Doha Round Impacts on India: A Study in a Sequential Dynamic CGE Framework

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DOHA ROUND IMPACTS ON INDIA: A STUDY IN A SEQUENTIAL DYNAMIC CGE FRAMEWORK

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CONTENT

EXECUTIVE SUMMARY

Background

- The Doha Round of negotiations by the WTO (World Trade Organisation) Members will have profound and far-reaching impact on developing countries like India. Doha negotiations target especially agriculture and manufacturing sectors, and India, being a developing country, is likely to have important implications of such negotiations.

- The general objective of this research is to examine the impact of Doha round negotiations on the economy of India. The specific objectives are to examine the impact of agricultural trade liberalisation under the Doha negotiations, to examine the impact of NAMA negations, to explore the combined effect of agricultural and NAMA negotiations, and to examine the impact of liberalisation of the domestic services sectors.

- With a view to addressing these important issues, this study examines the effects of Doha agreement for India in a sequential dynamic computable general equilibrium (CGE) framework. We develop the first dynamic CGE model for India. The Social Accounting Matrix has also been updated for year 2006. The dynamic CGE model takes into account accumulation effects and thus allows long-run poverty analysis. In addition, it enables to track the adjustment path of the economy, which may include substantial effects on poverty. All these effects are analysed by comparing the business-as-usual scenario and the impacts of different policy scenarios.

Issues in WTO Doha Negotiations for India

- Agriculture has been at the centre stage of multilateral trade negotiations during the past 20 years. Several studies predict that, with the elimination of export and production subsidies, prices of agricultural commodities are likely to increase. Rise in prices following liberalisation will be, on the whole, welfare-enhancing for a net-exporter country, while for a net-importer country this will be translated into a terms of trade shock with adverse welfare consequences. India is a net exporter of many agricultural commodities. India was among the top 15 exporters of agricultural products and in 2007 India registered a 1.4 percent share of world exports of agricultural products.

- WTO negotiations with respect to the non-agricultural commodities (all those are not covered under the negotiation on agriculture, sometimes referred to as industrial or, manufactured goods) center around the enhancement of Non-Agricultural Market Access (NAMA), and are, therefore, proceeding towards the elimination or the reduction of bound tariff rates, bringing unbound tariff rates under binding commitments which will be subject to formula cuts, and identifying and removing Non-tariff Barriers (NTBs). The important considerations under the NAMA negotiations are the extent and modalities of tariff cut for industrial goods in order to reduce and ultimately eliminate high bound tariffs rates, tariff peaks and tariff escalation. The NAMA liberalisation would have important implications for India in

terms of both market access in developed countries' markets and domestic trade liberalisation in the manufacturing sectors. In 2007, India was among the top 15 exporters of manufacturing products and it registered a 1.0 percent share of world exports of manufacturing products in that year.

- In present day world services sector is the fastest growing sector of the global economy and it accounts for two thirds of global output, 30 percent of global employment and 20 percent of global trade. Services sector was not included in the world trade negotiation process till the inception of Uruguay Round. Commencement of General Agreement on Trade in Services (GATS) in world trade negotiation is relatively a recent phenomenon. GATS is the first initiative with the aim of progressive liberalisation of trade in services. After the inception of GATS, services trade is getting the importance in WTO multilateral trade negotiations. Services trade liberalisation has also important implications for India. It appears that for almost all broad services categories, India was among the top 15 countries in the world in 2007.

Overview of the Indian Economy

- The structure of the Indian economy has undergone significant changes since the 1980s with the share of agriculture in GDP declining to about half in 2006. The agriculture sector, for so long the mainstay of the Indian economy, now accounts for only about 20 per cent of GDP, yet employs over 50 per cent of the population. The average rate of GDP growth since the 1980s has been 5.82 per cent per year with wide variations over different sub-periods. There have been some remarkable growth performances during the 2003 and 2006 when the GDP growth rate exceeded 8 percent level.

- The growth performance over the period was underpinned by relatively steady rates of savings, investment and improvements in other macroeconomic indicators. As a share of GDP, investment increased to 34 per cent in 2006 along with increases in domestic and national savings. The changes in the external sector were significant. The share of exports of goods and services in GDP rose to 23 per cent in 2006 from only 6 per cent in early 1980s. On the other hand, the share of imports of goods and services in GDP rose from only 8.7 percent in 1981 to around 26 percent in 2006.

  India undertook significant liberalisation of trade during the 1990s. Average tariff rate was as high as 100 percent in 1986, which came down to 14 percent in 2007. There has also been substantial reduction in the import-weighted average rate during this period. The highest rate of duty was declined from 335 percent in 1990-91 to 35 percent in 2000- 01. It is noted that tariffs on consumer goods were drastically reduced as compared to tariffs on intermediate and capital goods.

- The trade policy reforms brought significant changes in the external sector of the economy. Compared with an average annual growth of around 5.4 per cent per year during 1980-1990, merchandise exports increased annually on average by 12.7 percent during 1991 and 2000 and the similar annual growth rate was also maintained during 2001 and 2006. In case of imports, the rates increased to around 14 per cent during 1990s compared with a 7.2 per cent growth during the 1980s. However, the growth in imports was a bit slowed down during 2001 and 2006.

- The trade basket, however, indicates an increasing concentration of manufactured goods accounting for 70 per cent of total merchandise exports in 2005. The shares of food and agricultural raw materials in total exports were reduced over time. In the case of imports, manufacturing accounts for slightly more than 50 percent of total imports and its share has increased over time. Fuels account for more than one third of the total imports. The shares of food and agricultural raw materials have declined over time.

- Considering head count poverty ratio for rural and urban India since 1973-74, it can be seen that rural poverty has always been higher than urban poverty until late 1990s. Approximately 80 percent of the total poor live in rural areas. There has generally been a reduction in poverty over the last three decades of so both in the rural and urban areas. However, the reduction was sharp between 1993-94 and 1999-00 largely due to an increase in GDP growth rate. Interestingly during 2001 and 2006, the reduction in rural head-count poverty has been remarkable whilst the reduction in urban poverty has been rather modest. In the case of inequality, both rural and urban Gini coefficients increased in the period between 1993-1994 and 1997, and declined between 1997 and 1999-2000.

Data and the Dynamic CGE Model

- In this study, the dynamic CGE model is be numerically calibrated to a recent an updated Social Accounting Matrix (SAM) of India. We worked on the latest available SAM for India for the year 2004 and updated it for 2006. We have updated the SAM for 73 sectors. For the modelling purpose, we use an aggregated version of SAM that includes 29 sectors, four factors of production: skilled and unskilled labour, agricultural and non-agricultural capital. An important feature of the SAM is the decomposition of the households into nine representative groups. Households are classified in terms of location: urban and rural. In case of both rural and urban households occupation is the main criterion to differentiate household groups.

- The basic structure of the 2006 Indian SAM suggests that tariff rates vary across the sectors and range from as low as 0 percent (cotton and cement) to as high as 16.1 percent (miscellaneous food). The tariff rates on paddy, wheat and oilseeds sectors are only 3.8 percent. In general, the tariff rates on agricultural products are low compared to the manufacturing products. Among the agricultural products 'sugar' appears to have the highest tariff rate. In the manufacturing sector textile and clothing sectors enjoy higher tariff rates. The highest import penetration ratio is for the minerals sector, and this sector has the highest share in imports as well. In the case of exports, 'other textile' appears to have the highest export-orientation ratio (52.4 percent). India's export basket is fairly diversified. In the case of value addition, the service and construction sectors together account for around 63 percent of total value added in the economy. The aggregate agricultural and the manufacturing sectors contribute 18 percent and 19 percent of the total value added respectively. The share of intermediate consumption in total demand is highest for the sugar sector.

- The income composition of households, which is derived from SAM 2006, shows that all the nine household categories receive most of their income from factor

remuneration. In the rural areas, agricultural labour and rural other labour households are heavily dependent on unskilled labour income. In contrast, rural non-agricultural self employed households derive incomes mostly from two sources: skilled labour and non-agricultural capital. The rural other households are heavily dependent on non-agricultural capital income. In the urban area the casual labour households derive more than three-fourth of their income from unskilled labour whereas urban salaried class household derive around two-third of their income from skilled labour. For the urban other households and urban self employed households income from the non-agricultural capital seem to be significant. For some household categories, like rural non-agricultural self employed households, rural agricultural self employed households, urban self employed households and urban other households, public transfer is also an important source of income. For the urban self employed households, urban other households and rural other households, remittance constitutes a notable share in their income. These considerable differences in income sources for different households are expected to generate varying income and poverty effects when different policy shocks are introduced in the model.

- The consumption composition of households, as derived from the SAM 2006, shows that, on average, agricultural commodities account for 40 percent of the consumption of the households. However, this share is around 45 percent for the rural households whereas, for the urban households the share is only 30 percent. For both rural agricultural labour and rural other labour this share is around 52 percent. It is also observed that the shares of non-food items are considerably high among the urban households. These differences in the consumption composition for different households are expected to cause varying consumption effects as a result of different policy shocks.

- A dynamic CGE model is constructed. The representative household approach is followed and the information of Household Expenditure Survey (HES) of India for 2006-06 is used to subsequently estimate poverty effects of different trade policy shocks. It is also important to mention here that initially the Doha scenarios are generated using the global general equilibrium model, namely the GTAP model. Then the price results obtained from the GTAP model are introduced as part of the shocks in the Indian dynamic CGE model.

Agricultural Trade Liberalisation under Doha

- Using the GTAP model we simulate a moderate Doha scenario for agricultural liberalization under which developed countries cut agricultural tariffs by 36 percent and the developing countries including India cut the same by 24 percent. Furthermore, both the developed and developing countries carry out a one-third reduction in domestic agricultural subsidies and a complete elimination of agricultural export subsidies. It appears from the GTAP simulation results that all agricultural sectors would experience rise in export prices and the rise is more prominent for the paddy and wheat sectors. Also, there import prices of these products increase. Because of the general equilibrium effect, the liberalization in the agricultural sectors also transmits price shocks for different manufacturing and services sectors in the economy. Except mineral and miscellaneous chemicals all subsectors in the manufacturing and services

sectors would experience some rise in export prices. On the other hand, all these sectors would face rise in import prices.

- The simulation results from the dynamic CGE model for India suggest that the impacts on GDP and welfare are positive both in the short and long run. The impact of the Doha agricultural scenario on real GDP appears to be very small. The small impact on GDP can be explained by the fact that the simulation generated two types of opposite shocks in the economy. Head-count poverty appears to decline both in the short and long run and the long run effect is more prominent. On the one hand, because of the export price rise there would be a rise in exports from different sectors which would also lead to rise in production. On the other hand, because of domestic trade liberalization in the agricultural sectors the there would be rise in imports which might lead to fall in domestic production. The net effect will depend on the relative strength of these two effects will certainly the rise in import prices shock in the economy There are also some small but positive impacts on imports and exports in the short run and they increase further in the long run. The rural and urban consumer price indices would experience some rise in the short run though the extent rise tend to lessened in the long run. Skilled and unskilled wage rates rise, although less so in the long run when capital is reallocated toward the expanding sectors. The rise in unskilled wage rates is somewhat larger, given the expansion of unskilled labour–intensive agricultural sectors. The agricultural capital rental rate increases more than the non-agricultural capital rental rate in the short run, and they eventually decline.

- Tariff elimination leads to an immediate reduction in the domestic price of imports of all agricultural commodities, except paddy, that is proportional to the initial sectoral tariff rates. Domestic consumers respond by increasing import demand, once again in rough proportion to the fall in import prices, with the strongest increases in the sugar and miscellaneous food. Because of the general equilibrium effect, the manufacturing and services sub-sectors are also affected. It appears that since only the agricultural sub-sectors have been liberalized, the protection on the non-agricultural sectors make these sectors profitable for increased investment. The export response is generally smaller in the long run. With a negative sloping demand curve for exports and rising world price of exports, FOB export prices rise. As a result of the rise in export demand, sectoral outputs expand in paddy, wheat, oilseeds and cotton sectors in the short run and they increase further in the long run compared to the BaU path. Production of cotton would expand on an increasing trend during the period under consideration. All other agricultural sectors would however experience fall in production despite the fact that their export demand also rise. It is due to rise in imports as a result of tariff liberalization in these sectors.

- As the four major agricultural sectors (paddy, wheat, oil seeds and cotton) expand they also attract increased investment into their sectors. In the short run the highest percentage rise in investment is observed to be in the wheat sector followed by the paddy sector. However, in the long run the percentage deviation of investment from the BaU appears to be lessened. Because of increased investment in those aforementioned four agricultural sectors, resources are also reallocated from other contracting sectors to these sectors.

- Under this scenario, a rise in nominal income for all households is observed in both the short run and the long run. This rise is largest among rural other households as

these households derive substantial income from land, and the rate of return on land increases more than the rate of return on any other factor of production. However, the rate of change in CPI is also high for this category of households. Both in the short and long run, real consumption increases for all households as nominal income rises more than consumer prices. All the household categories also experience rise in EVs both in the short and long run and the rural agricultural labour and rural other labour would emerge as the biggest winners.

- In the short run, head-count poverty declines for all households. Also the depth of poverty and the severity of poverty decrease in the short run and they decline further in the long run. Poverty indices fall more for the poorer households. It suggests that accumulation effects captured by the model play a major role in alleviating poverty.

NAMA Trade Liberalisation under Doha

- Using the GTAP model we simulate a moderate Doha- NAMA scenario where developed countries cut their industrial tariffs by 36 percent whereas the developing countries, including India, cut their tariffs by 24 percent. It appears from the GTAP simulation results that because of the tariff cut on non-agricultural commodities all the industrial commodities experience fall in world export price. The highest fall in export price is observed for the machinery sub-sector. Also, because of sectoral interlinkages the export prices of agricultural and services sub-sectors would also decline. On the other hand, import prices of all manufacturing commodities decline whereas those of agricultural sectors increase. The largest fall in import prices is observed in the other textile sector.

- The simulation results from the dynamic CGE model for India suggest that the NAMA scenario would lead to a rise in real GDP for India. However, aggregate welfare would fall both in the short and long run. The reason would be because of the fact that all the factor returns fall more than the fall in consumer price indices both in the rural and urban areas. The negative effect on welfare, however, appears to be less prominent in the long run. It appears that imports and export would experience some positive growth both in the short and long run and the growth in exports would be higher than that of imports. Contrary to the agricultural liberalization, CPIs, both in the rural and urban areas, would fall and though their effects are slightly lessened in the long run. All the factor returns also experience negative growth and the fall in non-agricultural capital rental rate appears the highest among all these factors.

- NAMA Tariff elimination leads to an immediate reduction in the domestic price of imports of manufacturing goods that is proportional to the initial sectoral tariff rates. Because of the fall in import prices, the domestic prices also fall. The sectors that had high initial tariff rates would register large import growth in the short run as consumers substitute toward goods for which prices drop more dramatically. In the long run, import volumes grow more in all manufacturing sectors. Thus, the increase in imports leads to a real devaluation and an increase in exports. The export response is the greatest for the textile and leather sectors though some other sectors like metal, machinery and electrical goods experience negative growth in exports. The export growth effect is generally larger in the long run. With a negative sloping demand curve for exports, FOB export prices fall.

- Because of increased flow of imports, output shrinks in most of the manufacturing sectors except cotton textile and other textile. Under such a scenario, the expanding sectors are only two manufacturing sectors: cotton textile and other textile. Though the leather sector would experience slight fall in production, its exports would rise, which would be facilitated decreased domestic sales of leather products. The largest percentage fall in production in the manufacturing sector appears to be for the machinery sub-sector followed by electrical goods. The effects on production (either positive or negative) are more prominent in the long run. Among the agricultural and services sectors some sub-sectors would gain out of this scenario, especially, cotton, oilseeds, transport services and other services.

- As a result of the expansion of the textile sector non-agricultural capital and labour migrate to this sector and away from the other manufacturing sectors, with relatively little movement in the agricultural and services sectors. In the long run, the non-agricultural capital stock response is much larger and tempers the reallocation of skilled and unskilled labour. Investment in the textile sector also increases though the percentage rise appears to be narrowed in the long run. The average returns to capital fall slightly more in the non-agricultural sector, although these rates converge after long-term adjustment in sectoral investment rates.

- Under the NAMA scenario, a fall in nominal income for all households is observed in both the short run and the long run. This reduction is the highest among rural other households and smallest among urban other households. There are also reductions in the consumer price indices for all household categories. However, the fall in incomes is much higher than the fall in CPIs which suggests a decline in real consumption for these household categories. The changes in EVs are also in line with the changes in real consumption. It appears that in the rural areas rural other labour and in the urban area urban casual labour are the worst sufferer. The long run negative effects on EVs are much smaller than the short run effects.

- All household categories would experience rise in head-count poverty both in the short and long run, though the long run effects are smaller than the short run effects. In the rural area rural other households and in the urban area urban casual labour would experience the largest rise in head-count poverty. For all household categories poverty gap and poverty depth also increase and again the rural other households and urban casual labour are the worst sufferer.

Full Doha Scenario

- It appears from the analysis on agricultural trade liberalisation and NAMA liberalisation that agricultural trade liberalisation under the Doha round would be beneficial whereas the NAMA scenario would have negative effects as far as the poverty and welfare impacts are concerned in the context of the Indian economy. However, it should be mentioned here that under the WTO's Doha round of negotiations the agricultural and NAMA liberalisation would be executed under a single undertaking. Therefore, it is more plausible to examine the joint effects of these two scenarios on the Indian economy.

