMA-C | N-HHD | 1129.02 | 1129.43 | 0.036 | 1138.91 | 0.876 | 1129.78 | 0.067 | 1153.47 | 2.166 | 1127.95 | (0.095) | 1107.36 | (1.919) |
| | AINDUS-C | A-HHD | 1881.42 | 1897.29 | 0.843 | 1895.28 | 0.737 | 1957.49 | 4.043 | 1898.35 | 0.900 | 1860.54 | (1.110) | 1834.82 | (2.477) |
| | AINDUS-C | G-HHD | 920.08 | 927.90 | 0.850 | 927.84 | 0.844 | 957.67 | 4.086 | 932.46 | 1.346 | 909.81 | (1.115) | 896.74 | (2.537) |

| | | | BASE | SIM 5.1 | Δ% | SIM 5.2 | Δ% | SIM 6.1 | Δ% | SIM 6.2 | Δ% | SIM 7.1 | Δ% | SIM 7.2 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3575.24 | 0.845 | 3573.14 | 0.786 | 3689.13 | 4.057 | 3584.32 | 1.101 | 3505.92 | (1.110) | 3456.39 | (2.507) |
| | MANU-C | A-HHD | 1743.73 | 1743.86 | 0.007 | 1812.23 | 3.929 | 1741.96 | (0.101) | 1909.13 | 9.486 | 1742.42 | (0.075) | 1609.02 | (7.725) |
| | MANU-C | G-HHD | 852.75 | 852.87 | 0.014 | 887.19 | 4.039 | 852.24 | (0.060) | 937.76 | 9.970 | 852.06 | (0.081) | 786.39 | (7.782) |
| | MANU-C | N-HHD | 3285.84 | 3286.14 | 0.009 | 3416.59 | 3.979 | 3282.96 | (0.088) | 3604.69 | 9.704 | 3283.35 | (0.076) | 3031.06 | (7.754) |
| | UTICON-C | A-HHD | 97.86 | 97.85 | (0.005) | 99.22 | 1.395 | 97.70 | (0.158) | 101.20 | 3.412 | 97.80 | (0.056) | 95.05 | (2.867) |
| | UTICON-C | G-HHD | 47.86 | 47.86 | 0.002 | 48.58 | 1.502 | 47.81 | (0.117) | 49.72 | 3.870 | 47.83 | (0.062) | 46.46 | (2.926) |
| | UTICON-C | N-HHD | 184.43 | 184.42 | (0.004) | 187.09 | 1.444 | 184.16 | (0.144) | 191.10 | 3.619 | 184.32 | (0.057) | 179.08 | (2.897) |
| | TRADE-C | A-HHD | 347.20 | 347.22 | 0.007 | 349.19 | 0.573 | 347.00 | (0.058) | 350.20 | 0.863 | 347.02 | (0.051) | 341.25 | (1.714) |
| | TRADE-C | G-HHD | 427.95 | 428.01 | 0.014 | 430.86 | 0.680 | 427.88 | (0.016) | 433.55 | 1.309 | 427.71 | (0.057) | 420.36 | (1.774) |
| | TRADE-C | N-HHD | 1656.57 | 1656.72 | 0.009 | 1666.88 | 0.622 | 1655.84 | (0.044) | 1674.20 | 1.064 | 1655.72 | (0.051) | 1627.66 | (1.745) |
| | SER-C | A-HHD | 1147.00 | 1147.39 | 0.034 | 1154.20 | 0.627 | 1147.54 | 0.048 | 1167.84 | 1.817 | 1145.85 | (0.100) | 1133.71 | (1.158) |
| | SER-C | G-HHD | 1413.70 | 1414.29 | 0.042 | 1424.08 | 0.734 | 1414.96 | 0.089 | 1445.76 | 2.268 | 1412.21 | (0.106) | 1396.47 | (1.219) |
| | SER-C | N-HHD | 5472.33 | 5474.32 | 0.036 | 5509.36 | 0.677 | 5475.68 | 0.061 | 5582.90 | 2.021 | 5466.84 | (0.100) | 5407.27 | (1.189) |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1247.85 | 0.232 | 1264.07 | 1.535 | 1257.45 | 1.004 | 1289.16 | 3.551 | 1240.62 | (0.348) | 1202.92 | (3.377) |
| | ENT-P | | 10396.40 | 10419.76 | 0.225 | 10537.07 | 1.353 | 10495.41 | 0.952 | 10687.65 | 2.801 | 10360.36 | (0.347) | 10057.59 | (3.259) |
| ENTSAV | ENT-G | | 902.97 | 905.06 | 0.232 | 916.83 | 1.535 | 912.03 | 1.004 | 935.03 | 3.551 | 899.82 | (0.348) | 872.48 | (3.377) |
| | ENT-P | | 6326.21 | 6341.35 | 0.239 | 6467.30 | 2.230 | 6397.93 | 1.134 | 6753.04 | 6.747 | 6306.18 | (0.317) | 6102.44 | (3.537) |
| QE | PRIMA-C | | 2236.89 | 2242.09 | 0.232 | 2211.52 | (1.134) | 2275.86 | 1.742 | 2043.71 | (8.636) | 2237.18 | 0.013 | 2173.42 | (2.837) |
| | AINDUS-C | | 2909.02 | 2938.99 | 1.030 | 2888.41 | (0.708) | 3420.66 | 17.588 | 2663.91 | (8.426) | 2925.66 | 0.572 | 2773.14 | (4.671) |
| | MANU-C | | 16662.56 | 16618.96 | (0.262) | 16942.34 | 1.679 | 16175.94 | (2.920) | 19025.07 | 14.179 | 16586.36 | (0.457) | 16392.28 | (1.622) |
| | UTICON-C | | 113.66 | 113.28 | (0.331) | 111.91 | (1.542) | 111.32 | (2.059) | 107.64 | (5.297) | 113.87 | 0.186 | 115.81 | 1.889 |
| | TRADE-C | | 2898.91 | 2896.01 | (0.100) | 2870.81 | (0.969) | 2870.78 | (0.970) | 2751.05 | (5.100) | 2895.94 | (0.102) | 2889.73 | (0.317) |
| | SER-C | | 2416.15 | 2416.04 | (0.005) | 2389.51 | (1.102) | 2401.99 | (0.586) | 2261.99 | (6.381) | 2410.00 | (0.255) | 2393.76 | (0.927) |
| PE | PRIMA-C | | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| | AINDUS-C | | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.11 | 10.631 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| | MANU-C | | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 1.04 | 4.010 | 1.00 | (0.409) | 0.97 | (2.677) |
| | UTICON-C | | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| | TRADE-C | | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| | SER-C | | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| QM | PRIMA-C | | 1635.60 | 1639.37 | 0.231 | 1687.33 | 3.163 | 1686.66 | 3.122 | 1954.80 | 19.515 | 1645.97 | 0.634 | 1671.55 | 2.198 |
| | AINDUS-C | | 899.60 | 901.19 | 0.176 | 928.28 | 3.188 | 873.10 | (2.946) | 1066.18 | 18.517 | 756.36 | (15.923) | 912.31 | 1.413 |

| | | BASE | SIM 5.1 | Δ% | SIM 5.2 | Δ% | SIM 6.1 | Δ% | SIM 6.2 | Δ% | SIM 7.1 | Δ% | SIM 7.2 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 14808.08 | (0.116) | 14832.23 | 0.047 | 14803.60 | (0.146) | 15451.31 | 4.223 | 14873.89 | 0.328 | 14214.38 | (4.120) |
| | UTICON-C | 37.90 | 37.82 | (0.208) | 37.95 | 0.132 | 37.78 | (0.313) | 42.64 | 12.509 | 38.12 | 0.571 | 41.54 | 9.593 |
| | TRADE-C | 710.78 | 710.60 | (0.025) | 731.31 | 2.888 | 713.09 | 0.325 | 845.28 | 18.922 | 712.39 | 0.226 | 731.46 | 2.909 |
| | SER-C | 2534.31 | 2534.10 | (0.008) | 2607.56 | 2.890 | 2546.81 | 0.493 | 2941.90 | 16.083 | 2540.65 | 0.250 | 2554.08 | 0.780 |
| PM | PRIMA-C | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| | AINDUS-C | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.09 | 8.872 | 0.97 | (2.677) |
| | MANU-C | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 1.07 | 6.726 |
| | UTICON-C | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| | TRADE-C | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| | SER-C | 1.00 | 1.00 | 0.194 | 1.00 | (0.480) | 1.01 | 0.573 | 0.95 | (5.445) | 1.00 | (0.409) | 0.97 | (2.677) |
| QX | PRIMA-C | 11489.80 | 11516.46 | 0.232 | 11454.45 | (0.308) | 11720.76 | 2.010 | 11070.69 | (3.648) | 11505.21 | 0.134 | 11274.76 | (1.872) |
| | AINDUS-C | 13628.78 | 13744.70 | 0.851 | 13642.21 | 0.099 | 14764.58 | 8.334 | 13185.59 | (3.252) | 13755.47 | 0.930 | 13162.54 | (3.421) |
| | MANU-C | 43263.45 | 43158.87 | (0.242) | 43892.89 | 1.455 | 42162.42 | (2.545) | 47119.21 | 8.912 | 43111.92 | (0.350) | 43966.63 | 1.625 |
| | UTICON-C | 7195.13 | 7173.53 | (0.300) | 7114.09 | (1.126) | 7078.17 | (1.626) | 7114.07 | (1.127) | 7215.42 | 0.282 | 7465.90 | 3.763 |
| | TRADE-C | 16778.46 | 16764.75 | (0.082) | 16772.52 | (0.035) | 16668.69 | (0.654) | 16839.86 | 0.366 | 16774.78 | (0.022) | 16856.65 | 0.466 |
| | SER-C | 21320.57 | 21319.37 | (0.006) | 21306.26 | (0.067) | 21255.89 | (0.303) | 21129.81 | (0.895) | 21294.51 | (0.122) | 21218.06 | (0.481) |
| PX | PRIMA-C | 1.00 | 1.002 | 0.193 | 1.006 | 0.561 | 1.01 | 0.905 | 1.01 | 1.052 | 1.00 | (0.259) | 0.99 | (1.467) |
| | AINDUS-C | 1.00 | 1.000 | (0.029) | 1.005 | 0.532 | 1.00 | (0.143) | 1.01 | 1.279 | 1.00 | 0.033 | 0.99 | (1.079) |
| | MANU-C | 1.00 | 1.002 | 0.219 | 0.992 | (0.754) | 1.01 | 1.060 | 0.98 | (1.951) | 1.00 | (0.276) | 1.01 | 1.355 |
| | UTICON-C | 1.00 | 1.002 | 0.232 | 1.000 | 0.045 | 1.01 | 1.130 | 1.00 | (0.212) | 1.00 | (0.290) | 1.00 | (0.435) |
| | TRADE-C | 1.00 | 1.002 | 0.217 | 1.007 | 0.694 | 1.01 | 0.975 | 1.01 | 1.411 | 1.00 | (0.309) | 0.98 | (1.721) |
| | SER-C | 1.00 | 1.002 | 0.193 | 1.008 | 0.824 | 1.01 | 0.931 | 1.02 | 1.531 | 1.00 | (0.244) | 0.98 | (2.129) |
| QQ | PRIMA-C | 10888.51 | 10913.74 | 0.232 | 10929.85 | 0.380 | 11131.52 | 2.232 | 10964.89 | 0.701 | 10913.99 | 0.234 | 10772.32 | (1.067) |
| | AINDUS-C | 11619.36 | 11706.88 | 0.753 | 11681.78 | 0.537 | 12196.71 | 4.969 | 11574.30 | (0.388) | 11580.29 | (0.336) | 11300.96 | (2.740) |
| | MANU-C | 41426.12 | 41347.98 | (0.189) | 41782.43 | 0.860 | 40789.03 | (1.538) | 43500.28 | 5.007 | 41399.36 | (0.065) | 41761.46 | 0.809 |
| | UTICON-C | 7119.37 | 7098.07 | (0.299) | 7040.13 | (1.113) | 7004.63 | (1.612) | 7048.81 | (0.991) | 7139.67 | 0.285 | 7391.58 | 3.823 |
| | TRADE-C | 14590.33 | 14579.35 | (0.075) | 14632.69 | 0.290 | 14510.96 | (0.544) | 14922.75 | 2.278 | 14591.23 | 0.006 | 14698.16 | 0.739 |
| | SER-C | 21438.73 | 21437.43 | (0.006) | 21523.66 | 0.396 | 21400.66 | (0.178) | 21790.12 | 1.639 | 21425.16 | (0.063) | 21378.26 | (0.282) |
| PQ | PRIMA-C | 1.01 | 1.010 | 0.193 | 1.015 | 0.615 | 1.02 | 0.923 | 1.02 | 1.260 | 1.01 | (0.251) | 0.99 | (1.405) |
| | AINDUS-C | 1.01 | 0.999 | (0.611) | 1.013 | 0.704 | 0.98 | (2.948) | 1.03 | 2.326 | 1.01 | 0.774 | 1.00 | (0.810) |
| | MANU-C | 1.02 | 1.019 | 0.220 | 0.992 | (2.388) | 1.03 | 1.079 | 0.96 | (5.698) | 1.01 | (0.270) | 1.07 | 4.832 |
| | UTICON-C | 1.00 | 1.002 | 0.233 | 1.001 | 0.051 | 1.01 | 1.137 | 1.00 | (0.160) | 1.00 | (0.289) | 1.00 | (0.412) |
| | TRADE-C | 1.00 | 1.002 | 0.220 | 1.009 | 0.868 | 1.01 | 1.035 | 1.02 | 2.364 | 1.00 | (0.294) | 0.98 | (1.579) |
| | SER-C | 1.00 | 1.004 | 0.193 | 1.010 | 0.813 | 1.01 | 0.928 | 1.02 | 1.403 | 1.00 | (0.246) | 0.98 | (2.133) |

| | | | BASE | SIM 5.1 | Δ% | SIM 5.2 | Δ% | SIM 6.1 | Δ% | SIM 6.2 | Δ% | SIM 7.1 | Δ% | SIM 7.2 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 9274.37 | 0.232 | 9242.81 | (0.109) | 9444.89 | 2.075 | 9022.59 | (2.489) | 9268.02 | 0.163 | 9101.17 | (1.640) |
| | AINDUS-C | | 10719.76 | 10805.70 | 0.802 | 10753.65 | 0.316 | 11324.99 | 5.646 | 10515.42 | (1.906) | 10829.78 | 1.026 | 10389.03 | (3.085) |
| | MANU-C | | 26600.89 | 26539.91 | (0.229) | 26950.47 | 1.314 | 25986.24 | (2.311) | 28049.21 | 5.445 | 26525.54 | (0.283) | 27557.22 | 3.595 |
| | UTICON-C | | 7081.47 | 7060.25 | (0.300) | 7002.18 | (1.120) | 6966.85 | (1.619) | 7006.31 | (1.061) | 7101.55 | 0.284 | 7350.07 | 3.793 |
| | TRADE-C | | 13879.55 | 13868.74 | (0.078) | 13901.51 | 0.158 | 13797.89 | (0.588) | 14082.40 | 1.461 | 13878.84 | (0.005) | 13966.79 | 0.629 |
| | SER-C | | 18904.42 | 18903.33 | (0.006) | 18916.56 | 0.064 | 18853.88 | (0.267) | 18862.71 | (0.221) | 18884.51 | (0.105) | 18824.26 | (0.424) |
| PD | PRIMA-C | | 1.00 | 1.002 | 0.193 | 1.008 | 0.811 | 1.01 | 0.985 | 1.03 | 2.573 | 1.00 | (0.222) | 0.99 | (1.176) |
| | AINDUS-C | | 1.00 | 0.999 | (0.089) | 1.008 | 0.805 | 0.97 | (3.231) | 1.03 | 3.043 | 1.00 | 0.153 | 0.99 | (0.649) |
| | MANU-C | | 1.00 | 1.002 | 0.235 | 0.991 | (0.926) | 1.01 | 1.364 | 0.94 | (5.838) | 1.00 | (0.192) | 1.04 | 3.816 |
| | UTICON-C | | 1.00 | 1.002 | 0.233 | 1.001 | 0.054 | 1.01 | 1.139 | 1.00 | (0.130) | 1.00 | (0.288) | 1.00 | (0.399) |
| | TRADE-C | | 1.00 | 1.002 | 0.222 | 1.009 | 0.938 | 1.01 | 1.059 | 1.03 | 2.797 | 1.00 | (0.288) | 0.98 | (1.522) |
| | SER-C | | 1.00 | 1.002 | 0.193 | 1.010 | 0.989 | 1.01 | 0.976 | 1.02 | 2.395 | 1.00 | (0.223) | 0.98 | (2.060) |
| QA | PRIMA-A | | 11489.80 | 11516.46 | 0.232 | 11454.45 | (0.308) | 11720.76 | 2.010 | 11070.69 | (3.648) | 11505.21 | 0.134 | 11274.76 | (1.872) |
| | AINDUS-A | | 13628.78 | 13744.70 | 0.851 | 13642.21 | 0.099 | 14764.58 | 8.334 | 13185.59 | (3.252) | 13755.47 | 0.930 | 13162.54 | (3.421) |
| | MANU-A | | 43263.45 | 43158.87 | (0.242) | 43892.89 | 1.455 | 42162.42 | (2.545) | 47119.21 | 8.912 | 43111.92 | (0.350) | 43966.63 | 1.625 |
| | UTICON-A | | 7195.13 | 7173.53 | (0.300) | 7114.09 | (1.126) | 7078.17 | (1.626) | 7114.07 | (1.127) | 7215.42 | 0.282 | 7465.90 | 3.763 |
| | TRADE-A | | 16778.46 | 16764.75 | (0.082) | 16772.52 | (0.035) | 16668.69 | (0.654) | 16839.86 | 0.366 | 16774.78 | (0.022) | 16856.65 | 0.466 |
| | SER-A | | 21320.57 | 21319.37 | (0.006) | 21306.26 | (0.067) | 21255.89 | (0.303) | 21129.81 | (0.895) | 21294.51 | (0.122) | 21218.06 | (0.481) |
| PA | PRIMA-A | | 1.00 | 1.00 | 0.193 | 1.01 | 0.561 | 1.01 | 0.905 | 1.01 | 1.052 | 1.00 | (0.259) | 0.99 | (1.467) |
| | AINDUS-A | | 1.00 | 1.00 | (0.029) | 1.01 | 0.532 | 1.00 | (0.143) | 1.01 | 1.279 | 1.00 | 0.033 | 0.99 | (1.079) |
| | MANU-A | | 1.00 | 1.00 | 0.219 | 0.99 | (0.754) | 1.01 | 1.060 | 0.98 | (1.951) | 1.00 | (0.276) | 1.01 | 1.355 |
| | UTICON-A | | 1.00 | 1.00 | 0.232 | 1.00 | 0.045 | 1.01 | 1.130 | 1.00 | (0.212) | 1.00 | (0.290) | 1.00 | (0.435) |
| | TRADE-A | | 1.00 | 1.00 | 0.217 | 1.01 | 0.694 | 1.01 | 0.975 | 1.01 | 1.411 | 1.00 | (0.309) | 0.98 | (1.721) |
| | SER-A | | 1.00 | 1.00 | 0.193 | 1.01 | 0.824 | 1.01 | 0.931 | 1.02 | 1.531 | 1.00 | (0.244) | 0.98 | (2.129) |
| PVA | PRIMA-A | | 0.53 | 0.53 | 0.240 | 0.54 | 1.396 | 0.54 | 1.105 | 0.55 | 2.799 | 0.53 | (0.328) | 0.51 | (3.427) |
| | AINDUS-A | | 0.17 | 0.17 | 0.251 | 0.17 | 1.388 | 0.17 | 1.202 | 0.17 | 2.644 | 0.17 | (0.323) | 0.16 | (3.511) |
| | MANU-A | | 0.20 | 0.20 | 0.251 | 0.20 | 1.388 | 0.20 | 1.203 | 0.20 | 2.641 | 0.20 | (0.321) | 0.19 | (3.514) |
| | UTICON-A | | 0.39 | 0.39 | 0.258 | 0.39 | 1.378 | 0.39 | 1.264 | 0.40 | 2.543 | 0.39 | (0.318) | 0.37 | (3.569) |
| | TRADE-A | | 0.58 | 0.58 | 0.223 | 0.59 | 1.412 | 0.58 | 0.949 | 0.60 | 3.045 | 0.58 | (0.339) | 0.56 | (3.290) |
| | SER-A | | 0.57 | 0.57 | 0.252 | 0.57 | 1.383 | 0.57 | 1.225 | 0.58 | 2.608 | 0.56 | (0.321) | 0.55 | (3.533) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 919.82 | 0.232 | 914.86 | (0.308) | 936.13 | 2.010 | 884.21 | (3.648) | 918.92 | 0.134 | 900.51 | (1.872) |
| | PRIMA-C | AINDUS-A | 3594.75 | 3625.33 | 0.851 | 3598.29 | 0.099 | 3894.33 | 8.334 | 3477.85 | (3.252) | 3628.17 | 0.930 | 3471.77 | (3.421) |
| | PRIMA-C | MANU-A | 2330.82 | 2325.19 | (0.242) | 2364.73 | 1.455 | 2271.50 | (2.545) | 2538.55 | 8.912 | 2322.66 | (0.350) | 2368.71 | 1.625 |
| | PRIMA-C | UTICON-A | 492.64 | 491.16 | (0.300) | 487.09 | (1.126) | 484.63 | (1.626) | 487.09 | (1.127) | 494.03 | 0.282 | 511.18 | 3.763 |

| | | | BASE | SIM 5.1 | Δ% | SIM 5.2 | Δ% | SIM 6.1 | Δ% | SIM 6.2 | Δ% | SIM 7.1 | Δ% | SIM 7.2 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.42 | (0.082) | 3.42 | (0.036) | 3.40 | (0.654) | 3.43 | 0.366 | 3.42 | (0.022) | 3.44 | 0.466 |
| | PRIMA-C | SER-A | 1282.41 | 1282.34 | (0.006) | 1281.55 | (0.067) | 1278.52 | (0.303) | 1270.94 | (0.895) | 1280.85 | (0.122) | 1276.25 | (0.481) |
| | AINDUS-C | PRIMA-A | 457.75 | 458.81 | 0.232 | 456.34 | (0.308) | 466.95 | 2.010 | 441.05 | (3.648) | 458.36 | 0.134 | 449.18 | (1.872) |
| | AINDUS-C | AINDUS-A | 3741.97 | 3773.80 | 0.851 | 3745.66 | 0.099 | 4053.82 | 8.334 | 3620.29 | (3.252) | 3776.76 | 0.930 | 3613.96 | (3.421) |
| | AINDUS-C | MANU-A | 233.97 | 233.40 | (0.242) | 237.37 | 1.455 | 228.02 | (2.545) | 254.82 | 8.912 | 233.15 | (0.350) | 237.77 | 1.625 |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.64 | (0.082) | 7.65 | (0.035) | 7.60 | (0.654) | 7.68 | 0.366 | 7.65 | (0.022) | 7.68 | 0.466 |
| | AINDUS-C | SER-A | 1072.20 | 1072.14 | (0.006) | 1071.48 | (0.067) | 1068.94 | (0.303) | 1062.60 | (0.895) | 1070.89 | (0.122) | 1067.04 | (0.481) |
| | MANU-C | PRIMA-A | 1872.79 | 1877.13 | 0.232 | 1867.02 | (0.308) | 1910.43 | 2.010 | 1804.47 | (3.648) | 1875.30 | 0.134 | 1837.74 | (1.872) |
| | MANU-C | AINDUS-A | 1100.51 | 1109.87 | 0.851 | 1101.60 | 0.099 | 1192.23 | 8.334 | 1064.73 | (3.252) | 1110.74 | 0.930 | 1062.86 | (3.421) |
| | MANU-C | MANU-A | 21464.91 | 21413.02 | (0.242) | 21777.21 | 1.455 | 20918.64 | (2.545) | 23377.92 | 8.912 | 21389.73 | (0.350) | 21813.79 | 1.625 |
| | MANU-C | UTICON-A | 2040.52 | 2034.40 | (0.300) | 2017.54 | (1.126) | 2007.35 | (1.626) | 2017.53 | (1.127) | 2046.28 | 0.282 | 2117.31 | 3.763 |
| | MANU-C | TRADE-A | 2334.07 | 2332.16 | (0.082) | 2333.24 | (0.035) | 2318.79 | (0.654) | 2342.61 | 0.366 | 2333.55 | (0.022) | 2344.94 | 0.466 |
| | MANU-C | SER-A | 1663.74 | 1663.64 | (0.006) | 1662.62 | (0.067) | 1658.69 | (0.303) | 1648.85 | (0.895) | 1661.70 | (0.122) | 1655.74 | (0.481) |
| | UTICON-C | PRIMA-A | 210.22 | 210.71 | 0.232 | 209.58 | (0.308) | 214.45 | 2.010 | 202.55 | (3.648) | 210.50 | 0.134 | 206.29 | (1.872) |
| | UTICON-C | AINDUS-A | 301.60 | 304.17 | 0.851 | 301.90 | 0.099 | 326.74 | 8.334 | 291.79 | (3.252) | 304.40 | 0.930 | 291.28 | (3.421) |
| | UTICON-C | MANU-A | 1306.30 | 1303.14 | (0.242) | 1325.30 | 1.455 | 1273.05 | (2.545) | 1422.72 | 8.912 | 1301.72 | (0.350) | 1327.53 | 1.625 |
| | UTICON-C | UTICON-A | 369.25 | 368.14 | (0.300) | 365.09 | (1.126) | 363.25 | (1.626) | 365.09 | (1.127) | 370.29 | 0.282 | 383.15 | 3.763 |
| | UTICON-C | TRADE-A | 336.12 | 335.84 | (0.082) | 336.00 | (0.035) | 333.92 | (0.654) | 337.35 | 0.366 | 336.04 | (0.022) | 337.68 | 0.466 |
| | UTICON-C | SER-A | 1237.04 | 1236.97 | (0.006) | 1236.21 | (0.067) | 1233.29 | (0.303) | 1225.97 | (0.895) | 1235.53 | (0.122) | 1231.09 | (0.481) |
| | TRADE-C | PRIMA-A | 1059.51 | 1061.97 | 0.232 | 1056.25 | (0.308) | 1080.81 | 2.010 | 1020.86 | (3.648) | 1060.93 | 0.134 | 1039.68 | (1.872) |
| | TRADE-C | AINDUS-A | 1105.89 | 1115.30 | 0.851 | 1106.98 | 0.099 | 1198.05 | 8.334 | 1069.93 | (3.252) | 1116.17 | 0.930 | 1068.06 | (3.421) |
| | TRADE-C | MANU-A | 5085.91 | 5073.62 | (0.242) | 5159.91 | 1.455 | 4956.48 | (2.545) | 5539.18 | 8.912 | 5068.10 | (0.350) | 5168.57 | 1.625 |
| | TRADE-C | UTICON-A | 882.07 | 879.42 | (0.300) | 872.13 | (1.126) | 867.73 | (1.626) | 872.13 | (1.127) | 884.56 | 0.282 | 915.26 | 3.763 |
| | TRADE-C | TRADE-A | 1621.83 | 1620.51 | (0.082) | 1621.26 | (0.035) | 1611.22 | (0.654) | 1627.76 | 0.366 | 1621.47 | (0.022) | 1629.39 | 0.466 |
| | TRADE-C | SER-A | 1262.78 | 1262.71 | (0.006) | 1261.93 | (0.067) | 1258.95 | (0.303) | 1251.48 | (0.895) | 1261.24 | (0.122) | 1256.71 | (0.481) |
| | SER-C | PRIMA-A | 667.53 | 669.08 | 0.232 | 665.48 | (0.308) | 680.95 | 2.010 | 643.18 | (3.648) | 668.43 | 0.134 | 655.04 | (1.872) |
| | SER-C | AINDUS-A | 521.52 | 525.95 | 0.851 | 522.03 | 0.099 | 564.98 | 8.334 | 504.56 | (3.252) | 526.36 | 0.930 | 503.68 | (3.421) |
| | SER-C | MANU-A | 2753.93 | 2747.27 | (0.242) | 2794.00 | 1.455 | 2683.84 | (2.545) | 2999.37 | 8.912 | 2744.28 | (0.350) | 2798.69 | 1.625 |
| | SER-C | UTICON-A | 423.34 | 422.07 | (0.300) | 418.57 | (1.126) | 416.46 | (1.626) | 418.57 | (1.127) | 424.53 | 0.282 | 439.27 | 3.763 |
| | SER-C | TRADE-A | 2407.69 | 2405.73 | (0.082) | 2406.84 | (0.035) | 2391.94 | (0.654) | 2416.51 | 0.366 | 2407.17 | (0.022) | 2418.92 | 0.466 |
| | SER-C | SER-A | 2031.46 | 2031.34 | (0.006) | 2030.09 | (0.067) | 2025.29 | (0.303) | 2013.28 | (0.895) | 2028.97 | (0.122) | 2021.69 | (0.481) |