- Using the GTAP model we simulate a moderate Doha scenario where developed countries cut their agricultural and industrial tariffs by 36 percent whereas the

developing countries, including India, cut their agricultural and industrial tariffs by 24 percent. In addition, both the developed and developing countries carry out a one-third reduction in domestic agricultural subsidies and a complete elimination of agricultural export subsidies. It appears from the GTAP simulation results that all the agricultural products would experience rise in their prices in the world market. With respect to the export price, because of combined effects of agriculture and NAMA liberalisation, the export price changes of the manufacturing products are less prominent than those under the NAMA scenario. In contrast, the import price changes are relatively higher than those under the NAMA scenario.

- The simulation results from the dynamic CGE model for India suggest that the Doha scenario would lead to a rise in real GDP in the short run and the effect is stronger in the long run. In the short run, the aggregate welfare declines. However, in the long run the negative effect on welfare appears to be very minimal. Head-country poverty rises in the short run, and in the long rub the effect is very minimal. There are positive effects on exports and imports and the long run effects are more prominent than the short run effects. Both urban and rural CPIs fall and they fall more in the long run. All the factors of production would experience fall in their rate of returns and the decline in the non-agricultural capital rental rate is the most prominent.

- Domestic tariff cut under the Doha scenario leads to reduction in domestic prices of imports, and the sectors having higher initial tariffs tend to experience higher reduction in import prices. The fall in import prices also leads to fall in domestic prices. Since the manufacturing sectors have higher initial tariffs than the agricultural sectors, the Doha scenario would result in higher reduction in domestic prices of imports for the manufacturing sectors compared to the agricultural sectors. The price of value-added and producer prices fall for all sectors and the manufacturing sector in general experience higher fall in value-added prices and producer prices.

- In general, the agricultural sectors and the services sectors and a few sectors in the manufacturing, namely textile sectors, are the beneficiaries of this scenario. In contrast, production contracts in most of the manufacturing sectors. As a result, non-agricultural capital and labour migrate to the textile and garments sectors and away from the other manufacturing sectors, with relatively little movement in the agricultural sectors. The long run effects are more prominent than those of short run. In the long run, the non-agricultural capital stock response is much larger and tempers the reallocation of skilled and unskilled labour. There are also moderate capital stock increases in the agricultural and service sectors.

- Among the agricultural sectors the most expanding sub-sector appears to be the cotton sector, whereas in the manufacturing sector output expands mostly in the other textile sub-sector. The largest reduction in output would be seen in the machinery sector. As result of increased demand in the expanding sub-sectors in agriculture and manufacturing, a number of services sectors also expand and the largest expansion would be seen in other services sub-sector.

- All the expanding sub-sectors in agriculture, manufacturing and services sectors would attract more of skilled and unskilled labour and capital. In the short run, among the agricultural sub-sectors, cotton would experience largest rise in demand for the factors of production. In the manufacturing sector, other textile sub-sector would face

largest rise in demand for the factors. Also, the services sub-sectors would see increased demand for the factors. All other contracting sectors would however confront reduction in demand for factors. The long run effects of demand for skilled and unskilled labour seem to be higher than the short run effects. However, the long run effects of demand for capital appear to be higher than the short run effects. Since in the long run the rate of return to capital declines more than the fall in rate of return to labour categories. All the expanding sectors would also see increased investment while the contracting sector would experience fall in investment. The long run effects of investment appear to be smaller than the short run effects.

- Under the Doha scenario, a fall in nominal income for all households is observed in both the short run and the long run. In the rural area this reduction is smallest among rural agricultural labor and, in the urban area among the urban other households. The consumer price indices also decline both in the short and long run though the long run impacts are stronger than the short run impacts. Since the fall in the is larger than the fall in CPIs, all households, in the short run, would experience negative growth in real consumption, However, in the long run, for some household categories, like rural agricultural labour, urban self employed, urban salaried class and urban other households, the fall in income would be lower than the fall in CPIs, and therefore they would experience rise in real consumption. The figures of EVs are very much in line with real consumption growth.

- It appears that a full Doha scenario would result in a rise in head-count poverty for all household categories in the short run, though the long run effects are much less pronounced, and in fact for some household categories, head-count poverty declines in the long run. In the rural area, rural agricultural labour and in the urban area urban self employed, urban salaried class and urban other households would experience fall in head-count poverty in the long run. Among these household groups, the fall in head-count poverty appears to be most prominent for the urban other households. The poverty gap and squared poverty gap indices also suggest similar pattern as is observed for the head-count poverty.

Services Trade Liberalisation

- Services trade liberalisation is one of the major areas of negotiations under the Doha round. However, there are difficulties in modelling services trade liberalisation because of the lack of data on the protection of services sector. Given this context, we have considered a simple approach to model the services protection in Indian economy and we have examined the impact of liberalisation of this protection on the Indian economy using the dynamic CGE model for India. There are many forms of barriers and protection in the services trade and it is very difficult to quantify them. In the current exercise we assume that five services sectors (where there are imports of services) have a tariff equivalent protection equal to the average tariff rate on the manufacturing and agricultural sectors and we simulate a full liberalisation of these protections. In addition we also assume that along with the liberalisation there would be a 10 percent rise in foreign direct investment into these services sectors.

- The liberalisation in the services sectors would lead to a rise in real GDP and aggregate welfare both in the short and long run and the long run impacts are larger than the short run impacts. Aggregate head-count poverty falls in the short run and it

declines further in the long run. Exports and imports register positive growth in the short run and some larger growth in the long run. The consumer prices indices, both for the rural and urban households decline. All the factors returns would register negative growth and their long run deviations from the BaU path appear to be larger than the short run deviations.

- Because of the removal of restriction on import in the services sectors the import prices as well as the domestic prices in these sectors fall. As a result of the sectoral inter-linkages, and because of the fact that the rate of factor returns have declined, domestic prices in most of the manufacturing and agricultural sectors fall. The value-added price fall in lesser extents for the services sectors in general because of the increased flow of foreign direct investments into these sectors. The FOB export prices also fall for most of the sectors which indicates rise in export competitiveness for the export-oriented sectors.

- The services trade liberalisation scenario would entail two opposite effects. Because of trade liberalization domestic services sectors would tend to contract. On the other hand, because of increased flow of FDI into these sectors these sectors would expand. The net impact would depend on the relative strength of these two effects. It appears that the services sectors under consideration expand both in the short and long run, which suggests much stronger impact of the later effects. Exports from these services sectors also increase. Because of the rise in competitiveness in general we also observe increased export performance from some of the agricultural and manufacturing sectors.

- Liberalization in the services trade, along with increased flow of foreign direct investment, results in rise in net investments into these sectors. There are also increased demands for skilled and unskilled labour as well capital in these sectors. As a result, some of the sectors with weaker linkages with the services sectors experience contraction and reduced demand for the factors of production. Among the services sectors, the largest rise in investment would be in other services. This sector would also experience higher increased demand for factors compared to any other sectors.

- The nominal incomes of the households as well as the CPIs fall both in the short and long run. However, the reductions in incomes are smaller than the fall in CPIs, which suggests rise in real consumption of the households. The figures of EVs are very much in line with real consumption growth. All household categories would register rise in EVs both in the short and long run. In the short run, rural other households and urban other households would experience the largest rise in EVs compared to the BaU path. However, in the long run, urban other households would register the largest rise in EV.

- Services trade liberalization, along with increased flow of foreign investment into the services sectors, would result in drop in head-count poverty for all the household categories. In the rural area, rural other households and in the urban area urban other households would experience largest fall in head-count poverty. Also the depth and severity of poverty decline for all household categories. The long run poverty reducing effects are stronger than the short run effects for all three indices of poverty.

CHAPTER 1:
INTRODUCTION

1.1. Background

International trade is a strong instrument for development. This is equally important when it comes to the ongoing WTO Doha Development Round. The Doha Round of negotiations by the WTO Members will have profound and far-reaching impact on developing countries like India. The Doha Round of negotiations have at least three very important components from India's perspective: agricultural trade liberalisation, liberalisation of the manufacturing sector, and liberalisation of the services sector. With respect to the negotiations on global agricultural trade liberalisation, a number of studies have predicted that, with the elimination of export and production subsidies, prices of agricultural commodities are likely to increase in the international market. This will be beneficial to a number of developing countries that have clear comparative advantage in this sector. Liberalisation will also imply further market access opportunities for these countries as a result of reduced tariff barriers in the developed country markets. India, being a net exporter of agricultural commodities, is likely to gain from such liberalisation. WTO negotiations with respect to the NAMA negotiations are proceeding towards the elimination or the reduction of bound tariff rates, bringing unbound tariff rates under binding commitments which will be subject to formula cuts, and identifying and removing Non-tariff Barriers (NTBs). The important considerations under the NAMA negotiations are the extent and modalities of tariff cut for industrial goods in order to reduce and ultimately eliminate high bound tariffs rates, tariff peaks and tariff escalation. The NAMA liberalisation is likely to have important implications for India in terms of both market access in developed countries' markets and domestic trade liberalisation in the manufacturing sectors. Finally, negotiations on services trade liberalisation under GATS also have important implications for India as India has important offensive and defensive interests in a number of services sectors.

To address these important issues, this study examines the poverty effects on India of the Doha agreement in a sequential dynamic computable general equilibrium framework, which takes into account accumulation effects and long-run poverty analysis. In addition, the model tracks the adjustment path of the Indian economy, which may include substantial effects on poverty. All these effects are analysed by comparing the business-as-usual scenario and the impacts of different policy scenarios.

There have been a lot of misconceptions about the impacts of trade reforms on poverty in India. For India to decide what its position on trade should be, it needs to have good analysis about the impacts on the poor, so that it can determine whether to move forward, what more it needs, what more it can give, and where to put social resources to aid in any transition. This analysis intends to fill in that gap with the aim of taking the results to the policy-makers and relevant stakeholders.

1.2. Objective of the Research

The general objective of this research is to examine the impact of Doha round negotiations on the economy of India. The specific objectives are as follows:

- To examine the separated impacts of agricultural trade liberalisation on India under the Doha negotiations
- To examine the separated impacts of NAMA negations on India under Doha negotiations
- To assess the combined effects of agricultural and NAMA negotiations
- To examine the impacts of liberalisation of the domestic services sectors in the context of the Indian economy.

1.3. Methodology

Like any other useful work, the research has reviewed the relevant literature, data analysis, and discussions with the concerned stakeholders. In addition, a strong analytical framework is incorporated to provide credible results and thereby to promote informed policy analysis. The application of this kind of methodology means use of simulation exercises based on general equilibrium models.

Effective policy negotiations partly depend on the policymakers' (negotiators') a priori assessment about the implications arising from different negotiation outcomes. Therefore, it is very important to provide the policymakers with *ex ante* analysis of alternative scenarios. For example, for a net-agriculture exporting developing country like India, it is crucial for its negotiators to have a clear idea about the potential implications of agriculture trade liberalization (or, for that matter any other liberalisation scheme) under the WTO-led multilateral trade negotiations. These types of ex-ante analyses have been undertaken in the current research. A global general equilibrium model and a country-specific CGE model for India have been used to simulate the effects arising from alternative negotiating outcomes for India. The Social Accounting Matrix has also been updated for year 2006.

1.4. Outline of the Report

The study has ten chapters. After the introduction in Chapter 1, Chapter 2 discusses the Doha round issues for India and tries to provide an assessment on the possible impact of such negotiations on the Indian economy. Chapter 3 provides an overview of the economy by highlighting the major features of the economy as well as discusses on the trend in some major macroeconomic variables. Chapter 4 presents a brief description of the data. Chapter 5 provides a brief description of the model. Chapter 6, 7 and 8 presents the impact of agricultural liberalization, NAMA negotiations and full Doha negotiations on Indian economy respectively. Chapter 9 explores the impact of services trade liberalization. Finally Chapter 10 provides a conclusion of the study.

CHAPTER 2:
THE DOHA ROUND ISSUES FOR INDIA

2.1. Introduction

The Doha Round of negotiations involves developed-country reforms that have at least three very important components from India's perspective: agricultural trade liberalisation, liberalisation of the manufacturing sector, and services trade liberalisation. Furthermore, the implementation of the Doha Round agreement will require domestic reforms in India, notably in the area of trade liberalisation. Thus, the objectives of this study will be to analyse poverty and other economic impacts of these issues. They are discussed below.

2.2. Agricultural Trade Liberalisation

Agriculture has been at the centre stage of multilateral trade negotiations during the past 20 years. Despite having a major progress in improving the rules for trade, the overall achievement in terms of increasing market access for agricultural goods was considered to be 'disappointing' at the end of the Uruguay Round (Martin and Winters, 1996). Although under the WTO Agreement on Agriculture members committed to carrying on reforms, not much progress has so far been made in further opening-up of the markets. Nevertheless, agriculture continues to be an active area of negotiation. While the modalities for future liberalisation in the sector are being negotiated, the potential implications arising from such liberalisation have drawn a lot of attention. Several studies (e.g., Hertel *et al*., 2000; Diao *et al*., 2001; Beghin *et al.*, 2002; Elbehri and Leetmaa, 2002; van Meijl and van Tongeren, 2001; Dimaranan *et al.*, 2003; Francois *et al.*, 2003) predict that, with the elimination of export and production subsidies, prices of agricultural commodities are likely to increase. This will be beneficial to a number of developing countries that have clear comparative advantage in the sector. Liberalisation will also imply further market access opportunities for these countries as a result of reduced tariff barriers in the developed country markets.

Agricultural trade liberalisation is likely to affect the current pattern of global production and trade of many agricultural commodities. Rise in prices following liberalisation will be, on the whole, welfare-enhancing for a net-exporter country, while for a net-importer country this will be translated into a terms of trade shock with adverse welfare consequences. Since tariff reduction and removal of subsidies are two inherent components of the global agricultural trade liberalisation, they should be considered simultaneously in assessing the welfare consequences. While tariff reductions under the WTO rule will potentially depress prices, subsidy cuts will tend to exert an opposite effect with the net result depending on the relative strength of these two differing forces. It is generally suggested that the implementation of Doha agreement on agriculture is likely to increase the prices of food grains and commercial crops in the world market (Panagariya 2002, Beghin et al. 2002). However, the implications for the developing countries of increased agricultural prices are unclear and it is argued that the potential exporting countries could benefit and the net food importing countries may turn

out to be the looser (Panagariya 2002). There are competing predictions about such impact based on simulation results of various global trade models. Some studies foresee expansion of world trade, real output, wages and incomes in developing countries (Beghin et al. 2002, Conforti and Salvatici 2004, Polaski, 2006). On the other hand, some studies raise concerns about potential negative impact for the net food importing countries (François et al. 2003, Fabiosa et al. 2003).

2.2.1. World Agricultural Trade: Where does India Stand?

Figure 2.1: Growth in World Agricultural Trade (%)

Source: International Trade Statistics 2008
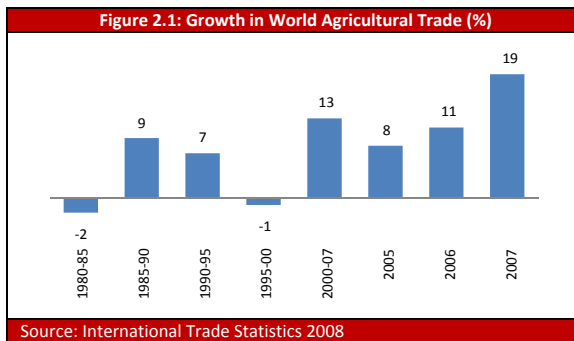
There have been fluctuations in the world trade in agricultural products over the last two decades (Figure 2.1). However, in recent time there has been an increasing trend in the world trade in agricultural products. During the first half of 1990s there was a positive rate of growth which turned into a negative growth during the second half. During 2000 and 2007 the annual average growth rate in agricultural trade was 13 percent which was mainly due to considerably higher growth rate in later years of that period. Especially, from 2005 the growth rate in agricultural trade has been more than doubled and in 2007 the growth rate stood at 19 percent.

It also appears that agricultural products constitute a sizeable share in world merchandise exports (Table 2.1). In 2007, the trade in agriculture was around 1128 billion US\$ which was around 30 percent of the world exports of primary products. However,

Table 2.1: World Trade in Agricultural Products, 2007	
Value in 2007	1127.7 \$bn
Share in world merchandise trade %	8.3
Share in world exports of primary products %	29.8
Source: International Trade Statistics 2008	

in terms of the share in total world merchandise exports the share was only 8.3 percent.

Table 2.2: Agricultural products' share in trade, by region, 2007		
Share in total merchandise trade, %	Exports	Imports
World	8.3	8.3
North America	9.6	6.0
South and Central America	25.1	8.7
Europe	9.0	9.2
CIS	7.6	10.9
Africa	8.1	14.0
Middle East	2.5	10.2
Asia	5.6	7.4
Note: CIS = Commonwealth of Independent States		
Source: International Trade Statistics 2008		

It appears from Table 2.2 that in the case of the share of agricultural exports in total regional merchandise exports Latin American countries' has the highest share (25.1 percent). The Asian countries, on average, have lower export-orientation in agricultural products compared to all the regions except the Middle East. On the other hand, in the case of imports, the Asian countries, on average, have lower import-orientation in agricultural products compared all the regions except the North America. The African countries, on average, appear to have the highest import-orientation as far as the agricultural imports are concerned.