# Results of Simulations 8.1-8.6

| | | | BASE | SIM 8.1 | Δ% | SIM 8.2 | Δ% | SIM 8.3 | Δ% | SIM 8.4 | Δ% | SIM 8.5 | Δ% | SIM 8.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 46358.61 | (0.001) | 46359.27 | 0.000 | 46366.89 | 0.016 | 46356.03 | (0.007) | 46355.92 | (0.007) | 46266.55 | (0.200) |
| | PRVCON | | 25292.80 | 25292.50 | (0.001) | 25292.80 | (0.000) | 25295.83 | 0.012 | 25291.64 | (0.005) | 25290.59 | (0.009) | 25287.25 | (0.022) |
| | GOVCON | | 5007.05 | 5009.15 | 0.042 | 5007.19 | 0.003 | 5062.34 | 1.104 | 5025.46 | 0.368 | 5039.84 | 0.655 | 6149.62 | 22.819 |
| | INVEST | | 8845.28 | 8842.81 | (0.028) | 8845.15 | (0.001) | 8794.77 | (0.571) | 8824.70 | (0.233) | 8811.41 | (0.383) | 7607.26 | (13.996) |
| | EXP | | 27237.19 | 27236.33 | (0.003) | 27237.16 | (0.000) | 27254.61 | 0.064 | 27230.39 | (0.025) | 27223.25 | (0.051) | 26809.10 | (1.572) |
| | IMP | | -20023.05 | -20022.18 | (0.004) | -20023.03 | (0.000) | -20040.67 | 0.088 | -20016.15 | (0.034) | -20009.16 | (0.069) | -19586.68 | (2.179) |
| | NITAX | | 4756.36 | 4756.20 | (0.003) | 4756.37 | 0.000 | 4758.90 | 0.053 | 4755.56 | (0.017) | 4754.14 | (0.047) | 4707.17 | (1.034) |
| | GDPFC | | 41602.91 | 41602.41 | (0.001) | 41602.90 | (0.000) | 41607.98 | 0.012 | 41600.47 | (0.006) | 41601.78 | (0.003) | 41559.38 | (0.105) |
| | GDPMP2 | | 46359.27 | 46358.61 | (0.001) | 46359.27 | 0.000 | 46366.89 | 0.016 | 46356.03 | (0.007) | 46355.92 | (0.007) | 46266.55 | (0.200) |
| YG | | | 8524.54 | 8524.34 | (0.002) | 8524.55 | 0.000 | 8527.48 | 0.035 | 8523.50 | (0.012) | 8522.45 | (0.025) | 8469.30 | (0.648) |
| EG | | | 5710.03 | 5712.13 | 0.037 | 5710.17 | 0.002 | 5765.32 | 0.968 | 5728.44 | 0.322 | 5742.82 | 0.574 | 6852.61 | 20.010 |
| IADJ | | | 1.00 | 1.00 | (0.028) | 1.00 | (0.001) | 0.99 | (0.571) | 1.00 | (0.233) | 1.00 | (0.383) | 0.86 | (14.000) |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| YF | LAB | | 14579.90 | 14579.71 | (0.001) | 14579.90 | (0.000) | 14581.89 | 0.014 | 14579.84 | (0.000) | 14574.76 | (0.035) | 14624.16 | 0.304 |
| | CAP | | 27023.01 | 27022.71 | (0.001) | 27023.01 | (0.000) | 27026.09 | 0.011 | 27020.64 | (0.009) | 27027.02 | 0.015 | 26935.22 | (0.325) |
| QF | LAB | PRIMA-A | 139410.00 | 139427.07 | 0.012 | 139410.44 | 0.000 | 139424.27 | 0.010 | 139406.25 | (0.003) | 139371.47 | (0.028) | 139517.92 | 0.077 |
| | LAB | AINDUS-A | 8490.00 | 8489.65 | (0.004) | 8490.14 | 0.002 | 8492.03 | 0.024 | 8490.36 | 0.004 | 8490.92 | 0.011 | 8601.03 | 1.308 |
| | LAB | MANU-A | 33960.00 | 33955.98 | (0.012) | 33959.82 | (0.001) | 33993.52 | 0.099 | 33947.27 | (0.037) | 33929.60 | (0.090) | 32901.71 | (3.116) |
| | LAB | UTICON-A | 18220.00 | 18216.74 | (0.018) | 18219.86 | (0.001) | 18177.83 | (0.231) | 18249.60 | 0.162 | 18188.92 | (0.171) | 17177.24 | (5.723) |
| | LAB | TRADE-A | 51750.00 | 51744.16 | (0.011) | 51749.84 | (0.000) | 51739.10 | (0.021) | 51739.12 | (0.021) | 51844.40 | 0.182 | 50770.40 | (1.893) |
| | LAB | SER-A | 54200.00 | 54196.40 | (0.007) | 54199.91 | (0.000) | 54203.25 | 0.006 | 54197.40 | (0.005) | 54204.68 | 0.009 | 57061.70 | 5.280 |
| | CAP | PRIMA-A | 12315.48 | 12318.01 | 0.021 | 12315.54 | 0.001 | 12318.25 | 0.023 | 12314.64 | (0.007) | 12309.41 | (0.049) | 12274.53 | (0.333) |
| | CAP | AINDUS-A | 6718.35 | 6718.63 | 0.004 | 6718.47 | 0.002 | 6720.79 | 0.036 | 6718.36 | 0.000 | 6717.62 | (0.011) | 6778.33 | 0.893 |
| | CAP | MANU-A | 22491.87 | 22491.07 | (0.004) | 22491.80 | (0.000) | 22516.83 | 0.111 | 22482.51 | (0.042) | 22466.86 | (0.111) | 21701.70 | (3.513) |
| | CAP | UTICON-A | 16829.92 | 16828.30 | (0.010) | 16829.83 | (0.001) | 16793.03 | (0.219) | 16856.56 | 0.158 | 16797.57 | (0.192) | 15801.72 | (6.109) |
| | CAP | TRADE-A | 44663.41 | 44662.07 | (0.003) | 44663.36 | (0.000) | 44659.48 | (0.009) | 44652.17 | (0.025) | 44735.18 | 0.161 | 43638.48 | (2.295) |
| | CAP | SER-A | 58248.63 | 58249.58 | 0.002 | 58248.65 | 0.000 | 58259.27 | 0.018 | 58243.42 | (0.009) | 58241.02 | (0.013) | 61072.90 | 4.849 |
| WF | LAB | | 0.05 | 0.05 | - | 0.05 | - | 0.05 | 0.021 | 0.05 | - | 0.05 | - | 0.05 | (0.252) |
| | CAP | | 0.17 | 0.17 | (0.006) | 0.17 | - | 0.17 | (0.006) | 0.17 | - | 0.17 | 0.006 | 0.17 | 0.161 |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01368 | 0.006 | 0.01368 | 0.006 | 0.01368 | 0.027 | 0.01368 | 0.006 | 0.01368 | 0.006 | 0.01365 | (0.246) |
| | LAB | AINDUS-A | 0.1128 | 0.11282 | (0.001) | 0.11282 | (0.001) | 0.11284 | 0.020 | 0.11282 | (0.001) | 0.11282 | (0.001) | 0.11253 | (0.253) |

| | | | BASE | SIM 8.1 | Δ% | SIM 8.2 | Δ% | SIM 8.3 | Δ% | SIM 8.4 | Δ% | SIM 8.5 | Δ% | SIM 8.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | MANU-A | 0.1069 | 0.10685 | (0.007) | 0.10685 | (0.007) | 0.10688 | 0.014 | 0.10685 | (0.007) | 0.10685 | (0.007) | 0.10658 | (0.259) |
| | LAB | UTICON-A | 0.0747 | 0.07471 | (0.003) | 0.07471 | (0.003) | 0.07472 | 0.018 | 0.07471 | (0.003) | 0.07471 | (0.003) | 0.07452 | (0.254) |
| | LAB | TRADE-A | 0.0262 | 0.02623 | 0.009 | 0.02623 | 0.009 | 0.02624 | 0.030 | 0.02623 | 0.009 | 0.02623 | 0.009 | 0.02617 | (0.242) |
| | LAB | SER-A | 0.0990 | 0.09902 | (0.001) | 0.09902 | (0.001) | 0.09904 | 0.020 | 0.09902 | (0.001) | 0.09902 | (0.001) | 0.09877 | (0.253) |
| | CAP | PRIMA-A | 0.3425 | 0.34246 | (0.003) | 0.34248 | 0.003 | 0.34246 | (0.003) | 0.34248 | 0.003 | 0.34250 | 0.009 | 0.34303 | 0.164 |
| | CAP | AINDUS-A | 0.1966 | 0.19654 | (0.004) | 0.19655 | 0.002 | 0.19654 | (0.004) | 0.19655 | 0.002 | 0.19657 | 0.008 | 0.19687 | 0.163 |
| | CAP | MANU-A | 0.2224 | 0.22241 | (0.003) | 0.22243 | 0.003 | 0.22241 | (0.003) | 0.22243 | 0.003 | 0.22244 | 0.009 | 0.22279 | 0.164 |
| | CAP | UTICON-A | 0.0845 | 0.08453 | (0.005) | 0.08453 | 0.001 | 0.08453 | (0.005) | 0.08453 | 0.001 | 0.08454 | 0.007 | 0.08467 | 0.162 |
| | CAP | TRADE-A | 0.1870 | 0.18698 | (0.005) | 0.18699 | 0.001 | 0.18698 | (0.005) | 0.18699 | 0.001 | 0.18700 | 0.007 | 0.18729 | 0.162 |
| | CAP | SER-A | 0.1152 | 0.11516 | (0.002) | 0.11516 | 0.004 | 0.11516 | (0.002) | 0.11516 | 0.004 | 0.11517 | 0.010 | 0.11535 | 0.165 |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 2024.73 | (0.001) | 2024.76 | (0.000) | 2025.04 | 0.014 | 2024.75 | (0.000) | 2024.05 | (0.035) | 2030.91 | 0.304 |
| | A-HHD | CAP | 2979.23 | 2979.20 | (0.001) | 2979.23 | (0.000) | 2979.57 | 0.011 | 2978.97 | (0.009) | 2979.67 | 0.015 | 2969.55 | (0.325) |
| | G-HHD | LAB | 4254.63 | 4254.57 | (0.001) | 4254.63 | (0.000) | 4255.21 | 0.014 | 4254.61 | (0.000) | 4253.13 | (0.035) | 4267.55 | 0.304 |
| | G-HHD | CAP | 648.94 | 648.93 | (0.001) | 648.94 | (0.000) | 649.01 | 0.011 | 648.88 | (0.009) | 649.04 | 0.015 | 646.83 | (0.325) |
| | N-HHD | LAB | 8300.51 | 8300.40 | (0.001) | 8300.51 | (0.000) | 8301.65 | 0.014 | 8300.47 | (0.000) | 8297.58 | (0.035) | 8325.71 | 0.304 |
| | N-HHD | CAP | 12376.62 | 12376.48 | (0.001) | 12376.62 | (0.000) | 12378.03 | 0.011 | 12375.53 | (0.009) | 12378.46 | 0.015 | 12336.41 | (0.325) |
| | ENT-G | CAP | 1244.96 | 1244.95 | (0.001) | 1244.96 | (0.000) | 1245.10 | 0.011 | 1244.85 | (0.009) | 1245.14 | 0.015 | 1240.92 | (0.325) |
| | ENT-P | CAP | 8979.21 | 8979.11 | (0.001) | 8979.21 | (0.000) | 8980.23 | 0.011 | 8978.42 | (0.009) | 8980.54 | 0.015 | 8950.04 | (0.325) |
| QINV | PRIMA-C | | 155.02 | 154.97 | (0.028) | 155.01 | (0.001) | 154.13 | (0.571) | 154.65 | (0.233) | 154.42 | (0.383) | 133.31 | (14.000) |
| | AINDUS-C | | -241.50 | -241.43 | (0.028) | -241.50 | (0.001) | -240.12 | (0.571) | -240.94 | (0.233) | -240.57 | (0.383) | -207.69 | (14.000) |
| | MANU-C | | 4849.76 | 4848.41 | (0.028) | 4849.69 | (0.001) | 4822.08 | (0.571) | 4838.48 | (0.233) | 4831.19 | (0.383) | 4170.80 | (14.000) |
| | UTICON-C | | 2955.06 | 2954.24 | (0.028) | 2955.02 | (0.001) | 2938.19 | (0.571) | 2948.19 | (0.233) | 2943.75 | (0.383) | 2541.36 | (14.000) |
| | TRADE-C | | 1009.26 | 1008.98 | (0.028) | 1009.25 | (0.001) | 1003.50 | (0.571) | 1006.91 | (0.233) | 1005.40 | (0.383) | 867.96 | (14.000) |
| | SER-C | | 36.68 | 36.67 | (0.028) | 36.68 | (0.001) | 36.47 | (0.571) | 36.60 | (0.233) | 36.54 | (0.383) | 31.55 | (14.000) |
| YH | A-HHD | | 5316.62 | 5316.56 | (0.001) | 5316.62 | (0.000) | 5317.23 | 0.011 | 5316.35 | (0.005) | 5316.35 | (0.005) | 5313.32 | (0.062) |
| | G-HHD | | 4971.28 | 4971.22 | (0.001) | 4971.28 | (0.000) | 4971.93 | 0.013 | 4971.20 | (0.002) | 4969.88 | (0.028) | 4982.13 | 0.218 |
| | N-HHD | | 21389.80 | 21389.55 | (0.001) | 21389.80 | (0.000) | 21392.34 | 0.012 | 21388.68 | (0.005) | 21388.71 | (0.005) | 21375.20 | (0.068) |
| QH | PRIMA-C | A-HHD | 700.14 | 700.14 | (0.001) | 700.14 | (0.000) | 700.23 | 0.012 | 700.11 | (0.005) | 700.10 | (0.006) | 699.58 | (0.081) |
| | PRIMA-C | G-HHD | 274.35 | 274.35 | (0.001) | 274.35 | (0.000) | 274.39 | 0.014 | 274.35 | (0.002) | 274.27 | (0.029) | 274.90 | 0.199 |
| | PRIMA-C | N-HHD | 1129.02 | 1129.01 | (0.001) | 1129.02 | (0.000) | 1129.16 | 0.012 | 1128.96 | (0.005) | 1128.96 | (0.006) | 1128.04 | (0.087) |
| | AINDUS-C | A-HHD | 1881.42 | 1881.40 | (0.001) | 1881.42 | (0.000) | 1881.63 | 0.011 | 1881.33 | (0.005) | 1881.32 | (0.005) | 1880.56 | (0.046) |
| | AINDUS-C | G-HHD | 920.08 | 920.07 | (0.001) | 920.08 | (0.000) | 920.20 | 0.013 | 920.07 | (0.001) | 919.82 | (0.029) | 922.24 | 0.235 |

| | | | BASE | SIM 8.1 | Δ% | SIM 8.2 | Δ% | SIM 8.3 | Δ% | SIM 8.4 | Δ% | SIM 8.5 | Δ% | SIM 8.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3545.24 | (0.001) | 3545.28 | (0.000) | 3545.69 | 0.011 | 3545.10 | (0.005) | 3545.09 | (0.005) | 3543.44 | (0.052) |
| | MANU-C | A-HHD | 1743.73 | 1743.71 | (0.001) | 1743.73 | (0.000) | 1743.93 | 0.011 | 1743.64 | (0.005) | 1743.64 | (0.005) | 1742.65 | (0.062) |
| | MANU-C | G-HHD | 852.75 | 852.74 | (0.001) | 852.75 | (0.000) | 852.86 | 0.013 | 852.73 | (0.002) | 852.51 | (0.028) | 854.61 | 0.219 |
| | MANU-C | N-HHD | 3285.84 | 3285.80 | (0.001) | 3285.84 | (0.000) | 3286.23 | 0.012 | 3285.67 | (0.005) | 3285.67 | (0.005) | 3283.60 | (0.068) |
| | UTICON-C | A-HHD | 97.86 | 97.86 | (0.002) | 97.86 | (0.000) | 97.87 | 0.011 | 97.85 | (0.005) | 97.85 | (0.004) | 97.81 | (0.053) |
| | UTICON-C | G-HHD | 47.86 | 47.86 | (0.002) | 47.86 | (0.000) | 47.87 | 0.013 | 47.86 | (0.001) | 47.85 | (0.027) | 47.97 | 0.228 |
| | UTICON-C | N-HHD | 184.43 | 184.42 | (0.002) | 184.43 | (0.000) | 184.45 | 0.012 | 184.42 | (0.005) | 184.42 | (0.004) | 184.32 | (0.059) |
| | TRADE-C | A-HHD | 347.20 | 347.20 | 0.000 | 347.20 | 0.000 | 347.25 | 0.013 | 347.18 | (0.006) | 347.17 | (0.008) | 346.78 | (0.120) |
| | TRADE-C | G-HHD | 427.95 | 427.95 | (0.000) | 427.95 | 0.000 | 428.01 | 0.015 | 427.94 | (0.002) | 427.82 | (0.031) | 428.63 | 0.160 |
| | TRADE-C | N-HHD | 1656.57 | 1656.57 | 0.000 | 1656.57 | 0.000 | 1656.80 | 0.014 | 1656.47 | (0.006) | 1656.43 | (0.008) | 1654.47 | (0.127) |
| | SER-C | A-HHD | 1147.00 | 1146.98 | (0.002) | 1147.00 | (0.000) | 1147.13 | 0.011 | 1146.94 | (0.005) | 1146.95 | (0.004) | 1146.39 | (0.053) |
| | SER-C | G-HHD | 1413.70 | 1413.68 | (0.002) | 1413.70 | (0.000) | 1413.88 | 0.013 | 1413.68 | (0.001) | 1413.32 | (0.027) | 1416.91 | 0.227 |
| | SER-C | N-HHD | 5472.33 | 5472.24 | (0.002) | 5472.33 | (0.000) | 5472.96 | 0.012 | 5472.05 | (0.005) | 5472.12 | (0.004) | 5469.09 | (0.059) |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1244.95 | (0.001) | 1244.96 | (0.000) | 1245.10 | 0.011 | 1244.85 | (0.009) | 1245.14 | 0.015 | 1240.92 | (0.325) |
| | ENT-P | | 10396.40 | 10396.30 | (0.001) | 10396.40 | (0.000) | 10397.46 | 0.010 | 10395.60 | (0.008) | 10397.67 | 0.012 | 10368.24 | (0.271) |
| ENTSAV | ENT-G | | 902.97 | 902.96 | (0.001) | 902.97 | (0.000) | 903.07 | 0.011 | 902.89 | (0.009) | 903.10 | 0.015 | 900.04 | (0.325) |
| | ENT-P | | 6326.21 | 6326.11 | (0.002) | 6326.21 | (0.000) | 6327.24 | 0.016 | 6325.46 | (0.012) | 6327.38 | 0.018 | 6297.40 | (0.455) |
| QE | PRIMA-C | | 2236.89 | 2237.30 | 0.018 | 2236.90 | 0.000 | 2237.27 | 0.017 | 2236.78 | (0.005) | 2235.91 | (0.044) | 2233.93 | (0.132) |
| | AINDUS-C | | 2909.02 | 2909.04 | 0.001 | 2909.07 | 0.002 | 2909.86 | 0.029 | 2909.10 | 0.003 | 2908.95 | (0.002) | 2942.69 | 1.157 |
| | MANU-C | | 16662.56 | 16661.40 | (0.007) | 16662.49 | (0.000) | 16679.84 | 0.104 | 16656.08 | (0.039) | 16645.47 | (0.103) | 16119.13 | (3.261) |
| | UTICON-C | | 113.66 | 113.64 | (0.014) | 113.66 | (0.001) | 113.40 | (0.228) | 113.84 | 0.161 | 113.45 | (0.181) | 107.04 | (5.828) |
| | TRADE-C | | 2898.91 | 2898.82 | (0.003) | 2898.91 | (0.000) | 2898.59 | (0.011) | 2898.21 | (0.024) | 2903.58 | 0.161 | 2835.12 | (2.200) |
| | SER-C | | 2416.15 | 2416.09 | (0.002) | 2416.15 | (0.000) | 2416.40 | 0.010 | 2416.01 | (0.006) | 2416.08 | (0.003) | 2540.45 | 5.145 |
| PE | PRIMA-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | AINDUS-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | MANU-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | UTICON-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | TRADE-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | SER-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| QM | PRIMA-C | | 1635.60 | 1635.87 | 0.017 | 1635.61 | 0.001 | 1636.02 | 0.026 | 1635.45 | (0.009) | 1634.97 | (0.038) | 1627.36 | (0.504) |
| | AINDUS-C | | 899.60 | 899.60 | 0.000 | 899.62 | 0.002 | 899.95 | 0.039 | 899.58 | (0.002) | 899.61 | 0.001 | 906.14 | 0.727 |

| | | BASE | SIM 8.1 | Δ% | SIM 8.2 | Δ% | SIM 8.3 | Δ% | SIM 8.4 | Δ% | SIM 8.5 | Δ% | SIM 8.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 14824.11 | (0.008) | 14825.19 | (0.000) | 14842.90 | 0.119 | 14818.38 | (0.046) | 14810.56 | (0.099) | 14249.61 | (3.883) |
| | UTICON-C | 37.90 | 37.90 | (0.013) | 37.90 | (0.001) | 37.82 | (0.218) | 37.96 | 0.157 | 37.83 | (0.182) | 35.55 | (6.197) |
| | TRADE-C | 710.78 | 710.73 | (0.007) | 710.78 | (0.000) | 710.72 | (0.008) | 710.59 | (0.026) | 712.00 | 0.172 | 694.03 | (2.357) |
| | SER-C | 2534.31 | 2534.28 | (0.001) | 2534.31 | 0.000 | 2534.81 | 0.020 | 2534.05 | (0.010) | 2534.19 | (0.005) | 2654.61 | 4.747 |
| PM | PRIMA-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | AINDUS-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | MANU-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | UTICON-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | TRADE-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| | SER-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.003) | 1.00 | 0.001 | 1.00 | (0.001) | 1.00 | 0.115 |
| QX | PRIMA-C | 11489.80 | 11491.86 | 0.018 | 11489.85 | 0.000 | 11491.95 | 0.019 | 11489.16 | (0.006) | 11484.91 | (0.043) | 11466.24 | (0.205) |
| | AINDUS-C | 13628.78 | 13628.87 | 0.001 | 13629.02 | 0.002 | 13633.02 | 0.031 | 13629.04 | 0.002 | 13628.55 | (0.002) | 13774.20 | 1.067 |
| | MANU-C | 43263.45 | 43260.41 | (0.007) | 43263.27 | (0.000) | 43309.23 | 0.106 | 43246.20 | (0.040) | 43219.29 | (0.102) | 41815.65 | (3.346) |
| | UTICON-C | 7195.13 | 7194.15 | (0.014) | 7195.08 | (0.001) | 7178.93 | (0.225) | 7206.67 | 0.160 | 7182.06 | (0.182) | 6769.13 | (5.921) |
| | TRADE-C | 16778.46 | 16777.76 | (0.004) | 16778.44 | (0.000) | 16776.70 | (0.011) | 16774.33 | (0.025) | 16805.93 | 0.164 | 16402.84 | (2.239) |
| | SER-C | 21320.57 | 21320.13 | (0.002) | 21320.56 | (0.000) | 21323.30 | 0.013 | 21319.06 | (0.007) | 21319.84 | (0.003) | 22395.15 | 5.040 |
| PX | PRIMA-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | - | 1.00 | 0.001 | 1.00 | 0.024 |
| | AINDUS-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | 0.003 |
| | MANU-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | 0.005 |
| | UTICON-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | (0.008) |
| | TRADE-C | 1.00 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.002) | 1.00 | 0.001 | 1.00 | 0.003 | 1.00 | 0.066 |
| | SER-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | (0.010) |
| QQ | PRIMA-C | 10888.51 | 10890.44 | 0.018 | 10888.56 | 0.000 | 10890.70 | 0.020 | 10887.83 | (0.006) | 10883.97 | (0.042) | 10859.67 | (0.265) |
| | AINDUS-C | 11619.36 | 11619.43 | 0.001 | 11619.57 | 0.002 | 11623.11 | 0.032 | 11619.51 | 0.001 | 11619.21 | (0.001) | 11737.65 | 1.018 |
| | MANU-C | 41426.12 | 41423.12 | (0.007) | 41425.97 | (0.000) | 41472.29 | 0.111 | 41408.50 | (0.043) | 41384.39 | (0.101) | 39946.08 | (3.573) |
| | UTICON-C | 7119.37 | 7118.40 | (0.014) | 7119.32 | (0.001) | 7103.35 | (0.225) | 7130.78 | 0.160 | 7106.44 | (0.182) | 6697.64 | (5.924) |
| | TRADE-C | 14590.33 | 14589.68 | (0.004) | 14590.31 | (0.000) | 14588.83 | (0.010) | 14586.72 | (0.025) | 14614.35 | 0.165 | 14261.74 | (2.252) |
| | SER-C | 21438.73 | 21438.32 | (0.002) | 21438.72 | (0.000) | 21441.71 | 0.014 | 21437.10 | (0.008) | 21437.95 | (0.004) | 22509.30 | 4.994 |
| PQ | PRIMA-C | 1.01 | 1.01 | - | 1.01 | - | 1.01 | - | 1.01 | - | 1.01 | 0.001 | 1.01 | 0.019 |
| | AINDUS-C | 1.01 | 1.01 | - | 1.01 | - | 1.01 | - | 1.01 | - | 1.01 | - | 1.01 | (0.016) |
| | MANU-C | 1.02 | 1.02 | - | 1.02 | - | 1.02 | - | 1.02 | - | 1.02 | - | 1.02 | - |
| | UTICON-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | (0.009) |
| | TRADE-C | 1.00 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.002) | 1.00 | 0.001 | 1.00 | 0.003 | 1.00 | 0.058 |
| | SER-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | (0.002) | 1.00 | (0.009) |

| | | | BASE | SIM 8.1 | Δ% | SIM 8.2 | Δ% | SIM 8.3 | Δ% | SIM 8.4 | Δ% | SIM 8.5 | Δ% | SIM 8.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 9254.56 | 0.018 | 9252.95 | 0.000 | 9254.68 | 0.019 | 9252.38 | (0.006) | 9248.99 | (0.042) | 9232.31 | (0.223) |
| | AINDUS-C | | 10719.76 | 10719.83 | 0.001 | 10719.95 | 0.002 | 10723.15 | 0.032 | 10719.93 | 0.002 | 10719.60 | (0.002) | 10831.51 | 1.042 |
| | MANU-C | | 26600.89 | 26599.01 | (0.007) | 26600.78 | (0.000) | 26629.39 | 0.107 | 26590.12 | (0.041) | 26573.82 | (0.102) | 25696.51 | (3.400) |
| | UTICON-C | | 7081.47 | 7080.50 | (0.014) | 7081.42 | (0.001) | 7065.53 | (0.225) | 7092.82 | 0.160 | 7068.61 | (0.182) | 6662.09 | (5.922) |
| | TRADE-C | | 13879.55 | 13878.94 | (0.004) | 13879.53 | (0.000) | 13878.11 | (0.010) | 13876.12 | (0.025) | 13902.35 | 0.164 | 13567.72 | (2.247) |
| | SER-C | | 18904.42 | 18904.04 | (0.002) | 18904.41 | (0.000) | 18906.90 | 0.013 | 18903.05 | (0.007) | 18903.76 | (0.003) | 19854.69 | 5.027 |
| PD | PRIMA-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | 0.001 | 1.00 | 0.002 |
| | AINDUS-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | 0.001 | 1.00 | - | 1.00 | - | 1.00 | (0.027) |
| | MANU-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | 0.002 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.064) |
| | UTICON-C | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | (0.010) |
| | TRADE-C | | 1.00 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.002) | 1.00 | 0.001 | 1.00 | 0.003 | 1.00 | 0.055 |
| | SER-C | | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.001 | 1.00 | - | 1.00 | (0.001) | 1.00 | (0.026) |
| QA | PRIMA-A | | 11489.80 | 11491.86 | 0.018 | 11489.85 | 0.000 | 11491.95 | 0.019 | 11489.16 | (0.006) | 11484.91 | (0.043) | 11466.24 | (0.205) |
| | AINDUS-A | | 13628.78 | 13628.87 | 0.001 | 13629.02 | 0.002 | 13633.02 | 0.031 | 13629.04 | 0.002 | 13628.55 | (0.002) | 13774.20 | 1.067 |
| | MANU-A | | 43263.45 | 43260.41 | (0.007) | 43263.27 | (0.000) | 43309.23 | 0.106 | 43246.20 | (0.040) | 43219.29 | (0.102) | 41815.65 | (3.346) |
| | UTICON-A | | 7195.13 | 7194.15 | (0.014) | 7195.08 | (0.001) | 7178.93 | (0.225) | 7206.67 | 0.160 | 7182.06 | (0.182) | 6769.13 | (5.921) |
| | TRADE-A | | 16778.46 | 16777.76 | (0.004) | 16778.44 | (0.000) | 16776.70 | (0.011) | 16774.33 | (0.025) | 16805.93 | 0.164 | 16402.84 | (2.239) |
| | SER-A | | 21320.57 | 21320.13 | (0.002) | 21320.56 | (0.000) | 21323.30 | 0.013 | 21319.06 | (0.007) | 21319.84 | (0.003) | 22395.15 | 5.040 |
| PA | PRIMA-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | - | 1.00 | 0.001 | 1.00 | 0.024 |
| | AINDUS-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | 0.003 |
| | MANU-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | 0.005 |
| | UTICON-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | (0.008) |
| | TRADE-A | | 1.00 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.002) | 1.00 | 0.001 | 1.00 | 0.003 | 1.00 | 0.066 |
| | SER-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | - | 1.00 | (0.001) | 1.00 | (0.010) |
| PVA | PRIMA-A | | 0.53 | 0.53 | - | 0.53 | - | 0.53 | - | 0.53 | - | 0.53 | - | 0.53 | 0.034 |
| | AINDUS-A | | 0.17 | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | - | 0.17 | (0.012) |
| | MANU-A | | 0.20 | 0.20 | - | 0.20 | - | 0.20 | - | 0.20 | - | 0.20 | - | 0.20 | (0.010) |
| | UTICON-A | | 0.39 | 0.39 | - | 0.39 | - | 0.39 | - | 0.39 | (0.003) | 0.39 | (0.005) | 0.39 | (0.039) |
| | TRADE-A | | 0.58 | 0.58 | (0.002) | 0.58 | - | 0.58 | (0.003) | 0.58 | 0.002 | 0.58 | 0.005 | 0.58 | 0.105 |
| | SER-A | | 0.57 | 0.57 | - | 0.57 | - | 0.57 | - | 0.57 | - | 0.57 | (0.004) | 0.57 | (0.021) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 917.85 | 0.018 | 917.69 | 0.000 | 917.86 | 0.019 | 917.64 | (0.006) | 917.30 | (0.043) | 915.81 | (0.205) |
| | PRIMA-C | AINDUS-A | 3594.75 | 3594.77 | 0.001 | 3594.81 | 0.002 | 3595.87 | 0.031 | 3594.82 | 0.002 | 3594.69 | (0.002) | 3633.11 | 1.067 |
| | PRIMA-C | MANU-A | 2330.82 | 2330.66 | (0.007) | 2330.81 | (0.000) | 2333.29 | 0.106 | 2329.89 | (0.040) | 2328.44 | (0.102) | 2252.82 | (3.346) |
| | PRIMA-C | UTICON-A | 492.64 | 492.57 | (0.014) | 492.64 | (0.001) | 491.53 | (0.225) | 493.43 | 0.160 | 491.75 | (0.182) | 463.47 | (5.921) |