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Table 2.3: Top 15 Agricultural Exporters and Importers, 2007					
	Value $bn	Share in World Exports %		Value $bn	Share in World Imports %
Exporters			**Importers**		
European Union (27)	487.74	43.3	European Union (27)	528.54	44.4
extra-EU (27) exports	108.66	9.6	extra-EU (27) imports	149.46	12.5
United States	113.51	10.1	United States	109.40	9.2
Canada	48.67	4.3	Japan	68.86	5.8
Brazil	48.22	4.3	China	65.24	5.5
China	38.85	3.4	Canada b	27.34	2.3
Argentina	28.81	2.6	Russian Federation a, b	26.88	2.3
Thailand	24.96	2.2	Korea, Republic of	21.94	1.8
Russian Federation a	23.52	2.1	Mexico b	21.90	1.8
Indonesia	23.43	2.1	Hong Kong, China	13.43	1.1
Australia	22.35	2.0	retained imports	8.60	0.7
Malaysia	20.51	1.8	Saudi Arabia	12.45	1.0
New Zealand	16.04	1.4	United Arab Emirates a	11.29	0.9
India	16.02	1.4	Taipei, Chinese	10.78	0.9
Mexico	15.59	1.4	Malaysia	10.61	0.9
Chile	13.63	1.2	Indonesia	10.46	0.9
			Switzerland	10.37	0.9
Above 15	941.87	83.5	**Above 15**	944.68	79.3

Source: International Trade Statistics 2008
Note: a Includes Secretariat estimates   b Imports are valued f.o.b.

Table 2.3 suggests that EU member countries are the largest traders of the agricultural products. They, among themselves, perform more than 43 percent of the world trade in agriculture, and do another 10-12 percent of world trade with the rest of the world. USA is another important player in world agricultural trade. Among the developing countries Brazil and China are also important exporters of agricultural products. On the other hand, apart from the EU and the USA, the major importers of agricultural products are Japan and China. India was among the top 15 exporters of agricultural products and in 2007 India registered a 1.4 percent share of world exports of agricultural products.

India is a net exporter of many agricultural commodities. To give one example, consider the case of rice. Rice is one the most important crops in India. It is by far the staple food for a large number of people and the major means of livelihood for millions of farm households in the country. Table 2.4 suggests that though India is the second biggest rice consuming country in the world it also the second largest rice producing and exporting country in the world. Therefore, if global agricultural trade liberalisation, as envisaged by the Doha round of negotiations, results in rise in the price of rice in the world market, being a net exporter of rice, India is likely to gain from such liberalisation.

Table 2.4: Leading Countries in Production, Consumption, Exports and Imports of rice in 2003				
Rank	Producing	Consuming	Exporting	Importing
1	China	China	Thailand	Indonesia
2	India	India	India	Nigeria
3	Indonesia	Indonesia	Vietnam	Bangladesh
4	Bangladesh	Bangladesh	United States	Iran
5	Vietnam	Vietnam	China	Philippines
6	Thailand	Japan	Pakistan	Brazil
7	Japan	Thailand	Uruguay	Iraq
8	Myanmar	Myanmar	Argentina	Saudi Arabia
9	Philippines	Philippines	Egypt	EU
10	Brazil	Brazil	Myanmar	Senegal
11	United States	Korea, Rep. of	Australia	China
12	Korea, Rep. of	United States	Japan	South Africa
13	Pakistan	Nigeria	EU	Co^te d´ Ivory
14	Egypt	Egypt	Guyana	Malaysia
15	Cambodia	Iran	Ecuador	Cuba

Source: World Bank (2005)

2.2.2. Negotiations on Global Agricultural Trade Liberalisation

In WTO terminology, subsidies in general are identified by "boxes" which are given the colours of traffic lights: green (permitted), amber (slow down — i.e. be reduced), red (forbidden). In agriculture, things are, as usual, more complicated. The Agriculture Agreement has no red box, although domestic support exceeding the reduction commitment levels in the amber box is prohibited; and there is a blue box for subsidies that are tied to

programmes that limit production. There are also exemptions for developing countries (sometimes called an "S&D box", including provisions in Article 6.2 of the agreement).

While the Uruguay Round Agreement on Agriculture made some significant progress on rules of trade in agriculture by replacing the QRs with tariffs and for specifying initial commitments on reduction of tariffs and subsidies, the momentum could not be maintained under the WTO-sponsored negotiations. The domestic support given to agriculture in the developed countries has not come down since the implementation of the commitments of the Uruguay Round began in 1995 (Naik, 2005). Although in the Doha Ministerial Declaration member countries vowed to achieve substantial improvements in market access through phasing out of all forms of export subsidies and substantial reductions in trade-distorting domestic support (WTO 2001, para. 13), no major breakthrough has been made after the conclusion of the Hong Kong Ministerial conference, held in December 2005. While members are still negotiating modalities for further liberalisation, consensus has been reached on abolishing all export subsidies only by 2013 (WTO 2005, para 6).[1] It however appears that export subsidies constitute very insignificant portion of the total domestic support measures given to agriculture in the developed countries.

Despite the lack of progress related to agricultural liberalisation in the post Uruguay Round period there is no denying that, most of the agricultural commodities have long been the most protected commodities in world trade, any significant liberalisation measure in this sector will likely to have huge welfare implications.

2.3. Liberalisation of the Manufacturing Sector

WTO negotiations with respect to the non-agricultural commodities (all those are not covered under the negotiation on agriculture, sometimes referred to as industrial or, manufactured goods) center around the enhancement of Non-Agricultural Market Access (NAMA), and are, therefore, proceeding towards the elimination or the reduction of bound tariff rates, bringing unbound tariff rates under binding commitments which will be subject to formula cuts, and identifying and removing Non-tariff Barriers (NTBs). The important considerations under the NAMA negotiations are the extent and modalities of tariff cut for industrial goods in order to reduce and ultimately eliminate high bound tariffs rates, tariff peaks and tariff escalation. Although, for the developed countries almost all of their tariff lines are bounded, in case of developing countries, the proportions of the bound tariffs to total tariff lines are quite low. As trade theory suggests, for small and vulnerable economies, industrial tariffs are used as a tool to protect domestic industries with artificially maintaining high price in the local market. It is also true that for many developing countries, tariff revenue acts as a major source of government revenue. Therefore, it is quite common that the developing countries might keep the floor open to adjust with economic shocks by not-committing to WTO, or not setting bound tariff rates. Similar considerations are applicable for 'less than full reciprocity' flexibility for the developing countries to be allowed for industrial tariff cut.

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[1] In the case of cotton, export subsidies by the developed countries were abolished in 2006.

2.3.1. World Manufacturing Trade: Where does India Stand?

Figure 2.2 shows the growth rate in the world manufacturing trade over the last two decades. It appears that during the first half of 1980s the annual average growth in trade in manufacturing products was very low, only 2 percent, which increased to 15 percent during the second half of the 19080s. However during the 1990s the world trade in manufacturing experienced some lower rate of growth which, however, increased considerably

Figure 2.2: Growth in World Manufacturing Trade (%)

Source: International Trade Statistics 2008

during the 2000s. Since 2005 there has been an increasing trend in the growth rate in this regard.
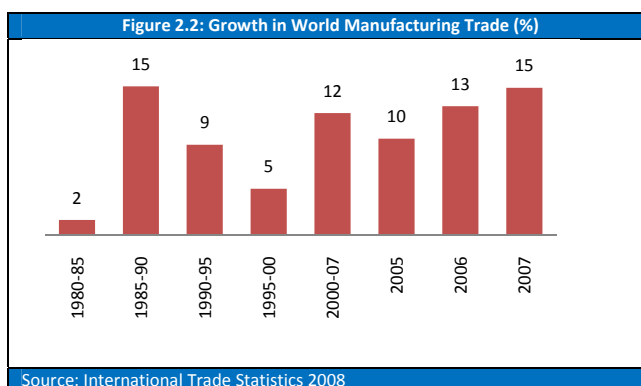
Table 2.5: World Trade in Manufacturing Products, 2007	
Value in 2007	9500 $bn
Share in world merchandise trade %	69.8
Source: International Trade Statistics 2008	

Table 2.5 shows that the trade in manufacturing products has the dominant share in world trade. In 2007, the total value of the trade in manufacturing products was US$ 9500 billion which was 69.8 percent of the total merchandise trade in that year.

Table 2.6 suggest that in the case of the share of manufacturing exports in total regional merchandise exports the Asian countries has the highest share (81.6 percent). The African countries, on average, have lower export-orientation in manufacturing products compared to all the regions in the world. On the other hand, in the case of imports, the Asian countries, on average, have the lowest import-orientation in manufacturing products compared all the. The CIS countries, on average, appear to have the highest import-orientation as far as the agricultural imports are concerned.

Table 2.6: Manufacturing products' share in trade, by region, 2007		
Share in total merchandise trade, %	Exports	Imports
World	69.8	69.8
North America	72.2	72.8
South and Central America	30.9	69.1
Europe	78.6	72.1
CIS	25.1	76.7
Africa	18.8	68.0
Middle East	21.0	75.7
Asia	81.6	63.7
Note: CIS = Commonwealth of Independent States		
Source: International Trade Statistics 2007		

Table 2.7: Top 15 Manufacturing Exporters and Importers, 2007					
	Value $bn	Share in World Exports %		Value $bn	Share in World Imports %
Exporters			**Importers**		
European Union (27)	4249.1	44.7	European Union (27)	4029.7	41.0
extra-EU (27) exports	1406.5	14.8	extra-EU (27) imports	1187.2	12.1
China a	1134.8	11.9	United States	1409.6	14.3
United States	909.4	9.6	China a, c	677.6	6.9
Japan	640.9	6.7	Hong Kong, China	333.6	3.4
Hong Kong, China	331.2	3.5	retained imports	14.7	0.1
domestic exports	12.3	0.1	Japan	314.4	3.2
re-exports	318.9	3.4	Canada d	293.8	3.0
Korea, Republic of	330.4	3.5	Mexico a, d	227.9	2.3
Singapore	227.1	2.4	Korea, Republic of	206.2	2.1
domestic exports	104.4	1.1	Singapore	188.1	1.9
re-exports	122.7	1.3	retained imports	65.4	0.7
Canada	224.5	2.4	Russian Federation b, d	185.6	1.9
Taipei, Chinese	209.6	2.2	Taipei, Chinese	142.6	1.5
Mexico a	204.2	2.1	Switzerland	132.2	1.3
Switzerland	155.5	1.6	Australia d	118.1	1.2
Malaysia a	125.0	1.3	Malaysia a	110.7	1.1
Thailand	116.5	1.2	Turkey b	106.6	1.1
India	92.4	1.0			
Turkey b	85.4	0.9			
Above 15	**8716.9**	**91.8**	**Above 15**	**8158.0**	**83.0**

Source: International Trade Statistics 2008
Note: a Includes significant shipments through processing zones   b Includes Secretariat estimates.
c   In 2007, China reported imports of manufactures from China amounting to $84.1 billion.
d   Imports are valued f.o.b.

According to Table 2.7, EU member countries are the largest traders of the manufacturing products. They, among themselves, perform more than 41-44 percent of the world trade in manufacturing products, and do another 12-15 percent of world trade with the rest of the world. China and USA are the two major important players in world agricultural trade. Apart from China, the other developing countries having important shares in world exports of manufacturing products are Malaysia, Thailand, India and Turkey. India was among the top 15 exporters of manufacturing products and in 2007 India registered a 1.0 percent share of world exports of manufacturing products. On the other hand, apart from the EU and the USA, the major importers of manufacturing products are China and Japan.

2.3.2. Negotiations on NAMA

Trade negotiations in the Uruguay Round, under the broad title of Non-agricultural Market Access (NAMA), achieved a progress in terms of reducing developed country's average tariff rates from 6.3 percent to 3.8 percent, and an increase in developing country's binding coverage from 21 percent to 73 percent. Under the ongoing Doha Round, the negotiations on NAMA incorporate the reduction or elimination of overall industrial tariff rates as well as the reduction or elimination of tariff peaks and tariff escalation, and also the removal of the non-tariff barriers (NTBs). In line with the work programmes, set in article 16 of the Doha Ministerial declaration, negotiations on NAMA were launched in January 2002 with the creation of a Negotiating Group on Market Access (NGMA). The sectors which should be covered for the formula approach for tariff reduction, as proposed by the NGMA in 2003, include (i) electronics and electrical goods, (ii) fish and fish products, (iii) footwear, (iv) leather goods, (v) motor vehicle parts and components, (vi) stones, gems, and precious metals, and (vii) textiles and clothing.

The July 2004 package moved onward with a framework for establishing modalities for NAMA negotiations and the 6th Ministerial Declaration in Hong Kong in December 2005 set out the mandate to use a 'Swiss type' formula for the reduction in the bound tariff rates.

However, there have been intense debates, and a number of proposals have been put in place with respect to the value and the number of coefficient used in the tariff-cut formula, and no consensus has yet been reached. According to the July 2004 framework, NAMA tariff reduction should have comprehensive product coverage, should commence from bound rates, and all non-ad-valorem duties are to be converted to ad-valorem equivalents and to bind them in ad-valorem terms. Although the tariff reductions are to be from the bound tariff rates, the implication will exert to the applied rates too, as in most of the cases the developed country MFN applied tariffs and bound tariffs don't have wide spreads for industrial commodities.

The rationale for applying a formula cut approach for tariff reduction includes the willingness of making the process transparent, efficient, equitable and predictable. There were intensive discussions among the member countries regarding the development of modalities for NAMA, and finally they reached a consensus of applying the formula approach, and the negotiation so far proceeded, the formula will be a 'Swiss type with coefficients'.

2.4. Services Trade Liberalisation

In present day world services sector is the fastest growing sector of the global economy and it accounts for two thirds of global output, 30 percent of global employment and 20 percent of global trade. Services activities in low- and middle-income countries have been expanding faster than GDP for the last two decades. An implication of this continuous shift toward services is that the overall growth of productivity in the economy is becoming increasingly determined by what is happening in the services sector.

Even though services sector is the major contributor to GDP in most of the countries, trade in services is relatively a new phenomenon, and it has a low share in the total world trade. 'Intangibility' and 'no storability' characteristics of services were considered as main impediments to services trade. Services sector was not included in the world trade negotiation process till the inception of Uruguay Round. Commencement of General Agreement on Trade in Services (GATS) in world trade negotiation is relatively a recent phenomenon. GATS is the first initiative with the aim of progressive liberalisation of trade in services. The World Trade Organization (WTO) administers the agreement with effect from January 1995. After the inception of GATS, services trade is getting the importance in WTO multilateral trade negotiations.

In the era of global economic integration, competitiveness play vital role in the success of international trade. In addition, the competitive environment of the domestic markets facilitates higher economic growth and can help in reducing poverty. Services sector plays fundamental role in ensuring the competitiveness of an economy. Services are used intensively in the production of all goods, making up around 10-20 percent of production costs in both manufacturing and agriculture, and sometimes more (Sauvé, 2006)[2].

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[2] The figure is 20-25 percent for ready-made garments in some countries (United Nations, 2005).

2.4.1. Global Trade in Services: Where does India Stand?

Table 2.8 presents the figures on global trade in services. It appears that global trade in services amounted to more than 3000 billion US$ in 2007. Transpiration and travel sectors together accounted for around 50 percent of the world trade of commercial services. The remaining 50 percent of the world trade in services were accounted by other commercial services.

Table 2.8: World Trade in Commercial Services by Category in 2007				
	Exports (Billion US$)	Share Export	Imports (Billion US$)	Share Import
Transportation	750	22.8	890	28.9
Travel	855	26.0	775	25.2
Other commercial	1685	51.2	1415	45.9
All commercial services	3290	100.0	3085	100.0
Source: International Trade Statistics 2008				

Figure 2.3: Growth in World Services Trade (%)

Source: International Trade Statistics 2008
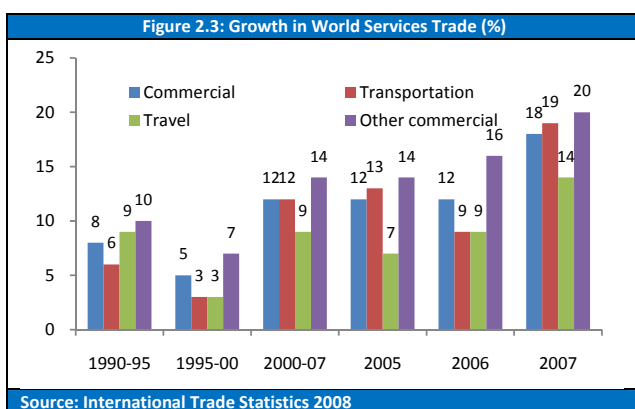
The growths in services trade over the last two decades are portrayed in Figure 2.3. Despite the fact the growth in services trade were reduced in the second half of 1990s, all the major services categories registered increasing growth rate in their trade during the 2000s. Especially compared to 2006, the growth rates in services trade have been much higher in 2007. The trade in transportation services in 2007 experienced a very high growth rate (19 percent) against a low growth rate of 9 percent in 2006.

India's relative positions in terms of exports and imports of services among the top 15 countries in the world in 2007 for different types of services are reported in Table 2.9. It appears that in 2007, for almost all broad services categories, India was among the top 15 countries in the world. In 2007, India's largest export earnings from services trade came from 'other business services'. In the case of exports of 'computer and information services' and 'other business services', India ranked

Table 2.9: Indian Exports and Imports of Services and Ranking among the Top 15 Countries in 2007				
Service Categories	Exports (million US$)	Export Rank	Imports (million US$)	Import Rank
Transport	8.8	11	31.1	5
Travel	11.1	13	8.8	15
Commercial	69.8	4	37.3	5
Communication	2191	5	899	8
Telecommunication	1096	4	450	6
Construction	403	12	906	10
Insurance	1116	8	2664	8
Financial	2071	8	1316	7
Computer and information	21461	2	2199	4
Personal, cultural and recreational	218	13	-	-
Other business	30923	3	21453	4
Source: WTO International Trade Statistics 2008				

2nd and 3rd respectively. India is also a large importer of commercial services. In 2007, the largest import payment for services trade was in the case of 'other business services' and India ranked 4th among the top 15 countries in the world.

India has experienced a significant shift in the structure of her economy towards the dominance of the services sector (from the traditional sectors of agriculture and industry) in national production and employment. At present, the contribution of the services sector to GDP is above 50 percent in India with the sector gaining further prominence. Among the different services categories, India's success lies in the sectors like Information Technology (IT), Business Processes Outsourcing, tourism, banking, construction etc. and especially on

the manpower based services export. India has emerged as an important source of 'Call for services' in business performance. There are shifts towards business and various deregulated infrastructure services where private participation has increased considerably.

CHAPTER 3:
AN OVERVIEW OF INDIAN ECONOMY

3.1. Structural Change and Economic Growth
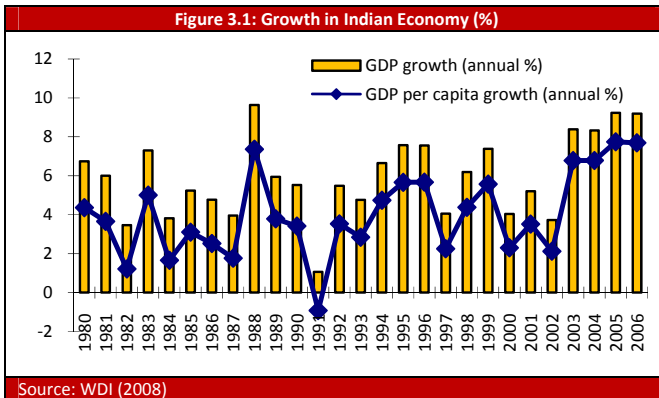
Figure 3.1: Growth in Indian Economy (%)

Source: WDI (2008)

The average rate of GDP growth since the 1980s has been 5.82 per cent per year with wide variations over different sub-periods (Figure 3.1). There have been some remarkable growth performances during the 2003 and 2006 when the GDP growth rate exceeded 8 percent level. Along with the accelerated growth rate in GDP there have also been significantly high growth rates in per capita GDP.

The structure of the Indian economy has undergone significant changes since the 1980s with the share of agriculture in GDP declining to about half in 2006 (Table 3.1). The agriculture sector, for so long the mainstay of the Indian economy now accounts for only about 20 per cent of GDP, yet employs over 50 per cent of the population. For some years after independence, India depended on foreign aid to meet its food needs, but in the last 35 years, food production has risen steadily, mainly due to the increase in irrigated areas and widespread use of high-yield seeds, fertilizers, and pesticides. The Country has large grain stockpiles and is a net exporter of food grains.

Table 3.1: Structure of Indian Economy							
Sectors	**Shares in GDP**						
	1980	**1985**	**1990**	**1995**	**2000**	**2005**	**2006**
Agriculture	35.7	31.2	29.3	26.5	23.4	18.3	17.5
Industry	24.7	26.1	26.9	27.8	26.2	27.6	27.9
Services	39.6	42.7	43.8	45.7	50.5	54.1	54.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Source:	WDI (2008)						

Table 3.2: Sectoral Growth in India					
	1981 - 85	**1986 - 90**	**1991 - 95**	**1996 - 2000**	**2001 - 2005**
Agriculture	3.3	3.8	2.4	3.2	3.0
Industry	5.2	7.2	6.0	5.1	7.3
Services	6.3	6.9	6.7	8.0	8.5
GDP	5.2	6.0	5.1	5.8	7.0
Per Capita GDP	2.9	3.8	3.2	4.0	5.4
Source: WDI (2008)					

India's growth performance during the last one decade or so has been largely driven by the growth in the services sector. Also during the 2000s India has been able to maintain high growth rate in the industrial sector and a stable growth rate in the agricultural sector.

The growth performance over the period was underpinned by relatively steady rates of savings, investment and improvements in other macroeconomic indicators (Table 3.3). As a share of GDP, investment increased to 34 per cent in 2006 along with increases in domestic and national savings. The changes in the

Table 3.3: Selected Indicators of Indian Economy (As % of GDP)							
	1981	1985	1990	1995	2000	2005	2006
Consumption	80.5	79.0	77.3	74.6	76.1	69.6	68.9
General Government	10.0	11.3	11.7	10.9	12.6	11.3	11.3
Private	70.5	67.7	65.6	63.7	63.5	58.3	57.6
Investment	22.2	23.5	24.2	26.6	24.8	33.4	33.9
Gross Domestic Saving	19.5	21.0	22.7	25.4	23.9	30.4	31.1
Gross National Saving	20.8	21.5	22.1	26.7	25.6	32.7	33.5
Exports	6.0	5.3	7.1	11.0	13.2	20.3	23.0
Imports	8.7	7.7	8.5	12.2	14.2	23.3	25.8
Source: WDI (2008)							

external sector were significant. The share of exports of goods and services in GDP rose to 23 per cent in 2006 from only 6 per cent in early 1980s. On the other hand, the share of imports of goods and services in GDP rose from only 8.7 percent in 1981 to around 26 percent in 2006.

3.2. Structure of Government Revenue

Table 3.4: Structure of Government Revenue				
	1990	1995	2000	2006
Total Revenue Excluding Grants (Billion LCU)	715.9	1466.5	2504.4	5237.8
Tax Revenue	575.7	1112.4	1885.3	4421.5
Non - tax Revenue	140.1	354.1	619.1	816.3
Total Revenue Excluding Grants as % of GDP	12.6	12.3	11.9	12.7
	% Share of Major Taxes in Total Revenue			
Taxes on Incomes, Profits & Capital Gains	14.8	22.5	27.0	39.2
Taxes on International Trade	28.6	24.2	18.9	14.6
Taxes on Domestic Production	56.6	53.3	54.1	46.1
Total	100.0	100.0	100.0	100.0
Source: WDI (2008)				

The changes in the structure of government revenue are given in Table 3.4. The share of government revenue in GDP remained low over the last one and half decade. There are two major sources of the government's revenue earnings – tax revenue and non-tax revenue, of which tax revenue contributes almost 85 per cent. It also appears that among tax revenue, the share of taxes on international trade has declined over time, mainly due to the trade liberalisation measures, whereas that of taxes on income, profits and capital gains has increased considerably. On the other hand, the share of taxes on domestic production deceased by some large margin during 2000 and 2006. The non-tax revenue e.g. income from state-owned enterprises, fees and other miscellaneous receipts provided about 20 per cent of total revenue in 1990 which decreased to around 16 per cent in 2006.

3.3. Changes in Trade Policies

Figure 3.2: Trend in Average Tariff Rate in India (%)

Source: UNCTAD
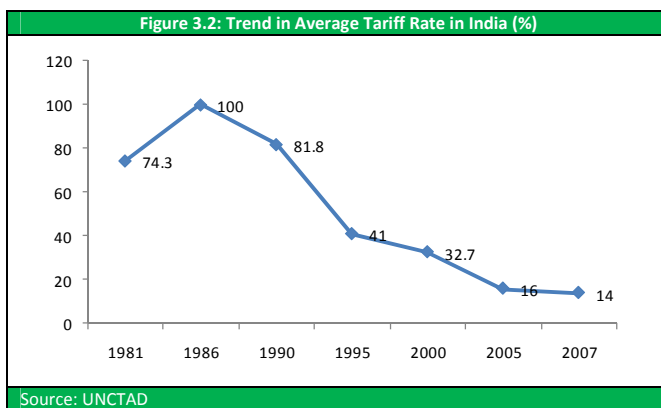
After independence from the British rule in 1947, India embarked the strategy that relied on import-substitution, emphasized the role of the government in providing infrastructure, as a regulator, and as a provider of goods and services. As a result, throughout the 1960s and 1970s, the growth rate of GDP in India had been stagnant at 3−3.5 percent per annum. In fact, the trade regime in the early 1980s was characterized by high nominal tariffs and nontariff barriers coupled with a complex import

licensing system. However, during the late 1980s, the government took the first steps towards reducing state control not only on the external policy front but also related to domestic industrial policy such as to ease industrial and import licensing, replace quantitative restrictions with tariff barriers, simplify the tariff structure, However, these measures were too little and left a lot to be desired. Figure 3.2 shows that the average tariff rate was as high as 100 percent in 1986, which came down to 14 percent in 2007. There has also been substantial reduction in the import-weighted average rate during this period. The highest rate of duty was declined from 335 percent in 1990-91 to 35 percent in 2000- 01. It is noted that tariffs on consumer goods were drastically reduced as compared to tariffs on intermediate and capital goods.

The trade policy reforms brought significant changes in the external sector of the economy. The growth and structural change in merchandise trade can be seen in Table 3.5. Compared with an average annual growth of around 5.4

Table 3.5: Growth & Structural Change in Merchandise Trade							
	Billion US$				Average Annual % Growth		
	1980	1990	2000	2006	1981-1990	1991-2000	2001-2006
Export	11406	18984	60880	122266	5.4	12.7	12.7
Import	10806	19417	65126	119812	7.2	13.3	10.8
	% of Total Exports				% of Total Imports		
	1980	1990	2000	2005	1980	1990	2000	2005
Food	28.2	15.6	12.9	8.9	9.0	3.2	4.8	3.3
Agricultural raw materials	5.0	4.1	1.2	1.5	1.7	4.0	3.5	2.0
Fuels	0.4	2.9	4.3	11.4	44.6	27.3	36.7	36.3
Ores and Metals	7.5	5.2	2.8	6.9	5.9	8.1	5.2	5.0
Manufactures	58.6	70.7	76.5	70.3	38.7	51.2	47.9	52.4
Source: WDI, 2008							

per cent per year during 1980-1990, merchandise exports increased annually on average by 12.7 percent during 1991 and 2000 and the similar annual growth rate was also maintained during 2001 and 2006. In case of imports, the rates increased to around 14 per cent during 1990s compared with a 7.2 per cent growth during the 1980s. However, the growth in imports was a bit slowed down during 2001 and 2006. The trade basket, however, indicates an increasing concentration of manufactured goods accounting for 70 per cent of total merchandise exports in 2005. The shares of food and agricultural raw materials in total exports were reduced over time. In the case of imports, manufacturing accounts for slightly more than 50 percent of total imports and its share has increased over time. Fuels account for more than one third of the total imports. The shares of food and agricultural raw materials have declined over time.

3.4 Changes in Poverty and Inequality

Table 3.6: Head- count Ratio (%)		
Year	Rural	Urban
1973-74	56.4	49.0
1977-78	53.1	45.2
1982-83	45.7	40.8
1987-88	39.1	38.2
1993-94	37.3	32.4
1999-00	27.8	23.6
2005-06	18.7	21.8
Source: Government of India (2003)		
The Economic Survey 2002- 2003, NSS 2005-06		

Poverty as a multi-dimensional phenomenon has many roots in India which cover both income and human poverty. The inter-temporal estimates of income poverty in India show substantial variations due to differences in underlying assumptions and methodologies. Some trends, however, can be discerned with available data. From Table 3.6, if we look at the head count poverty ratio for rural and urban India since 1973-74, it can be seen that rural poverty has always been higher than urban poverty until late 1990s. Approximately 80 percent of the total poor live in rural areas. There has generally been a reduction in poverty over the last three decades of so both in the rural and urban areas. However, the reduction was sharp between 1993-94 and 1999-00 largely due to an increase in GDP growth rate. Interestingly during 2001 and 2006, the reduction in rural head-count

poverty has been remarkable whilst the reduction in urban poverty has been rather modest. In the case of inequality, Table 3.7 reflects rural and urban inequality of India for the period 1993-1994 to 1999-2000. It shows that both rural and urban Gini coefficients increased in the period between 1993-1994 and 1997, and declined between 1997 and 1999-2000.

Table 3.7: Trends in rural and urban inequality in India					
	1993-94	1994-95	1995-96	1996-97	1999-00
Rural Gini	28.5	29.2	28.9	30.1	26.2
Urban Gini	34.5	33.4	35.4	36.1	34.4
Source: Jha (2004)					

CHAPTER 4:
DESCRIPTION OF THE DATA

4.1. Background

In this study the dynamic CGE model is be numerically calibrated to a recent an updated Social Accounting Matrix (SAM) of India. We worked on the latest available SAM for India for the year 2004 and updated it for 2006. The 2004 SAM consists of 73 production sectors, two factors of production and five household classes by expenditure levels separately for rural and urban areas. Although, the 2004 SAM is comprehensive with regard to activity/sector classification, it is not adequate to capture income distribution due to adoption of 2 factors and household groups classified on the basis on expenditure rather than their socio-economic characteristics. A review of the Indian SAMs suggests that in other SAMs household groups were classified in terms of socio-economic characteristics. For instance, the 1977-78 SAM constructed by De Janvy and Subbarao (1986) classified households into seven social classes characterised by socio-economic features such as: (a) rural landless agricultural workers; (b) rural small farmers; (c) rural medium size farmers; (d) rural large farmers; (e) urban workers; (f) urban marginal groups; and (g) urban capitalists. This SAM was later updated to 1981 and expanded by Subramanian (1993). In another SAM Pradhan and Sahoo (1996) considered the income distribution of households according to their occupational classification. A major limitation of their classification was the adoption of only one household group for the urban location.

4.2. Construction of an Updated Social Accounting Matrix for India for 2006

The 2004 SAM has been updated to 2006. The major tasks involved in SAM update have been to extend the factor and household accounts used in the 2004 SAM. The main sources for this SAM update are: (a) 2004 SAM prepared by India Development Foundation; (b) 2005-06 Household Expenditure Survey; (c) 2005-06 Labour Force Survey; and (d) National Accounts Estimates. We have updated the SAM for 73 sectors. The detailed analysis of the updating of the SAM is presented in Annex 1. For the modelling purpose, we use an aggregated version of SAM that

Table 4.1: Features of 2006 SAM of India	
Activities	
Agriculture (10)	paddy, wheat, oilseeds, cotton, other agriculture, livestock, forestry and logging, fishing, minerals, sugar
Industries (11)	misc food, cotton textiles, other textiles, leather products, misc chemicals, cement, metal products, machinery, electrical appliances, electronic equipments, misc manufacturing
Services (8)	construction, utility, other transport services, communication, hotels and restaurants, insurance, other services, misc services
Institutions	
Households (9)	**Rural:** 5 categories: rural non-agricultural self employed, rural agricultural labour, rural other labour, rural agricultural self employed, rural other households **Urban:** 4 categories: urban self employed, urban salaried class, urban casual labour, urban other households
Others (2)	Government, Rest of the World
Factors of production	
Labour (2)	Unskilled: Class 0-IX Skilled: Class X and above
Capital (2)	Agricultural capital Non agricultural capital
Source: SAM 2006 of India	

includes 29 sectors, four factors of production: skilled and unskilled labour, agricultural and non-agricultural capital. An important feature of the SAM is the decomposition of the

households into nine representative groups. Households are classified in terms of location: urban and rural. In case of both rural and urban households occupation is the main criterion to differentiate household groups.