| | | | BASE | SIM 8.1 | Δ% | SIM 8.2 | Δ% | SIM 8.3 | Δ% | SIM 8.4 | Δ% | SIM 8.5 | Δ% | SIM 8.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.42 | (0.004) | 3.42 | (0.000) | 3.42 | (0.011) | 3.42 | (0.025) | 3.43 | 0.164 | 3.34 | (2.239) |
| | PRIMA-C | SER-A | 1282.41 | 1282.39 | (0.002) | 1282.41 | (0.000) | 1282.58 | 0.013 | 1282.32 | (0.007) | 1282.37 | (0.003) | 1347.05 | 5.040 |
| | AINDUS-C | PRIMA-A | 457.75 | 457.83 | 0.018 | 457.75 | 0.000 | 457.83 | 0.019 | 457.72 | (0.006) | 457.55 | (0.043) | 456.81 | (0.205) |
| | AINDUS-C | AINDUS-A | 3741.97 | 3742.00 | 0.001 | 3742.04 | 0.002 | 3743.14 | 0.031 | 3742.04 | 0.002 | 3741.91 | (0.002) | 3781.90 | 1.067 |
| | AINDUS-C | MANU-A | 233.97 | 233.95 | (0.007) | 233.97 | (0.000) | 234.22 | 0.106 | 233.88 | (0.040) | 233.73 | (0.102) | 226.14 | (3.346) |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.65 | (0.004) | 7.65 | (0.000) | 7.65 | (0.010) | 7.65 | (0.025) | 7.66 | 0.164 | 7.48 | (2.239) |
| | AINDUS-C | SER-A | 1072.20 | 1072.17 | (0.002) | 1072.20 | (0.000) | 1072.33 | 0.013 | 1072.12 | (0.007) | 1072.16 | (0.003) | 1126.24 | 5.040 |
| | MANU-C | PRIMA-A | 1872.79 | 1873.12 | 0.018 | 1872.79 | 0.000 | 1873.14 | 0.019 | 1872.68 | (0.006) | 1871.99 | (0.043) | 1868.95 | (0.205) |
| | MANU-C | AINDUS-A | 1100.51 | 1100.52 | 0.001 | 1100.53 | 0.002 | 1100.85 | 0.031 | 1100.53 | 0.002 | 1100.49 | (0.002) | 1112.25 | 1.067 |
| | MANU-C | MANU-A | 21464.91 | 21463.40 | (0.007) | 21464.82 | (0.000) | 21487.63 | 0.106 | 21456.35 | (0.040) | 21443.00 | (0.102) | 20746.59 | (3.346) |
| | MANU-C | UTICON-A | 2040.52 | 2040.24 | (0.014) | 2040.51 | (0.001) | 2035.93 | (0.225) | 2043.79 | 0.160 | 2036.81 | (0.182) | 1919.71 | (5.921) |
| | MANU-C | TRADE-A | 2334.07 | 2333.97 | (0.004) | 2334.06 | (0.000) | 2333.82 | (0.011) | 2333.49 | (0.025) | 2337.89 | 0.164 | 2281.81 | (2.239) |
| | MANU-C | SER-A | 1663.74 | 1663.70 | (0.002) | 1663.74 | (0.000) | 1663.95 | 0.013 | 1663.62 | (0.007) | 1663.68 | (0.003) | 1747.59 | 5.040 |
| | UTICON-C | PRIMA-A | 210.22 | 210.26 | 0.018 | 210.22 | 0.000 | 210.26 | 0.019 | 210.21 | (0.006) | 210.13 | (0.043) | 209.79 | (0.205) |
| | UTICON-C | AINDUS-A | 301.60 | 301.60 | 0.001 | 301.61 | 0.002 | 301.69 | 0.031 | 301.61 | 0.002 | 301.60 | (0.002) | 304.82 | 1.067 |
| | UTICON-C | MANU-A | 1306.30 | 1306.21 | (0.007) | 1306.29 | (0.000) | 1307.68 | 0.106 | 1305.78 | (0.040) | 1304.97 | (0.102) | 1262.58 | (3.346) |
| | UTICON-C | UTICON-A | 369.25 | 369.20 | (0.014) | 369.25 | (0.001) | 368.42 | (0.225) | 369.84 | 0.160 | 368.58 | (0.182) | 347.39 | (5.921) |
| | UTICON-C | TRADE-A | 336.12 | 336.10 | (0.004) | 336.12 | (0.000) | 336.08 | (0.011) | 336.03 | (0.025) | 336.67 | 0.164 | 328.59 | (2.239) |
| | UTICON-C | SER-A | 1237.04 | 1237.01 | (0.002) | 1237.04 | (0.000) | 1237.20 | 0.013 | 1236.95 | (0.007) | 1237.00 | (0.003) | 1299.39 | 5.040 |
| | TRADE-C | PRIMA-A | 1059.51 | 1059.70 | 0.018 | 1059.51 | 0.000 | 1059.71 | 0.019 | 1059.45 | (0.006) | 1059.06 | (0.043) | 1057.34 | (0.205) |
| | TRADE-C | AINDUS-A | 1105.89 | 1105.90 | 0.001 | 1105.91 | 0.002 | 1106.23 | 0.031 | 1105.91 | 0.002 | 1105.87 | (0.002) | 1117.69 | 1.067 |
| | TRADE-C | MANU-A | 5085.91 | 5085.55 | (0.007) | 5085.89 | (0.000) | 5091.29 | 0.106 | 5083.88 | (0.040) | 5080.72 | (0.102) | 4915.71 | (3.346) |
| | TRADE-C | UTICON-A | 882.07 | 881.95 | (0.014) | 882.06 | (0.001) | 880.08 | (0.225) | 883.48 | 0.160 | 880.47 | (0.182) | 829.85 | (5.921) |
| | TRADE-C | TRADE-A | 1621.83 | 1621.76 | (0.004) | 1621.83 | (0.000) | 1621.66 | (0.011) | 1621.43 | (0.025) | 1624.49 | 0.164 | 1585.52 | (2.239) |
| | TRADE-C | SER-A | 1262.78 | 1262.75 | (0.002) | 1262.78 | (0.000) | 1262.94 | 0.013 | 1262.69 | (0.007) | 1262.74 | (0.003) | 1326.43 | 5.040 |
| | SER-C | PRIMA-A | 667.53 | 667.65 | 0.018 | 667.54 | 0.000 | 667.66 | 0.019 | 667.50 | (0.006) | 667.25 | (0.043) | 666.16 | (0.205) |
| | SER-C | AINDUS-A | 521.52 | 521.52 | 0.001 | 521.53 | 0.002 | 521.68 | 0.031 | 521.53 | 0.002 | 521.51 | (0.002) | 527.08 | 1.067 |
| | SER-C | MANU-A | 2753.93 | 2753.73 | (0.007) | 2753.92 | (0.000) | 2756.84 | 0.106 | 2752.83 | (0.040) | 2751.12 | (0.102) | 2661.77 | (3.346) |
| | SER-C | UTICON-A | 423.34 | 423.28 | (0.014) | 423.34 | (0.001) | 422.39 | (0.225) | 424.02 | 0.160 | 422.57 | (0.182) | 398.27 | (5.921) |
| | SER-C | TRADE-A | 2407.69 | 2407.59 | (0.004) | 2407.69 | (0.000) | 2407.44 | (0.011) | 2407.10 | (0.025) | 2411.64 | 0.164 | 2353.79 | (2.239) |
| | SER-C | SER-A | 2031.46 | 2031.42 | (0.002) | 2031.46 | (0.000) | 2031.72 | 0.013 | 2031.31 | (0.007) | 2031.39 | (0.003) | 2133.84 | 5.040 |

## Results of Simulations 9.1-9.3

| | | | BASE | SIM 9.1 | ∆% | SIM 9.2 | ∆% | SIM 9.3 | ∆% |
|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 46358.76 | (0.001) | 46359.09 | (0.000) | 46357.21 | (0.004) |
| | PRVCON | | 25292.80 | 25324.39 | 0.125 | 25298.58 | 0.023 | 25356.60 | 0.252 |
| | GOVCON | | 5007.05 | 5007.11 | 0.001 | 5007.06 | 0.000 | 5007.12 | 0.001 |
| | INVEST | | 8845.28 | 8813.23 | (0.362) | 8839.32 | (0.067) | 8779.43 | (0.744) |
| | EXP | | 27237.19 | 27233.42 | (0.014) | 27236.09 | (0.004) | 27224.93 | (0.045) |
| | IMP | | -20023.05 | -20019.39 | (0.018) | -20021.96 | (0.005) | -20010.86 | (0.061) |
| | NITAX | | 4756.36 | 4756.75 | 0.008 | 4756.34 | (0.000) | 4756.11 | (0.005) |
| | GDPFC | | 41602.91 | 41602.01 | (0.002) | 41602.75 | (0.000) | 41601.10 | (0.004) |
| | GDPMP2 | | 46359.27 | 46358.76 | (0.001) | 46359.09 | (0.000) | 46357.21 | (0.004) |
| YG | | | 8524.54 | 8524.99 | 0.005 | 8525.14 | 0.007 | 8528.23 | 0.043 |
| EG | | | 5710.03 | 5738.70 | 0.502 | 5717.40 | 0.129 | 5800.27 | 1.580 |
| IADJ | | | 1.00 | 1.00 | (0.362) | 1.00 | (0.067) | 0.99 | (0.744) |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| YF | LAB | | 14579.90 | 14579.68 | (0.002) | 14579.87 | (0.000) | 14579.52 | (0.003) |
| | CAP | | 27023.01 | 27022.34 | (0.002) | 27022.88 | (0.000) | 27021.58 | (0.005) |
| QF | LAB | PRIMA-A | 139410.00 | 139474.46 | 0.046 | 139417.51 | 0.005 | 139494.84 | 0.061 |
| | LAB | AINDUS-A | 8490.00 | 8500.64 | 0.125 | 8491.58 | 0.019 | 8507.32 | 0.204 |
| | LAB | MANU-A | 33960.00 | 33937.08 | (0.067) | 33955.59 | (0.013) | 33910.92 | (0.145) |
| | LAB | UTICON-A | 18220.00 | 18190.02 | (0.165) | 18214.61 | (0.030) | 18160.29 | (0.328) |
| | LAB | TRADE-A | 51750.00 | 51725.06 | (0.048) | 51746.95 | (0.006) | 51715.67 | (0.066) |
| | LAB | SER-A | 54200.00 | 54202.74 | 0.005 | 54203.76 | 0.007 | 54240.96 | 0.076 |
| | CAP | PRIMA-A | 12315.48 | 12324.79 | 0.076 | 12316.49 | 0.008 | 12326.96 | 0.093 |
| | CAP | AINDUS-A | 6718.35 | 6728.75 | 0.155 | 6719.79 | 0.021 | 6734.23 | 0.236 |
| | CAP | MANU-A | 22491.87 | 22483.29 | (0.038) | 22489.59 | (0.010) | 22466.62 | (0.112) |
| | CAP | UTICON-A | 16829.92 | 16807.16 | (0.135) | 16825.42 | (0.027) | 16780.18 | (0.296) |
| | CAP | TRADE-A | 44663.41 | 44654.99 | (0.019) | 44662.04 | (0.003) | 44648.20 | (0.034) |
| | CAP | SER-A | 58248.63 | 58268.68 | 0.034 | 58254.32 | 0.010 | 58311.48 | 0.108 |
| WF | LAB | | 0.05 | 0.05 | 0.021 | 0.05 | - | 0.05 | 0.021 |
| | CAP | | 0.17 | 0.17 | (0.012) | 0.17 | (0.006) | 0.17 | (0.012) |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01368 | 0.027 | 0.01368 | 0.006 | 0.01368 | 0.027 |
| | LAB | AINDUS-A | 0.1128 | 0.11284 | 0.020 | 0.11282 | (0.001) | 0.11284 | 0.020 |
| | LAB | MANU-A | 0.1069 | 0.10688 | 0.014 | 0.10685 | (0.007) | 0.10688 | 0.014 |
| | LAB | UTICON-A | 0.0747 | 0.07472 | 0.018 | 0.07471 | (0.003) | 0.07472 | 0.018 |
| | LAB | TRADE-A | 0.0262 | 0.02624 | 0.030 | 0.02623 | 0.009 | 0.02624 | 0.030 |
| | LAB | SER-A | 0.0990 | 0.09904 | 0.020 | 0.09902 | (0.001) | 0.09904 | 0.020 |
| | CAP | PRIMA-A | 0.3425 | 0.34244 | (0.009) | 0.34246 | (0.003) | 0.34244 | (0.009) |
| | CAP | AINDUS-A | 0.1966 | 0.19653 | (0.010) | 0.19654 | (0.004) | 0.19653 | (0.010) |
| | CAP | MANU-A | 0.2224 | 0.22240 | (0.009) | 0.22241 | (0.003) | 0.22240 | (0.009) |
| | CAP | UTICON-A | 0.0845 | 0.08452 | (0.011) | 0.08453 | (0.005) | 0.08452 | (0.011) |
| | CAP | TRADE-A | 0.1870 | 0.18697 | (0.011) | 0.18698 | (0.005) | 0.18697 | (0.011) |
| | CAP | SER-A | 0.1152 | 0.11515 | (0.008) | 0.11516 | (0.002) | 0.11515 | (0.008) |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 2024.73 | (0.002) | 2024.76 | (0.000) | 2024.71 | (0.003) |
| | A-HHD | CAP | 2979.23 | 2979.16 | (0.002) | 2979.22 | (0.000) | 2979.07 | (0.005) |
| | G-HHD | LAB | 4254.63 | 4254.56 | (0.002) | 4254.62 | (0.000) | 4254.52 | (0.003) |
| | G-HHD | CAP | 648.94 | 648.92 | (0.002) | 648.94 | (0.000) | 648.91 | (0.005) |

| | | | BASE | SIM 9.1 | ∆% | SIM 9.2 | ∆% | SIM 9.3 | ∆% |
|---|---|---|---|---|---|---|---|---|---|
| YFID | N-HHD | LAB | 8300.51 | 8300.38 | (0.002) | 8300.49 | (0.000) | 8300.30 | (0.003) |
| | N-HHD | CAP | 12376.62 | 12376.31 | (0.002) | 12376.56 | (0.000) | 12375.96 | (0.005) |
| | ENT-G | CAP | 1244.96 | 1244.93 | (0.002) | 1244.95 | (0.000) | 1244.89 | (0.005) |
| | ENT-P | CAP | 8979.21 | 8978.99 | (0.002) | 8979.17 | (0.000) | 8978.73 | (0.005) |
| QINV | PRIMA-C | | 155.02 | 154.45 | (0.362) | 154.91 | (0.067) | 153.86 | (0.744) |
| | AINDUS-C | | -241.50 | -240.62 | (0.362) | -241.34 | (0.067) | -239.70 | (0.744) |
| | MANU-C | | 4849.76 | 4832.20 | (0.362) | 4846.50 | (0.067) | 4813.66 | (0.744) |
| | UTICON-C | | 2955.06 | 2944.36 | (0.362) | 2953.07 | (0.067) | 2933.07 | (0.744) |
| | TRADE-C | | 1009.26 | 1005.60 | (0.362) | 1008.58 | (0.067) | 1001.75 | (0.744) |
| | SER-C | | 36.68 | 36.55 | (0.362) | 36.66 | (0.067) | 36.41 | (0.744) |
| YH | A-HHD | | 5316.62 | 5345.12 | 0.536 | 5316.60 | (0.000) | 5316.41 | (0.004) |
| | G-HHD | | 4971.28 | 4971.20 | (0.002) | 4978.63 | 0.148 | 4971.13 | (0.003) |
| | N-HHD | | 21389.80 | 21389.36 | (0.002) | 21389.72 | (0.000) | 21479.09 | 0.417 |
| QH | PRIMA-C | A-HHD | 700.14 | 703.90 | 0.537 | 700.14 | (0.000) | 700.12 | (0.003) |
| | PRIMA-C | G-HHD | 274.35 | 274.35 | (0.001) | 274.76 | 0.148 | 274.35 | (0.002) |
| | PRIMA-C | N-HHD | 1129.02 | 1129.01 | (0.001) | 1129.02 | (0.000) | 1133.75 | 0.419 |
| | AINDUS-C | A-HHD | 1881.42 | 1891.50 | 0.536 | 1881.41 | (0.000) | 1881.35 | (0.004) |
| | AINDUS-C | G-HHD | 920.08 | 920.06 | (0.002) | 921.44 | 0.148 | 920.05 | (0.003) |
| QH | AINDUS-C | N-HHD | 3545.28 | 3545.21 | (0.002) | 3545.27 | (0.000) | 3560.08 | 0.418 |
| | MANU-C | A-HHD | 1743.73 | 1753.08 | 0.536 | 1743.72 | (0.000) | 1743.66 | (0.004) |
| | MANU-C | G-HHD | 852.75 | 852.73 | (0.002) | 854.01 | 0.148 | 852.72 | (0.003) |
| | MANU-C | N-HHD | 3285.84 | 3285.77 | (0.002) | 3285.83 | (0.000) | 3299.55 | 0.417 |
| | UTICON-C | A-HHD | 97.86 | 98.38 | 0.535 | 97.86 | (0.000) | 97.85 | (0.005) |
| | UTICON-C | G-HHD | 47.86 | 47.86 | (0.003) | 47.93 | 0.148 | 47.86 | (0.004) |
| | UTICON-C | N-HHD | 184.43 | 184.42 | (0.003) | 184.43 | (0.000) | 185.19 | 0.416 |
| | TRADE-C | A-HHD | 347.20 | 349.08 | 0.540 | 347.20 | 0.000 | 347.20 | 0.001 |
| | TRADE-C | G-HHD | 427.95 | 427.96 | 0.003 | 428.58 | 0.148 | 427.96 | 0.002 |
| | TRADE-C | N-HHD | 1656.57 | 1656.61 | 0.002 | 1656.57 | 0.000 | 1663.56 | 0.422 |
| | SER-C | A-HHD | 1147.00 | 1153.13 | 0.535 | 1146.99 | (0.000) | 1146.93 | (0.006) |
| | SER-C | G-HHD | 1413.70 | 1413.66 | (0.003) | 1415.79 | 0.148 | 1413.64 | (0.005) |
| | SER-C | N-HHD | 5472.33 | 5472.14 | (0.003) | 5472.30 | (0.001) | 5495.09 | 0.416 |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1244.93 | (0.002) | 1244.95 | (0.000) | 1244.89 | (0.005) |
| | ENT-P | | 10396.40 | 10396.21 | (0.002) | 10396.56 | 0.002 | 10397.11 | 0.007 |
| ENTSAV | ENT-G | | 902.97 | 902.95 | (0.002) | 902.97 | (0.000) | 902.92 | (0.005) |
| | ENT-P | | 6326.21 | 6326.09 | (0.002) | 6326.36 | 0.002 | 6326.88 | 0.011 |
| QE | PRIMA-C | | 2236.89 | 2238.37 | 0.066 | 2237.05 | 0.007 | 2238.75 | 0.083 |
| | AINDUS-C | | 2909.02 | 2913.13 | 0.141 | 2909.61 | 0.020 | 2915.48 | 0.222 |
| | MANU-C | | 16662.56 | 16653.94 | (0.052) | 16660.66 | (0.011) | 16641.45 | (0.127) |
| | UTICON-C | | 113.66 | 113.49 | (0.152) | 113.63 | (0.028) | 113.30 | (0.313) |
| | TRADE-C | | 2898.91 | 2898.30 | (0.021) | 2898.82 | (0.003) | 2897.86 | (0.036) |
| | SER-C | | 2416.15 | 2416.61 | 0.019 | 2416.35 | 0.008 | 2418.36 | 0.091 |
| PE | PRIMA-C | | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | AINDUS-C | | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | MANU-C | | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | UTICON-C | | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | TRADE-C | | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | SER-C | | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| QM | PRIMA-C | | 1635.60 | 1636.71 | 0.068 | 1635.72 | 0.007 | 1636.96 | 0.083 |

| | | BASE | SIM 9.1 | ∆% | SIM 9.2 | ∆% | SIM 9.3 | ∆% |
|---|---|---|---|---|---|---|---|---|
| QM | AINDUS-C | 899.60 | 900.92 | 0.146 | 899.78 | 0.021 | 901.63 | 0.225 |
| | MANU-C | 14825.23 | 14818.89 | (0.043) | 14823.62 | (0.011) | 14807.38 | (0.120) |
| | UTICON-C | 37.90 | 37.85 | (0.143) | 37.89 | (0.028) | 37.78 | (0.306) |
| | TRADE-C | 710.78 | 710.58 | (0.029) | 710.75 | (0.004) | 710.45 | (0.046) |
| | SER-C | 2534.31 | 2535.02 | 0.028 | 2534.54 | 0.009 | 2536.83 | 0.100 |
| PM | PRIMA-C | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | AINDUS-C | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | MANU-C | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | UTICON-C | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | TRADE-C | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| | SER-C | 1.00 | 1.00 | (0.002) | 1.00 | - | 1.00 | (0.001) |
| QX | PRIMA-C | 11489.80 | 11497.44 | 0.066 | 11490.64 | 0.007 | 11499.35 | 0.083 |
| | AINDUS-C | 13628.78 | 13648.19 | 0.142 | 13631.55 | 0.020 | 13659.14 | 0.223 |
| | MANU-C | 43263.45 | 43241.61 | (0.050) | 43258.54 | (0.011) | 43209.02 | (0.126) |
| | UTICON-C | 7195.13 | 7184.37 | (0.150) | 7193.11 | (0.028) | 7172.73 | (0.311) |
| | TRADE-C | 16778.46 | 16774.61 | (0.023) | 16777.88 | (0.003) | 16771.99 | (0.039) |
| | SER-C | 21320.57 | 21325.13 | 0.021 | 21322.38 | 0.009 | 21340.51 | 0.094 |
| PX | PRIMA-C | 1.00 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.001) |
| | AINDUS-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - |
| | MANU-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - |
| | UTICON-C | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.001 |
| | TRADE-C | 1.00 | 1.00 | (0.004) | 1.00 | - | 1.00 | (0.004) |
| | SER-C | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.002 |
| QQ | PRIMA-C | 10888.51 | 10895.78 | 0.067 | 10889.31 | 0.007 | 10897.56 | 0.083 |
| | AINDUS-C | 11619.36 | 11635.97 | 0.143 | 11621.72 | 0.020 | 11645.28 | 0.223 |
| | MANU-C | 41426.12 | 41406.56 | (0.047) | 41421.51 | (0.011) | 41374.94 | (0.124) |
| | UTICON-C | 7119.37 | 7108.73 | (0.149) | 7117.37 | (0.028) | 7097.21 | (0.311) |
| | TRADE-C | 14590.33 | 14586.89 | (0.024) | 14589.81 | (0.004) | 14584.57 | (0.039) |
| | SER-C | 21438.73 | 21443.54 | 0.022 | 21440.57 | 0.009 | 21458.99 | 0.094 |
| PQ | PRIMA-C | 1.01 | 1.01 | (0.001) | 1.01 | - | 1.01 | (0.001) |
| | AINDUS-C | 1.01 | 1.01 | - | 1.01 | - | 1.01 | - |
| | MANU-C | 1.02 | 1.02 | - | 1.02 | - | 1.02 | - |
| | UTICON-C | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.001 |
| | TRADE-C | 1.00 | 1.00 | (0.004) | 1.00 | - | 1.00 | (0.005) |
| | SER-C | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.001 |
| QD | PRIMA-C | 9252.91 | 9259.07 | 0.067 | 9253.59 | 0.007 | 9260.60 | 0.083 |
| | AINDUS-C | 10719.76 | 10735.05 | 0.143 | 10721.94 | 0.020 | 10743.66 | 0.223 |
| | MANU-C | 26600.89 | 26587.66 | (0.050) | 26597.89 | (0.011) | 26567.56 | (0.125) |
| | UTICON-C | 7081.47 | 7070.88 | (0.150) | 7079.48 | (0.028) | 7059.43 | (0.311) |
| | TRADE-C | 13879.55 | 13876.31 | (0.023) | 13879.06 | (0.004) | 13874.12 | (0.039) |
| | SER-C | 18904.42 | 18908.52 | 0.022 | 18906.03 | 0.009 | 18922.15 | 0.094 |
| PD | PRIMA-C | 1.00 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.001) |
| | AINDUS-C | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - |
| | MANU-C | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.001 |
| | UTICON-C | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.001 |
| | TRADE-C | 1.00 | 1.00 | (0.004) | 1.00 | - | 1.00 | (0.005) |
| | SER-C | 1.00 | 1.00 | 0.002 | 1.00 | - | 1.00 | 0.002 |
| QA | PRIMA-A | 11489.80 | 11497.44 | 0.066 | 11490.64 | 0.007 | 11499.35 | 0.083 |
| | AINDUS-A | 13628.78 | 13648.19 | 0.142 | 13631.55 | 0.020 | 13659.14 | 0.223 |
| | MANU-A | 43263.45 | 43241.61 | (0.050) | 43258.54 | (0.011) | 43209.02 | (0.126) |
| | UTICON-A | 7195.13 | 7184.37 | (0.150) | 7193.11 | (0.028) | 7172.73 | (0.311) |

| | | | BASE | SIM 9.1 | Δ% | SIM 9.2 | Δ% | SIM 9.3 | Δ% |
|---|---|---|---|---|---|---|---|---|---|
| QA | TRADE-A | | 16778.46 | 16774.61 | (0.023) | 16777.88 | (0.003) | 16771.99 | (0.039) |
| | SER-A | | 21320.57 | 21325.13 | 0.021 | 21322.38 | 0.009 | 21340.51 | 0.094 |
| PA | PRIMA-A | | 1.00 | 1.00 | (0.001) | 1.00 | - | 1.00 | (0.001) |
| | AINDUS-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - |
| | MANU-A | | 1.00 | 1.00 | - | 1.00 | - | 1.00 | - |
| | UTICON-A | | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.001 |
| | TRADE-A | | 1.00 | 1.00 | (0.004) | 1.00 | - | 1.00 | (0.004) |
| | SER-A | | 1.00 | 1.00 | 0.001 | 1.00 | - | 1.00 | 0.002 |
| PVA | PRIMA-A | | 0.53 | 0.53 | (0.002) | 0.53 | - | 0.53 | (0.002) |
| | AINDUS-A | | 0.17 | 0.17 | 0.006 | 0.17 | - | 0.17 | 0.006 |
| | MANU-A | | 0.20 | 0.20 | 0.005 | 0.20 | - | 0.20 | 0.005 |
| | UTICON-A | | 0.39 | 0.39 | 0.003 | 0.39 | - | 0.39 | 0.003 |
| | TRADE-A | | 0.58 | 0.58 | (0.005) | 0.58 | - | 0.58 | (0.007) |
| | SER-A | | 0.57 | 0.57 | 0.002 | 0.57 | - | 0.57 | 0.002 |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 918.30 | 0.066 | 917.75 | 0.007 | 918.45 | 0.083 |
| | PRIMA-C | AINDUS-A | 3594.75 | 3599.87 | 0.142 | 3595.48 | 0.020 | 3602.76 | 0.223 |
| | PRIMA-C | MANU-A | 2330.82 | 2329.64 | (0.050) | 2330.56 | (0.011) | 2327.89 | (0.126) |
| | PRIMA-C | UTICON-A | 492.64 | 491.90 | (0.150) | 492.50 | (0.028) | 491.11 | (0.311) |
| | PRIMA-C | TRADE-A | 3.42 | 3.42 | (0.023) | 3.42 | (0.004) | 3.42 | (0.039) |
| | PRIMA-C | SER-A | 1282.41 | 1282.69 | 0.021 | 1282.52 | 0.009 | 1283.61 | 0.094 |
| | AINDUS-C | PRIMA-A | 457.75 | 458.05 | 0.066 | 457.78 | 0.007 | 458.13 | 0.083 |
| | AINDUS-C | AINDUS-A | 3741.97 | 3747.30 | 0.142 | 3742.73 | 0.020 | 3750.31 | 0.223 |
| | AINDUS-C | MANU-A | 233.97 | 233.85 | (0.050) | 233.94 | (0.011) | 233.68 | (0.126) |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.65 | (0.023) | 7.65 | (0.003) | 7.65 | (0.039) |
| | AINDUS-C | SER-A | 1072.20 | 1072.42 | 0.021 | 1072.29 | 0.009 | 1073.20 | 0.094 |
| | MANU-C | PRIMA-A | 1872.79 | 1874.03 | 0.066 | 1872.92 | 0.007 | 1874.34 | 0.083 |
| | MANU-C | AINDUS-A | 1100.51 | 1102.08 | 0.142 | 1100.74 | 0.020 | 1102.96 | 0.223 |
| | MANU-C | MANU-A | 21464.91 | 21454.08 | (0.050) | 21462.48 | (0.011) | 21437.91 | (0.126) |
| | MANU-C | UTICON-A | 2040.52 | 2037.47 | (0.150) | 2039.95 | (0.028) | 2034.17 | (0.311) |
| | MANU-C | TRADE-A | 2334.07 | 2333.53 | (0.023) | 2333.98 | (0.003) | 2333.16 | (0.039) |
| | MANU-C | SER-A | 1663.74 | 1664.09 | 0.021 | 1663.88 | 0.009 | 1665.29 | 0.094 |
| | UTICON-C | PRIMA-A | 210.22 | 210.36 | 0.066 | 210.24 | 0.007 | 210.40 | 0.083 |
| | UTICON-C | AINDUS-A | 301.60 | 302.03 | 0.142 | 301.66 | 0.020 | 302.27 | 0.223 |
| | UTICON-C | MANU-A | 1306.30 | 1305.64 | (0.050) | 1306.15 | (0.011) | 1304.66 | (0.126) |
| | UTICON-C | UTICON-A | 369.25 | 368.70 | (0.150) | 369.15 | (0.028) | 368.10 | (0.311) |
| | UTICON-C | TRADE-A | 336.12 | 336.04 | (0.023) | 336.10 | (0.003) | 335.99 | (0.039) |
| | UTICON-C | SER-A | 1237.04 | 1237.30 | 0.021 | 1237.14 | 0.009 | 1238.20 | 0.094 |
| | TRADE-C | PRIMA-A | 1059.51 | 1060.21 | 0.066 | 1059.59 | 0.007 | 1060.39 | 0.083 |
| | TRADE-C | AINDUS-A | 1105.89 | 1107.46 | 0.142 | 1106.11 | 0.020 | 1108.35 | 0.223 |
| | TRADE-C | MANU-A | 5085.91 | 5083.34 | (0.050) | 5085.33 | (0.011) | 5079.51 | (0.126) |
| | TRADE-C | UTICON-A | 882.07 | 880.75 | (0.150) | 881.82 | (0.028) | 879.32 | (0.311) |
| | TRADE-C | TRADE-A | 1621.83 | 1621.46 | (0.023) | 1621.77 | (0.003) | 1621.20 | (0.039) |
| | TRADE-C | SER-A | 1262.78 | 1263.05 | 0.021 | 1262.89 | 0.009 | 1263.96 | 0.094 |
| | SER-C | PRIMA-A | 667.53 | 667.98 | 0.066 | 667.58 | 0.007 | 668.09 | 0.083 |
| | SER-C | AINDUS-A | 521.52 | 522.26 | 0.142 | 521.62 | 0.020 | 522.68 | 0.223 |
| | SER-C | MANU-A | 2753.93 | 2752.54 | (0.050) | 2753.62 | (0.011) | 2750.46 | (0.126) |
| | SER-C | UTICON-A | 423.34 | 422.71 | (0.150) | 423.22 | (0.028) | 422.02 | (0.311) |
| | SER-C | TRADE-A | 2407.69 | 2407.14 | (0.023) | 2407.61 | (0.003) | 2406.77 | (0.039) |
| | SER-C | SER-A | 2031.46 | 2031.89 | 0.021 | 2031.63 | 0.009 | 2033.36 | 0.094 |

# Results of Simulations 10.1-10.6

| | | | BASE | SIM 10.1 | Δ% | SIM 10.2 | Δ% | SIM 10.3 | Δ% | SIM 10.4 | Δ% | SIM 10.5 | Δ% | SIM 10.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 46675.41 | 0.682 | 47573.09 | 2.618 | 49859.57 | 7.550 | 46366.31 | 0.015 | 46915.00 | 1.199 | 46817.92 | 0.989 |
| | PRVCON | | 25292.80 | 25502.90 | 0.831 | 25892.90 | 2.373 | 27190.49 | 7.503 | 25297.57 | 0.019 | 25586.68 | 1.162 | 25578.85 | 1.131 |
| | GOVCON | | 5007.05 | 5065.08 | 1.159 | 5128.37 | 2.423 | 5114.94 | 2.155 | 5006.47 | (0.012) | 5034.83 | 0.555 | 4907.97 | (1.979) |
| | INVEST | | 8845.28 | 8935.96 | 1.025 | 9310.04 | 5.254 | 11459.30 | 29.553 | 8851.77 | 0.073 | 9183.76 | 3.827 | 9147.38 | 3.415 |
| | EXP | | 27237.19 | 27197.67 | (0.145) | 28078.95 | 3.090 | 29111.35 | 6.881 | 27247.21 | 0.037 | 27388.50 | 0.556 | 27372.37 | 0.496 |
| | IMP | | -20023.05 | -20026.20 | 0.016 | -20837.17 | 4.066 | -23016.50 | 14.950 | -20036.71 | 0.068 | -20278.77 | 1.277 | -20188.65 | 0.827 |
| | NITAX | | 4756.36 | 4705.63 | (1.067) | 4953.07 | 4.136 | 4916.03 | 3.357 | 4755.57 | (0.017) | 4724.98 | (0.660) | 4753.03 | (0.070) |
| | GDPFC | | 41602.91 | 41969.78 | 0.882 | 42620.02 | 2.445 | 44943.54 | 8.030 | 41610.74 | 0.019 | 42190.02 | 1.411 | 42064.89 | 1.110 |
| | GDPMP2 | | 46359.27 | 46675.41 | 0.682 | 47573.09 | 2.618 | 49859.57 | 7.550 | 46366.31 | 0.015 | 46915.00 | 1.199 | 46817.92 | 0.989 |
| YG | | | 8524.54 | 8502.46 | (0.259) | 8805.79 | 3.299 | 8908.84 | 4.508 | 8524.18 | (0.004) | 8543.26 | 0.220 | 8555.39 | 0.362 |
| EG | | | 5710.03 | 5768.01 | 1.015 | 5831.39 | 2.125 | 5816.57 | 1.866 | 5709.45 | (0.010) | 5737.68 | 0.484 | 5610.91 | (1.736) |
| IADJ | | | 1.00 | 1.00 | 0.054 | 1.02 | 2.026 | 1.38 | 38.382 | 1.00 | 0.222 | 1.04 | 4.383 | 1.03 | 2.566 |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| YF | LAB | | 14579.90 | 14702.73 | 0.842 | 14943.14 | 2.491 | 15808.42 | 8.426 | 14583.99 | 0.028 | 14654.14 | 0.509 | 14795.56 | 1.479 |
| | CAP | | 27023.01 | 27267.05 | 0.903 | 27676.88 | 2.420 | 29135.12 | 7.816 | 27026.75 | 0.014 | 27535.88 | 1.898 | 27269.33 | 0.912 |
| QF | LAB | PRIMA-A | 139410.00 | 147383.59 | 5.720 | 143906.92 | 3.226 | 126984.94 | (8.913) | 139351.13 | (0.042) | 136996.01 | (1.732) | 138120.23 | (0.925) |
| | LAB | AINDUS-A | 8490.00 | 8480.45 | (0.112) | 10303.26 | 21.358 | 7758.04 | (8.621) | 8487.32 | (0.032) | 8456.63 | (0.393) | 8480.92 | (0.107) |
| | LAB | MANU-A | 33960.00 | 31310.96 | (7.800) | 30851.99 | (9.152) | 40388.99 | 18.931 | 33930.54 | (0.087) | 32942.14 | (2.997) | 32720.31 | (3.650) |
| | LAB | UTICON-A | 18220.00 | 17654.35 | (3.105) | 18042.93 | (0.972) | 22099.74 | 21.294 | 18308.75 | 0.487 | 18558.93 | 1.860 | 18484.33 | 1.451 |
| | LAB | TRADE-A | 51750.00 | 48989.28 | (5.335) | 50053.74 | (3.278) | 55183.88 | 6.636 | 51751.72 | 0.003 | 54869.00 | 6.027 | 51416.28 | (0.645) |
| | LAB | SER-A | 54200.00 | 52211.37 | (3.669) | 52871.16 | (2.452) | 53614.41 | (1.080) | 54200.55 | 0.001 | 54207.29 | 0.013 | 56807.93 | 4.812 |
| | CAP | PRIMA-A | 12315.48 | 13531.71 | 9.876 | 12976.83 | 5.370 | 10656.24 | (13.473) | 12305.91 | (0.078) | 11946.73 | (2.994) | 12065.62 | (2.029) |
| | CAP | AINDUS-A | 6718.35 | 6974.61 | 3.814 | 8322.60 | 23.879 | 5831.78 | (13.196) | 6713.85 | (0.067) | 6605.96 | (1.673) | 6636.40 | (1.220) |
| | CAP | MANU-A | 22491.87 | 21552.63 | (4.176) | 20857.90 | (7.265) | 25410.63 | 12.977 | 22464.39 | (0.122) | 21537.41 | (4.244) | 21429.41 | (4.724) |
| | CAP | UTICON-A | 16829.92 | 16948.50 | 0.705 | 17012.58 | 1.085 | 19391.67 | 15.221 | 16905.90 | 0.451 | 16922.74 | 0.551 | 16883.89 | 0.321 |
| | CAP | TRADE-A | 44663.41 | 43942.89 | (1.613) | 44096.84 | (1.269) | 45242.67 | 1.297 | 44649.05 | (0.032) | 46746.85 | 4.665 | 43881.06 | (1.752) |
| | CAP | SER-A | 58248.63 | 58317.32 | 0.118 | 58000.90 | (0.425) | 54734.67 | (6.033) | 58228.56 | (0.034) | 57507.96 | (1.272) | 60371.28 | 3.644 |
| WF | LAB | | 0.05 | 0.05 | 4.324 | 0.05 | 4.324 | 0.05 | 3.086 | 0.05 | 0.021 | 0.05 | 0.777 | 0.05 | 0.672 |
| | CAP | | 0.17 | 0.17 | 0.376 | 0.17 | 2.190 | 0.18 | 8.510 | 0.17 | 0.042 | 0.17 | 2.077 | 0.17 | 1.796 |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01427 | 4.330 | 0.01427 | 4.330 | 0.01410 | 3.092 | 0.01368 | 0.027 | 0.01379 | 0.782 | 0.01377 | 0.677 |
| | LAB | AINDUS-A | 0.1128 | 0.11770 | 4.323 | 0.11770 | 4.323 | 0.11630 | 3.084 | 0.11284 | 0.020 | 0.11369 | 0.775 | 0.11358 | 0.671 |

| | | | BASE | SIM 10.1 | Δ% | SIM 10.2 | Δ% | SIM 10.3 | Δ% | SIM 10.4 | Δ% | SIM 10.5 | Δ% | SIM 10.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | MANU-A | 0.1069 | 0.11147 | 4.317 | 0.11147 | 4.317 | 0.11015 | 3.079 | 0.10688 | 0.014 | 0.10768 | 0.770 | 0.10757 | 0.665 |
| | LAB | UTICON-A | 0.0747 | 0.07794 | 4.321 | 0.07794 | 4.321 | 0.07701 | 3.083 | 0.07472 | 0.018 | 0.07529 | 0.774 | 0.07521 | 0.669 |
| | LAB | TRADE-A | 0.0262 | 0.02737 | 4.334 | 0.02737 | 4.334 | 0.02704 | 3.095 | 0.02624 | 0.030 | 0.02644 | 0.786 | 0.02641 | 0.681 |
| | LAB | SER-A | 0.0990 | 0.10330 | 4.323 | 0.10330 | 4.323 | 0.10207 | 3.084 | 0.09904 | 0.020 | 0.09979 | 0.775 | 0.09968 | 0.670 |
| | CAP | PRIMA-A | 0.3425 | 0.34377 | 0.379 | 0.34998 | 2.193 | 0.37162 | 8.513 | 0.34262 | 0.045 | 0.34959 | 2.080 | 0.34863 | 1.799 |
| | CAP | AINDUS-A | 0.1966 | 0.19729 | 0.378 | 0.20086 | 2.193 | 0.21328 | 8.512 | 0.19664 | 0.044 | 0.20064 | 2.079 | 0.20009 | 1.799 |
| | CAP | MANU-A | 0.2224 | 0.22326 | 0.379 | 0.22730 | 2.194 | 0.24136 | 8.513 | 0.22252 | 0.045 | 0.22705 | 2.080 | 0.22642 | 1.800 |
| | CAP | UTICON-A | 0.0845 | 0.08485 | 0.377 | 0.08638 | 2.191 | 0.09172 | 8.511 | 0.08457 | 0.043 | 0.08629 | 2.078 | 0.08605 | 1.797 |
| | CAP | TRADE-A | 0.1870 | 0.18769 | 0.377 | 0.19109 | 2.191 | 0.20290 | 8.511 | 0.18707 | 0.043 | 0.19087 | 2.077 | 0.19035 | 1.797 |
| | CAP | SER-A | 0.1152 | 0.11560 | 0.380 | 0.11769 | 2.194 | 0.12496 | 8.514 | 0.11521 | 0.045 | 0.11756 | 2.080 | 0.11723 | 1.800 |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 2041.82 | 0.842 | 2075.20 | 2.491 | 2195.37 | 8.426 | 2025.33 | 0.028 | 2035.07 | 0.509 | 2054.71 | 1.479 |
| | A-HHD | CAP | 2979.23 | 3006.13 | 0.903 | 3051.32 | 2.420 | 3212.09 | 7.816 | 2979.64 | 0.014 | 3035.77 | 1.898 | 3006.39 | 0.912 |
| | G-HHD | LAB | 4254.63 | 4290.47 | 0.842 | 4360.63 | 2.491 | 4613.13 | 8.426 | 4255.82 | 0.028 | 4276.29 | 0.509 | 4317.56 | 1.479 |
| | G-HHD | CAP | 648.94 | 654.80 | 0.903 | 664.64 | 2.420 | 699.66 | 7.816 | 649.03 | 0.014 | 661.26 | 1.898 | 654.86 | 0.912 |
| | N-HHD | LAB | 8300.51 | 8370.44 | 0.842 | 8507.31 | 2.491 | 8999.92 | 8.426 | 8302.84 | 0.028 | 8342.77 | 0.509 | 8423.29 | 1.479 |
| | N-HHD | CAP | 12376.62 | 12488.39 | 0.903 | 12676.09 | 2.420 | 13343.97 | 7.816 | 12378.33 | 0.014 | 12611.52 | 1.898 | 12489.44 | 0.912 |
| | ENT-G | CAP | 1244.96 | 1256.20 | 0.903 | 1275.08 | 2.420 | 1342.27 | 7.816 | 1245.13 | 0.014 | 1268.59 | 1.898 | 1256.31 | 0.912 |
| | ENT-P | CAP | 8979.21 | 9060.30 | 0.903 | 9196.48 | 2.420 | 9681.02 | 7.816 | 8980.45 | 0.014 | 9149.63 | 1.898 | 9061.06 | 0.912 |
| QINV | PRIMA-C | | 155.02 | 155.10 | 0.054 | 158.16 | 2.026 | 214.51 | 38.382 | 155.36 | 0.222 | 161.81 | 4.383 | 158.99 | 2.566 |
| | AINDUS-C | | -241.50 | -241.63 | 0.054 | -246.39 | 2.026 | -334.19 | 38.382 | -242.03 | 0.222 | -252.08 | 4.383 | -247.70 | 2.566 |
| | MANU-C | | 4849.76 | 4852.41 | 0.054 | 4948.00 | 2.026 | 6711.20 | 38.382 | 4860.52 | 0.222 | 5062.34 | 4.383 | 4974.22 | 2.566 |
| | UTICON-C | | 2955.06 | 2956.67 | 0.054 | 3014.92 | 2.026 | 4089.28 | 38.382 | 2961.62 | 0.222 | 3084.59 | 4.383 | 3030.90 | 2.566 |
| | TRADE-C | | 1009.26 | 1009.81 | 0.054 | 1029.70 | 2.026 | 1396.63 | 38.382 | 1011.50 | 0.222 | 1053.50 | 4.383 | 1035.16 | 2.566 |
| | SER-C | | 36.68 | 36.70 | 0.054 | 37.42 | 2.026 | 50.76 | 38.382 | 36.76 | 0.222 | 38.29 | 4.383 | 37.62 | 2.566 |
| YH | A-HHD | | 5316.62 | 5359.41 | 0.805 | 5439.91 | 2.319 | 5689.33 | 7.010 | 5317.50 | 0.017 | 5380.60 | 1.203 | 5372.89 | 1.058 |
| | G-HHD | | 4971.28 | 5012.76 | 0.834 | 5093.13 | 2.451 | 5374.57 | 8.112 | 4972.55 | 0.025 | 5004.71 | 0.672 | 5039.97 | 1.382 |
| | N-HHD | | 21389.80 | 21569.42 | 0.840 | 21897.42 | 2.373 | 23001.95 | 7.537 | 21393.67 | 0.018 | 21661.87 | 1.272 | 21623.91 | 1.095 |
| QH | PRIMA-C | A-HHD | 700.14 | 742.03 | 5.983 | 699.18 | (0.138) | 731.14 | 4.427 | 700.13 | (0.002) | 703.61 | 0.496 | 699.79 | (0.050) |
| | PRIMA-C | G-HHD | 274.35 | 290.85 | 6.014 | 274.33 | (0.009) | 289.45 | 5.502 | 274.37 | 0.007 | 274.27 | (0.031) | 275.09 | 0.269 |
| | PRIMA-C | N-HHD | 1129.02 | 1196.99 | 6.020 | 1128.07 | (0.085) | 1184.81 | 4.941 | 1129.02 | (0.000) | 1135.39 | 0.564 | 1128.86 | (0.015) |
| | AINDUS-C | A-HHD | 1881.42 | 1920.16 | 2.059 | 2086.53 | 10.902 | 1914.18 | 1.741 | 1881.41 | (0.001) | 1892.85 | 0.607 | 1877.69 | (0.198) |
| | AINDUS-C | G-HHD | 920.08 | 939.30 | 2.089 | 1021.70 | 11.045 | 945.74 | 2.789 | 920.15 | 0.008 | 920.81 | 0.079 | 921.19 | 0.121 |

| | | | BASE | SIM 10.1 | Δ% | SIM 10.2 | Δ% | SIM 10.3 | Δ% | SIM 10.4 | Δ% | SIM 10.5 | Δ% | SIM 10.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3619.53 | 2.094 | 3933.87 | 10.961 | 3624.77 | 2.242 | 3545.31 | 0.001 | 3569.22 | 0.675 | 3539.51 | (0.163) |
| | MANU-C | A-HHD | 1743.73 | 1742.09 | (0.094) | 1735.12 | (0.494) | 2131.21 | 22.221 | 1744.07 | 0.019 | 1767.28 | 1.350 | 1748.29 | 0.262 |
| | MANU-C | G-HHD | 852.75 | 852.19 | (0.065) | 849.63 | (0.365) | 1052.97 | 23.480 | 852.99 | 0.028 | 859.73 | 0.819 | 857.71 | 0.583 |
| | MANU-C | N-HHD | 3285.84 | 3283.88 | (0.060) | 3271.35 | (0.441) | 4035.75 | 22.823 | 3286.53 | 0.021 | 3332.46 | 1.419 | 3295.62 | 0.298 |
| | UTICON-C | A-HHD | 97.86 | 97.54 | (0.320) | 97.23 | (0.637) | 104.87 | 7.164 | 98.31 | 0.465 | 98.93 | 1.096 | 98.05 | 0.196 |
| | UTICON-C | G-HHD | 47.86 | 47.72 | (0.290) | 47.62 | (0.508) | 51.82 | 8.267 | 48.09 | 0.474 | 48.13 | 0.565 | 48.11 | 0.516 |
| | UTICON-C | N-HHD | 184.43 | 183.90 | (0.285) | 183.35 | (0.584) | 198.61 | 7.691 | 185.29 | 0.467 | 186.57 | 1.164 | 184.85 | 0.232 |
| | TRADE-C | A-HHD | 347.20 | 345.77 | (0.411) | 345.28 | (0.552) | 350.32 | 0.898 | 347.16 | (0.010) | 367.05 | 5.717 | 347.17 | (0.007) |
| | TRADE-C | G-HHD | 427.95 | 426.32 | (0.382) | 426.14 | (0.423) | 436.24 | 1.937 | 427.94 | (0.001) | 450.04 | 5.162 | 429.29 | 0.312 |
| | TRADE-C | N-HHD | 1656.57 | 1650.34 | (0.376) | 1648.30 | (0.499) | 1679.67 | 1.395 | 1656.42 | (0.009) | 1752.46 | 5.788 | 1657.04 | 0.028 |
| | SER-C | A-HHD | 1147.00 | 1142.73 | (0.372) | 1146.29 | (0.062) | 1194.15 | 4.111 | 1147.26 | 0.023 | 1152.34 | 0.466 | 1185.84 | 3.387 |
| | SER-C | G-HHD | 1413.70 | 1408.85 | (0.343) | 1414.65 | 0.067 | 1486.98 | 5.183 | 1414.15 | 0.032 | 1412.83 | (0.061) | 1466.26 | 3.718 |
| | SER-C | N-HHD | 5472.33 | 5453.85 | (0.338) | 5471.84 | (0.009) | 5725.35 | 4.624 | 5473.66 | 0.024 | 5501.55 | 0.534 | 5659.69 | 3.424 |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1256.20 | 0.903 | 1275.08 | 2.420 | 1342.27 | 7.816 | 1245.13 | 0.014 | 1268.59 | 1.898 | 1256.31 | 0.912 |
| | ENT-P | | 10396.40 | 10476.48 | 0.770 | 10627.18 | 2.220 | 11009.40 | 5.896 | 10397.33 | 0.009 | 10560.11 | 1.575 | 10480.10 | 0.805 |
| ENTSAV | ENT-G | | 902.97 | 911.12 | 0.903 | 924.82 | 2.420 | 973.55 | 7.816 | 903.09 | 0.014 | 920.11 | 1.898 | 911.20 | 0.912 |
| | ENT-P | | 6326.21 | 6416.15 | 1.422 | 6522.23 | 3.099 | 7347.28 | 16.140 | 6328.58 | 0.037 | 6517.29 | 3.020 | 6414.27 | 1.392 |
| QE | PRIMA-C | | 2236.89 | 2871.76 | 28.382 | 2305.64 | 3.074 | 1682.14 | (24.800) | 2234.23 | (0.119) | 2143.03 | (4.196) | 2173.74 | (2.823) |
| | AINDUS-C | | 2909.02 | 2984.46 | 2.593 | 4296.62 | 47.700 | 2203.87 | (24.240) | 2906.16 | (0.098) | 2835.83 | (2.516) | 2854.19 | (1.885) |
| | MANU-C | | 16662.56 | 15529.02 | (6.803) | 15032.33 | (9.784) | 20777.22 | 24.694 | 16638.61 | (0.144) | 15879.73 | (4.698) | 15800.88 | (5.171) |
| | UTICON-C | | 113.66 | 110.81 | (2.509) | 111.47 | (1.926) | 117.60 | 3.469 | 136.46 | 20.064 | 113.60 | (0.056) | 113.49 | (0.145) |
| | TRADE-C | | 2898.91 | 2801.26 | (3.368) | 2805.21 | (3.232) | 2509.03 | (13.449) | 2896.56 | (0.081) | 3569.10 | 23.119 | 2823.24 | (2.610) |
| | SER-C | | 2416.15 | 2344.22 | (2.977) | 2346.34 | (2.889) | 1973.36 | (18.326) | 2414.84 | (0.054) | 2357.14 | (2.443) | 2978.18 | 23.261 |
| PE | PRIMA-C | | 1.00 | 1.24 | 24.261 | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | AINDUS-C | | 1.00 | 0.99 | (0.591) | 1.25 | 25.479 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | MANU-C | | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 1.06 | 5.606 | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | UTICON-C | | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.25 | 24.937 | 0.99 | (1.447) | 1.00 | (0.422) |
| | TRADE-C | | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 1.23 | 23.191 | 1.00 | (0.422) |
| | SER-C | | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.24 | 24.473 |
| QM | PRIMA-C | | 1635.60 | 1481.14 | (9.444) | 1825.81 | 11.629 | 2660.88 | 62.685 | 1638.03 | 0.149 | 1704.46 | 4.210 | 1686.65 | 3.121 |
| | AINDUS-C | | 899.60 | 903.83 | 0.470 | 845.73 | (5.988) | 1401.80 | 55.825 | 900.70 | 0.122 | 937.44 | 4.207 | 932.06 | 3.608 |

| | | BASE | SIM 10.1 | Δ% | SIM 10.2 | Δ% | SIM 10.3 | Δ% | SIM 10.4 | Δ% | SIM 10.5 | Δ% | SIM 10.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 15029.24 | 1.376 | 15330.99 | 3.411 | 18960.72 | 27.895 | 14843.50 | 0.123 | 15215.29 | 2.631 | 15055.03 | 1.550 |
| | UTICON-C | 37.90 | 39.01 | 2.932 | 40.30 | 6.320 | 66.61 | 75.740 | 37.59 | (0.821) | 39.80 | 5.020 | 39.41 | 3.985 |
| | TRADE-C | 710.78 | 722.99 | 1.717 | 737.64 | 3.780 | 1177.38 | 65.646 | 711.77 | 0.139 | 674.13 | (5.157) | 721.99 | 1.577 |
| | SER-C | 2534.31 | 2595.76 | 2.425 | 2614.46 | 3.163 | 3801.89 | 50.017 | 2536.38 | 0.082 | 2644.06 | 4.331 | 2468.96 | (2.579) |
| PM | PRIMA-C | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | AINDUS-C | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | MANU-C | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | UTICON-C | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | TRADE-C | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| | SER-C | 1.00 | 0.99 | (0.591) | 1.00 | 0.383 | 0.84 | (15.515) | 1.00 | (0.051) | 0.99 | (1.447) | 1.00 | (0.422) |
| QX | PRIMA-C | 11489.80 | 12473.81 | 8.564 | 12029.54 | 4.698 | 10102.09 | (12.078) | 11482.14 | (0.067) | 11190.75 | (2.603) | 11296.03 | (1.686) |
| | AINDUS-C | 13628.78 | 13921.12 | 2.145 | 16737.84 | 22.812 | 12088.53 | (11.301) | 13621.67 | (0.052) | 13473.84 | (1.137) | 13526.09 | (0.753) |
| | MANU-C | 43263.45 | 40790.17 | (5.717) | 39775.17 | (8.063) | 49944.61 | 15.443 | 43217.03 | (0.107) | 41653.38 | (3.722) | 41414.38 | (4.274) |
| | UTICON-C | 7195.13 | 7110.49 | (1.176) | 7200.46 | 0.074 | 8501.17 | 18.152 | 7228.87 | 0.469 | 7280.70 | 1.189 | 7257.85 | 0.872 |
| | TRADE-C | 16778.46 | 16419.02 | (2.142) | 16518.06 | (1.552) | 17118.56 | 2.027 | 16773.90 | (0.027) | 17592.92 | 4.854 | 16510.40 | (1.598) |
| | SER-C | 21320.57 | 20982.99 | (1.583) | 21036.76 | (1.331) | 20496.97 | (3.863) | 21316.58 | (0.019) | 21170.80 | (0.702) | 22207.82 | 4.161 |
| PX | PRIMA-C | 1.00 | 1.01 | 0.766 | 1.02 | 2.364 | 1.03 | 2.714 | 1.00 | 0.015 | 1.01 | 0.605 | 1.01 | 1.036 |
| | AINDUS-C | 1.00 | 0.99 | (1.134) | 1.00 | (0.368) | 1.03 | 2.890 | 1.00 | 0.007 | 1.00 | 0.298 | 1.01 | 1.016 |
| | MANU-C | 1.00 | 1.01 | 0.859 | 1.03 | 2.782 | 0.96 | (4.095) | 1.00 | (0.005) | 1.00 | (0.183) | 1.01 | 0.758 |
| | UTICON-C | 1.00 | 1.01 | 1.110 | 1.03 | 2.948 | 1.00 | (0.272) | 1.00 | (0.008) | 1.00 | 0.091 | 1.01 | 0.848 |
| | TRADE-C | 1.00 | 1.01 | 0.988 | 1.03 | 2.567 | 1.04 | 3.773 | 1.00 | 0.017 | 1.01 | 0.787 | 1.01 | 0.874 |
| | SER-C | 1.00 | 1.01 | 1.197 | 1.02 | 2.401 | 1.04 | 3.583 | 1.00 | (0.006) | 1.01 | 0.755 | 1.01 | 0.850 |
| QQ | PRIMA-C | 10888.51 | 11011.23 | 1.127 | 11548.18 | 6.058 | 10932.68 | 0.406 | 10885.94 | (0.024) | 10750.58 | (1.267) | 10808.14 | (0.738) |
| | AINDUS-C | 11619.36 | 11840.39 | 1.902 | 13151.67 | 13.188 | 11181.27 | (3.770) | 11616.21 | (0.027) | 11574.55 | (0.386) | 11603.36 | (0.138) |
| | MANU-C | 41426.12 | 40281.15 | (2.764) | 40049.63 | (3.323) | 47942.86 | 15.731 | 41421.92 | (0.010) | 40981.65 | (1.073) | 40662.34 | (1.844) |
| | UTICON-C | 7119.37 | 7038.67 | (1.134) | 7129.23 | 0.138 | 8447.04 | 18.649 | 7127.18 | 0.110 | 7206.89 | 1.229 | 7183.75 | 0.904 |
| | TRADE-C | 14590.33 | 14340.18 | (1.714) | 14449.44 | (0.966) | 15688.89 | 7.529 | 14589.10 | (0.008) | 14623.32 | 0.226 | 14408.77 | (1.244) |
| | SER-C | 21438.73 | 21233.35 | (0.958) | 21303.40 | (0.631) | 22159.15 | 3.360 | 21438.12 | (0.003) | 21455.88 | 0.080 | 21635.30 | 0.917 |
| PQ | PRIMA-C | 1.01 | 0.96 | (4.886) | 1.03 | 2.460 | 1.03 | 2.474 | 1.01 | 0.019 | 1.02 | 0.704 | 1.02 | 1.110 |
| | AINDUS-C | 1.01 | 0.99 | (1.229) | 0.93 | (7.740) | 1.06 | 5.179 | 1.01 | 0.017 | 1.01 | 0.593 | 1.02 | 1.259 |
| | MANU-C | 1.02 | 1.03 | 0.900 | 1.05 | 2.826 | 0.89 | (12.445) | 1.02 | (0.003) | 1.02 | (0.146) | 1.02 | 0.795 |
| | UTICON-C | 1.00 | 1.01 | 1.128 | 1.03 | 2.975 | 1.00 | (0.143) | 1.00 | (0.447) | 1.00 | 0.107 | 1.01 | 0.861 |
| | TRADE-C | 1.00 | 1.01 | 1.221 | 1.03 | 2.887 | 1.06 | 6.058 | 1.00 | 0.027 | 0.96 | (4.269) | 1.01 | 1.066 |
| | SER-C | 1.00 | 1.01 | 1.181 | 1.03 | 2.383 | 1.03 | 2.785 | 1.00 | (0.006) | 1.01 | 0.734 | 0.98 | (2.253) |