4.3. The Structure of the SAM 2006

The basic structure of the 2006 Indian SAM is summarised in Table 4.2. Tariff rates vary across the sectors and range from as low as 0 percent (cotton and cement) to as high as 16.1 percent (miscellaneous food). The tariff rates on paddy, wheat and oilseeds sectors are only 3.8 percent. In general, the tariff rates on agricultural products are low compared to the manufacturing products. Among the agricultural products sugar appears to have the highest tariff rate. In the manufacturing sector textile and clothing sectors enjoy higher tariff rates. The highest import penetration ratio is for the minerals sector, and this sector has the highest share in imports as well. In the

Table 4.2: Basic Structure of the SAM 2006							
	Tariff rates	Import penetration ratio	Import share	Export orientation ratio	Export share	Value-added share	Share of intermediate demand in output	Share of intermediate demand in absorption
PDR	3.8	0	0	4.5	0.7	2.3	29.5	31.9
WHT	3.8	0	0	4.1	0.4	1.5	31.8	37.3
OIL	3.8	0	0	10.8	0.8	1.3	22.6	60
COT	0	0	0	2.9	0.1	0.5	21.6	77.2
OGR	4.3	2.9	0.9	3	1.2	6.7	21.6	41.9
LIV	5.2	0.3	0.1	0.1	0	4.2	34.8	22.8
FOS	5.2	15.1	0.5	5.3	0.2	0.8	9.5	27.4
FSH	5.2	0.5	0	16.3	0.8	1	12.2	7.8
MIN	5.2	74.8	25.2	24.6	3.7	2.8	16.3	94.2
SUG	12.4	3.4	0.1	6	0.2	0.1	96.5	15
MFD	16.1	4	1.4	4.4	1.9	2	81.9	17
CTX	12.4	6.3	0.5	19.7	2.3	0.7	72	62.2
OTX	12.6	23.1	1.9	52.4	8.8	1.2	71.2	22.5
LEA	13.6	12.3	0.2	17.6	0.5	0.2	69.9	73.2
CHM	11.8	21.3	11.1	26.5	16.5	3.9	82.9	87
CEM	0	0	0	4.8	0.2	0.2	67.1	123.1
MET	5.7	26.7	9.8	8.9	3.2	2.2	76.7	84
MCH	13.2	48.2	12.2	11.7	2.2	1.3	70.1	17.6
ELA	14	43.5	0.6	41	0.6	0.1	72.7	18.9
ELE	14	37.5	1.9	5.3	0.2	0.2	76.6	5.6
MMN	12.5	39.7	18.7	37.4	20.2	4	72.3	42.5
CON	0	0	0	0	0	6.8	58.8	3.2
UTL	0	0	0	0	0	2	38.3	77.1
OTS	7.8	18.4	5.6	23.1	9.2	5.8	33.1	11.8
COM	7.8	0.7	0.1	1	0.1	2	18.2	86.6
HOT	7.8	10.8	1.1	16.8	2.3	1.1	64.2	23.2
INS	7.8	10.9	0.7	5.9	0.5	1.3	22.1	60.9
OSV	7.8	21.4	7.4	22.8	10.6	7.1	30	66.1
MSV	0	0	0	6.3	12.6	36.7	15.2	23.4
TOTAL	-	-	100.0	-	100.0	100.0	-	-

Note: PDR = paddy, WHT = wheat, OIL = oilseeds, COT = cotton, OGR = other agriculture,
LIV = livestock, FOS = forestry and logging, FSH = fishing, MIN = minerals, SUG = sugar,
MFD = misc food, CTX = cotton textiles, OTX = other textiles, LEA = leather products,
CHM = misc chemicals, CEM = cement, MET = metal products,
MCH = machinery, ELA = electrical appliances, ELE = electronic equipments(incl.TV),
MMN = misc manufacturing, CON = construction, UTL = utility,
OTS = other transport services, COM = communication, HOT = hotels and restaurants,
INS = insurance, OSV = other services, MSV = misc services
The model assumes that the elasticity of substitution between capital and labour = 1.2;
the elasticity of substitution between skilled and unskilled labour = 0.8;
and the capital stock depreciation rate = 5 percent.
Import penetration ratio = ratio of imports to domestic demand;
Export orientation ratio = ratio of exports to output

case of exports, 'other textile' appears to have the highest export-orientation ratio (52.4 percent). India's export basket is fairly diversified. In the case of value addition, the service and construction sectors together account for around 63 percent of total value added in the economy. The aggregate agricultural and the manufacturing sectors contribute 18 percent and 19 percent of the total value added respectively. The share of intermediate consumption in total demand is highest for the sugar sector.

4.4. Income Composition of the Households

The income composition of households, which is derived from SAM 2006, is presented in Table 4.3. It appears that all the nine household categories receive most of their income from factor

Table 4.3: Income Composition of the Households							
Household Categories	Percentage Contributions to the Household Income from						
	Skilled labour	Unskilled labour	Non-agricultural capital	Land	Public transfers	Remit-tances	Total
Rural							
Rural non-agricultural self employed	36.7	12.4	37.5	0	12.1	1.3	100.0
Rural agricultural labour	24.7	65.6	0.1	0	8	1.6	100.0
Rural other labour	30.4	58.1	5.1	0	5.9	0.5	100.0
Rural agricultural self employed	10.1	20.7	35.1	21.1	12	1	100.0
Rural other households	10.9	11.7	61.9	0	10.9	4.6	100.0
Urban							
Urban self employed	20.3	20.1	41.7	0	10.6	7.3	100.0
Urban salaried class	64.6	19.5	3.4	0	9.1	3.4	100.0
Urban casual labour	6.5	77.3	11.3	0	3.7	1.2	100.0
Urban other households	5	14.5	51.8	0	9.5	19.2	100.0
All	**28.7**	**26**	**26.5**	**5.2**	**10.1**	**3.5**	**100.0**
Source: SAM 2006 for India.							

remuneration. In the rural areas, agricultural labour and rural other labour households are heavily dependent on unskilled labour income. In contrast, rural non-agricultural self employed households derive incomes mostly from two sources: skilled labour and non-agricultural capital. The rural other households are heavily dependent on non-agricultural capital income. In the urban area the casual labour households derive more than three-fourth of their income from unskilled labour whereas urban salaried class household derive around two-third of their income from skilled labour. For the urban other households and urban self employed households income from the non-agricultural capital seem to be significant. For some household categories, like rural non-agricultural self employed households, rural agricultural self employed households, urban self employed households and urban other households, public transfer is also an important source of income. For the urban self employed households, urban other households and rural other households, remittance constitutes a notable share in their income. These considerable differences in income sources for different households are expected to generate varying income and poverty effects when different policy shocks are introduced in the model.

4.5. Consumption Composition of the Households

Table 4.4: Percentage Contributions to the Household Consumption									
	Rural Households					Urban Households			
	RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
PDR	4.3	6.5	1.3	2.5	1.2	1.2	1.1	1.4	0.3
WHT	3.8	5.8	1.1	2.2	1.0	1.1	1.0	1.2	0.3
OIL	1.0	0.7	0.5	0.4	0.6	0.0	0.2	1.3	0.3
COT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OGR	5.7	10.8	20.1	7.3	12.8	2.9	3.6	28.7	9.6
LIV	10.5	7.1	10.2	8.6	7.1	6.3	5.3	3.6	4.5
FOS	2.3	3.1	0.7	1.4	0.7	0.5	0.4	0.5	0.1
FSH	2.3	1.1	0.7	1.3	0.6	1.3	1.1	0.8	0.7
MIN	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUG	0.5	1.1	2.8	0.8	1.2	0.1	0.2	2.0	0.5
MFD	16.1	14.9	15.2	12.9	9.7	8.8	9.6	10.2	12.9
CTX	2.6	1.8	0.8	1.7	1.0	1.6	1.8	0.7	0.5
OTX	2.7	2.8	3.1	2.2	1.6	2.8	2.8	1.8	6.9
LEA	0.5	0.3	0.1	0.3	0.2	0.3	0.3	0.1	0.1
CHM	3.6	3.9	1.3	2.4	2.0	3.0	3.3	2.0	0.9
CEM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MET	0.6	0.2	0.2	0.4	0.3	0.6	0.6	0.3	0.1
MCH	0.3	0.1	0.1	0.1	0.0	0.1	0.0	0.2	0.2
ELA	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
ELE	0.3	0.1	0.1	0.3	0.0	0.6	0.2	0.3	0.3
MMN	4.9	4.3	2.3	3.9	2.7	3.6	4.4	2.3	1.7
CON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UTL	1.4	1.3	0.7	1.3	0.8	1.4	1.1	0.9	1.5
OTS	9.6	10.9	14.1	13.5	15.4	13.6	10.0	8.7	16.2
COM	0.3	0.2	0.2	0.4	0.3	0.9	0.8	0.4	0.3
HOT	3.2	2.8	1.5	3.2	2.2	4.5	5.2	2.3	1.6
INS	1.0	0.9	0.5	1.0	0.7	1.4	1.7	0.7	0.5
OSV	2.9	3.1	10.9	5.2	7.1	4.4	5.4	10.5	8.4
MSV	19.7	16.1	11.3	26.5	30.8	38.9	39.7	19.1	31.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Source: SAM 2006 of India									

The consumption composition of households, as derived from the SAM 2006, is reported in Table 4.4. It appears that, on average, agricultural commodities account for 40 percent of the consumption of the households. However, this share is around 45 percent for the rural households whereas, for the urban households the share is only 30 percent. For both rural agricultural labour (RH2) and rural other labour (RH3) this share is around 52 percent. It is also observed that the shares of non-food items are considerably high among the urban households. These differences in the consumption composition for different households are expected to cause varying consumption effects as a result of different policy shocks.

CHAPTER 5:
DESCRIPTION OF THE MODEL

5.1. Introduction

To assess the effects of trade policies on trade, production, factor markets and poverty in India we use a general equilibrium framework. A dynamic CGE model is constructed and is calibrated with a social accounting matrix for the year 2006. The representative household approach is followed and the information of Household Expenditure Survey (HES) of India for 2006-06 is used to subsequently estimate poverty effects of different trade policy shocks. It is also important to mention here that initially the Doha scenarios are generated using the global general equilibrium model, namely the GTAP model. Then the price results obtained from the GTAP model are introduced as part of the shocks in the Indian dynamic CGE model. Following sections provide description of some features of the model and the database.

5.2. Some Features of the Indian Dynamic CGE Model

Much of the current debate focuses on the role of growth in reducing poverty. However, a majority of CGE models used in poverty and inequality analysis are static in nature. The inability of this kind of models to account for growth effects make them inadequate for long-run analysis of the poverty impacts of economic policies. They exclude accumulation effects and do not allow the study of transition path of an economy where short-run policy impacts are likely to be different from those of the long-run. To overcome this limitation we use a sequential dynamic CGE model. This kind of dynamics will not be the result of inter-temporal optimisation by economic agents. Instead, these agents have myopic behaviour. It is a series of static CGE models that are linked between periods by updating procedures for exogenous and endogenous variables. Capital stock is updated endogenously with a capital accumulation equation, whereas population (and total labour supply) is updated exogenously between periods. It is also possible to add updating mechanisms for other variables such as public expenditure, transfers, technological change or debt accumulation. Annex 2 presents the set of equations used in this dynamic mode. Below we present a brief description of static and dynamic aspects of the model.

5.2.1. Static Module

In each sector there is a representative firm, which earns capital income, pays dividends to households and pays direct income taxes to the government. A nested structure for production is adopted. Sectoral output is a Leontief function of value added and total intermediate consumption. Value added is in turn represented by a CES function of capital and composite labour. The latter is also represented by a CES function of two labour categories: skilled labour

and unskilled labour. Both labour categories are assumed to be fully mobile in the model. Capital is fully mobile only after the first year. In different production activities it is assumed that a representative firm remunerates factors of production and pays dividends to households.

Households earn their income from production factors: skilled and unskilled labour, agricultural and non-agricultural capital. They also receive dividends, intra-household transfers, government transfers and remittances and pay direct income tax to the government. Household savings are a fixed proportion of total disposal income. Household demand is represented by a linear expenditure system (LES) derived from the maximisation of a Stone-Geary utility function. The model includes nine household categories according to characteristics of the household head, as identified in the HES household survey. Five of these categories correspond to rural households and four are of urban households. Minimal consumption levels are calibrated by using guess-estimates of the income elasticity and the Frisch parameters.

We assume that foreign and domestic goods are imperfect substitutes. This geographical differentiation is introduced by the standard Armington assumption with a constant elasticity of substitution function (CES) between imports and domestic goods. On the supply side, producers make an optimal distribution of their production between exports and local sales according to a constant elasticity of transformation (CET) function. Furthermore, we assume a finitely elastic export demand function that expresses the limited power of the local producers on the world market. In order to increase their exports, local producers may decrease their free on board (FOB) prices.

The government receives direct tax revenue from households and firms and indirect tax revenue on domestic and imported goods. Its expenditure is allocated between the consumption of goods and services (including public wages) and transfers. The model accounts for indirect or direct tax compensation in the case of a tariff cut. Furthermore, general equilibrium is defined by the equality (in each period) between supply and demand of goods and factors and the investment-saving identity. The nominal exchange rate is the numéraire in each period.

5.2.2. Dynamic Module

In every period capital stock is updated with a capital accumulation equation. We assume that the stocks are measured at the beginning of the period and that their flows are measured at the end of the period. We use an investment demand function to determine how new investments will be distributed between the different sectors. This can also be done through a capital distribution function[1]. Investment here is not by origin (product) but rather by sector of destination. The investment demand function used here is similar to those proposed by Bourguignon et al. (1989), and Jung and Thorbecke (2003). The capital accumulation rate (ratio of investment to capital stock) is increasing with respect to the ratio of the rate of return to capital and its user cost. The latter is equal to the dual price of investment times the sum of the depreciation rate and the exogenous real interest rate. The elasticity of the accumulation rate with respect to the ratio of return to capital and its user cost is assumed to be equal to two. By introducing investment by

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[1] Abbink et al (1995) use a sequential dynamic CGE model for Indonesia where total investment is distributed as a function of base year sectoral shares in total capital remuneration and sectoral profit rates.

destination, we respect the equality condition with total investment by origin in the SAM (Social Accounting Matrix). Besides this, investment by destination is used to calibrate the sectoral capital stock in base run.

Total labour supply is an endogenous variable, although it is assumed to simply increase at the exogenous population growth rate. Note that the minimal level of consumption in the LES function also increases (as do other nominal variables, like transfers) at the same rate. The exogenous dynamic updating of the model includes nominal variables (that are indexed), government savings and the current account balance. The equilibrium between total savings and total investment is reached by means of an adjustment variable introduced in the investment demand function. Moreover, the government budget equilibrium is met by a neutral tax adjustment.

The model is formulated as a static model that is solved sequentially over a 30 period time horizon.[2] The model is homogenous in prices and calibrated in a way to generate "*steady state*" paths. In the baseline all the variables are increasing, in level, at the same rate and the prices remain constant. The homogeneity test (for example, a shock on the numéraire – the nominal exchange rate – with the "steady state" characteristics) generates the same shock on prices, and unchanged real values, along the counterfactual path. This method is used to facilitate welfare and poverty analysis since all prices remain constant along the business as usual (BaU) path.

It is, however, important to note that, in contrast to the static CGE models, which make counterfactual analysis with respect to the base run (generally the initial SAM), a dynamic CGE model allows the economy to grow even in the absence of a shock. This scenario of the economy (without a shock) is termed as the business-as-usual (BAU) scenario. The counterfactual analysis of any simulation under the dynamic CGE model is, therefore, done with respect to this growth path. One of the salient features of the dynamic model is that it takes into account not only efficiency effects, as also present in the static models, but also accumulation effects. The sectoral accumulation effects are linked to the ratio between the rate of return to the capital stock and the cost of investment goods.

5.3. GTAP Model

Trade issues by nature require an analytical framework that allows a holistic view of world economies. This is not only because of the inter-linkages between various sectors in any given economy but also because of the relationships between sectors in one economy to the rest of the world economies. These national, regional and global linkages may occur either in the inputs or products markets or as are usually the case, in both. Therefore, in order to avoid ignoring these linkages, a general equilibrium methodology such as one using the Global Trade Analysis Project (GTAP) model is one of the analytical instruments be used in this study.

The global computable general equilibrium (CGE) modelling framework of the Global Trade Analysis Project (GTAP) (Hertel, 1997), is the best possible way for the *ex ante* analysis of the

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[2] The model is formulated as a system of non linear equations solved simultaneously as a constrained non-linear system (CNS) with GAMS/Conopt3 solver.

economic and trade consequences of multilateral or bilateral trade agreements. The GTAP model is a comparative static model and uses a common global database for the CGE analysis.[3] The study uses the version 7 of the GTAP database which has 2004 as the base year. The GTAP database has been updated to 2008 by incorporating different changes in global trade scenarios occurred during 2005 and 2008.

5.4. Linking the Global Model with the Country Model

We assume that the Indian dynamic CGE model is a single country CGE model that has capital and labour mobile among sectors, and exports and domestically produced goods are imperfect substitutes. Therefore, the export prices are not identical to prices of domestically produced goods. The two are related via a constant elasticity of transformation (CET) frontier. This gives individual export supply functions a marked upward slope. For each good, the export price is related to the export and domestic quantity ratio for that good, this export prices can be shocked independently and export quantities will adjust to suit. This type of model also assumes that cost, insurance and freight (CIF) inclusive import prices are fixed, and that users substitute between imports and domestic goods via a constant elasticity of substitution (CES) nest, with the ease of substitution governed by an Armington elasticity. Therefore, the changes in world import prices can directly be introduced in the model.

The method of linking the global model with the country CGE model, therefore, can be stated as a way where the price shocks from the GTAP model are introduced in the country CGE model as external shocks. The GTAP simulation results generate changes in world import and export prices for various commodities. It is however, important to note that in the GTAP framework, because of the Armington assumption, there are no world prices of imports and exports. Each country or region faces different world prices. In the Indian dynamic model we have assumed a downward slopping export demand functions for India's export items. Therefore, any changes in the world export prices for India are plugged into the export demand function of the Indian dynamic model. In the same way the changes in the world import prices for India are plugged into the import demand function of the Indian dynamic model.

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[3] Full documentation of the GTAP model and the database can be found in Hertel (1997) and also in Dimaranan and McDougall (2002).

CHAPTER 6:
THE IMPACTS OF AGRICULTURAL LIBERALISATION

6.1. Introduction

As has been mentioned in Chapter 2, agriculture remains to be one of the major areas of negotiations under the Doha round. The concerns and possible implications of agricultural liberalisation for the Indian economy have also been discussed in that chapter. In the current chapter we examine the impact of such liberalisation on the Indian economy using the dynamic CGE model for India.