| | | | BASE | SIM 10.1 | Δ% | SIM 10.2 | Δ% | SIM 10.3 | Δ% | SIM 10.4 | Δ% | SIM 10.5 | Δ% | SIM 10.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 9534.56 | 3.044 | 9723.47 | 5.085 | 8389.55 | (9.331) | 9247.91 | (0.054) | 9047.26 | (2.222) | 9122.06 | (1.414) |
| | AINDUS-C | | 10719.76 | 10936.61 | 2.023 | 12313.80 | 14.870 | 9843.37 | (8.175) | 10715.51 | (0.040) | 10637.57 | (0.767) | 10671.61 | (0.449) |
| | MANU-C | | 26600.89 | 25259.05 | (5.044) | 24737.46 | (7.005) | 29032.77 | 9.142 | 26578.42 | (0.084) | 25771.99 | (3.116) | 25612.08 | (3.717) |
| | UTICON-C | | 7081.47 | 6999.67 | (1.155) | 7088.96 | 0.106 | 8382.27 | 18.369 | 7089.59 | 0.115 | 7167.10 | 1.209 | 7144.35 | 0.888 |
| | TRADE-C | | 13879.55 | 13617.42 | (1.889) | 13712.23 | (1.206) | 14560.49 | 4.906 | 13877.34 | (0.016) | 13949.78 | 0.506 | 13686.93 | (1.388) |
| | SER-C | | 18904.42 | 18638.44 | (1.407) | 18690.01 | (1.134) | 18487.79 | (2.204) | 18901.75 | (0.014) | 18813.15 | (0.483) | 19167.27 | 1.390 |
| PD | PRIMA-C | | 1.00 | 0.94 | (5.598) | 1.03 | 2.838 | 1.07 | 6.741 | 1.00 | 0.031 | 1.01 | 1.097 | 1.01 | 1.386 |
| | AINDUS-C | | 1.00 | 0.99 | (1.282) | 0.92 | (8.356) | 1.07 | 7.443 | 1.00 | 0.023 | 1.01 | 0.768 | 1.01 | 1.403 |
| | MANU-C | | 1.00 | 1.02 | 1.759 | 1.04 | 4.263 | 0.89 | (10.593) | 1.00 | 0.024 | 1.01 | 0.602 | 1.01 | 1.491 |
| | UTICON-C | | 1.00 | 1.01 | 1.138 | 1.03 | 2.989 | 1.00 | (0.043) | 1.00 | (0.449) | 1.00 | 0.115 | 1.01 | 0.868 |
| | TRADE-C | | 1.00 | 1.01 | 1.315 | 1.03 | 3.018 | 1.07 | 7.446 | 1.00 | 0.031 | 0.96 | (4.410) | 1.01 | 1.143 |
| | SER-C | | 1.00 | 1.01 | 1.424 | 1.03 | 2.656 | 1.06 | 5.822 | 1.00 | - | 1.01 | 1.034 | 0.98 | (2.493) |
| QA | PRIMA-A | | 11489.80 | 12473.81 | 8.564 | 12029.54 | 4.698 | 10102.09 | (12.078) | 11482.14 | (0.067) | 11190.75 | (2.603) | 11296.03 | (1.686) |
| | AINDUS-A | | 13628.78 | 13921.12 | 2.145 | 16737.84 | 22.812 | 12088.53 | (11.301) | 13621.67 | (0.052) | 13473.84 | (1.137) | 13526.09 | (0.753) |
| | MANU-A | | 43263.45 | 40790.17 | (5.717) | 39775.17 | (8.063) | 49944.61 | 15.443 | 43217.03 | (0.107) | 41653.38 | (3.722) | 41414.38 | (4.274) |
| | UTICON-A | | 7195.13 | 7110.49 | (1.176) | 7200.46 | 0.074 | 8501.17 | 18.152 | 7228.87 | 0.469 | 7280.70 | 1.189 | 7257.85 | 0.872 |
| | TRADE-A | | 16778.46 | 16419.02 | (2.142) | 16518.06 | (1.552) | 17118.56 | 2.027 | 16773.90 | (0.027) | 17592.92 | 4.854 | 16510.40 | (1.598) |
| | SER-A | | 21320.57 | 20982.99 | (1.583) | 21036.76 | (1.331) | 20496.97 | (3.863) | 21316.58 | (0.019) | 21170.80 | (0.702) | 22207.82 | 4.161 |
| PA | PRIMA-A | | 1.00 | 1.01 | 0.766 | 1.02 | 2.364 | 1.03 | 2.714 | 1.00 | 0.015 | 1.01 | 0.605 | 1.01 | 1.036 |
| | AINDUS-A | | 1.00 | 0.99 | (1.134) | 1.00 | (0.368) | 1.03 | 2.890 | 1.00 | 0.007 | 1.00 | 0.298 | 1.01 | 1.016 |
| | MANU-A | | 1.00 | 1.01 | 0.859 | 1.03 | 2.782 | 0.96 | (4.095) | 1.00 | (0.005) | 1.00 | (0.183) | 1.01 | 0.758 |
| | UTICON-A | | 1.00 | 1.01 | 1.110 | 1.03 | 2.948 | 1.00 | (0.272) | 1.00 | (0.008) | 1.00 | 0.091 | 1.01 | 0.848 |
| | TRADE-A | | 1.00 | 1.01 | 0.988 | 1.03 | 2.567 | 1.04 | 3.773 | 1.00 | 0.017 | 1.01 | 0.787 | 1.01 | 0.874 |
| | SER-A | | 1.00 | 1.01 | 1.197 | 1.02 | 2.401 | 1.04 | 3.583 | 1.00 | (0.006) | 1.01 | 0.755 | 1.01 | 0.850 |
| PVA | PRIMA-A | | 0.53 | 0.54 | 1.591 | 0.55 | 2.851 | 0.57 | 6.789 | 0.53 | 0.036 | 0.54 | 1.671 | 0.54 | 1.444 |
| | AINDUS-A | | 0.17 | 0.17 | 2.022 | 0.17 | 3.087 | 0.18 | 6.197 | 0.17 | 0.036 | 0.17 | 1.531 | 0.17 | 1.322 |
| | MANU-A | | 0.20 | 0.20 | 2.020 | 0.21 | 3.083 | 0.21 | 6.195 | 0.20 | 0.035 | 0.20 | 1.529 | 0.20 | 1.318 |
| | UTICON-A | | 0.39 | 0.40 | 2.287 | 0.40 | 3.226 | 0.41 | 5.818 | 0.39 | 0.028 | 0.39 | 1.437 | 0.39 | 1.241 |
| | TRADE-A | | 0.58 | 0.58 | 0.921 | 0.59 | 2.490 | 0.62 | 7.735 | 0.58 | 0.041 | 0.59 | 1.897 | 0.59 | 1.638 |
| | SER-A | | 0.57 | 0.58 | 2.113 | 0.58 | 3.132 | 0.60 | 6.062 | 0.57 | 0.030 | 0.57 | 1.496 | 0.57 | 1.292 |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 996.28 | 8.564 | 960.80 | 4.698 | 806.85 | (12.078) | 917.08 | (0.067) | 893.80 | (2.603) | 902.21 | (1.686) |
| | PRIMA-C | AINDUS-A | 3594.75 | 3671.86 | 2.145 | 4414.80 | 22.812 | 3188.49 | (11.301) | 3592.88 | (0.052) | 3553.88 | (1.137) | 3567.67 | (0.753) |
| | PRIMA-C | MANU-A | 2330.82 | 2197.57 | (5.717) | 2142.89 | (8.063) | 2690.77 | 15.443 | 2328.32 | (0.107) | 2244.08 | (3.722) | 2231.20 | (4.274) |
| | PRIMA-C | UTICON-A | 492.64 | 486.85 | (1.176) | 493.01 | 0.074 | 582.06 | 18.152 | 494.95 | 0.469 | 498.50 | 1.189 | 496.94 | 0.872 |

| | | | BASE | SIM 10.1 | Δ% | SIM 10.2 | Δ% | SIM 10.3 | Δ% | SIM 10.4 | Δ% | SIM 10.5 | Δ% | SIM 10.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.35 | (2.142) | 3.37 | (1.552) | 3.49 | 2.027 | 3.42 | (0.027) | 3.59 | 4.854 | 3.37 | (1.598) |
| | PRIMA-C | SER-A | 1282.41 | 1262.11 | (1.583) | 1265.34 | (1.331) | 1232.87 | (3.863) | 1282.17 | (0.019) | 1273.40 | (0.702) | 1335.78 | 4.161 |
| | AINDUS-C | PRIMA-A | 457.75 | 496.95 | 8.564 | 479.25 | 4.698 | 402.46 | (12.078) | 457.44 | (0.067) | 445.83 | (2.603) | 450.03 | (1.686) |
| | AINDUS-C | AINDUS-A | 3741.97 | 3822.24 | 2.145 | 4595.61 | 22.812 | 3319.08 | (11.301) | 3740.02 | (0.052) | 3699.43 | (1.137) | 3713.78 | (0.753) |
| | AINDUS-C | MANU-A | 233.97 | 220.59 | (5.717) | 215.11 | (8.063) | 270.10 | 15.443 | 233.72 | (0.107) | 225.26 | (3.722) | 223.97 | (4.274) |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.48 | (2.142) | 7.53 | (1.552) | 7.80 | 2.027 | 7.65 | (0.027) | 8.02 | 4.854 | 7.53 | (1.598) |
| | AINDUS-C | SER-A | 1072.20 | 1055.22 | (1.583) | 1057.92 | (1.331) | 1030.78 | (3.863) | 1072.00 | (0.019) | 1064.66 | (0.702) | 1116.81 | 4.161 |
| | MANU-C | PRIMA-A | 1872.79 | 2033.18 | 8.564 | 1960.76 | 4.698 | 1646.59 | (12.078) | 1871.54 | (0.067) | 1824.04 | (2.603) | 1841.20 | (1.686) |
| | MANU-C | AINDUS-A | 1100.51 | 1124.12 | 2.145 | 1351.57 | 22.812 | 976.14 | (11.301) | 1099.94 | (0.052) | 1088.00 | (1.137) | 1092.22 | (0.753) |
| | MANU-C | MANU-A | 21464.91 | 20237.81 | (5.717) | 19734.22 | (8.063) | 24779.73 | 15.443 | 21441.88 | (0.107) | 20666.09 | (3.722) | 20547.51 | (4.274) |
| | MANU-C | UTICON-A | 2040.52 | 2016.52 | (1.176) | 2042.03 | 0.074 | 2410.91 | 18.152 | 2050.09 | 0.469 | 2064.79 | 1.189 | 2058.31 | 0.872 |
| | MANU-C | TRADE-A | 2334.07 | 2284.06 | (2.142) | 2297.84 | (1.552) | 2381.38 | 2.027 | 2333.43 | (0.027) | 2447.37 | 4.854 | 2296.78 | (1.598) |
| | MANU-C | SER-A | 1663.74 | 1637.40 | (1.583) | 1641.59 | (1.331) | 1599.47 | (3.863) | 1663.43 | (0.019) | 1652.05 | (0.702) | 1732.97 | 4.161 |
| | UTICON-C | PRIMA-A | 210.22 | 228.23 | 8.564 | 220.10 | 4.698 | 184.83 | (12.078) | 210.08 | (0.067) | 204.75 | (2.603) | 206.68 | (1.686) |
| | UTICON-C | AINDUS-A | 301.60 | 308.07 | 2.145 | 370.40 | 22.812 | 267.52 | (11.301) | 301.44 | (0.052) | 298.17 | (1.137) | 299.33 | (0.753) |
| | UTICON-C | MANU-A | 1306.30 | 1231.62 | (5.717) | 1200.97 | (8.063) | 1508.03 | 15.443 | 1304.90 | (0.107) | 1257.68 | (3.722) | 1250.47 | (4.274) |
| | UTICON-C | UTICON-A | 369.25 | 364.91 | (1.176) | 369.53 | 0.074 | 436.28 | 18.152 | 370.98 | 0.469 | 373.64 | 1.189 | 372.47 | 0.872 |
| | UTICON-C | TRADE-A | 336.12 | 328.92 | (2.142) | 330.90 | (1.552) | 342.93 | 2.027 | 336.02 | (0.027) | 352.43 | 4.854 | 330.75 | (1.598) |
| | UTICON-C | SER-A | 1237.04 | 1217.45 | (1.583) | 1220.57 | (1.331) | 1189.25 | (3.863) | 1236.81 | (0.019) | 1228.35 | (0.702) | 1288.52 | 4.161 |
| | TRADE-C | PRIMA-A | 1059.51 | 1150.25 | 8.564 | 1109.28 | 4.698 | 931.54 | (12.078) | 1058.80 | (0.067) | 1031.93 | (2.603) | 1041.64 | (1.686) |
| | TRADE-C | AINDUS-A | 1105.89 | 1129.61 | 2.145 | 1358.17 | 22.812 | 980.91 | (11.301) | 1105.31 | (0.052) | 1093.32 | (1.137) | 1097.56 | (0.753) |
| | TRADE-C | MANU-A | 5085.91 | 4795.16 | (5.717) | 4675.84 | (8.063) | 5871.33 | 15.443 | 5080.45 | (0.107) | 4896.64 | (3.722) | 4868.54 | (4.274) |
| | TRADE-C | UTICON-A | 882.07 | 871.69 | (1.176) | 882.72 | 0.074 | 1042.18 | 18.152 | 886.21 | 0.469 | 892.56 | 1.189 | 889.76 | 0.872 |
| | TRADE-C | TRADE-A | 1621.83 | 1587.09 | (2.142) | 1596.66 | (1.552) | 1654.70 | 2.027 | 1621.39 | (0.027) | 1700.56 | 4.854 | 1595.92 | (1.598) |
| | TRADE-C | SER-A | 1262.78 | 1242.79 | (1.583) | 1245.97 | (1.331) | 1214.00 | (3.863) | 1262.54 | (0.019) | 1253.91 | (0.702) | 1315.33 | 4.161 |
| | SER-C | PRIMA-A | 667.53 | 724.70 | 8.564 | 698.89 | 4.698 | 586.91 | (12.078) | 667.09 | (0.067) | 650.16 | (2.603) | 656.28 | (1.686) |
| | SER-C | AINDUS-A | 521.52 | 532.70 | 2.145 | 640.49 | 22.812 | 462.58 | (11.301) | 521.24 | (0.052) | 515.59 | (1.137) | 517.59 | (0.753) |
| | SER-C | MANU-A | 2753.93 | 2596.49 | (5.717) | 2531.88 | (8.063) | 3179.22 | 15.443 | 2750.97 | (0.107) | 2651.44 | (3.722) | 2636.23 | (4.274) |
| | SER-C | UTICON-A | 423.34 | 418.36 | (1.176) | 423.65 | 0.074 | 500.18 | 18.152 | 425.32 | 0.469 | 428.37 | 1.189 | 427.03 | 0.872 |
| | SER-C | TRADE-A | 2407.69 | 2356.12 | (2.142) | 2370.33 | (1.552) | 2456.50 | 2.027 | 2407.04 | (0.027) | 2524.57 | 4.854 | 2369.23 | (1.598) |
| | SER-C | SER-A | 2031.46 | 1999.29 | (1.583) | 2004.42 | (1.331) | 1952.98 | (3.863) | 2031.08 | (0.019) | 2017.19 | (0.702) | 2116.00 | 4.161 |

## Results of Simulations 11.1-11.6

| | | | BASE | SIM 11.1 | Δ% | SIM 11.2 | Δ% | SIM 11.3 | Δ% | SIM 11.4 | Δ% | SIM 11.5 | Δ% | SIM 11.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 45623.56 | (1.587) | 46013.27 | (0.746) | 43330.48 | (6.533) | 46350.68 | (0.019) | 46164.88 | (0.419) | 45662.32 | (1.503) |
| | PRVCON | | 25292.80 | 24907.38 | (1.524) | 25098.44 | (0.768) | 23484.73 | (7.149) | 25288.43 | (0.017) | 25179.16 | (0.449) | 24938.83 | (1.399) |
| | GOVCON | | 5007.05 | 4981.84 | (0.503) | 4978.74 | (0.565) | 4807.99 | (3.976) | 5007.04 | (0.000) | 4998.68 | (0.167) | 5074.44 | 1.346 |
| | INVEST | | 8845.28 | 8580.70 | (2.991) | 8781.33 | (0.723) | 8084.20 | (8.604) | 8841.65 | (0.041) | 8782.71 | (0.707) | 8509.92 | (3.791) |
| | EXP | | 27237.19 | 26518.57 | (2.638) | 26912.34 | (1.193) | 26211.43 | (3.766) | 27224.61 | (0.046) | 27032.55 | (0.751) | 26452.72 | (2.880) |
| | IMP | | -20023.05 | -19364.93 | (3.287) | -19757.58 | (1.326) | -19257.87 | (3.821) | -20011.04 | (0.060) | -19828.22 | (0.973) | -19313.58 | (3.543) |
| | NITAX | | 4756.36 | 4664.78 | (1.925) | 4734.49 | (0.460) | 4787.04 | 0.645 | 4755.53 | (0.017) | 4734.32 | (0.463) | 4677.45 | (1.659) |
| | GDPFC | | 41602.91 | 40958.78 | (1.548) | 41278.78 | (0.779) | 38543.44 | (7.354) | 41595.15 | (0.019) | 41430.56 | (0.414) | 40984.86 | (1.486) |
| | GDPMP2 | | 46359.27 | 45623.56 | (1.587) | 46013.27 | (0.746) | 43330.48 | (6.533) | 46350.68 | (0.019) | 46164.88 | (0.419) | 45662.32 | (1.503) |
| YG | | | 8524.54 | 8377.93 | (1.720) | 8473.52 | (0.598) | 8292.00 | (2.728) | 8523.01 | (0.018) | 8489.64 | (0.409) | 8389.65 | (1.582) |
| EG | | | 5710.03 | 5684.75 | (0.443) | 5681.65 | (0.497) | 5510.65 | (3.492) | 5710.02 | (0.000) | 5701.64 | (0.147) | 5777.33 | 1.179 |
| IADJ | | | 1.00 | 0.98 | (2.456) | 1.00 | (0.004) | 0.86 | (13.667) | 1.00 | (0.075) | 0.99 | (0.790) | 0.97 | (3.110) |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| YF | LAB | | 14579.90 | 14342.57 | (1.628) | 14465.45 | (0.785) | 13516.34 | (7.295) | 14577.84 | (0.014) | 14482.71 | (0.667) | 14404.52 | (1.203) |
| | CAP | | 27023.01 | 26616.21 | (1.505) | 26813.33 | (0.776) | 25027.10 | (7.386) | 27017.31 | (0.021) | 26947.85 | (0.278) | 26580.35 | (1.638) |
| QF | LAB | PRIMA-A | 139410.00 | 144495.88 | 3.648 | 139866.19 | 0.327 | 137876.51 | (1.100) | 139397.08 | (0.009) | 138961.18 | (0.322) | 139017.34 | (0.282) |
| | LAB | AINDUS-A | 8490.00 | 8156.66 | (3.926) | 8685.85 | 2.307 | 8177.72 | (3.678) | 8488.77 | (0.014) | 8465.94 | (0.283) | 8492.25 | 0.026 |
| | LAB | MANU-A | 33960.00 | 32658.85 | (3.831) | 33678.41 | (0.829) | 36238.93 | 6.711 | 33946.66 | (0.039) | 33684.27 | (0.812) | 33143.95 | (2.403) |
| | LAB | UTICON-A | 18220.00 | 17669.22 | (3.023) | 18186.91 | (0.182) | 17290.65 | (5.101) | 18257.68 | 0.207 | 18145.59 | (0.408) | 18008.77 | (1.159) |
| | LAB | TRADE-A | 51750.00 | 50112.43 | (3.164) | 51600.86 | (0.288) | 52057.58 | 0.594 | 51744.82 | (0.010) | 52544.89 | 1.536 | 51245.84 | (0.974) |
| | LAB | SER-A | 54200.00 | 52936.97 | (2.330) | 54011.78 | (0.347) | 54388.61 | 0.348 | 54194.98 | (0.009) | 54228.12 | 0.052 | 56121.86 | 3.546 |
| | CAP | PRIMA-A | 12315.48 | 13085.75 | 6.254 | 12382.87 | 0.547 | 12124.64 | (1.550) | 12313.27 | (0.018) | 12244.99 | (0.572) | 12215.51 | (0.812) |
| | CAP | AINDUS-A | 6718.35 | 6616.88 | (1.510) | 6888.40 | 2.531 | 6441.82 | (4.116) | 6716.80 | (0.023) | 6682.48 | (0.534) | 6684.41 | (0.505) |
| | CAP | MANU-A | 22491.87 | 22174.01 | (1.413) | 22354.27 | (0.612) | 23892.11 | 6.226 | 22481.08 | (0.048) | 22253.20 | (1.061) | 21834.71 | (2.922) |
| | CAP | UTICON-A | 16829.92 | 16731.56 | (0.584) | 16836.19 | 0.037 | 15898.87 | (5.532) | 16863.26 | 0.198 | 16719.08 | (0.659) | 16546.38 | (1.685) |
| | CAP | TRADE-A | 44663.41 | 44337.64 | (0.729) | 44632.32 | (0.070) | 44724.62 | 0.137 | 44655.06 | (0.019) | 45235.50 | 1.281 | 43993.19 | (1.501) |
| | CAP | SER-A | 58248.63 | 58321.82 | 0.126 | 58173.61 | (0.129) | 58185.61 | (0.108) | 58238.18 | (0.018) | 58132.42 | (0.200) | 59993.45 | 2.995 |
| WF | LAB | | 0.05 | 0.05 | 0.567 | 0.05 | (0.588) | 0.04 | (8.207) | 0.05 | (0.021) | 0.05 | (0.525) | 0.05 | (1.658) |
| | CAP | | 0.17 | 0.16 | (1.916) | 0.17 | (0.824) | 0.15 | (7.788) | 0.17 | (0.012) | 0.17 | (0.280) | 0.17 | (1.146) |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01376 | 0.572 | 0.01360 | (0.582) | 0.01256 | (8.202) | 0.01368 | (0.015) | 0.01361 | (0.519) | 0.01345 | (1.653) |
| | LAB | AINDUS-A | 0.1128 | 0.11346 | 0.566 | 0.11216 | (0.589) | 0.10356 | (8.208) | 0.11279 | (0.022) | 0.11223 | (0.526) | 0.11095 | (1.659) |

| | | | BASE | SIM 11.1 | Δ% | SIM 11.2 | Δ% | SIM 11.3 | Δ% | SIM 11.4 | Δ% | SIM 11.5 | Δ% | SIM 11.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | MANU-A | 0.1069 | 0.10746 | 0.560 | 0.10622 | (0.595) | 0.09808 | (8.214) | 0.10683 | (0.028) | 0.10629 | (0.532) | 0.10508 | (1.665) |
| | LAB | UTICON-A | 0.0747 | 0.07513 | 0.564 | 0.07427 | (0.590) | 0.06858 | (8.210) | 0.07469 | (0.024) | 0.07432 | (0.527) | 0.07347 | (1.661) |
| | LAB | TRADE-A | 0.0262 | 0.02638 | 0.576 | 0.02608 | (0.578) | 0.02408 | (8.199) | 0.02623 | (0.012) | 0.02609 | (0.515) | 0.02580 | (1.649) |
| | LAB | SER-A | 0.0990 | 0.09958 | 0.566 | 0.09844 | (0.589) | 0.09089 | (8.209) | 0.09900 | (0.022) | 0.09850 | (0.526) | 0.09738 | (1.659) |
| | CAP | PRIMA-A | 0.3425 | 0.33592 | (1.913) | 0.33966 | (0.821) | 0.31581 | (7.785) | 0.34244 | (0.009) | 0.34152 | (0.278) | 0.33856 | (1.143) |
| | CAP | AINDUS-A | 0.1966 | 0.19279 | (1.913) | 0.19494 | (0.821) | 0.18125 | (7.786) | 0.19653 | (0.010) | 0.19600 | (0.278) | 0.19430 | (1.143) |
| | CAP | MANU-A | 0.2224 | 0.21817 | (1.912) | 0.22060 | (0.820) | 0.20511 | (7.785) | 0.22240 | (0.009) | 0.22180 | (0.277) | 0.21988 | (1.143) |
| | CAP | UTICON-A | 0.0845 | 0.08291 | (1.915) | 0.08383 | (0.823) | 0.07795 | (7.787) | 0.08452 | (0.011) | 0.08429 | (0.280) | 0.08356 | (1.145) |
| | CAP | TRADE-A | 0.1870 | 0.18341 | (1.915) | 0.18545 | (0.823) | 0.17243 | (7.787) | 0.18697 | (0.011) | 0.18647 | (0.280) | 0.18485 | (1.145) |
| | CAP | SER-A | 0.1152 | 0.11296 | (1.912) | 0.11422 | (0.820) | 0.10620 | (7.784) | 0.11515 | (0.008) | 0.11484 | (0.277) | 0.11384 | (1.142) |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 1991.80 | (1.628) | 2008.87 | (0.785) | 1877.06 | (7.295) | 2024.47 | (0.014) | 2011.26 | (0.667) | 2000.40 | (1.203) |
| | A-HHD | CAP | 2979.23 | 2934.38 | (1.505) | 2956.11 | (0.776) | 2759.18 | (7.386) | 2978.60 | (0.021) | 2970.94 | (0.278) | 2930.43 | (1.638) |
| | G-HHD | LAB | 4254.63 | 4185.37 | (1.628) | 4221.23 | (0.785) | 3944.27 | (7.295) | 4254.03 | (0.014) | 4226.27 | (0.667) | 4203.45 | (1.203) |
| | G-HHD | CAP | 648.94 | 639.17 | (1.505) | 643.90 | (0.776) | 601.01 | (7.386) | 648.80 | (0.021) | 647.14 | (0.278) | 638.31 | (1.638) |
| | N-HHD | LAB | 8300.51 | 8165.40 | (1.628) | 8235.35 | (0.785) | 7695.02 | (7.295) | 8299.34 | (0.014) | 8245.18 | (0.667) | 8200.66 | (1.203) |
| | N-HHD | CAP | 12376.62 | 12190.30 | (1.505) | 12280.58 | (0.776) | 11462.48 | (7.386) | 12374.01 | (0.021) | 12342.20 | (0.278) | 12173.88 | (1.638) |
| | ENT-G | CAP | 1244.96 | 1226.22 | (1.505) | 1235.30 | (0.776) | 1153.01 | (7.386) | 1244.70 | (0.021) | 1241.50 | (0.278) | 1224.57 | (1.638) |
| | ENT-P | CAP | 8979.21 | 8844.04 | (1.505) | 8909.54 | (0.776) | 8316.01 | (7.386) | 8977.32 | (0.021) | 8954.24 | (0.278) | 8832.12 | (1.638) |
| QINV | PRIMA-C | | 155.02 | 151.21 | (2.456) | 155.01 | (0.004) | 133.83 | (13.667) | 154.90 | (0.075) | 153.79 | (0.790) | 150.19 | (3.110) |
| | AINDUS-C | | -241.50 | -235.57 | (2.456) | -241.49 | (0.004) | -208.49 | (13.667) | -241.32 | (0.075) | -239.59 | (0.790) | -233.99 | (3.110) |
| | MANU-C | | 4849.76 | 4730.63 | (2.456) | 4849.55 | (0.004) | 4186.96 | (13.667) | 4846.13 | (0.075) | 4811.44 | (0.790) | 4698.93 | (3.110) |
| | UTICON-C | | 2955.06 | 2882.47 | (2.456) | 2954.93 | (0.004) | 2551.21 | (13.667) | 2952.85 | (0.075) | 2931.71 | (0.790) | 2863.16 | (3.110) |
| | TRADE-C | | 1009.26 | 984.47 | (2.456) | 1009.22 | (0.004) | 871.33 | (13.667) | 1008.50 | (0.075) | 1001.29 | (0.790) | 977.87 | (3.110) |
| | SER-C | | 36.68 | 35.78 | (2.456) | 36.68 | (0.004) | 31.67 | (13.667) | 36.65 | (0.075) | 36.39 | (0.790) | 35.54 | (3.110) |
| YH | A-HHD | | 5316.62 | 5237.15 | (1.495) | 5275.98 | (0.764) | 4941.72 | (7.052) | 5315.69 | (0.018) | 5294.57 | (0.415) | 5241.40 | (1.415) |
| | G-HHD | | 4971.28 | 4891.93 | (1.596) | 4932.53 | (0.779) | 4611.61 | (7.235) | 4970.54 | (0.015) | 4941.06 | (0.608) | 4909.07 | (1.251) |
| | N-HHD | | 21389.80 | 21065.42 | (1.517) | 21225.71 | (0.767) | 19857.46 | (7.164) | 21385.99 | (0.018) | 21299.57 | (0.422) | 21083.55 | (1.432) |
| QH | PRIMA-C | A-HHD | 700.14 | 674.02 | (3.730) | 698.88 | (0.180) | 673.16 | (3.854) | 700.05 | (0.013) | 698.17 | (0.281) | 696.44 | (0.528) |
| | PRIMA-C | G-HHD | 274.35 | 263.85 | (3.829) | 273.82 | (0.195) | 263.26 | (4.044) | 274.33 | (0.010) | 273.05 | (0.474) | 273.36 | (0.363) |
| | PRIMA-C | N-HHD | 1129.02 | 1086.67 | (3.752) | 1126.96 | (0.182) | 1084.20 | (3.971) | 1128.88 | (0.013) | 1125.77 | (0.288) | 1122.87 | (0.545) |
| | AINDUS-C | A-HHD | 1881.42 | 1838.73 | (2.269) | 1834.07 | (2.517) | 1793.09 | (4.695) | 1881.10 | (0.017) | 1874.30 | (0.379) | 1868.65 | (0.679) |
| | AINDUS-C | G-HHD | 920.08 | 898.28 | (2.369) | 896.79 | (2.531) | 875.15 | (4.883) | 919.95 | (0.014) | 914.82 | (0.572) | 915.35 | (0.514) |