6.2. Simulation Design

Table 6.1: Price and Volume Shocks from GTAP Simulation on Doha-Agriculture		
	% Change in World Export Price	% Change in World Import Price
Paddy	2.03	1.51
Wheat	3.23	0.64
Oilseeds	1.10	0.72
Cotton	1.14	0.85
Other agriculture	0.68	0.95
Livestock	0.31	0.91
Forestry and logging	0.36	0.15
Fishing	0.49	0.16
Minerals	-0.98	0.04
Sugar	0.30	0.67
Misc Food	0.77	0.60
Cotton textiles	0.31	0.21
Other textiles	0.28	0.10
Leather products	0.24	0.10
Misc chemicals	-0.84	0.04
Cement	-0.39	0.06
Metal products	0.06	0.08
Machinery	0.16	0.05
Electrical appliances	0.13	0.10
Misc Manufacturing	0.17	0.07
Other transport services	0.08	0.04
Communication	0.37	0.02
Hotels and restaurants	0.29	0.07
Insurance	0.41	0.01
Other services	0.39	0.02
Source: GTAP Simulation Results		

Using the GTAP model we simulate a moderate Doha scenario for agricultural liberalization under which developed countries cut agricultural tariffs by 36 percent and the developing countries including India cut the same by 24 percent. Furthermore, both the developed and developing countries carry out a one-third reduction in domestic agricultural subsidies and a complete elimination of agricultural export subsidies. The GTAP results for changes in world export and import prices are reported in Table 6.1. It appears from the GTAP simulation results that all agricultural sectors would experience rise in export prices and the rise is more prominent for the paddy and wheat sectors. Also, there import prices of these products increase. The interesting feature to observe from Table 6.1 is that, because of the general equilibrium effect, the liberalization in the agricultural sectors also transmits price shocks for different manufacturing and services sectors in the economy. Except mineral and miscellaneous chemicals all subsectors in the manufacturing and services sectors would experience some rise in export prices. On the other hand, all these sectors would face rise in import prices.

As mentioned in Chapter 5 the price and volume results from the GTAP model are introduced in the Indian dynamic CGE model as shocks. Also the tariffs on the agricultural products in

the Indian dynamic CGE model are reduced by 24 percent. The results of this simulation, conducted in the dynamic CGE model for India, are reported in the subsequent sections.

6.3. Macroeconomic Effects

The macroeconomic impacts for both short run (year 2008) and long run (year 2030) are reported in Table 6.2. In addition, Figures 6.1, 6.2, 6.3, 6.4, 6.5 and 6.6 show the trend of these macro variables over same period of time. The impacts on the macro variables illustrate the importance of analyzing trade liberalization in a dynamic framework as the long run impacts appear to be much different from the short run impacts in comparison to the business-as-usual

Table 6.2: Macroeconomic Effects (% change from the base year value)		
Variables	2008	2030
Real GDP	0.003	0.04
Welfare	0.18	0.26
Headcount Ratio	-0.16	-0.24
Imports	0.08	0.09
Exports	0.11	0.12
Urban CPI	0.17	0.08
Rural CPI	0.16	0.07
Skilled wage rate	0.18	0.06
Unskilled wage rate	0.19	0.06
Agricultural capital rental rate	0.26	0.11
Non-agricultural capital rental rate	0.24	0.12
Note: Welfare is measured as the sum of individual household EVs. Source: Author's calculations, based on simulation results.		

(BaU) scenario. The impacts on GDP and welfare are positive both in the short and long run. Figure 6.1 and 6.2 respectively show the path of percentage change of real GDP and aggregate EV during 2008 and 2030. Figure 6.1 suggests that real GDP would experience a positive increasing percentage deviation from the BaU throughout this period, while Figure 6.2 indicates a stability of the percentage deviation of EV from the BaU during the same period. The impact of the Doha agricultural scenario on real GDP appears to be very small. The small impact on GDP can be explained by the fact that the simulation generated two types of opposite shocks in the economy. Head-count poverty appears to decline both in the short and long run and the long run effect is more prominent. On the one hand, because of the export price rise there would be a rise in exports from different sectors which would also lead to rise in production. On the other hand, because of domestic trade liberalization in the agricultural sectors the there would be rise in imports which might lead to fall in domestic production. The net effect will depend on the relative strength of these two effects will certainly the rise in import prices shock in the economy There are also some small but positive impacts on imports and exports in the short run and they increase further in the long run. Figure 6.3 suggests that both imports and exports would have positive deviation from the BaU path in a similar fashion – there would be an increasing trend in the initial few years which would decline a bit and remain almost stable in the remaining years. The rural and urban consumer price indices would experience some rise in the short run though the extent rise tend to lessened in the long run. Figure 6.4 highlights the declining deviations of both rural and urban CPIs from the BaU path over the period under consideration. Skilled and unskilled wage rates rise, although less so in the long run when capital is reallocated toward the expanding sectors. The rise in unskilled wage rates is somewhat larger, given the expansion of unskilled labour–intensive agricultural sectors. Figure 6.5 suggests that percentage deviations of these two wage rates gradually decline over time. The agricultural capital rental rate increases more than the non-agricultural capital rental rate in the short run, and they eventually decline. Figure 6.6 illustrates an interesting pattern where the agricultural capital rental rate appears to have a higher growth compared to the non-agricultural capital rental rate during only first couple of years and then the non-agricultural capital rental rate would have higher growth rate for most of the years under consideration before these two rental rates have almost similar growth rates towards the end of the period.

Figure 6.1: Percentage change in GDP from the BaU Path

Figure 6.2: Percentage Change in EV from the BaU Path
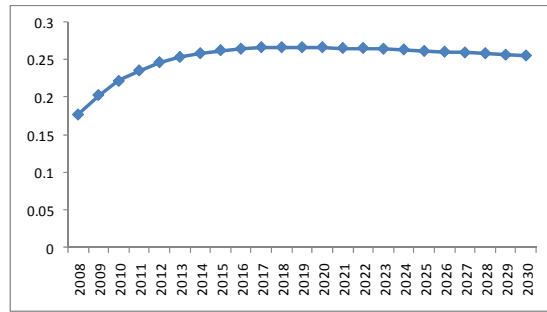
Figure 6.3: Percentage Change in Imports and Exports from the BaU Path
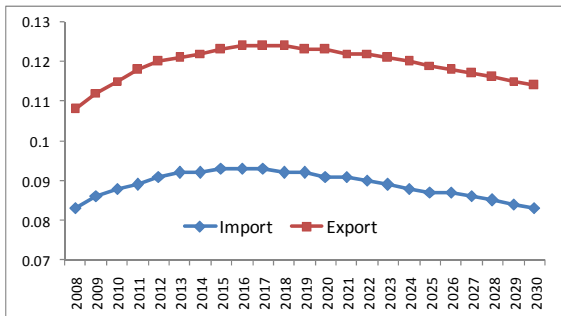
Figure 6.4: Percentage Change in Urban CPI and Rural CPI from the BaU Path
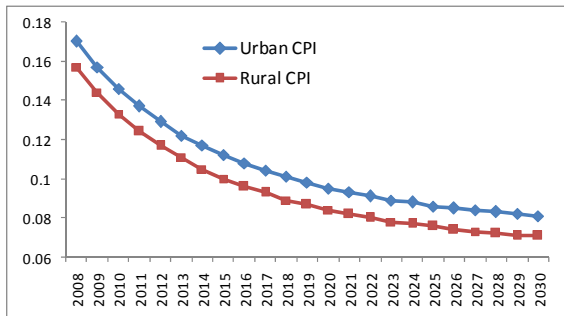
Figure 6.5: Percentage Change in Skilled Wage Rate and Unskilled Wage Rate from the BaU Path
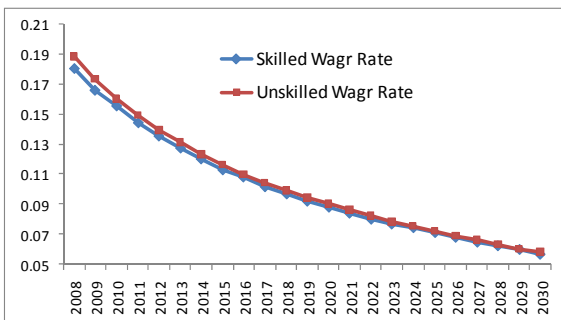
Figure 6.6: Percentage change in Agricultural and Non-agricultural Capital Rental Rates from the BaU Path
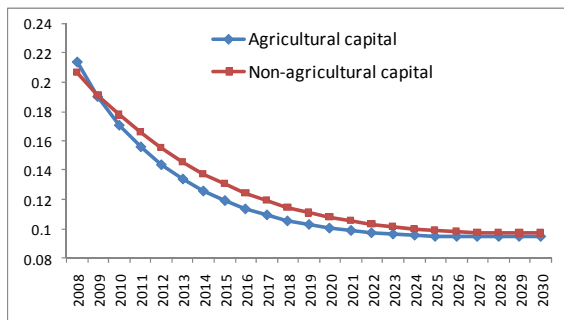
Source: Simulation Results

6.4. Sectoral Effects

The sectoral price and volume effects for the agricultural sectors are presented in Table 6.3 and Table 6.4. Tariff elimination leads to an immediate reduction in the domestic price of imports of all

Table 6.3: Percentage Changes in Prices of Agricultural Commodities from the BaU Path												
	PM		PD		PV		PX		PQ		PE_FOB	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	0.62	0.62	0.11	-0.03	0.26	0.07	0.19	0.05	0.20	0.06	1.71	1.68
Wheat	-0.24	-0.24	0.08	-0.07	0.30	0.07	0.19	0.05	0.15	0.01	2.69	2.67
Oilseeds	-0.16	-0.16	0.07	-0.05	0.23	0.07	0.17	0.05	0.14	0.03	0.93	0.91
Cotton	0.00	0.00	0.15	0.03	0.26	0.08	0.17	0.06	0.23	0.12	0.96	0.94
Other agri	-0.05	-0.05	0.12	0.04	0.17	0.07	0.13	0.06	0.18	0.12	0.59	0.58
Livestock	-0.28	-0.28	0.18	0.08	0.16	0.07	0.17	0.08	0.27	0.19	0.29	0.28
Forestry	-1.03	-1.03	0.06	0.05	0.07	0.08	0.08	0.07	-0.11	-0.07	0.33	0.34
Fishing	-1.02	-1.02	0.14	-0.01	0.22	0.07	0.19	0.07	0.22	0.09	0.43	0.41
Sugar	-1.99	-1.99	0.17	0.09	0.11	0.07	0.17	0.09	0.15	0.09	0.29	0.28
Misc Food	-2.74	-2.74	0.08	0.01	0.12	0.07	0.10	0.03	-0.02	-0.07	0.67	0.66
Note: PD = Domestic goods price, PV=Value-added price, PX=Aggregate output price, PQ=Price of composite goods, PE_FOB=FOB export price												
Source: Author's calculations, based on simulation results.												

agricultural commodities, except paddy, that is proportional to the initial sectoral tariff rates. Domestic consumers respond by increasing import demand, once again in rough proportion to the fall in import prices, with the strongest increases in the sugar and miscellaneous food. As mentioned before, because of the general equilibrium effect, the manufacturing and services sub-sectors are also affected. The results for these sectors are reported in Annex 3. It appears that since only the agricultural sub-sectors have been liberalized, the protection on the non-agricultural sectors make these sectors profitable for increased investment. The current account balance is fixed in the short run and subsequently increases at a fixed rate. Thus, the increase in imports leads to a real devaluation and an increase in exports. The export response is generally smaller in the long run. With a negative sloping demand curve for exports and rising world price of exports, FOB export prices rise. It also appears from Annex 3 that, except miscellaneous chemicals and cement, FOB export price rise for all other manufacturing and services sectors.

Table 6.4: Percentage Changes in Volumes of Agricultural Commodities from the BaU Path									
	M		X		E		Q		D	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	-0.74	-0.95	0.17	0.18	3.24	3.45	0.02	0.00	0.01	0.00
Wheat	0.49	0.26	0.24	0.26	5.34	5.58	0.02	0.00	0.00	-0.01
Oilseeds	0.30	0.09	0.11	0.12	1.68	1.85	-0.06	-0.07	-0.10	-0.11
Cotton	0.00	0.00	0.15	0.25	1.76	2.03	0.10	0.20	0.10	0.20
Other agri	0.24	0.11	-0.02	-0.03	0.92	1.02	-0.03	-0.02	-0.04	-0.06
Livestock	0.66	0.51	-0.04	-0.05	0.19	0.30	-0.02	-0.04	-0.04	-0.05
Forestry	1.43	1.04	-0.28	-0.31	0.31	0.40	0.02	0.01	-0.31	-0.34
Fishing	1.75	1.41	0.08	0.11	0.57	0.77	-0.01	-0.02	-0.02	-0.03
Sugar	3.21	3.06	-0.17	-0.18	0.07	0.16	-0.02	-0.01	-0.03	-0.20
Misc Food	4.21	4.08	-0.19	-0.20	0.99	1.06	0.00	-0.06	-0.15	-0.26

Note: M =Imports, X=Domestic Sales, E=Exports, Q= composite goods, D=Domestic Sales.
Source: Author's calculations, based on simulation results.

As a result of the rise in export demand, sectoral outputs expand in paddy, wheat, oilseeds and cotton sectors in the short run and they increase further in the long run compared to the BaU path. Figure 6.7 suggests that production of cotton would expand on an increasing trend during the period under consideration. All other agricultural sectors would however experience fall in production despite the fact that their export demand also rise. It is due to rise in imports as a result of tariff liberalization in these sectors. The impacts on the manufacturing and services sectors are reported in Annex 3. It appears that in terms of production, the impacts on most of the manufacturing and services sub-sectors are minimal.

As the four major agricultural sectors (paddy, wheat, oil seeds and cotton) expand they also attract increased investment into their sectors. In the short run the highest percentage rise in investment is observed to be in the wheat sector followed by the paddy sector (Table 6.5). However, in the long run the percentage deviation of investment from the BaU appears to be lessened. Because of increased investment in those aforementioned four agricultural sectors,

Table 6.5: Percentage Changes in demand for Labor and Capital and Investment In the Agricultural Sectors from the BaU Path								
	SKL		USKL		K		I	
	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	0.25	0.18	0.24	0.18	0.10	0.15	0.51	0.12
Wheat	0.36	0.26	0.35	0.25	0.13	0.23	0.74	0.19
Oilseeds	0.20	0.17	0.19	0.17	0.08	0.14	0.43	0.11
Cotton	0.22	0.29	0.21	0.29	0.07	0.25	0.48	0.24
Other agri	0.01	0.01	0.00	0.01	0.01	-0.02	0.05	-0.06
Livestock	-0.03	-0.03	-0.04	-0.03	0.00	-0.06	-0.03	-0.09
Forestry	-0.28	-0.20	-0.29	-0.20	-0.09	-0.23	-0.51	-0.26
Fishing	0.12	0.13	0.11	0.13	0.05	0.10	0.28	0.07
Sugar	-0.16	-0.10	-0.17	-0.11	-0.05	-0.13	-0.27	-0.16
Misc Food	-0.16	-0.11	-0.17	-0.11	-0.05	-0.14	-0.28	-0.17

Note: SKL =Skilled Labour, USKL= Unskilled Labour, K=Capital, I= Investment.
Source: Author's calculations, based on simulation results.

resources are also reallocated from other contracting sectors to these sectors. Annex 3 suggest that sub-sectors in the manufacturing and services sectors who enjoy high protection (it should be remembered that under this simulation the manufacturing and services sectors have not been liberalized) they also experience increased investment both in the short and long run.