| | | | BASE | SIM 11.1 | Δ% | SIM 11.2 | Δ% | SIM 11.3 | Δ% | SIM 11.4 | Δ% | SIM 11.5 | Δ% | SIM 11.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3464.08 | (2.290) | 3455.97 | (2.519) | 3374.75 | (4.810) | 3544.66 | (0.017) | 3531.60 | (0.386) | 3520.62 | (0.696) |
| | MANU-C | A-HHD | 1743.73 | 1725.91 | (1.022) | 1741.44 | (0.131) | 1449.49 | (16.874) | 1743.42 | (0.018) | 1736.18 | (0.433) | 1730.41 | (0.764) |
| | MANU-C | G-HHD | 852.75 | 843.16 | (1.124) | 851.50 | (0.146) | 707.46 | (17.038) | 852.62 | (0.015) | 847.41 | (0.626) | 847.63 | (0.600) |
| | MANU-C | N-HHD | 3285.84 | 3251.54 | (1.044) | 3281.44 | (0.134) | 2728.08 | (16.975) | 3285.24 | (0.018) | 3271.38 | (0.440) | 3260.17 | (0.781) |
| | UTICON-C | A-HHD | 97.86 | 96.85 | (1.032) | 97.76 | (0.099) | 91.62 | (6.371) | 97.74 | (0.120) | 97.52 | (0.345) | 97.29 | (0.584) |
| | UTICON-C | G-HHD | 47.86 | 47.32 | (1.134) | 47.81 | (0.114) | 44.73 | (6.556) | 47.81 | (0.117) | 47.61 | (0.539) | 47.66 | (0.419) |
| | UTICON-C | N-HHD | 184.43 | 182.48 | (1.054) | 184.24 | (0.101) | 172.47 | (6.485) | 184.20 | (0.120) | 183.78 | (0.353) | 183.32 | (0.601) |
| | TRADE-C | A-HHD | 347.20 | 346.35 | (0.244) | 346.99 | (0.059) | 336.56 | (3.065) | 347.15 | (0.014) | 342.79 | (1.269) | 344.38 | (0.812) |
| | TRADE-C | G-HHD | 427.95 | 426.47 | (0.346) | 427.63 | (0.074) | 414.01 | (3.257) | 427.90 | (0.011) | 421.70 | (1.461) | 425.18 | (0.648) |
| | TRADE-C | N-HHD | 1656.57 | 1652.17 | (0.266) | 1655.54 | (0.062) | 1603.85 | (3.182) | 1656.33 | (0.014) | 1635.43 | (1.276) | 1642.84 | (0.829) |
| | SER-C | A-HHD | 1147.00 | 1135.41 | (1.011) | 1144.60 | (0.209) | 1119.74 | (2.376) | 1146.82 | (0.016) | 1144.62 | (0.208) | 1113.64 | (2.908) |
| | SER-C | G-HHD | 1413.70 | 1397.97 | (1.113) | 1410.53 | (0.224) | 1377.38 | (2.569) | 1413.52 | (0.013) | 1408.03 | (0.401) | 1374.86 | (2.747) |
| | SER-C | N-HHD | 5472.33 | 5415.82 | (1.033) | 5460.75 | (0.212) | 5335.84 | (2.494) | 5471.46 | (0.016) | 5460.58 | (0.215) | 5312.27 | (2.925) |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1226.22 | (1.505) | 1235.30 | (0.776) | 1153.01 | (7.386) | 1244.70 | (0.021) | 1241.50 | (0.278) | 1224.57 | (1.638) |
| | ENT-P | | 10396.40 | 10247.86 | (1.429) | 10316.85 | (0.765) | 9673.23 | (6.956) | 10394.37 | (0.020) | 10368.25 | (0.271) | 10235.09 | (1.552) |
| ENTSAV | ENT-G | | 902.97 | 889.38 | (1.505) | 895.96 | (0.776) | 836.28 | (7.386) | 902.78 | (0.021) | 900.46 | (0.278) | 888.18 | (1.638) |
| | ENT-P | | 6326.21 | 6217.96 | (1.711) | 6279.56 | (0.737) | 5784.95 | (8.556) | 6324.62 | (0.025) | 6305.00 | (0.335) | 6212.56 | (1.797) |
| QE | PRIMA-C | | 2236.89 | 2354.61 | 5.263 | 2243.52 | 0.297 | 2200.39 | (1.632) | 2236.49 | (0.018) | 2225.80 | (0.496) | 2219.90 | (0.760) |
| | AINDUS-C | | 2909.02 | 2803.82 | (3.616) | 2958.41 | 1.698 | 2772.25 | (4.701) | 2908.30 | (0.025) | 2894.58 | (0.496) | 2894.86 | (0.487) |
| | MANU-C | | 16662.56 | 16211.09 | (2.709) | 16521.21 | (0.848) | 16758.27 | 0.574 | 16654.10 | (0.051) | 16483.66 | (1.074) | 16163.78 | (2.993) |
| | UTICON-C | | 113.66 | 111.30 | (2.075) | 113.44 | (0.195) | 105.13 | (7.508) | 113.88 | 0.196 | 112.99 | (0.589) | 111.85 | (1.589) |
| | TRADE-C | | 2898.91 | 2876.17 | (0.784) | 2893.62 | (0.182) | 2915.26 | 0.564 | 2898.31 | (0.021) | 2936.90 | 1.311 | 2848.89 | (1.726) |
| | SER-C | | 2416.15 | 2385.86 | (1.254) | 2405.49 | (0.441) | 2442.40 | 1.086 | 2415.69 | (0.019) | 2415.42 | (0.030) | 2491.37 | 3.113 |
| PE | PRIMA-C | | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | AINDUS-C | | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | MANU-C | | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | UTICON-C | | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | TRADE-C | | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | SER-C | | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| QM | PRIMA-C | | 1635.60 | 993.88 | (39.234) | 1655.75 | 1.232 | 1627.58 | (0.490) | 1635.52 | (0.005) | 1627.61 | (0.489) | 1632.64 | (0.181) |
| | AINDUS-C | | 899.60 | 914.34 | 1.639 | 579.58 | (35.573) | 890.72 | (0.987) | 899.60 | (0.000) | 898.04 | (0.173) | 904.03 | 0.493 |

| | | BASE | SIM 11.1 | Δ% | SIM 11.2 | Δ% | SIM 11.3 | Δ% | SIM 11.4 | Δ% | SIM 11.5 | Δ% | SIM 11.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 14721.01 | (0.703) | 14857.43 | 0.217 | 11897.08 | (19.751) | 14824.73 | (0.003) | 14793.60 | (0.213) | 14697.79 | (0.860) |
| | UTICON-C | 37.90 | 37.56 | (0.909) | 38.02 | 0.305 | 38.49 | 1.550 | 22.48 | (40.678) | 37.76 | (0.379) | 37.54 | (0.946) |
| | TRADE-C | 710.78 | 696.85 | (1.960) | 711.87 | 0.153 | 704.31 | (0.910) | 710.72 | (0.008) | 471.37 | (33.682) | 707.20 | (0.503) |
| | SER-C | 2534.31 | 2529.67 | (0.183) | 2543.95 | 0.380 | 2467.32 | (2.643) | 2534.31 | (0.000) | 2527.99 | (0.249) | 1718.20 | (32.203) |
| PM | PRIMA-C | 1.00 | 1.24 | 23.952 | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | AINDUS-C | 1.00 | 0.99 | (0.839) | 1.24 | 23.971 | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | MANU-C | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 1.20 | 20.485 | 1.00 | (0.008) | 1.00 | (0.136) | 0.99 | (1.040) |
| | UTICON-C | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.25 | 24.990 | 1.00 | (0.136) | 0.99 | (1.040) |
| | TRADE-C | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.25 | 24.830 | 0.99 | (1.040) |
| | SER-C | 1.00 | 0.99 | (0.839) | 0.99 | (0.823) | 0.96 | (3.612) | 1.00 | (0.008) | 1.00 | (0.136) | 1.24 | 23.700 |
| QX | PRIMA-C | 11489.80 | 12114.38 | 5.436 | 11544.79 | 0.479 | 11327.82 | (1.410) | 11488.05 | (0.015) | 11432.99 | (0.494) | 11415.47 | (0.647) |
| | AINDUS-C | 13628.78 | 13283.51 | (2.533) | 13960.88 | 2.437 | 13092.87 | (3.932) | 13626.12 | (0.019) | 13570.36 | (0.429) | 13590.34 | (0.282) |
| | MANU-C | 43263.45 | 42209.03 | (2.437) | 42959.21 | (0.703) | 46044.95 | 6.429 | 43244.28 | (0.044) | 42849.66 | (0.956) | 42093.61 | (2.704) |
| | UTICON-C | 7195.13 | 7066.74 | (1.784) | 7190.11 | (0.070) | 6812.25 | (5.321) | 7209.69 | 0.202 | 7156.54 | (0.536) | 7092.37 | (1.428) |
| | TRADE-C | 16778.46 | 16598.34 | (1.074) | 16761.65 | (0.100) | 16812.16 | 0.201 | 16775.53 | (0.017) | 16999.35 | 1.317 | 16539.00 | (1.427) |
| | SER-C | 21320.57 | 21113.02 | (0.973) | 21272.39 | (0.226) | 21340.68 | 0.094 | 21317.57 | (0.014) | 21301.84 | (0.088) | 22011.30 | 3.240 |
| PX | PRIMA-C | 1.00 | 0.99 | (0.635) | 0.99 | (0.598) | 0.97 | (3.340) | 1.00 | (0.005) | 1.00 | (0.134) | 0.99 | (0.899) |
| | AINDUS-C | 1.00 | 1.01 | 0.556 | 1.00 | 0.078 | 0.97 | (2.639) | 1.00 | (0.002) | 1.00 | (0.051) | 0.99 | (0.785) |
| | MANU-C | 1.00 | 1.00 | (0.492) | 0.99 | (0.642) | 1.03 | 3.452 | 1.00 | - | 1.00 | 0.012 | 0.99 | (0.671) |
| | UTICON-C | 1.00 | 1.00 | (0.471) | 0.99 | (0.668) | 0.99 | (0.756) | 1.00 | - | 1.00 | (0.070) | 0.99 | (0.838) |
| | TRADE-C | 1.00 | 0.99 | (1.200) | 0.99 | (0.721) | 0.96 | (4.047) | 1.00 | (0.004) | 1.00 | (0.129) | 0.99 | (0.664) |
| | SER-C | 1.00 | 1.00 | (0.487) | 0.99 | (0.555) | 0.95 | (4.793) | 1.00 | (0.002) | 1.00 | (0.208) | 0.99 | (0.888) |
| QQ | PRIMA-C | 10888.51 | 10686.42 | (1.856) | 10957.00 | 0.629 | 10754.98 | (1.226) | 10887.07 | (0.013) | 10834.80 | (0.493) | 10828.20 | (0.554) |
| | AINDUS-C | 11619.36 | 11393.47 | (1.944) | 11548.72 | (0.608) | 11211.05 | (3.514) | 11617.42 | (0.017) | 11573.82 | (0.392) | 11599.50 | (0.171) |
| | MANU-C | 41426.12 | 40718.40 | (1.708) | 41295.28 | (0.316) | 40974.05 | (1.091) | 41414.92 | (0.027) | 41159.50 | (0.644) | 40627.00 | (1.929) |
| | UTICON-C | 7119.37 | 6992.99 | (1.775) | 7114.68 | (0.066) | 6745.53 | (5.251) | 7116.60 | (0.039) | 7081.31 | (0.535) | 7018.06 | (1.423) |
| | TRADE-C | 14590.33 | 14418.99 | (1.174) | 14579.90 | (0.072) | 14601.17 | 0.074 | 14587.93 | (0.016) | 14507.44 | (0.568) | 14397.29 | (1.323) |
| | SER-C | 21438.73 | 21256.78 | (0.849) | 21410.82 | (0.130) | 21365.02 | (0.344) | 21436.19 | (0.012) | 21414.40 | (0.113) | 21150.48 | (1.345) |
| PQ | PRIMA-C | 1.01 | 1.03 | 2.322 | 1.00 | (0.586) | 0.97 | (3.325) | 1.01 | (0.005) | 1.01 | (0.134) | 1.00 | (0.891) |
| | AINDUS-C | 1.01 | 1.01 | 0.792 | 1.02 | 1.797 | 0.98 | (2.472) | 1.01 | (0.001) | 1.01 | (0.037) | 1.00 | (0.741) |
| | MANU-C | 1.02 | 1.01 | (0.478) | 1.01 | (0.634) | 1.14 | 11.816 | 1.02 | - | 1.02 | 0.018 | 1.01 | (0.656) |
| | UTICON-C | 1.00 | 1.00 | (0.467) | 0.99 | (0.667) | 0.99 | (0.726) | 1.00 | 0.102 | 1.00 | (0.070) | 0.99 | (0.836) |
| | TRADE-C | 1.00 | 0.99 | (1.254) | 0.99 | (0.706) | 0.96 | (4.112) | 1.00 | (0.004) | 1.01 | 0.866 | 0.99 | (0.608) |
| | SER-C | 1.00 | 1.00 | (0.489) | 1.00 | (0.557) | 0.95 | (4.789) | 1.00 | (0.002) | 1.00 | (0.208) | 1.02 | 1.538 |

| | | | BASE | SIM 11.1 | Δ% | SIM 11.2 | Δ% | SIM 11.3 | Δ% | SIM 11.4 | Δ% | SIM 11.5 | Δ% | SIM 11.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 9759.76 | 5.478 | 9301.26 | 0.523 | 9127.42 | (1.356) | 9251.55 | (0.015) | 9207.19 | (0.494) | 9195.57 | (0.620) |
| | AINDUS-C | | 10719.76 | 10479.41 | (2.242) | 11002.35 | 2.636 | 10320.47 | (3.725) | 10717.82 | (0.018) | 10675.78 | (0.410) | 10695.47 | (0.227) |
| | MANU-C | | 26600.89 | 25997.81 | (2.267) | 26437.96 | (0.612) | 29234.42 | 9.900 | 26590.18 | (0.040) | 26365.97 | (0.883) | 25929.69 | (2.523) |
| | UTICON-C | | 7081.47 | 6955.44 | (1.780) | 7076.67 | (0.068) | 6707.08 | (5.287) | 7095.81 | 0.202 | 7043.55 | (0.535) | 6980.52 | (1.426) |
| | TRADE-C | | 13879.55 | 13722.15 | (1.134) | 13868.03 | (0.083) | 13896.88 | 0.125 | 13877.21 | (0.017) | 14062.45 | 1.318 | 13690.10 | (1.365) |
| | SER-C | | 18904.42 | 18727.15 | (0.938) | 18866.90 | (0.198) | 18898.11 | (0.033) | 18901.88 | (0.013) | 18886.42 | (0.095) | 19519.93 | 3.256 |
| PD | PRIMA-C | | 1.00 | 0.99 | (0.585) | 0.99 | (0.544) | 0.97 | (3.275) | 1.00 | (0.004) | 1.00 | (0.134) | 0.99 | (0.865) |
| | AINDUS-C | | 1.00 | 1.01 | 0.932 | 1.00 | 0.322 | 0.98 | (2.376) | 1.00 | - | 1.00 | (0.028) | 0.99 | (0.716) |
| | MANU-C | | 1.00 | 1.00 | (0.275) | 0.99 | (0.528) | 1.08 | 7.687 | 1.00 | 0.005 | 1.00 | 0.105 | 1.00 | (0.440) |
| | UTICON-C | | 1.00 | 1.00 | (0.465) | 0.99 | (0.666) | 0.99 | (0.710) | 1.00 | - | 1.00 | (0.069) | 0.99 | (0.835) |
| | TRADE-C | | 1.00 | 0.99 | (1.275) | 0.99 | (0.700) | 0.96 | (4.138) | 1.00 | (0.003) | 1.00 | (0.127) | 0.99 | (0.586) |
| | SER-C | | 1.00 | 1.00 | (0.442) | 0.99 | (0.521) | 0.95 | (4.945) | 1.00 | (0.001) | 1.00 | (0.217) | 0.99 | (0.868) |
| QA | PRIMA-A | | 11489.80 | 12114.38 | 5.436 | 11544.79 | 0.479 | 11327.82 | (1.410) | 11488.05 | (0.015) | 11432.99 | (0.494) | 11415.47 | (0.647) |
| | AINDUS-A | | 13628.78 | 13283.51 | (2.533) | 13960.88 | 2.437 | 13092.87 | (3.932) | 13626.12 | (0.019) | 13570.36 | (0.429) | 13590.34 | (0.282) |
| | MANU-A | | 43263.45 | 42209.03 | (2.437) | 42959.21 | (0.703) | 46044.95 | 6.429 | 43244.28 | (0.044) | 42849.66 | (0.956) | 42093.61 | (2.704) |
| | UTICON-A | | 7195.13 | 7066.74 | (1.784) | 7190.11 | (0.070) | 6812.25 | (5.321) | 7209.69 | 0.202 | 7156.54 | (0.536) | 7092.37 | (1.428) |
| | TRADE-A | | 16778.46 | 16598.34 | (1.074) | 16761.65 | (0.100) | 16812.16 | 0.201 | 16775.53 | (0.017) | 16999.35 | 1.317 | 16539.00 | (1.427) |
| | SER-A | | 21320.57 | 21113.02 | (0.973) | 21272.39 | (0.226) | 21340.68 | 0.094 | 21317.57 | (0.014) | 21301.84 | (0.088) | 22011.30 | 3.240 |
| PA | PRIMA-A | | 1.00 | 0.99 | (0.635) | 0.99 | (0.598) | 0.97 | (3.340) | 1.00 | (0.005) | 1.00 | (0.134) | 0.99 | (0.899) |
| | AINDUS-A | | 1.00 | 1.01 | 0.556 | 1.00 | 0.078 | 0.97 | (2.639) | 1.00 | (0.002) | 1.00 | (0.051) | 0.99 | (0.785) |
| | MANU-A | | 1.00 | 1.00 | (0.492) | 0.99 | (0.642) | 1.03 | 3.452 | 1.00 | - | 1.00 | 0.012 | 0.99 | (0.671) |
| | UTICON-A | | 1.00 | 1.00 | (0.471) | 0.99 | (0.668) | 0.99 | (0.756) | 1.00 | - | 1.00 | (0.070) | 0.99 | (0.838) |
| | TRADE-A | | 1.00 | 0.99 | (1.200) | 0.99 | (0.721) | 0.96 | (4.047) | 1.00 | (0.004) | 1.00 | (0.129) | 0.99 | (0.664) |
| | SER-A | | 1.00 | 1.00 | (0.487) | 0.99 | (0.555) | 0.95 | (4.793) | 1.00 | (0.002) | 1.00 | (0.208) | 0.99 | (0.888) |
| PVA | PRIMA-A | | 0.53 | 0.53 | (1.152) | 0.53 | (0.752) | 0.49 | (7.916) | 0.53 | (0.011) | 0.53 | (0.356) | 0.53 | (1.306) |
| | AINDUS-A | | 0.17 | 0.17 | (0.879) | 0.17 | (0.730) | 0.15 | (7.962) | 0.17 | (0.012) | 0.17 | (0.383) | 0.16 | (1.364) |
| | MANU-A | | 0.20 | 0.20 | (0.882) | 0.20 | (0.727) | 0.18 | (7.960) | 0.20 | (0.010) | 0.20 | (0.381) | 0.20 | (1.363) |
| | UTICON-A | | 0.39 | 0.38 | (0.716) | 0.38 | (0.713) | 0.36 | (7.992) | 0.39 | (0.013) | 0.39 | (0.401) | 0.38 | (1.401) |
| | TRADE-A | | 0.58 | 0.57 | (1.571) | 0.57 | (0.790) | 0.53 | (7.844) | 0.58 | (0.009) | 0.58 | (0.313) | 0.57 | (1.217) |
| | SER-A | | 0.57 | 0.56 | (0.825) | 0.56 | (0.724) | 0.52 | (7.974) | 0.57 | (0.012) | 0.56 | (0.390) | 0.56 | (1.377) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 967.57 | 5.436 | 922.08 | 0.479 | 904.75 | (1.410) | 917.55 | (0.015) | 913.15 | (0.494) | 911.75 | (0.647) |
| | PRIMA-C | AINDUS-A | 3594.75 | 3503.68 | (2.533) | 3682.35 | 2.437 | 3453.40 | (3.932) | 3594.05 | (0.019) | 3579.34 | (0.429) | 3584.61 | (0.282) |
| | PRIMA-C | MANU-A | 2330.82 | 2274.01 | (2.437) | 2314.43 | (0.703) | 2480.67 | 6.429 | 2329.79 | (0.044) | 2308.53 | (0.956) | 2267.80 | (2.704) |
| | PRIMA-C | UTICON-A | 492.64 | 483.85 | (1.784) | 492.30 | (0.070) | 466.43 | (5.321) | 493.64 | 0.202 | 490.00 | (0.536) | 485.61 | (1.428) |

| | | | BASE | SIM 11.1 | Δ% | SIM 11.2 | Δ% | SIM 11.3 | Δ% | SIM 11.4 | Δ% | SIM 11.5 | Δ% | SIM 11.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.38 | (1.074) | 3.42 | (0.100) | 3.43 | 0.201 | 3.42 | (0.018) | 3.47 | 1.316 | 3.37 | (1.427) |
| | PRIMA-C | SER-A | 1282.41 | 1269.93 | (0.973) | 1279.52 | (0.226) | 1283.62 | 0.094 | 1282.23 | (0.014) | 1281.29 | (0.088) | 1323.96 | 3.240 |
| | AINDUS-C | PRIMA-A | 457.75 | 482.63 | 5.436 | 459.94 | 0.479 | 451.29 | (1.410) | 457.68 | (0.015) | 455.48 | (0.494) | 454.79 | (0.647) |
| | AINDUS-C | AINDUS-A | 3741.97 | 3647.18 | (2.533) | 3833.16 | 2.437 | 3594.83 | (3.932) | 3741.24 | (0.019) | 3725.93 | (0.429) | 3731.42 | (0.282) |
| | AINDUS-C | MANU-A | 233.97 | 228.27 | (2.437) | 232.32 | (0.703) | 249.01 | 6.429 | 233.87 | (0.044) | 231.73 | (0.956) | 227.64 | (2.704) |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.57 | (1.073) | 7.64 | (0.100) | 7.66 | 0.201 | 7.65 | (0.018) | 7.75 | 1.317 | 7.54 | (1.427) |
| | AINDUS-C | SER-A | 1072.20 | 1061.76 | (0.973) | 1069.77 | (0.226) | 1073.21 | 0.094 | 1072.04 | (0.014) | 1071.25 | (0.088) | 1106.93 | 3.240 |
| | MANU-C | PRIMA-A | 1872.79 | 1974.59 | 5.436 | 1881.75 | 0.479 | 1846.38 | (1.410) | 1872.50 | (0.015) | 1863.53 | (0.494) | 1860.67 | (0.647) |
| | MANU-C | AINDUS-A | 1100.51 | 1072.63 | (2.533) | 1127.33 | 2.437 | 1057.24 | (3.932) | 1100.30 | (0.019) | 1095.80 | (0.429) | 1097.41 | (0.282) |
| | MANU-C | MANU-A | 21464.91 | 20941.77 | (2.437) | 21313.96 | (0.703) | 22844.94 | 6.429 | 21455.40 | (0.044) | 21259.61 | (0.956) | 20884.51 | (2.704) |
| | MANU-C | UTICON-A | 2040.52 | 2004.11 | (1.784) | 2039.10 | (0.070) | 1931.94 | (5.321) | 2044.65 | 0.202 | 2029.58 | (0.536) | 2011.38 | (1.428) |
| | MANU-C | TRADE-A | 2334.07 | 2309.01 | (1.074) | 2331.73 | (0.100) | 2338.75 | 0.201 | 2333.66 | (0.017) | 2364.79 | 1.317 | 2300.75 | (1.427) |
| | MANU-C | SER-A | 1663.74 | 1647.54 | (0.973) | 1659.98 | (0.226) | 1665.31 | 0.094 | 1663.50 | (0.014) | 1662.28 | (0.088) | 1717.64 | 3.240 |
| | UTICON-C | PRIMA-A | 210.22 | 221.65 | 5.436 | 211.23 | 0.479 | 207.26 | (1.410) | 210.19 | (0.015) | 209.18 | (0.494) | 208.86 | (0.647) |
| | UTICON-C | AINDUS-A | 301.60 | 293.96 | (2.533) | 308.95 | 2.437 | 289.74 | (3.932) | 301.54 | (0.019) | 300.31 | (0.429) | 300.75 | (0.282) |
| | UTICON-C | MANU-A | 1306.30 | 1274.46 | (2.437) | 1297.11 | (0.703) | 1390.28 | 6.429 | 1305.72 | (0.044) | 1293.81 | (0.956) | 1270.98 | (2.704) |
| | UTICON-C | UTICON-A | 369.25 | 362.66 | (1.784) | 368.99 | (0.070) | 349.60 | (5.321) | 370.00 | 0.202 | 367.27 | (0.536) | 363.98 | (1.428) |
| | UTICON-C | TRADE-A | 336.12 | 332.51 | (1.074) | 335.78 | (0.100) | 336.79 | 0.201 | 336.06 | (0.017) | 340.54 | 1.317 | 331.32 | (1.427) |
| | UTICON-C | SER-A | 1237.04 | 1225.00 | (0.973) | 1234.24 | (0.226) | 1238.21 | 0.094 | 1236.86 | (0.014) | 1235.95 | (0.088) | 1277.12 | 3.240 |
| | TRADE-C | PRIMA-A | 1059.51 | 1117.10 | 5.436 | 1064.58 | 0.479 | 1044.57 | (1.410) | 1059.35 | (0.015) | 1054.27 | (0.494) | 1052.66 | (0.647) |
| | TRADE-C | AINDUS-A | 1105.89 | 1077.87 | (2.533) | 1132.84 | 2.437 | 1062.40 | (3.932) | 1105.67 | (0.019) | 1101.15 | (0.429) | 1102.77 | (0.282) |
| | TRADE-C | MANU-A | 5085.91 | 4961.96 | (2.437) | 5050.14 | (0.703) | 5412.89 | 6.429 | 5083.66 | (0.044) | 5037.27 | (0.956) | 4948.39 | (2.704) |
| | TRADE-C | UTICON-A | 882.07 | 866.33 | (1.784) | 881.45 | (0.070) | 835.13 | (5.321) | 883.86 | 0.202 | 877.34 | (0.536) | 869.47 | (1.428) |
| | TRADE-C | TRADE-A | 1621.83 | 1604.42 | (1.074) | 1620.21 | (0.100) | 1625.09 | 0.201 | 1621.55 | (0.017) | 1643.18 | 1.317 | 1598.68 | (1.427) |
| | TRADE-C | SER-A | 1262.78 | 1250.49 | (0.973) | 1259.93 | (0.226) | 1263.97 | 0.094 | 1262.60 | (0.014) | 1261.67 | (0.088) | 1303.69 | 3.240 |
| | SER-C | PRIMA-A | 667.53 | 703.82 | 5.436 | 670.73 | 0.479 | 658.12 | (1.410) | 667.43 | (0.015) | 664.23 | (0.494) | 663.21 | (0.647) |
| | SER-C | AINDUS-A | 521.52 | 508.30 | (2.533) | 534.22 | 2.437 | 501.01 | (3.932) | 521.41 | (0.019) | 519.28 | (0.429) | 520.05 | (0.282) |
| | SER-C | MANU-A | 2753.93 | 2686.81 | (2.437) | 2734.56 | (0.703) | 2930.98 | 6.429 | 2752.71 | (0.044) | 2727.59 | (0.956) | 2679.46 | (2.704) |
| | SER-C | UTICON-A | 423.34 | 415.79 | (1.784) | 423.04 | (0.070) | 400.81 | (5.321) | 424.20 | 0.202 | 421.07 | (0.536) | 417.29 | (1.428) |
| | SER-C | TRADE-A | 2407.69 | 2381.85 | (1.074) | 2405.28 | (0.100) | 2412.53 | 0.201 | 2407.27 | (0.017) | 2439.39 | 1.317 | 2373.33 | (1.427) |
| | SER-C | SER-A | 2031.46 | 2011.68 | (0.973) | 2026.87 | (0.226) | 2033.37 | 0.094 | 2031.17 | (0.014) | 2029.67 | (0.088) | 2097.27 | 3.240 |

## Results of Simulations 12-13

| | | | BASE | SIM 12 | ∆% | SIM 13 | ∆% |
|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 45566.61 | (1.710) | 48269.00 | 4.119 |
| | PRVCON | | 25292.80 | 24758.92 | (2.111) | 26455.36 | 4.596 |
| | GOVCON | | 5007.05 | 4965.20 | (0.836) | 5102.36 | 1.903 |
| | INVEST | | 8845.28 | 19944.21 | 125.479 | -2354.00 | (126.613) |
| | EXP | | 27237.19 | 20814.67 | (23.580) | 34784.54 | 27.710 |
| | IMP | | -20023.05 | -24916.38 | 24.438 | -15719.25 | (21.494) |
| | NITAX | | 4756.36 | 4784.02 | 0.581 | 4773.92 | 0.369 |
| | GDPFC | | 41602.91 | 40782.60 | (1.972) | 43495.08 | 4.548 |
| | GDPMP2 | | 46359.27 | 45566.61 | (1.710) | 48269.00 | 4.119 |
| YG | | | 8524.54 | 8454.45 | (0.822) | 8727.95 | 2.386 |
| EG | | | 5710.03 | 5667.31 | (0.748) | 5806.20 | 1.684 |
| IADJ | | | 1.00 | 2.27 | 127.392 | -0.27 | (126.693) |
| FSAV | | | 3903.00 | 15674.60 | 301.604 | -6214.94 | (259.235) |
| EXR | PRIMA-A | | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| YF | LAB | | 14579.90 | 14284.22 | (2.028) | 15253.21 | 4.618 |
| | CAP | | 27023.01 | 26498.38 | (1.941) | 28241.88 | 4.510 |
| QF | LAB | PRIMA-A | 139410.00 | 129079.65 | (7.410) | 149665.93 | 7.357 |
| | LAB | AINDUS-A | 8490.00 | 7494.80 | (11.722) | 9657.56 | 13.752 |
| | LAB | MANU-A | 33960.00 | 31769.40 | (6.451) | 35788.13 | 5.383 |
| | LAB | UTICON-A | 18220.00 | 28438.87 | 56.086 | 8548.32 | (53.083) |
| | LAB | TRADE-A | 51750.00 | 55950.50 | 8.117 | 47575.68 | (8.066) |
| | LAB | SER-A | 54200.00 | 53296.79 | (1.666) | 54794.38 | 1.097 |
| | CAP | PRIMA-A | 12315.48 | 10803.79 | (12.275) | 13989.83 | 13.595 |
| | CAP | AINDUS-A | 6718.35 | 5619.22 | (16.360) | 8086.38 | 20.363 |
| | CAP | MANU-A | 22491.87 | 19935.52 | (11.366) | 25080.08 | 11.507 |
| | CAP | UTICON-A | 16829.92 | 24888.97 | 47.885 | 8355.00 | (50.356) |
| | CAP | TRADE-A | 44663.41 | 45751.60 | 2.436 | 43446.87 | (2.724) |
| | CAP | SER-A | 58248.63 | 54268.56 | (6.833) | 62309.51 | 6.972 |
| WF | LAB | | 0.05 | 0.05 | (3.967) | 0.05 | 6.864 |
| | CAP | | 0.17 | 0.17 | 1.343 | 0.17 | 0.991 |
| wfa | LAB | PRIMA-A | 0.0137 | 0.01314 | (3.962) | 0.01462 | 6.870 |
| | LAB | AINDUS-A | 0.1128 | 0.10834 | (3.968) | 0.12056 | 6.863 |
| | LAB | MANU-A | 0.1069 | 0.10261 | (3.974) | 0.11419 | 6.857 |
| | LAB | UTICON-A | 0.0747 | 0.07174 | (3.970) | 0.07984 | 6.861 |
| | LAB | TRADE-A | 0.0262 | 0.02519 | (3.958) | 0.02803 | 6.874 |
| | LAB | SER-A | 0.0990 | 0.09509 | (3.968) | 0.10582 | 6.863 |
| | CAP | PRIMA-A | 0.3425 | 0.34708 | 1.346 | 0.34587 | 0.993 |
| | CAP | AINDUS-A | 0.1966 | 0.19919 | 1.345 | 0.19850 | 0.993 |
| | CAP | MANU-A | 0.2224 | 0.22541 | 1.346 | 0.22463 | 0.994 |
| | CAP | UTICON-A | 0.0845 | 0.08567 | 1.344 | 0.08537 | 0.991 |
| | CAP | TRADE-A | 0.1870 | 0.18950 | 1.343 | 0.18884 | 0.991 |
| | CAP | SER-A | 0.1152 | 0.11671 | 1.346 | 0.11631 | 0.994 |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 1983.70 | (2.028) | 2118.26 | 4.618 |
| | A-HHD | CAP | 2979.23 | 2921.39 | (1.941) | 3113.61 | 4.510 |
| | G-HHD | LAB | 4254.63 | 4168.35 | (2.028) | 4451.11 | 4.618 |
| | G-HHD | CAP | 648.94 | 636.34 | (1.941) | 678.21 | 4.510 |

| | | | BASE | SIM 12 | Δ% | SIM 13 | Δ% |
|---|---|---|---|---|---|---|---|
| YFID | N-HHD | LAB | 8300.51 | 8132.18 | (2.028) | 8683.83 | 4.618 |
| | N-HHD | CAP | 12376.62 | 12136.34 | (1.941) | 12934.86 | 4.510 |
| | ENT-G | CAP | 1244.96 | 1220.79 | (1.941) | 1301.11 | 4.510 |
| | ENT-P | CAP | 8979.21 | 8804.89 | (1.941) | 9384.22 | 4.510 |
| QINV | PRIMA-C | | 155.02 | 352.49 | 127.392 | -41.38 | (126.693) |
| | AINDUS-C | | -241.50 | -549.15 | 127.392 | 64.46 | (126.693) |
| | MANU-C | | 4849.76 | 11027.95 | 127.392 | -1294.57 | (126.693) |
| | UTICON-C | | 2955.06 | 6719.57 | 127.392 | -788.81 | (126.693) |
| | TRADE-C | | 1009.26 | 2294.97 | 127.392 | -269.41 | (126.693) |
| | SER-C | | 36.68 | 83.41 | 127.392 | -9.79 | (126.693) |
| YH | A-HHD | | 5316.62 | 5197.90 | (2.233) | 5564.32 | 4.659 |
| | G-HHD | | 4971.28 | 4868.57 | (2.066) | 5200.86 | 4.618 |
| | N-HHD | | 21389.80 | 20945.98 | (2.075) | 22366.57 | 4.567 |
| QH | PRIMA-C | A-HHD | 700.14 | 684.99 | (2.165) | 727.88 | 3.962 |
| | PRIMA-C | G-HHD | 274.35 | 268.87 | (1.998) | 285.11 | 3.921 |
| | PRIMA-C | N-HHD | 1129.02 | 1106.37 | (2.007) | 1172.72 | 3.870 |
| | AINDUS-C | A-HHD | 1881.42 | 1806.48 | (3.983) | 2001.18 | 6.365 |
| | AINDUS-C | G-HHD | 920.08 | 884.94 | (3.819) | 978.26 | 6.324 |
| QH | AINDUS-C | N-HHD | 3545.28 | 3409.58 | (3.828) | 3767.62 | 6.271 |
| | MANU-C | A-HHD | 1743.73 | 1727.13 | (0.952) | 1849.65 | 6.074 |
| | MANU-C | G-HHD | 852.75 | 846.07 | (0.783) | 904.19 | 6.033 |
| | MANU-C | N-HHD | 3285.84 | 3259.82 | (0.792) | 3482.35 | 5.981 |
| | UTICON-C | A-HHD | 97.86 | 96.36 | (1.530) | 101.18 | 3.394 |
| | UTICON-C | G-HHD | 47.86 | 47.21 | (1.362) | 49.47 | 3.353 |
| | UTICON-C | N-HHD | 184.43 | 181.90 | (1.371) | 190.52 | 3.302 |
| | TRADE-C | A-HHD | 347.20 | 334.37 | (3.694) | 364.36 | 4.942 |
| | TRADE-C | G-HHD | 427.95 | 412.85 | (3.530) | 448.92 | 4.901 |
| | TRADE-C | N-HHD | 1656.57 | 1597.96 | (3.538) | 1736.90 | 4.849 |
| | SER-C | A-HHD | 1147.00 | 1131.40 | (1.360) | 1175.33 | 2.470 |
| | SER-C | G-HHD | 1413.70 | 1396.85 | (1.192) | 1448.05 | 2.430 |
| | SER-C | N-HHD | 5472.33 | 5406.64 | (1.201) | 5602.55 | 2.380 |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1220.79 | (1.941) | 1301.11 | 4.510 |
| | ENT-P | | 10396.40 | 10134.01 | (2.524) | 10900.45 | 4.848 |
| ENTSAV | ENT-G | | 902.97 | 885.44 | (1.941) | 943.70 | 4.510 |
| | ENT-P | | 6326.21 | 6392.82 | 1.053 | 6477.00 | 2.384 |
| QE | PRIMA-C | | 2236.89 | 1838.07 | (17.829) | 2664.91 | 19.135 |
| | AINDUS-C | | 2909.02 | 2281.95 | (21.556) | 3681.13 | 26.542 |
| | MANU-C | | 16662.56 | 13970.36 | (16.157) | 19552.93 | 17.346 |
| | UTICON-C | | 113.66 | 159.65 | 40.466 | 58.62 | (48.429) |
| | TRADE-C | | 2898.91 | 2746.60 | (5.254) | 2991.34 | 3.189 |
| | SER-C | | 2416.15 | 2130.77 | (11.811) | 2673.38 | 10.646 |
| PE | PRIMA-C | | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | AINDUS-C | | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | MANU-C | | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | UTICON-C | | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | TRADE-C | | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | SER-C | | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| QM | PRIMA-C | | 1635.60 | 2030.22 | 24.127 | 1386.44 | (15.234) |

| | | BASE | SIM 12 | ∆% | SIM 13 | ∆% |
|---|---|---|---|---|---|---|
| QM | AINDUS-C | 899.60 | 1056.96 | 17.492 | 793.75 | (11.766) |
| | MANU-C | 14825.23 | 21434.29 | 44.580 | 9736.39 | (34.326) |
| | UTICON-C | 37.90 | 72.66 | 91.723 | 15.02 | (60.364) |
| | TRADE-C | 710.78 | 948.76 | 33.482 | 555.67 | (21.822) |
| | SER-C | 2534.31 | 3008.38 | 18.706 | 2236.61 | (11.747) |
| PM | PRIMA-C | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | AINDUS-C | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | MANU-C | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | UTICON-C | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | TRADE-C | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| | SER-C | 1.00 | 0.90 | (10.000) | 1.10 | 10.000 |
| QX | PRIMA-C | 11489.80 | 10250.29 | (10.788) | 12824.32 | 11.615 |
| | AINDUS-C | 13628.78 | 11660.69 | (14.441) | 16018.97 | 17.538 |
| | MANU-C | 43263.45 | 39226.32 | (9.332) | 47109.75 | 8.890 |
| | UTICON-C | 7195.13 | 10925.08 | 51.840 | 3474.62 | (51.709) |
| | TRADE-C | 16778.46 | 17317.45 | 3.212 | 16193.04 | (3.489) |
| | SER-C | 21320.57 | 20346.02 | (4.571) | 22241.48 | 4.319 |
| PX | PRIMA-C | 1.00 | 1.00 | (0.259) | 1.01 | 1.391 |
| | AINDUS-C | 1.00 | 1.00 | 0.318 | 1.00 | 0.305 |
| | MANU-C | 1.00 | 0.99 | (0.750) | 1.00 | 0.183 |
| | UTICON-C | 1.00 | 0.99 | (0.800) | 1.01 | 1.325 |
| | TRADE-C | 1.00 | 1.00 | 0.163 | 1.01 | 1.175 |
| | SER-C | 1.00 | 0.99 | (0.671) | 1.02 | 2.195 |
| QQ | PRIMA-C | 10888.51 | 10403.97 | (4.450) | 11519.09 | 5.791 |
| | AINDUS-C | 11619.36 | 10405.59 | (10.446) | 13101.88 | 12.759 |
| | MANU-C | 41426.12 | 46247.80 | 11.639 | 36889.82 | (10.950) |
| | UTICON-C | 7119.37 | 10836.74 | 52.215 | 3430.73 | (51.811) |
| | TRADE-C | 14590.33 | 15492.55 | 6.184 | 13741.15 | (5.820) |
| | SER-C | 21438.73 | 21186.96 | (1.174) | 21783.83 | 1.610 |
| PQ | PRIMA-C | 1.01 | 1.01 | (0.069) | 1.02 | 0.670 |
| | AINDUS-C | 1.01 | 1.02 | 1.822 | 0.99 | (1.604) |
| | MANU-C | 1.02 | 1.00 | (1.294) | 1.00 | (1.335) |
| | UTICON-C | 1.00 | 0.99 | (0.714) | 1.01 | 1.224 |
| | TRADE-C | 1.00 | 1.02 | 1.517 | 1.00 | (0.270) |
| | SER-C | 1.00 | 0.99 | (0.885) | 1.02 | 2.136 |
| QD | PRIMA-C | 9252.91 | 8402.83 | (9.187) | 10150.39 | 9.699 |
| | AINDUS-C | 10719.76 | 9365.50 | (12.633) | 12321.39 | 14.941 |
| | MANU-C | 26600.89 | 25173.82 | (5.365) | 27437.84 | 3.146 |
| | UTICON-C | 7081.47 | 10764.82 | 52.014 | 3415.84 | (51.764) |
| | TRADE-C | 13879.55 | 14556.03 | 4.874 | 13191.34 | (4.958) |
| | SER-C | 18904.42 | 18206.06 | (3.694) | 19561.47 | 3.476 |
| PD | PRIMA-C | 1.00 | 1.02 | 1.984 | 0.99 | (0.780) |
| | AINDUS-C | 1.00 | 1.03 | 2.973 | 0.98 | (2.458) |
| | MANU-C | 1.00 | 1.05 | 4.707 | 0.94 | (6.379) |
| | UTICON-C | 1.00 | 0.99 | (0.658) | 1.01 | 1.181 |
| | TRADE-C | 1.00 | 1.02 | 2.182 | 0.99 | (0.747) |
| | SER-C | 1.00 | 1.00 | 0.472 | 1.01 | 1.163 |
| QA | PRIMA-A | 11489.80 | 10250.29 | (10.788) | 12824.32 | 11.615 |
| | AINDUS-A | 13628.78 | 11660.69 | (14.441) | 16018.97 | 17.538 |
| | MANU-A | 43263.45 | 39226.32 | (9.332) | 47109.75 | 8.890 |
| | UTICON-A | 7195.13 | 10925.08 | 51.840 | 3474.62 | (51.709) |

| | | | BASE | SIM 12 | Δ% | SIM 13 | Δ% |
|---|---|---|---|---|---|---|---|
| QA | TRADE-A | | 16778.46 | 17317.45 | 3.212 | 16193.04 | (3.489) |
| | SER-A | | 21320.57 | 20346.02 | (4.571) | 22241.48 | 4.319 |
| PA | PRIMA-A | | 1.00 | 1.00 | (0.259) | 1.01 | 1.391 |
| | AINDUS-A | | 1.00 | 1.00 | 0.318 | 1.00 | 0.305 |
| | MANU-A | | 1.00 | 0.99 | (0.750) | 1.00 | 0.183 |
| | UTICON-A | | 1.00 | 0.99 | (0.800) | 1.01 | 1.325 |
| | TRADE-A | | 1.00 | 1.00 | 0.163 | 1.01 | 1.175 |
| | SER-A | | 1.00 | 0.99 | (0.671) | 1.02 | 2.195 |
| PVA | PRIMA-A | | 0.53 | 0.53 | (0.345) | 0.55 | 2.784 |
| | AINDUS-A | | 0.17 | 0.17 | (0.927) | 0.17 | 3.422 |
| | MANU-A | | 0.20 | 0.20 | (0.927) | 0.21 | 3.418 |
| | UTICON-A | | 0.39 | 0.38 | (1.297) | 0.40 | 3.817 |
| | TRADE-A | | 0.58 | 0.58 | 0.582 | 0.59 | 1.792 |
| | SER-A | | 0.57 | 0.56 | (1.059) | 0.59 | 3.558 |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 818.69 | (10.788) | 1024.27 | 11.615 |
| | PRIMA-C | AINDUS-A | 3594.75 | 3075.65 | (14.441) | 4225.19 | 17.538 |
| | PRIMA-C | MANU-A | 2330.82 | 2113.32 | (9.332) | 2538.04 | 8.890 |
| | PRIMA-C | UTICON-A | 492.64 | 748.03 | 51.840 | 237.90 | (51.709) |
| | PRIMA-C | TRADE-A | 3.42 | 3.53 | 3.212 | 3.30 | (3.489) |
| | PRIMA-C | SER-A | 1282.41 | 1223.80 | (4.571) | 1337.81 | 4.319 |
| | AINDUS-C | PRIMA-A | 457.75 | 408.36 | (10.788) | 510.91 | 11.615 |
| | AINDUS-C | AINDUS-A | 3741.97 | 3201.61 | (14.441) | 4398.24 | 17.538 |
| | AINDUS-C | MANU-A | 233.97 | 212.14 | (9.332) | 254.77 | 8.890 |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.89 | 3.212 | 7.38 | (3.489) |
| | AINDUS-C | SER-A | 1072.20 | 1023.19 | (4.571) | 1118.51 | 4.319 |
| | MANU-C | PRIMA-A | 1872.79 | 1670.75 | (10.788) | 2090.31 | 11.615 |
| | MANU-C | AINDUS-A | 1100.51 | 941.59 | (14.441) | 1293.52 | 17.538 |
| | MANU-C | MANU-A | 21464.91 | 19461.91 | (9.332) | 23373.23 | 8.890 |
| | MANU-C | UTICON-A | 2040.52 | 3098.33 | 51.840 | 985.39 | (51.709) |
| | MANU-C | TRADE-A | 2334.07 | 2409.04 | 3.212 | 2252.63 | (3.489) |
| | MANU-C | SER-A | 1663.74 | 1587.69 | (4.571) | 1735.60 | 4.319 |
| | UTICON-C | PRIMA-A | 210.22 | 187.54 | (10.788) | 234.64 | 11.615 |
| | UTICON-C | AINDUS-A | 301.60 | 258.05 | (14.441) | 354.49 | 17.538 |
| | UTICON-C | MANU-A | 1306.30 | 1184.40 | (9.332) | 1422.43 | 8.890 |
| | UTICON-C | UTICON-A | 369.25 | 560.67 | 51.840 | 178.32 | (51.709) |
| | UTICON-C | TRADE-A | 336.12 | 346.91 | 3.212 | 324.39 | (3.489) |
| | UTICON-C | SER-A | 1237.04 | 1180.49 | (4.571) | 1290.47 | 4.319 |
| | TRADE-C | PRIMA-A | 1059.51 | 945.21 | (10.788) | 1182.57 | 11.615 |
| | TRADE-C | AINDUS-A | 1105.89 | 946.19 | (14.441) | 1299.84 | 17.538 |
| | TRADE-C | MANU-A | 5085.91 | 4611.32 | (9.332) | 5538.07 | 8.890 |
| | TRADE-C | UTICON-A | 882.07 | 1339.33 | 51.840 | 425.96 | (51.709) |
| | TRADE-C | TRADE-A | 1621.83 | 1673.93 | 3.212 | 1565.24 | (3.489) |
| | TRADE-C | SER-A | 1262.78 | 1205.06 | (4.571) | 1317.32 | 4.319 |
| | SER-C | PRIMA-A | 667.53 | 595.52 | (10.788) | 745.07 | 11.615 |
| | SER-C | AINDUS-A | 521.52 | 446.21 | (14.441) | 612.98 | 17.538 |
| | SER-C | MANU-A | 2753.93 | 2496.94 | (9.332) | 2998.76 | 8.890 |
| | SER-C | UTICON-A | 423.34 | 642.80 | 51.840 | 204.44 | (51.709) |
| | SER-C | TRADE-A | 2407.69 | 2485.04 | 3.212 | 2323.69 | (3.489) |
| | SER-C | SER-A | 2031.46 | 1938.60 | (4.571) | 2119.20 | 4.319 |

# Results of Simulations 14.1-14.6

| | | | BASE | SIM 14.1 | Δ% | SIM 14.2 | Δ% | SIM 14.3 | Δ% | SIM 14.4 | Δ% | SIM 14.5 | Δ% | SIM 14.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | GDPMP1 | | 46359.27 | 47258.51 | 1.940 | 46665.12 | 0.660 | 46861.45 | 1.083 | 46631.04 | 0.586 | 47385.62 | 2.214 | 47645.30 | 2.774 |
| | PRVCON | | 25292.80 | 25770.84 | 1.890 | 25445.14 | 0.602 | 25525.35 | 0.919 | 25419.19 | 0.500 | 25879.00 | 2.318 | 25947.01 | 2.587 |
| | GOVCON | | 5007.05 | 5053.34 | 0.924 | 5041.67 | 0.691 | 5037.35 | 0.605 | 5005.55 | (0.030) | 5051.18 | 0.881 | 4847.26 | (3.191) |
| | INVEST | | 8845.28 | 9195.72 | 3.962 | 8922.70 | 0.875 | 9247.09 | 4.543 | 8996.32 | 1.708 | 9264.09 | 4.735 | 9561.85 | 8.101 |
| | EXP | | 27237.19 | 27629.36 | 1.440 | 27462.23 | 0.826 | 27426.32 | 0.694 | 27459.95 | 0.818 | 27783.59 | 2.006 | 27989.51 | 2.762 |
| | IMP | | -20023.05 | -20390.74 | 1.836 | -20206.61 | 0.917 | -20374.66 | 1.756 | -20249.97 | 1.133 | -20592.25 | 2.843 | -20700.33 | 3.383 |
| | NITAX | | 4756.36 | 4843.12 | 1.824 | 4799.35 | 0.904 | 4813.83 | 1.208 | 4793.23 | 0.775 | 4857.20 | 2.120 | 4898.41 | 2.987 |
| | GDPFC | | 41602.91 | 42415.39 | 1.953 | 41865.77 | 0.632 | 42047.62 | 1.069 | 41837.81 | 0.565 | 42528.41 | 2.225 | 42746.89 | 2.750 |
| | GDPMP2 | | 46359.27 | 47258.51 | 1.940 | 46665.12 | 0.660 | 46861.45 | 1.083 | 46631.04 | 0.586 | 47385.62 | 2.214 | 47645.30 | 2.774 |
| YG | | | 8524.54 | 8679.16 | 1.814 | 8591.59 | 0.787 | 8614.12 | 1.051 | 8582.15 | 0.676 | 8693.96 | 1.987 | 8767.00 | 2.844 |
| EG | | | 5710.03 | 5756.35 | 0.811 | 5744.70 | 0.607 | 5740.13 | 0.527 | 5708.52 | (0.026) | 5754.14 | 0.772 | 5550.33 | (2.797) |
| IADJ | | | 1.00 | 1.03 | 2.981 | 1.00 | (0.001) | 1.06 | 6.165 | 1.03 | 2.964 | 1.05 | 5.336 | 1.06 | 6.465 |
| FSAV | | | 3903.00 | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - | 3903.00 | - |
| EXR | PRIMA-A | | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| YF | LAB | | 14579.90 | 14865.48 | 1.959 | 14657.93 | 0.535 | 14684.66 | 0.718 | 14628.57 | 0.334 | 15044.12 | 3.184 | 14915.26 | 2.300 |
| | CAP | | 27023.01 | 27549.91 | 1.950 | 27207.84 | 0.684 | 27362.96 | 1.258 | 27209.24 | 0.689 | 27484.29 | 1.707 | 27831.63 | 2.992 |
| QF | LAB | PRIMA-A | 139410.00 | 136239.46 | (2.274) | 140556.37 | 0.822 | 138532.72 | (0.629) | 139860.59 | 0.323 | 140220.58 | 0.581 | 140180.13 | 0.552 |
| | LAB | AINDUS-A | 8490.00 | 8898.15 | 4.807 | 7994.20 | (5.840) | 8343.70 | (1.723) | 8502.59 | 0.148 | 8569.36 | 0.935 | 8513.50 | 0.277 |
| | LAB | MANU-A | 33960.00 | 34257.34 | 0.876 | 33660.69 | (0.881) | 32849.33 | (3.271) | 34288.68 | 0.968 | 34674.48 | 2.104 | 34276.93 | 0.933 |
| | LAB | UTICON-A | 18220.00 | 18709.24 | 2.685 | 18187.74 | (0.177) | 18972.93 | 4.132 | 16870.69 | (7.406) | 18795.77 | 3.160 | 18922.06 | 3.853 |
| | LAB | TRADE-A | 51750.00 | 52896.13 | 2.215 | 51583.97 | (0.321) | 52981.40 | 2.380 | 52112.17 | 0.700 | 49148.72 | (5.027) | 52496.44 | 1.442 |
| | LAB | SER-A | 54200.00 | 55029.68 | 1.531 | 54047.03 | (0.282) | 54349.93 | 0.277 | 54395.27 | 0.360 | 54621.08 | 0.777 | 51640.93 | (4.722) |
| | CAP | PRIMA-A | 12315.48 | 11846.42 | (3.809) | 12480.74 | 1.342 | 12163.27 | (1.236) | 12390.36 | 0.608 | 12437.45 | 0.990 | 12473.31 | 1.282 |
| | CAP | AINDUS-A | 6718.35 | 6930.77 | 3.162 | 6358.61 | (5.355) | 6562.27 | (2.323) | 6747.41 | 0.433 | 6808.72 | 1.345 | 6785.80 | 1.004 |
| | CAP | MANU-A | 22491.87 | 22332.55 | (0.708) | 22408.52 | (0.371) | 21623.45 | (3.861) | 22774.02 | 1.254 | 23058.45 | 2.519 | 22866.39 | 1.665 |
| | CAP | UTICON-A | 16829.92 | 17010.48 | 1.073 | 16886.70 | 0.337 | 17418.42 | 3.497 | 15627.79 | (7.143) | 17432.36 | 3.580 | 17605.16 | 4.606 |
| | CAP | TRADE-A | 44663.41 | 44935.77 | 0.610 | 44749.54 | 0.193 | 45447.04 | 1.755 | 45103.66 | 0.986 | 42590.83 | (4.640) | 45636.17 | 2.178 |
| | CAP | SER-A | 58248.63 | 58211.68 | (0.063) | 58383.56 | 0.232 | 58053.20 | (0.336) | 58624.43 | 0.645 | 58939.85 | 1.187 | 55900.83 | (4.031) |
| WF | LAB | | 0.05 | 0.05 | 0.693 | 0.05 | 1.196 | 0.05 | 1.029 | 0.05 | 0.546 | 0.05 | 2.393 | 0.05 | 3.254 |
| | CAP | | 0.17 | 0.17 | 2.298 | 0.17 | 0.668 | 0.17 | 1.641 | 0.17 | 0.251 | 0.17 | 1.975 | 0.17 | 2.506 |
| wfa | LAB | PRIMA-A | 0.0137 | 0.0138 | 0.731 | 0.0138 | 1.170 | 0.0138 | 1.023 | 0.0138 | 0.512 | 0.0140 | 2.412 | 0.0141 | 3.289 |
| | LAB | AINDUS-A | 0.1128 | 0.1136 | 0.700 | 0.1142 | 1.188 | 0.1140 | 1.028 | 0.1134 | 0.541 | 0.1155 | 2.393 | 0.1165 | 3.253 |

| | | | BASE | SIM 14.1 | Δ% | SIM 14.2 | Δ% | SIM 14.3 | Δ% | SIM 14.4 | Δ% | SIM 14.5 | Δ% | SIM 14.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| wfa | LAB | MANU-A | 0.1069 | 0.1076 | 0.692 | 0.1081 | 1.188 | 0.1080 | 1.020 | 0.1074 | 0.533 | 0.1094 | 2.386 | 0.1103 | 3.247 |
| | LAB | UTICON-A | 0.0747 | 0.0752 | 0.696 | 0.0756 | 1.191 | 0.0755 | 1.017 | 0.0751 | 0.535 | 0.0765 | 2.396 | 0.0771 | 3.253 |
| | LAB | TRADE-A | 0.0262 | 0.0264 | 0.724 | 0.0266 | 1.220 | 0.0265 | 1.029 | 0.0264 | 0.534 | 0.0269 | 2.402 | 0.0271 | 3.279 |
| | LAB | SER-A | 0.0990 | 0.0997 | 0.697 | 0.1002 | 1.192 | 0.1000 | 1.020 | 0.0996 | 0.535 | 0.1014 | 2.393 | 0.1022 | 3.252 |
| | CAP | PRIMA-A | 0.3425 | 0.3504 | 2.301 | 0.3448 | 0.672 | 0.3481 | 1.644 | 0.3433 | 0.251 | 0.3492 | 1.977 | 0.3511 | 2.508 |
| | CAP | AINDUS-A | 0.1966 | 0.2011 | 2.300 | 0.1979 | 0.672 | 0.1998 | 1.643 | 0.1970 | 0.249 | 0.2004 | 1.974 | 0.2015 | 2.508 |
| | CAP | MANU-A | 0.2224 | 0.2275 | 2.302 | 0.2239 | 0.670 | 0.2261 | 1.646 | 0.2230 | 0.252 | 0.2268 | 1.978 | 0.2280 | 2.509 |
| | CAP | UTICON-A | 0.0845 | 0.0865 | 2.295 | 0.0851 | 0.662 | 0.0859 | 1.644 | 0.0847 | 0.248 | 0.0862 | 1.976 | 0.0867 | 2.508 |
| | CAP | TRADE-A | 0.1870 | 0.1913 | 2.300 | 0.1882 | 0.668 | 0.1901 | 1.642 | 0.1875 | 0.251 | 0.1907 | 1.973 | 0.1917 | 2.508 |
| | CAP | SER-A | 0.1152 | 0.1178 | 2.301 | 0.1159 | 0.669 | 0.1171 | 1.641 | 0.1155 | 0.252 | 0.1174 | 1.980 | 0.1181 | 2.510 |
| QFS | LAB | | 306030.00 | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - | 306030.00 | - |
| | CAP | | 161267.66 | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - | 161267.66 | - |
| YFID | A-HHD | LAB | 2024.76 | 2064.42 | 1.959 | 2035.60 | 0.535 | 2039.31 | 0.718 | 2031.52 | 0.334 | 2089.23 | 3.184 | 2071.33 | 2.300 |
| | A-HHD | CAP | 2979.23 | 3037.32 | 1.950 | 2999.61 | 0.684 | 3016.71 | 1.258 | 2999.76 | 0.689 | 3030.09 | 1.707 | 3068.38 | 2.992 |
| | G-HHD | LAB | 4254.63 | 4337.97 | 1.959 | 4277.40 | 0.535 | 4285.20 | 0.718 | 4268.83 | 0.334 | 4390.10 | 3.184 | 4352.49 | 2.300 |
| | G-HHD | CAP | 648.94 | 661.59 | 1.950 | 653.38 | 0.684 | 657.10 | 1.258 | 653.41 | 0.689 | 660.02 | 1.707 | 668.36 | 2.992 |
| | N-HHD | LAB | 8300.51 | 8463.09 | 1.959 | 8344.93 | 0.535 | 8360.15 | 0.718 | 8328.22 | 0.334 | 8564.79 | 3.184 | 8491.44 | 2.300 |
| | N-HHD | CAP | 12376.62 | 12617.94 | 1.950 | 12461.27 | 0.684 | 12532.32 | 1.258 | 12461.92 | 0.689 | 12587.89 | 1.707 | 12746.97 | 2.992 |
| | ENT-G | CAP | 1244.96 | 1269.23 | 1.950 | 1253.48 | 0.684 | 1260.62 | 1.258 | 1253.54 | 0.689 | 1266.21 | 1.707 | 1282.21 | 2.992 |
| | ENT-P | CAP | 8979.21 | 9154.29 | 1.950 | 9040.62 | 0.684 | 9092.17 | 1.258 | 9041.09 | 0.689 | 9132.49 | 1.707 | 9247.90 | 2.992 |
| QINV | PRIMA-C | | 155.02 | 159.64 | 2.981 | 155.01 | (0.001) | 164.57 | 6.165 | 159.61 | 2.964 | 163.29 | 5.336 | 165.04 | 6.465 |
| | AINDUS-C | | -241.50 | -248.70 | 2.981 | -241.50 | (0.001) | -256.39 | 6.165 | -248.66 | 2.964 | -254.39 | 5.336 | -257.11 | 6.465 |
| | MANU-C | | 4849.76 | 4994.32 | 2.981 | 4849.72 | (0.001) | 5148.75 | 6.165 | 4993.51 | 2.964 | 5108.55 | 5.336 | 5163.28 | 6.465 |
| | UTICON-C | | 2955.06 | 3043.14 | 2.981 | 2955.04 | (0.001) | 3137.24 | 6.165 | 3042.65 | 2.964 | 3112.75 | 5.336 | 3146.10 | 6.465 |
| | TRADE-C | | 1009.26 | 1039.34 | 2.981 | 1009.25 | (0.001) | 1071.48 | 6.165 | 1039.17 | 2.964 | 1063.12 | 5.336 | 1074.51 | 6.465 |
| | SER-C | | 36.68 | 37.77 | 2.981 | 36.68 | (0.001) | 38.94 | 6.165 | 37.77 | 2.964 | 38.64 | 5.336 | 39.05 | 6.465 |
| YH | A-HHD | | 5316.62 | 5415.04 | 1.851 | 5348.97 | 0.609 | 5364.18 | 0.895 | 5343.80 | 0.511 | 5431.32 | 2.157 | 5454.40 | 2.592 |
| | G-HHD | | 4971.28 | 5067.40 | 1.933 | 4998.71 | 0.552 | 5009.15 | 0.762 | 4989.93 | 0.375 | 5117.70 | 2.945 | 5088.96 | 2.367 |
| | N-HHD | | 21389.80 | 21794.90 | 1.894 | 21520.90 | 0.613 | 21597.21 | 0.970 | 21502.60 | 0.527 | 21864.24 | 2.218 | 21954.74 | 2.641 |
| QH | PRIMA-C | A-HHD | 700.14 | 745.53 | 6.482 | 699.64 | (0.071) | 701.68 | 0.219 | 702.65 | 0.358 | 709.35 | 1.316 | 704.49 | 0.621 |
| | PRIMA-C | G-HHD | 274.35 | 292.37 | 6.568 | 274.00 | (0.128) | 274.59 | 0.088 | 274.96 | 0.222 | 280.11 | 2.097 | 275.45 | 0.401 |
| | PRIMA-C | N-HHD | 1129.02 | 1202.71 | 6.527 | 1128.27 | (0.067) | 1132.34 | 0.294 | 1133.25 | 0.374 | 1144.56 | 1.376 | 1136.59 | 0.670 |
| | AINDUS-C | A-HHD | 1881.42 | 1940.86 | 3.159 | 1934.70 | 2.832 | 1877.07 | (0.231) | 1889.60 | 0.435 | 1913.53 | 1.707 | 1894.24 | 0.681 |
| | AINDUS-C | G-HHD | 920.08 | 949.91 | 3.243 | 945.60 | 2.774 | 916.74 | (0.362) | 922.83 | 0.299 | 943.00 | 2.491 | 924.32 | 0.461 |