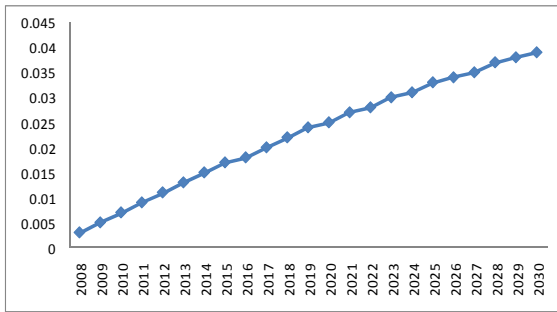Figure 6.7: Percentage change in Production from the BaU Path
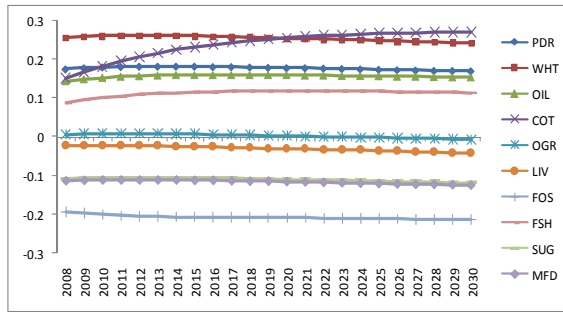
Figure 6.8: Percentage Change in Exports from the BaU Path
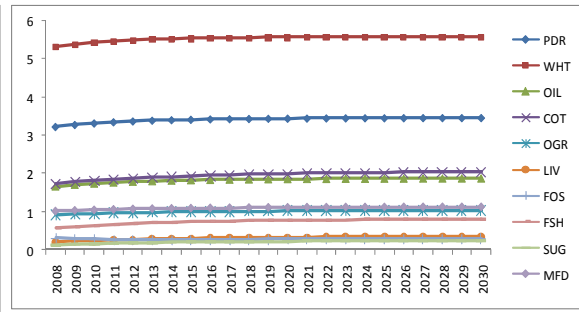
Figure 6.9: Percentage Change in Imports from the BaU Path
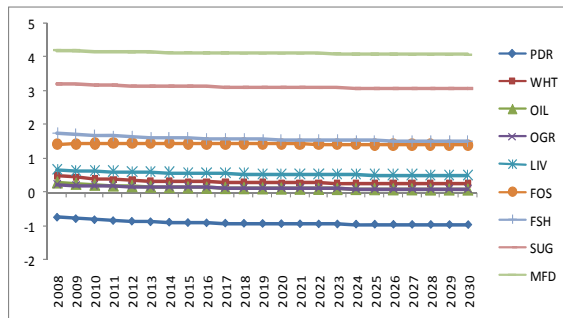
Figure 6.10: Percentage Change in Domestic Sales from the BaU Path
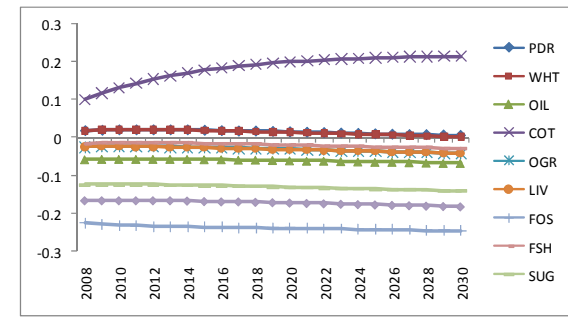
Source: Simulation Results

6.5. Welfare Effects

Table 6.6: Income and Welfare Effects (percentage change from BaU path)										
Variables	**Period**	**Rural**					**Urban**			
		RH1	**RH2**	**RH3**	**RH4**	**RH5**	**UH1**	**UH2**	**UH3**	**UH4**
Income	2008	0.19	0.17	0.18	0.11	0.20	0.18	0.17	0.18	0.17
	2030	0.10	0.07	0.08	0.00	0.11	0.10	0.08	0.08	0.10
CPI	2008	0.15	0.14	0.16	0.16	0.18	0.18	0.18	0.17	0.18
	2030	0.07	0.07	0.09	0.09	0.10	0.10	0.10	0.09	0.10
EV	2008	0.12	0.25	0.25	0.17	0.13	0.16	0.19	0.18	0.14
	2030	0.22	0.40	0.40	0.25	0.23	0.25	0.26	0.27	0.23

RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour,
RH3 = rural other labour, RH4 = rural agricultural self employed,
RH5 = rural other households
UH1 = urban self employed, UH2 = urban salaried class,
UH3 = urban casual labour, UH4 = urban other households
Source: Authors' calculations, based on simulation results

Under this scenario, a rise in nominal income for all households is observed in both the short run and the long run (see Table 6.6). This rise is largest among RH5 (rural other households) as these households derive substantial income from land, and the rate of return on land increases more than the rate of return on any other factor of production (see Table 6.2). However, the rate of change in CPI is also high for this category of households. Both in the short and long run, real consumption increases for all households as nominal income rises more than consumer prices. All the household categories also experience rise in EVs both in the short and long run and the RH2 (rural agricultural labour) and RH3 (rural other labour) would emerge as the biggest winners.

6.6. Poverty Effects

FGT poverty indexes are used to evaluate the impacts of the simulation on the poverty profiles of the nine representative households (Foster, Greer, and Thorbecke 1984) (see Table

6.7). The variations in consumption for each household group from the dynamic model are applied to generate new consumption vectors for individual households from the Bangladeshi household survey. The FGT indexes allow comparison of three measures of poverty: headcount ratio; poverty gap index, and squared poverty gap index. To estimate these three indexes, a poverty line is first defined. The poverty line is the minimum income that is required to maintain a subsistence level of consumption. The first indicator, the headcount ratio, is the proportion of the population with a per capita income below the poverty line. This is the simplest measure of poverty. The second indicator, the poverty gap, measures the depth of poverty as the average distance separating the income of poor households from the poverty line. The final indicator, the squared poverty gap index, measures the severity of poverty, taking account of the inequality of income distribution among the poor. Two different poverty lines for rural and urban households are used, which are endogenously determined by the model taking into account the rural and urban CPIs. Changes in poverty indexes are determined by changes in the poverty line and changes in nominal consumption (or income). The poverty line represents the cost of a basic-needs basket of goods. If the change in poverty line is greater (smaller) than the change in nominal consumption, then poverty is likely to decrease (increase). The poverty effects of the simulation are reported in Table 6.7.

Table 6.7: Poverty Effects (percentage point change from the BaU Poverty Levels)										
Poverty Index	Period	Rural					Urban			
		RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
P0	2008	-0.12	-0.21	-0.29	-0.22	-0.12	-0.08	-0.09	-0.14	-0.17
	2030	-0.27	-0.35	-0.39	-0.28	-0.19	-0.13	-0.16	-0.21	-0.25
P1	2008	-0.13	-0.29	-0.10	-0.21	-0.16	-0.16	-0.24	-0.13	-0.12
	2030	-0.21	-0.36	-0.11	-0.28	-0.20	-0.24	-0.27	-0.19	-0.18
P2	2008	-0.18	-0.28	-0.23	-0.20	-0.21	-0.19	-0.15	-0.19	-0.15
	2030	-0.15	-0.33	-0.29	-0.27	-0.28	-0.26	-0.27	-0.26	-0.19
P0 = Head count poverty, P1 = poverty gap, P2 = poverty gap squared										
RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour,										
RH3 = rural other labour, RH4 = rural agricultural self employed,										
RH5 = rural other households										
UH1 = urban self employed, UH2 = urban salaried class,										
UH3 = urban casual labour, UH4 = urban other households										
Source: Authors' calculations, based on simulation results.										

In the short run, head-count poverty declines for all households. Also the depth of poverty (P1 – poverty gap) and the severity of poverty (P2 – poverty gap squared) decrease in the short run and they decline further in the long run. Poverty indices fall more for the poorer households. It suggests that accumulation effects captured by the model play a major role in alleviating poverty.

CHAPTER 7:
THE IMPACTS OF NAMA

7.1. Introduction

It has been mentioned in Chapter 2 that non-agricultural market access (NAMA) negotiation also remains to be one of the major areas of negotiations under the Doha round. There are many concerns with respect to the possible implications of liberalisation in the non-agricultural sector for the Indian economy. In the current chapter we examine the impact of such liberalisation on the Indian economy using the dynamic CGE model for India.

7.2. Simulation Design

Table 7.1: Price and Volume Shocks from GTAP Simulation on Doha-Agriculture		
	% Change in World Export Price	% Change in World Import Price
Paddy	-0.17	0.27
Wheat	-0.13	0.16
Oilseeds	-0.11	0.20
Cotton	0.40	0.02
Other agriculture	-0.05	0.13
Livestock	-0.03	0.07
Forestry and logging	0.06	0.26
Fishing	-0.07	0.01
Minerals	-0.04	0.03
Sugar	-0.09	0.18
Misc Food	-0.13	0.07
Cotton textiles	-0.15	-0.16
Other textiles	-0.17	-0.29
Leather products	-0.23	-0.18
Misc chemicals	-0.35	-0.03
Cement	-0.14	-0.01
Metal products	-0.74	0.00
Machinery	-1.00	-0.11
Electrical appliances	-0.86	-0.09
Misc Manufacturing	-0.53	-0.05
Other transport services	-0.18	-0.04
Communication	-0.02	-0.06
Hotels and restaurants	-0.26	-0.08
Insurance	-0.01	-0.11
Other services	-0.02	-0.08
Source: GTAP Simulation Results		

Using the GTAP model we simulate a moderate Doha- NAMA scenario where developed countries cut their industrial tariffs by 36 percent whereas the developing countries, including India, cut their tariffs by 24 percent. The GTAP simulation results for the NAMA scenario are presented in Table 7.1. It appears that because of the tariff cut on non-agricultural commodities all the industrial commodities experience fall in world export price. The highest fall in export price is observed for the machinery sub-sector. Also, because of sectoral interlinkages the export prices of agricultural and services sub-sectors would also decline. On the other hand, import prices of all manufacturing commodities decline whereas those of agricultural sectors increase. The largest fall in import prices is observed in the other textile sector.

Now the price and volume results from the GTAP model are introduced in the Indian dynamic CGE model as shocks. Also the tariffs on the manufacturing products in the Indian dynamic CGE model are reduced by 24 percent. The results of this simulation, conducted in the dynamic CGE model for India, are reported in the subsequent sections.

7.3. Macroeconomic Effects

The macroeconomic effects for NAMA simulation are reported in Table 7.2. The NAMA scenario would lead to a rise in real GDP. However, aggregate welfare would fall both in the short and long run. The reason would be because of the fact that all the factor returns fall more than the fall in consumer price indices both in the rural and urban areas. The negative effect on welfare, however, appears to be less prominent in the long run. It appears that imports and export would experience some

Table 7.2: Macroeconomic Effects (% change from the base year value)		
Variables	2008	2030
Real GDP	0.04	0.16
Welfare	-0.14	-0.02
Headcount Ratio	0.22	0.12
Imports	0.53	0.58
Exports	0.93	0.99
Urban CPI	-0.76	-0.75
Rural CPI	-0.74	-0.72
Skilled wage rate	-0.86	-0.68
Unskilled wage rate	-0.91	-0.71
Agricultural capital rental rate	-0.97	-1.09
Non-agricultural capital rental rate	-1.13	-1.10

Note: Welfare is measured as the sum of individual household equivalent variations.
Source: Authors' calculations, based on simulation results.

positive growth both in the short and long run and the growth in exports would be higher than that of imports. Contrary to the agricultural liberalization, (see Chapter 6) CPIs, both in the rural and urban areas, would fall and though their effects are slightly lessened in the long run. All the factor returns also experience negative growth and the fall in non-agricultural capital rental rate appears the highest among all these factors. Figures 7.1- 7.6 show the trend path of the percentage deviation in the macro variables from the BaU path.

Figure 7.1: Percentage change in GDP from the BaU Path
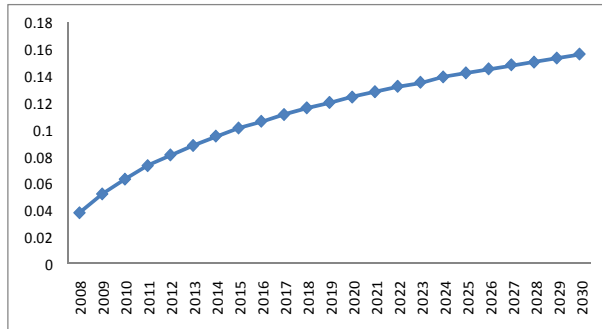
Figure 7.2: Percentage Change in EV from the BaU Path
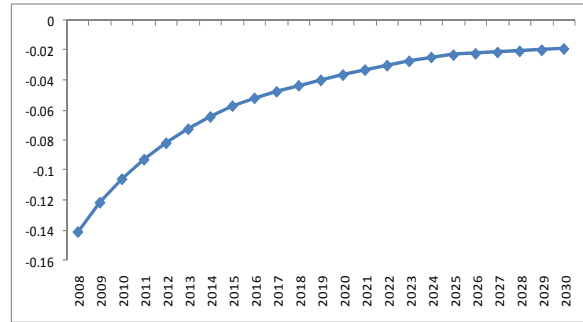
Figure 7.3: Percentage Change in Imports and Exports from the BaU Path
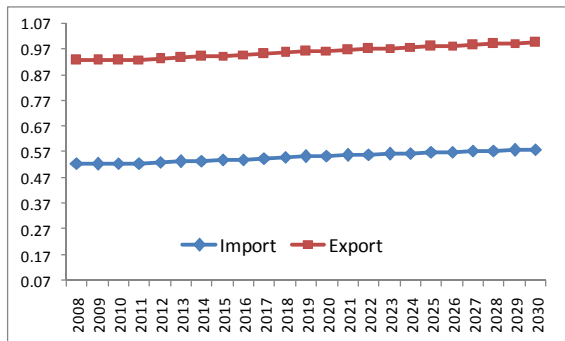
Figure 7.4: Percentage Change in Urban CPI and Rural CPI from the BaU Path
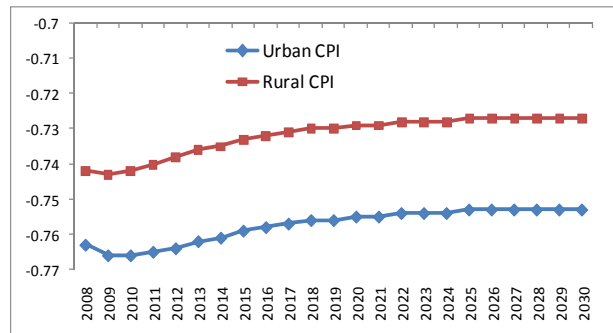
Figure 7.5: Percentage Change in Skilled Wage Rate and Unskilled Wage Rate from the BaU Path
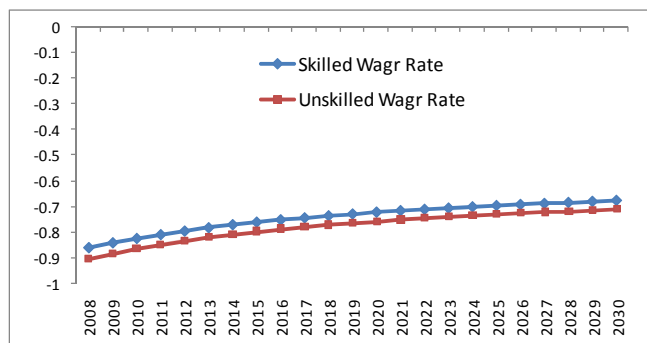
Figure 7.6: Percentage change in Agricultural and Non-agricultural Capital Rental Rates from the BaU Path

7.4. Sectoral Effects
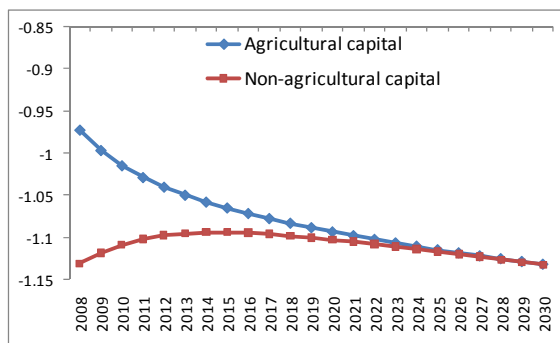
Table 7.3: Percentage Changes in Prices of Non-agricultural Commodities from the BaU Path											
	PM		PD		PV		PX		PQ		PE_FOB	
	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
Cotton textiles	-2.44	-2.44	-0.85	-0.90	-0.79	-0.91	-0.73	-0.78	-0.75	-0.80	-0.27	-0.29
Other textiles	-2.97	-2.97	-1.37	-1.49	-0.65	-0.87	-0.81	-0.89	-1.54	-1.64	-0.33	-0.36
Leather product	-3.04	-3.04	-1.30	-1.22	-0.94	-0.85	-1.13	-1.07	-1.31	-1.25	-0.38	-0.37
Misc chemicals	-2.57	-2.57	-0.74	-0.60	-1.62	-1.04	-0.64	-0.53	-0.93	-0.83	-0.36	-0.34
Cement	0.00	0.00	-0.71	-0.74	-1.03	-1.02	-0.69	-0.72	-0.51	-0.54	-0.22	-0.23
Metal products	-1.29	-1.29	-0.81	-0.68	-1.42	-0.99	-0.80	-0.68	-0.74	-0.64	-0.71	-0.68
Machinery	-2.91	-2.91	-1.06	-0.87	-1.40	-0.95	-1.05	-0.87	-1.76	-1.67	-0.95	-0.91
Electrical goods	-3.04	-3.04	-1.07	-0.86	-1.34	-0.97	-0.98	-0.83	-1.74	-1.62	-0.84	-0.79
Electronic equip	-3.04	-3.04	-1.17	-1.02	-1.42	-1.01	-1.15	-1.01	-1.68	-1.59	-0.87	-0.85
Misc Manufac	-2.72	-2.72	-1.16	-1.01	-1.18	-0.94	-0.94	-0.84	-1.58	-1.50	-0.57	-0.54
Note: PD = Domestic goods price, PV=Value-added price, PX=Aggregate output price, PQ=Price of composite goods, PE_FOB=FOB export price. Source: Author's calculations, based on simulation results.												

The effects on the manufacturing sub-sectors are presented in Table 7.3 and 7.4. Annex 5 presents the full results of the NAMA simulations. Tariff elimination leads to an immediate reduction in the domestic price of imports of manufacturing goods that is proportional to the initial sectoral tariff rates. Because of the fall in import prices, the domestic prices also fall. The sectors that had high initial tariff rates would register large import growth in the short run as consumers substitute toward goods for which prices drop more dramatically. In the long run, import volumes grow more in all manufacturing sectors. Thus, the increase in imports leads to a real devaluation and an increase in exports. The export response is the greatest for the textile and leather sectors though some other sectors like metal, machinery and electrical goods experience negative growth in exports. The export growth effect is generally larger in the long run. With a negative sloping demand curve for exports, FOB export prices fall.