| | | | BASE | SIM 14.1 | Δ% | SIM 14.2 | Δ% | SIM 14.3 | Δ% | SIM 14.4 | Δ% | SIM 14.5 | Δ% | SIM 14.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QH | AINDUS-C | N-HHD | 3545.28 | 3658.82 | 3.202 | 3645.83 | 2.836 | 3539.72 | (0.157) | 3561.27 | 0.451 | 3607.93 | 1.767 | 3571.16 | 0.730 |
| | MANU-C | A-HHD | 1743.73 | 1760.85 | 0.982 | 1740.68 | (0.175) | 1812.01 | 3.916 | 1752.98 | 0.531 | 1783.67 | 2.290 | 1763.19 | 1.116 |
| | MANU-C | G-HHD | 852.75 | 861.82 | 1.064 | 850.78 | (0.231) | 884.97 | 3.779 | 856.11 | 0.395 | 879.01 | 3.079 | 860.38 | 0.895 |
| | MANU-C | N-HHD | 3285.84 | 3319.50 | 1.024 | 3280.24 | (0.170) | 3417.05 | 3.993 | 3303.81 | 0.547 | 3363.10 | 2.351 | 3324.12 | 1.165 |
| | UTICON-C | A-HHD | 97.86 | 98.79 | 0.955 | 97.64 | (0.219) | 98.80 | 0.965 | 102.10 | 4.338 | 99.66 | 1.846 | 98.65 | 0.809 |
| | UTICON-C | G-HHD | 47.86 | 48.36 | 1.036 | 47.73 | (0.275) | 48.26 | 0.832 | 49.87 | 4.197 | 49.12 | 2.632 | 48.15 | 0.588 |
| | UTICON-C | N-HHD | 184.43 | 186.26 | 0.997 | 184.03 | (0.214) | 186.34 | 1.040 | 192.46 | 4.355 | 187.94 | 1.907 | 186.01 | 0.857 |
| | TRADE-C | A-HHD | 347.20 | 347.10 | (0.029) | 346.65 | (0.158) | 346.30 | (0.259) | 348.50 | 0.375 | 374.63 | 7.901 | 351.10 | 1.124 |
| | TRADE-C | G-HHD | 427.95 | 428.17 | 0.052 | 427.03 | (0.214) | 426.28 | (0.390) | 428.97 | 0.239 | 465.33 | 8.734 | 431.81 | 0.903 |
| | TRADE-C | N-HHD | 1656.57 | 1656.78 | 0.013 | 1654.03 | (0.154) | 1653.51 | (0.185) | 1663.05 | 0.391 | 1788.52 | 7.966 | 1676.00 | 1.173 |
| | SER-C | A-HHD | 1147.00 | 1157.69 | 0.932 | 1146.15 | (0.074) | 1148.42 | 0.124 | 1152.60 | 0.488 | 1158.79 | 1.028 | 1221.17 | 6.466 |
| | SER-C | G-HHD | 1413.70 | 1428.03 | 1.014 | 1411.86 | (0.130) | 1413.59 | (0.008) | 1418.68 | 0.352 | 1439.25 | 1.807 | 1501.82 | 6.233 |
| | SER-C | N-HHD | 5472.33 | 5525.66 | 0.975 | 5468.53 | (0.069) | 5483.19 | 0.198 | 5499.93 | 0.504 | 5531.86 | 1.088 | 5829.01 | 6.518 |
| MPS | A-HHD | | -0.13 | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - | -0.13 | - |
| | G-HHD | | 0.10 | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - | 0.10 | - |
| | N-HHD | | 0.24 | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - | 0.24 | - |
| YENT | ENT-G | | 1244.96 | 1269.23 | 1.950 | 1253.48 | 0.684 | 1260.62 | 1.258 | 1253.54 | 0.689 | 1266.21 | 1.707 | 1282.21 | 2.992 |
| | ENT-P | | 10396.40 | 10582.50 | 1.790 | 10464.95 | 0.659 | 10495.52 | 0.953 | 10459.92 | 0.611 | 10557.89 | 1.553 | 10684.47 | 2.771 |
| ENTSAV | ENT-G | | 902.97 | 920.58 | 1.950 | 909.15 | 0.684 | 914.33 | 1.258 | 909.19 | 0.689 | 918.38 | 1.707 | 929.99 | 2.992 |
| | ENT-P | | 6326.21 | 6483.36 | 2.484 | 6370.48 | 0.700 | 6483.55 | 2.487 | 6385.10 | 0.931 | 6481.06 | 2.448 | 6553.89 | 3.599 |
| QE | PRIMA-C | | 2236.89 | 2464.99 | 10.197 | 2261.48 | 1.099 | 2164.03 | (3.257) | 2244.93 | 0.359 | 2236.64 | (0.011) | 2244.97 | 0.361 |
| | AINDUS-C | | 2909.02 | 3054.35 | 4.996 | 3079.03 | 5.844 | 2782.90 | (4.336) | 2915.46 | 0.222 | 2927.91 | 0.649 | 2912.45 | 0.118 |
| | MANU-C | | 16662.56 | 16588.62 | (0.444) | 16538.51 | (0.744) | 17757.20 | 6.569 | 16846.55 | 1.104 | 17028.81 | 2.198 | 16834.97 | 1.035 |
| | UTICON-C | | 113.66 | 115.27 | 1.419 | 113.53 | (0.114) | 115.94 | 2.008 | 119.36 | 5.014 | 116.92 | 2.867 | 117.80 | 3.646 |
| | TRADE-C | | 2898.91 | 2892.12 | (0.234) | 2898.55 | (0.012) | 2882.30 | (0.573) | 2922.39 | 0.810 | 3148.94 | 8.625 | 2950.71 | 1.787 |
| | SER-C | | 2416.15 | 2420.57 | 0.183 | 2414.14 | (0.083) | 2355.88 | (2.495) | 2427.10 | 0.453 | 2412.47 | (0.152) | 2640.48 | 9.284 |
| PE | PRIMA-C | | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | AINDUS-C | | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | MANU-C | | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | UTICON-C | | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | TRADE-C | | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | SER-C | | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| QM | PRIMA-C | | 1635.60 | 1498.44 | (8.386) | 1660.33 | 1.512 | 1775.15 | 8.532 | 1654.92 | 1.181 | 1709.81 | 4.537 | 1700.27 | 3.954 |
| | AINDUS-C | | 899.60 | 896.26 | (0.371) | 870.58 | (3.226) | 961.38 | 6.868 | 905.52 | 0.658 | 928.06 | 3.164 | 925.75 | 2.907 |

| | | BASE | SIM 14.1 | Δ% | SIM 14.2 | Δ% | SIM 14.3 | Δ% | SIM 14.4 | Δ% | SIM 14.5 | Δ% | SIM 14.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QM | MANU-C | 14825.23 | 15195.79 | 2.499 | 14887.84 | 0.422 | 15216.30 | 2.638 | 15021.11 | 1.321 | 15310.35 | 3.272 | 15330.82 | 3.410 |
| | UTICON-C | 37.90 | 39.11 | 3.187 | 38.16 | 0.687 | 41.46 | 9.396 | 35.42 | (6.535) | 39.76 | 4.911 | 40.19 | 6.031 |
| | TRADE-C | 710.78 | 740.49 | 4.179 | 714.56 | 0.532 | 778.98 | 9.594 | 720.48 | 1.365 | 667.13 | (6.141) | 731.86 | 2.966 |
| | SER-C | 2534.31 | 2583.48 | 1.940 | 2540.53 | 0.245 | 2713.02 | 7.052 | 2552.09 | 0.702 | 2643.67 | 4.315 | 2396.27 | (5.447) |
| PM | PRIMA-C | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | AINDUS-C | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | MANU-C | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | UTICON-C | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | TRADE-C | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| | SER-C | 1.00 | 1.00 | 0.339 | 1.01 | 0.575 | 0.98 | (2.252) | 1.00 | (0.058) | 1.00 | (0.316) | 1.01 | 1.040 |
| QX | PRIMA-C | 11489.80 | 12217.47 | 6.333 | 11625.36 | 1.180 | 11369.46 | (1.047) | 11549.46 | 0.519 | 11588.94 | 0.863 | 11610.89 | 1.054 |
| | AINDUS-C | 13628.78 | 14153.55 | 3.850 | 14158.29 | 3.885 | 13346.47 | (2.071) | 13671.44 | 0.313 | 13788.57 | 1.172 | 13723.86 | 0.698 |
| | MANU-C | 43263.45 | 43243.76 | (0.046) | 43010.08 | (0.586) | 45870.28 | 6.025 | 43753.99 | 1.134 | 44277.67 | 2.344 | 43850.45 | 1.357 |
| | UTICON-C | 7195.13 | 7328.82 | 1.858 | 7201.28 | 0.086 | 7469.05 | 3.807 | 7339.13 | 2.001 | 7437.91 | 3.374 | 7500.02 | 4.237 |
| | TRADE-C | 16778.46 | 16918.17 | 0.833 | 16798.74 | 0.121 | 17087.47 | 1.842 | 16937.13 | 0.946 | 17589.87 | 4.836 | 17126.58 | 2.075 |
| | SER-C | 21320.57 | 21457.46 | 0.642 | 21321.19 | 0.003 | 21306.95 | (0.064) | 21431.11 | 0.518 | 21534.70 | 1.004 | 22435.17 | 5.228 |
| PX | PRIMA-C | 1.00 | 0.96 | (4.039) | 1.01 | 0.675 | 1.01 | 0.547 | 1.00 | 0.142 | 1.01 | 0.775 | 1.02 | 1.913 |
| | AINDUS-C | 1.00 | 0.99 | (1.027) | 0.98 | (1.747) | 1.01 | 0.648 | 1.00 | 0.056 | 1.00 | 0.332 | 1.02 | 1.772 |
| | MANU-C | 1.00 | 1.01 | 0.841 | 1.01 | 0.776 | 0.97 | (2.875) | 1.00 | (0.021) | 1.00 | (0.138) | 1.01 | 1.443 |
| | UTICON-C | 1.00 | 1.01 | 0.882 | 1.01 | 0.826 | 1.00 | (0.092) | 0.96 | (3.628) | 1.00 | 0.299 | 1.02 | 1.761 |
| | TRADE-C | 1.00 | 1.02 | 1.682 | 1.01 | 0.743 | 1.01 | 0.724 | 1.00 | 0.111 | 0.95 | (4.643) | 1.01 | 1.398 |
| | SER-C | 1.00 | 1.01 | 0.914 | 1.01 | 0.683 | 1.01 | 0.803 | 1.00 | 0.023 | 1.01 | 1.130 | 0.96 | (3.626) |
| QQ | PRIMA-C | 10888.51 | 11243.11 | 3.257 | 11024.20 | 1.246 | 10977.53 | 0.818 | 10959.43 | 0.651 | 11061.66 | 1.590 | 11065.91 | 1.629 |
| | AINDUS-C | 11619.36 | 11994.88 | 3.232 | 11948.16 | 2.830 | 11522.48 | (0.834) | 11661.49 | 0.363 | 11788.60 | 1.457 | 11737.01 | 1.013 |
| | MANU-C | 41426.12 | 41849.77 | 1.023 | 41359.22 | (0.161) | 43327.39 | 4.590 | 41928.54 | 1.213 | 42559.06 | 2.735 | 42345.55 | 2.219 |
| | UTICON-C | 7119.37 | 7252.65 | 1.872 | 7125.91 | 0.092 | 7394.53 | 3.865 | 7255.07 | 1.906 | 7360.75 | 3.390 | 7422.39 | 4.256 |
| | TRADE-C | 14590.33 | 14766.12 | 1.205 | 14614.74 | 0.167 | 14982.01 | 2.685 | 14735.21 | 0.993 | 15103.16 | 3.515 | 14907.71 | 2.175 |
| | SER-C | 21438.73 | 21620.24 | 0.847 | 21447.58 | 0.041 | 21660.46 | 1.034 | 21556.09 | 0.547 | 21765.11 | 1.522 | 22182.20 | 3.468 |
| PQ | PRIMA-C | 1.01 | 0.96 | (4.349) | 1.02 | 0.680 | 1.02 | 0.674 | 1.01 | 0.153 | 1.02 | 0.831 | 1.03 | 1.958 |
| | AINDUS-C | 1.01 | 0.99 | (1.268) | 0.98 | (2.162) | 1.02 | 1.128 | 1.01 | 0.076 | 1.01 | 0.443 | 1.02 | 1.898 |
| | MANU-C | 1.02 | 1.03 | 0.861 | 1.02 | 0.784 | 0.99 | (2.908) | 1.02 | (0.020) | 1.02 | (0.130) | 1.03 | 1.459 |
| | UTICON-C | 1.00 | 1.01 | 0.888 | 1.01 | 0.829 | 1.00 | (0.070) | 0.96 | (3.669) | 1.00 | 0.305 | 1.02 | 1.769 |
| | TRADE-C | 1.00 | 1.02 | 1.881 | 1.01 | 0.768 | 1.01 | 1.156 | 1.00 | 0.136 | 0.95 | (5.323) | 1.01 | 1.451 |
| | SER-C | 1.00 | 1.01 | 0.910 | 1.01 | 0.683 | 1.01 | 0.770 | 1.00 | 0.023 | 1.01 | 1.118 | 0.97 | (3.639) |

| | | | BASE | SIM 14.1 | Δ% | SIM 14.2 | Δ% | SIM 14.3 | Δ% | SIM 14.4 | Δ% | SIM 14.5 | Δ% | SIM 14.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QD | PRIMA-C | | 9252.91 | 9750.00 | 5.372 | 9363.87 | 1.199 | 9204.58 | (0.522) | 9304.53 | 0.558 | 9352.17 | 1.073 | 9365.84 | 1.221 |
| | AINDUS-C | | 10719.76 | 11098.91 | 3.537 | 11078.39 | 3.346 | 10562.37 | (1.468) | 10755.97 | 0.338 | 10860.60 | 1.314 | 10811.33 | 0.854 |
| | MANU-C | | 26600.89 | 26654.87 | 0.203 | 26471.52 | (0.486) | 28112.60 | 5.683 | 26907.44 | 1.152 | 27248.83 | 2.436 | 27015.30 | 1.558 |
| | UTICON-C | | 7081.47 | 7213.55 | 1.865 | 7087.75 | 0.089 | 7353.09 | 3.836 | 7219.71 | 1.952 | 7320.99 | 3.382 | 7382.21 | 4.247 |
| | TRADE-C | | 13879.55 | 14025.80 | 1.054 | 13900.18 | 0.149 | 14203.92 | 2.337 | 14014.74 | 0.974 | 14437.89 | 4.023 | 14175.86 | 2.135 |
| | SER-C | | 18904.42 | 19036.85 | 0.701 | 18907.05 | 0.014 | 18950.07 | 0.241 | 19004.00 | 0.527 | 19122.01 | 1.151 | 19792.01 | 4.695 |
| PD | PRIMA-C | | 1.00 | 0.95 | (5.122) | 1.01 | 0.699 | 1.01 | 1.214 | 1.00 | 0.190 | 1.01 | 1.037 | 1.02 | 2.123 |
| | AINDUS-C | | 1.00 | 0.99 | (1.400) | 0.98 | (2.384) | 1.01 | 1.424 | 1.00 | 0.087 | 1.01 | 0.507 | 1.02 | 1.970 |
| | MANU-C | | 1.00 | 1.01 | 1.155 | 1.01 | 0.902 | 0.97 | (3.268) | 1.00 | 0.002 | 1.00 | (0.026) | 1.02 | 1.695 |
| | UTICON-C | | 1.00 | 1.01 | 0.891 | 1.01 | 0.830 | 1.00 | (0.058) | 0.96 | (3.687) | 1.00 | 0.309 | 1.02 | 1.773 |
| | TRADE-C | | 1.00 | 1.02 | 1.961 | 1.01 | 0.778 | 1.01 | 1.337 | 1.00 | 0.146 | 0.94 | (5.567) | 1.01 | 1.472 |
| | SER-C | | 1.00 | 1.01 | 0.988 | 1.01 | 0.697 | 1.01 | 1.188 | 1.00 | 0.034 | 1.01 | 1.313 | 0.96 | (4.236) |
| QA | PRIMA-A | | 11489.80 | 12217.47 | 6.333 | 11625.36 | 1.180 | 11369.46 | (1.047) | 11549.46 | 0.519 | 11588.94 | 0.863 | 11610.89 | 1.054 |
| | AINDUS-A | | 13628.78 | 14153.55 | 3.850 | 14158.29 | 3.885 | 13346.47 | (2.071) | 13671.44 | 0.313 | 13788.57 | 1.172 | 13723.86 | 0.698 |
| | MANU-A | | 43263.45 | 43243.76 | (0.046) | 43010.08 | (0.586) | 45870.28 | 6.025 | 43753.99 | 1.134 | 44277.67 | 2.344 | 43850.45 | 1.357 |
| | UTICON-A | | 7195.13 | 7328.82 | 1.858 | 7201.28 | 0.086 | 7469.05 | 3.807 | 7339.13 | 2.001 | 7437.91 | 3.374 | 7500.02 | 4.237 |
| | TRADE-A | | 16778.46 | 16918.17 | 0.833 | 16798.74 | 0.121 | 17087.47 | 1.842 | 16937.13 | 0.946 | 17589.87 | 4.836 | 17126.58 | 2.075 |
| | SER-A | | 21320.57 | 21457.46 | 0.642 | 21321.19 | 0.003 | 21306.95 | (0.064) | 21431.11 | 0.518 | 21534.70 | 1.004 | 22435.17 | 5.228 |
| PA | PRIMA-A | | 1.00 | 0.96 | (4.039) | 1.01 | 0.675 | 1.01 | 0.547 | 1.00 | 0.142 | 1.01 | 0.775 | 1.02 | 1.913 |
| | AINDUS-A | | 1.00 | 0.99 | (1.027) | 0.98 | (1.747) | 1.01 | 0.648 | 1.00 | 0.056 | 1.00 | 0.332 | 1.02 | 1.772 |
| | MANU-A | | 1.00 | 1.01 | 0.841 | 1.01 | 0.776 | 0.97 | (2.875) | 1.00 | (0.021) | 1.00 | (0.138) | 1.01 | 1.443 |
| | UTICON-A | | 1.00 | 1.01 | 0.882 | 1.01 | 0.826 | 1.00 | (0.092) | 0.96 | (3.628) | 1.00 | 0.299 | 1.02 | 1.761 |
| | TRADE-A | | 1.00 | 1.02 | 1.682 | 1.01 | 0.743 | 1.01 | 0.724 | 1.00 | 0.111 | 0.95 | (4.643) | 1.01 | 1.398 |
| | SER-A | | 1.00 | 1.01 | 0.914 | 1.01 | 0.683 | 1.01 | 0.803 | 1.00 | 0.023 | 1.01 | 1.130 | 0.96 | (3.626) |
| PVA | PRIMA-A | | 0.53 | 0.49 | (7.457) | 0.54 | 0.831 | 0.54 | 1.448 | 0.53 | 0.340 | 0.54 | 2.107 | 0.55 | 2.739 |
| | AINDUS-A | | 0.17 | 0.17 | 1.621 | 0.15 | (8.285) | 0.17 | 1.382 | 0.17 | 0.371 | 0.17 | 2.153 | 0.17 | 2.823 |
| | MANU-A | | 0.20 | 0.20 | 1.624 | 0.20 | 0.887 | 0.18 | (7.834) | 0.20 | 0.371 | 0.20 | 2.150 | 0.21 | 2.822 |
| | UTICON-A | | 0.39 | 0.39 | 1.509 | 0.39 | 0.923 | 0.39 | 1.336 | 0.35 | (8.738) | 0.40 | 2.179 | 0.40 | 2.869 |
| | TRADE-A | | 0.58 | 0.59 | 2.074 | 0.58 | 0.743 | 0.59 | 1.555 | 0.58 | 0.290 | 0.54 | (7.241) | 0.59 | 2.613 |
| | SER-A | | 0.57 | 0.58 | 1.582 | 0.57 | 0.900 | 0.57 | 1.365 | 0.57 | 0.378 | 0.58 | 2.161 | 0.53 | (6.512) |
| QINT | PRIMA-C | PRIMA-A | 917.69 | 975.81 | 6.333 | 928.51 | 1.180 | 908.07 | (1.047) | 922.45 | 0.519 | 925.61 | 0.863 | 927.36 | 1.054 |
| | PRIMA-C | AINDUS-A | 3594.75 | 3733.16 | 3.850 | 3734.41 | 3.885 | 3520.29 | (2.071) | 3606.00 | 0.313 | 3636.90 | 1.172 | 3619.83 | 0.698 |
| | PRIMA-C | MANU-A | 2330.82 | 2329.76 | (0.046) | 2317.17 | (0.586) | 2471.26 | 6.025 | 2357.25 | 1.134 | 2385.46 | 2.344 | 2362.45 | 1.357 |
| | PRIMA-C | UTICON-A | 492.64 | 501.80 | 1.858 | 493.06 | 0.086 | 511.40 | 3.807 | 502.50 | 2.001 | 509.26 | 3.374 | 513.52 | 4.237 |

| | | | BASE | SIM 14.1 | Δ% | SIM 14.2 | Δ% | SIM 14.3 | Δ% | SIM 14.4 | Δ% | SIM 14.5 | Δ% | SIM 14.6 | Δ% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QINT | PRIMA-C | TRADE-A | 3.42 | 3.45 | 0.833 | 3.43 | 0.121 | 3.48 | 1.842 | 3.45 | 0.946 | 3.59 | 4.836 | 3.49 | 2.075 |
| | PRIMA-C | SER-A | 1282.41 | 1290.65 | 0.642 | 1282.45 | 0.003 | 1281.59 | (0.064) | 1289.06 | 0.518 | 1295.29 | 1.004 | 1349.46 | 5.228 |
| | AINDUS-C | PRIMA-A | 457.75 | 486.74 | 6.333 | 463.15 | 1.180 | 452.95 | (1.047) | 460.12 | 0.519 | 461.70 | 0.863 | 462.57 | 1.054 |
| | AINDUS-C | AINDUS-A | 3741.97 | 3886.06 | 3.850 | 3887.36 | 3.885 | 3664.46 | (2.071) | 3753.69 | 0.313 | 3785.85 | 1.172 | 3768.08 | 0.698 |
| | AINDUS-C | MANU-A | 233.97 | 233.86 | (0.046) | 232.60 | (0.586) | 248.07 | 6.025 | 236.62 | 1.134 | 239.46 | 2.344 | 237.14 | 1.357 |
| | AINDUS-C | UTICON-A | 0.00 | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - | 0.00 | - |
| | AINDUS-C | TRADE-A | 7.65 | 7.71 | 0.833 | 7.66 | 0.121 | 7.79 | 1.842 | 7.72 | 0.946 | 8.02 | 4.836 | 7.81 | 2.075 |
| | AINDUS-C | SER-A | 1072.20 | 1079.08 | 0.642 | 1072.23 | 0.003 | 1071.51 | (0.064) | 1077.75 | 0.518 | 1082.96 | 1.004 | 1128.25 | 5.228 |
| | MANU-C | PRIMA-A | 1872.79 | 1991.39 | 6.333 | 1894.88 | 1.180 | 1853.17 | (1.047) | 1882.51 | 0.519 | 1888.95 | 0.863 | 1892.52 | 1.054 |
| | MANU-C | AINDUS-A | 1100.51 | 1142.89 | 3.850 | 1143.27 | 3.885 | 1077.72 | (2.071) | 1103.96 | 0.313 | 1113.41 | 1.172 | 1108.19 | 0.698 |
| | MANU-C | MANU-A | 21464.91 | 21455.15 | (0.046) | 21339.20 | (0.586) | 22758.28 | 6.025 | 21708.29 | 1.134 | 21968.11 | 2.344 | 21756.15 | 1.357 |
| | MANU-C | UTICON-A | 2040.52 | 2078.43 | 1.858 | 2042.26 | 0.086 | 2118.20 | 3.807 | 2081.36 | 2.001 | 2109.37 | 3.374 | 2126.99 | 4.237 |
| | MANU-C | TRADE-A | 2334.07 | 2353.50 | 0.833 | 2336.89 | 0.121 | 2377.05 | 1.842 | 2356.14 | 0.946 | 2446.94 | 4.836 | 2382.49 | 2.075 |
| | MANU-C | SER-A | 1663.74 | 1674.42 | 0.642 | 1663.79 | 0.003 | 1662.68 | (0.064) | 1672.36 | 0.518 | 1680.45 | 1.004 | 1750.72 | 5.228 |
| | UTICON-C | PRIMA-A | 210.22 | 223.54 | 6.333 | 212.70 | 1.180 | 208.02 | (1.047) | 211.31 | 0.519 | 212.04 | 0.863 | 212.44 | 1.054 |
| | UTICON-C | AINDUS-A | 301.60 | 313.21 | 3.850 | 313.32 | 3.885 | 295.35 | (2.071) | 302.54 | 0.313 | 305.14 | 1.172 | 303.70 | 0.698 |
| | UTICON-C | MANU-A | 1306.30 | 1305.70 | (0.046) | 1298.65 | (0.586) | 1385.01 | 6.025 | 1321.11 | 1.134 | 1336.92 | 2.344 | 1324.02 | 1.357 |
| | UTICON-C | UTICON-A | 369.25 | 376.11 | 1.858 | 369.57 | 0.086 | 383.31 | 3.807 | 376.64 | 2.001 | 381.71 | 3.374 | 384.90 | 4.237 |
| | UTICON-C | TRADE-A | 336.12 | 338.91 | 0.833 | 336.52 | 0.121 | 342.31 | 1.842 | 339.29 | 0.946 | 352.37 | 4.836 | 343.09 | 2.075 |
| | UTICON-C | SER-A | 1237.04 | 1244.98 | 0.642 | 1237.07 | 0.003 | 1236.25 | (0.064) | 1243.45 | 0.518 | 1249.46 | 1.004 | 1301.71 | 5.228 |
| | TRADE-C | PRIMA-A | 1059.51 | 1126.61 | 6.333 | 1072.01 | 1.180 | 1048.41 | (1.047) | 1065.01 | 0.519 | 1068.65 | 0.863 | 1070.68 | 1.054 |
| | TRADE-C | AINDUS-A | 1105.89 | 1148.47 | 3.850 | 1148.86 | 3.885 | 1082.98 | (2.071) | 1109.35 | 0.313 | 1118.86 | 1.172 | 1113.60 | 0.698 |
| | TRADE-C | MANU-A | 5085.91 | 5083.60 | (0.046) | 5056.12 | (0.586) | 5392.36 | 6.025 | 5143.58 | 1.134 | 5205.14 | 2.344 | 5154.92 | 1.357 |
| | TRADE-C | UTICON-A | 882.07 | 898.46 | 1.858 | 882.82 | 0.086 | 915.65 | 3.807 | 899.72 | 2.001 | 911.83 | 3.374 | 919.45 | 4.237 |
| | TRADE-C | TRADE-A | 1621.83 | 1635.33 | 0.833 | 1623.79 | 0.121 | 1651.70 | 1.842 | 1637.17 | 0.946 | 1700.26 | 4.836 | 1655.48 | 2.075 |
| | TRADE-C | SER-A | 1262.78 | 1270.89 | 0.642 | 1262.82 | 0.003 | 1261.97 | (0.064) | 1269.33 | 0.518 | 1275.46 | 1.004 | 1328.80 | 5.228 |
| | SER-C | PRIMA-A | 667.53 | 709.81 | 6.333 | 675.41 | 1.180 | 660.54 | (1.047) | 671.00 | 0.519 | 673.29 | 0.863 | 674.57 | 1.054 |
| | SER-C | AINDUS-A | 521.52 | 541.60 | 3.850 | 541.78 | 3.885 | 510.71 | (2.071) | 523.15 | 0.313 | 527.63 | 1.172 | 525.15 | 0.698 |
| | SER-C | MANU-A | 2753.93 | 2752.67 | (0.046) | 2737.80 | (0.586) | 2919.87 | 6.025 | 2785.15 | 1.134 | 2818.49 | 2.344 | 2791.29 | 1.357 |
| | SER-C | UTICON-A | 423.34 | 431.21 | 1.858 | 423.70 | 0.086 | 439.46 | 3.807 | 431.81 | 2.001 | 437.62 | 3.374 | 441.28 | 4.237 |
| | SER-C | TRADE-A | 2407.69 | 2427.74 | 0.833 | 2410.60 | 0.121 | 2452.04 | 1.842 | 2430.46 | 0.946 | 2524.13 | 4.836 | 2457.65 | 2.075 |
| | SER-C | SER-A | 2031.46 | 2044.50 | 0.642 | 2031.52 | 0.003 | 2030.16 | (0.064) | 2041.99 | 0.518 | 2051.86 | 1.004 | 2137.66 | 5.228 |