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Because of increased flow of imports, output shrinks in most of the manufacturing sectors except cotton textile and other textile. Under such a scenario, the expanding sectors are only two manufacturing sectors: cotton textile and other textile. Though the leather sector would experience slight fall in production, its exports would rise, which would be facilitated decreased domestic sales of

Table 7.4: Percentage Changes in Volumes of Non-agricultural Commodities from the BaU Path										
	M		X		E		Q		D	
	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
Cotton textiles	2.48	2.60	0.26	0.45	1.20	1.44	0.17	0.36	0.02	0.21
Other textiles	1.95	1.95	0.62	0.88	1.61	1.97	0.05	0.19	-0.52	-0.33
Leather product	2.33	2.47	-0.04	-0.05	1.50	1.38	-0.04	0.00	-0.37	-0.35
Misc chemicals	2.16	2.39	-0.46	-0.51	0.10	0.13	-0.06	-0.01	-0.66	-0.65
Cement	0.00	0.00	-0.19	-0.11	0.76	0.88	-0.24	-0.16	-0.24	-0.16
Metal products	0.20	0.31	-0.50	-0.62	-0.31	-0.62	-0.33	-0.37	-0.52	-0.62
Machinery	2.17	2.37	-0.66	-0.78	-0.46	-0.86	0.69	0.74	-0.68	-0.77
Electrical goods	2.34	2.56	-0.52	-0.76	-0.23	-0.68	0.62	0.65	-0.70	-0.81
Electronic equip	2.46	2.67	-0.41	-0.45	0.15	0.13	0.65	0.70	-0.44	-0.47
Misc Manufac	1.63	1.82	-0.34	-0.45	0.41	0.14	0.18	0.24	-0.77	-0.80

Note: M =Imports, X=Domestic Sales, E=Exports, Q= composite goods, D=Domestic Sales.
Source: Author's calculations, based on simulation results.
Source: Author's calculations, based on simulation results.

leather products. The largest percentage fall in production in the manufacturing sector appears to be for the machinery sub-sector followed by electrical goods. The effects on production (either positive or negative) are more prominent in the long run. Annex 5 suggests among the agricultural and services sectors some sub-sectors would gain out of this scenario, especially, cotton, oilseeds, transport services and other services.

Table 7.5: Percentage Changes in demand for Labor and Capital and Investment In the Non-Agricultural Sectors from the BaU Path								
	SKL		USKL		K		I	
	2008	2030	2008	2030	2008	2030	2008	2030
Cotton textiles	0.31	0.30	0.36	0.33	0.19	0.67	1.25	0.74
Other textiles	0.79	0.76	0.84	0.80	0.36	1.13	2.20	1.22
Leather product	-0.11	-0.17	-0.06	-0.13	0.07	0.21	0.39	0.26
Misc chemicals	-1.07	-0.77	-1.02	-0.73	-0.33	-0.40	-1.43	-0.33
Cement	-0.33	-0.36	-0.28	-0.32	-0.15	0.02	0.16	0.08
Metal products	-0.96	-0.83	-0.91	-0.79	-0.26	-0.46	-1.25	-0.40
Machinery	-1.10	-0.95	-1.05	-0.92	-0.31	-0.59	-1.53	-0.51
Electrical goods	-0.90	-0.95	-0.85	-0.91	-0.19	-0.58	-1.22	-0.52
Electronic equip	-0.87	-0.68	-0.81	-0.65	-0.26	-0.32	-1.02	-0.24
Misc Manufac	-0.59	-0.62	-0.54	-0.58	-0.09	-0.24	-0.61	-0.18

Note: SKL = Skilled labour, USKL = Unskilled Labour, K = Capital, I = Investment
Source: Author's calculations, based on simulation results.

As a result of the expansion of the textile sector non-agricultural capital and labour migrate to this sector and away from the other manufacturing sectors, with relatively little movement in the agricultural and services sectors. In the long run, the non-agricultural capital stock response is much larger and tempers the reallocation of skilled and unskilled labour. Investment in the textile sector also increases though the percentage rise appears to be narrowed in the long run. The average returns to capital fall slightly more in the non-agricultural sector, although these rates converge after long-term adjustment in sectoral investment rates (see Figure 7.6).

7.5. Welfare Effects

Under the NAMA scenario, a fall in nominal income for all households is observed in both the short run and the long run (see Table 7.6). This reduction is the highest among RH5 (rural other households) and smallest among UH4 (urban other households). There are also reductions in the

Table 7.6: Income and Welfare Effects (percentage change from BaU path)										
Variable	Period	Rural					Urban			
		RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
Income	2008	-0.92	-0.88	-0.90	-0.90	-0.93	-0.88	-0.86	-0.91	-0.78
	2030	-0.81	-0.75	-0.76	-0.78	-0.82	-0.77	-0.76	-0.77	-0.76
CPI	2008	-0.76	-0.75	-0.71	-0.74	-0.73	-0.77	-0.77	-0.72	-0.76
	2030	-0.74	-0.73	-0.70	-0.73	-0.72	-0.76	-0.73	-0.71	-0.69
EV	2008	-0.16	-0.14	-0.19	-0.16	-0.21	-0.12	-0.09	-0.19	-0.03
	2030	-0.03	-0.02	-0.01	-0.02	-0.08	-0.02	-0.02	-0.07	-0.01

RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour,
RH3 = rural other labour, RH4 = rural agricultural self employed,
RH5 = rural other households
UH1 = urban self employed, UH2 = urban salaried class,
UH3 = urban casual labour, UH4 = urban other households
Source: Authors' calculations, based on simulation results.

consumer price indices for all household categories. However, the fall in incomes is much higher than the fall in CPIs which suggests a decline in real consumption for these household categories. The changes in EVs are also in line with the changes in real consumption. It appears that in the rural areas RH5 (rural other labour) and in the urban area UH3 (urban casual labour) are the worst sufferer. The long run negative effects on EVs are much smaller than the short run effects.

7.6. Poverty Effects

Table 7.7: Poverty Effects (percentage point change from the BaU Poverty Levels)										
Poverty Index	Period	Rural					Urban			
		RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
P0	2008	0.22	0.29	0.23	0.16	0.32	0.11	0.13	0.21	0.17
	2030	0.10	0.17	0.18	0.10	0.24	0.07	0.07	0.14	0.12
P1	2008	0.17	0.21	0.23	0.17	0.30	0.20	0.15	0.22	0.16
	2030	0.11	0.13	0.17	0.13	0.19	0.13	0.10	0.20	0.11
P2	2008	0.17	0.15	0.22	0.23	0.24	0.18	0.16	0.22	0.17
	2030	0.15	0.13	0.17	0.17	0.19	0.12	0.12	0.14	0.11
P0 = Head count poverty, P1 = poverty gap, P2 = poverty gap squared										
RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour,										
RH3 = rural other labour, RH4 = rural agricultural self employed,										
RH5 = rural other households										
UH1 = urban self employed, UH2 = urban salaried class,										
UH3 = urban casual labour, UH4 = urban other households										
Source: Authors' calculations, based on simulation results.										

The poverty effects of the NAMA scenario are presented in Table 7.7. All household categories would experience rise in head-count poverty both in the short and long run, though the long run effects are smaller than the short run effects. In the rural area RH5 (Rural other households) and in the urban area UH3 (urban casual labour) experience the largest rise in head-count poverty. For all household categories poverty gap and poverty depth (P2) also increase and again the RH5 and UH3 are the worst sufferer.

CHAPTER 8:
THE IMPACT OF FULL DOHA SCENARIO

8.1. Introduction

The discussions in Chapter 6 and 7 suggest that agricultural trade liberalisation under the Doha round would be beneficial whereas the NAMA scenario would have negative effects as far as the poverty and welfare impacts are concerned in the context of the Indian economy. However, it should be mentioned here that under the WTO's Doha round of negotiations the agricultural and NAMA liberalisation would be executed under a single undertaking. Therefore, it is more plausible to examine the joint effects of these two scenarios on the Indian economy. Therefore, in the current chapter we examine the impacts of full Doha scenario on the Indian economy using the dynamic CGE model for India.

8.2. Simulation Design

Table 8.1: Price and Volume Shocks from GTAP Simulation on Doha-Agriculture		
	% Change in World Export Price	% Change in World Import Price
Paddy	1.76	1.86
Wheat	0.79	3.09
Oilseeds	0.92	0.98
Cotton	0.87	1.54
Other agriculture	1.08	0.62
Livestock	0.98	0.27
Forestry and logging	0.41	0.41
Fishing	0.18	0.41
Minerals	0.07	-1.01
Sugar	0.85	0.2
Misc Food	0.67	0.64
Cotton textiles	0.04	0.15
Other textiles	-0.20	0.10
Leather products	-0.08	0.00
Misc chemicals	0.01	-1.18
Cement	0.05	-0.53
Metal products	0.08	-0.68
Machinery	-0.06	-0.85
Electrical appliances	0.01	-0.73
Misc Manufacturing	0.02	-0.35
Other transport services	-0.01	-0.1
Communication	-0.02	-0.21
Hotels and restaurants	0.00	-0.10
Insurance	-0.03	0.34
Other services	-0.02	0.02
Source: GTAP Simulation Results		

Using the GTAP model we simulate a moderate Doha scenario where developed countries cut their agricultural and industrial tariffs by 36 percent whereas the developing countries, including India, cut their agricultural and industrial tariffs by 24 percent. In addition, both the developed and developing countries carry out a one-third reduction in domestic agricultural subsidies and a complete elimination of agricultural export subsidies. The GTAP simulation results for the Doha scenario are presented in Table 8.1. It appears that all the agricultural products would experience rise in their prices in the world market. With respect to the export price, because of combined effects of agriculture and NAMA liberalisation, the export price changes of the manufacturing products are less prominent than those under the NAMA scenario (see Table 7.1). In contrast, the import price changes are relatively higher than those under the NAMA scenario. Now the price and volume results from the GTAP model are introduced in the Indian dynamic CGE model as shocks. Also the tariffs on the agricultural and manufacturing products in the Indian dynamic CGE model are reduced by 24 percent. The results of this simulation, conducted in the dynamic CGE model for India, are reported in the subsequent sections.

8.3. Macroeconomic Effects

The macroeconomic effects for Doha simulation are reported in Table 8.2. The Doha scenario would lead to a rise in real GDP in the short run and the effect is stronger in the long run. In the short run, the aggregate welfare declines. However, in the long run the negative effect on welfare appears to be very minimal. Head-country poverty rises in the short run, and in the long rub the effect is very minimal. There are positive effects on exports and imports and the long run effects are more prominent than the short run effects. Both urban and rural CPIs fall and they fall more in the long run. All the factors of production would experience fall in their rate of returns and the decline in the non-agricultural capital rental rate is the most prominent. Figures 8.1-8.6 show the long run path of the changes in the aforementioned macro variables.

Table 8.2: Macroeconomic Effects (% change from the base year value)		
Variables	2008	2030
Real GDP	0.04	0.11
Welfare	-0.19	-0.01
Headcount Ratio	0.05	0.01
Imports	0.61	0.67
Exports	1.04	1.11
Urban CPI	-0.59	-0.67
Rural CPI	-0.58	-0.65
Skilled wage rate	-0.68	-0.62
Unskilled wage rate	-0.72	-0.65
Agricultural capital rental rate	-0.61	-1.03
Non-agricultural capital rental rate	-1.01	-1.03

Note: Welfare is measured as the sum of individual household equivalent variations.
Source: Authors' calculations, based on simulation results.

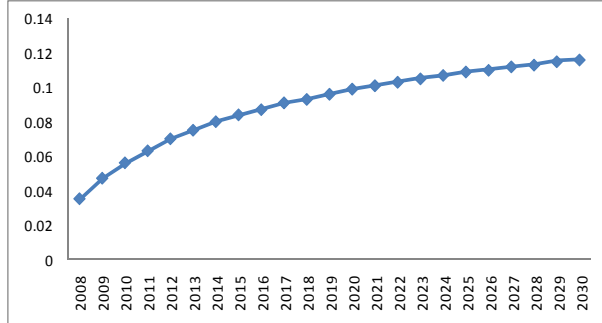Figure 8.1: Percentage change in GDP from the BaU Path

Figure 8.2: Percentage Change in EV from the BaU Path
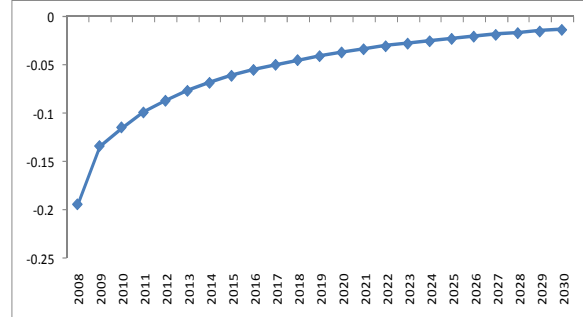
Figure 8.3: Percentage Change in Imports and Exports from the BaU Path
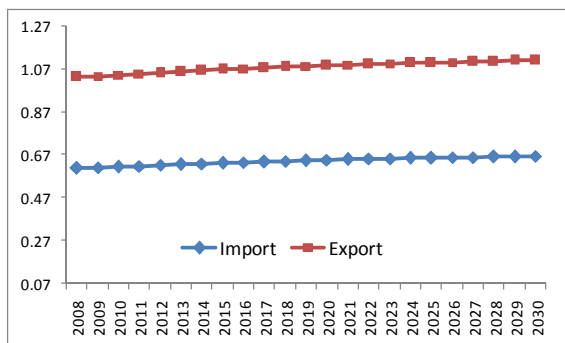
Figure 8.4: Percentage Change in Urban CPI and Rural CPI from the BaU Path
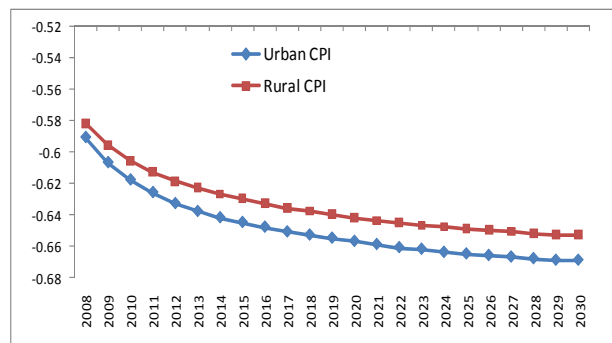
Figure 8.5: Percentage Change in Skilled Wage Rate and Unskilled Wage Rate from the BaU Path
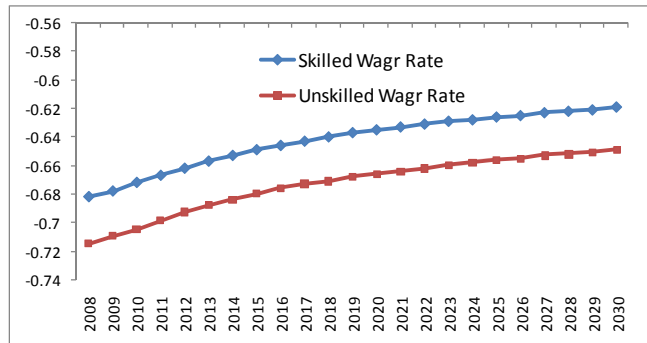
Figure 8.6: Percentage change in Agricultural and Non-agricultural Capital Rental Rates from the BaU Path
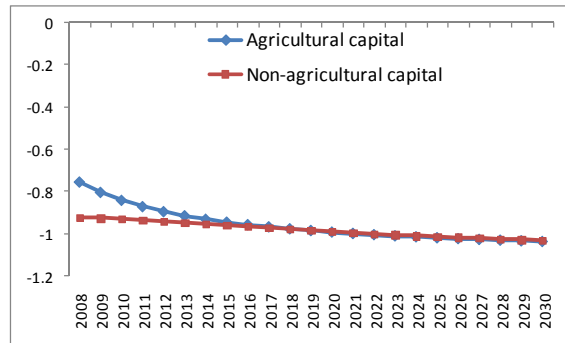
8.4. Sectoral Effects

Domestic tariff cut under the Doha scenario leads to reduction in domestic prices of imports, and the sectors having higher initial tariffs tend to experience higher reduction in import prices (see Table 8.3). The fall in import prices also leads to fall in domestic prices. Since the manufacturing sectors have higher initial tariffs than the agricultural sectors, the Doha scenario would result in higher reduction in domestic prices of imports for the manufacturing sectors compared to

Table 8.3: Percentage Changes in Prices from the BaU Path												
	PM		PD		PV		PX		PQ		PE_FOB	
	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
Paddy	0.87	0.87	-0.83	-0.90	-0.69	-0.82	-0.72	-0.79	-0.55	-0.64	1.41	1.39
Wheat	-0.09	-0.09	-0.86	-0.94	-0.66	-0.81	-0.72	-0.79	-0.59	-0.68	2.43	2.40
Oilseeds	0.04	0.04	-0.89	-1.00	-0.64	-0.82	-0.71	-0.81	-0.62	-0.74	0.67	0.65
Cotton	0.00	0.00	-0.72	-0.87	-0.58	-0.81	-0.67	-0.81	-0.45	-0.61	1.14	1.09
Other agri	0.08	0.08	-0.83	-0.84	-0.78	-0.81	-0.79	-0.80	-0.53	-0.55	0.38	0.37
Livestock	-0.21	-0.21	-0.73	-0.74	-0.83	-0.82	-0.73	-0.74	-0.45	-0.48	0.11	0.10
Forestry	-0.77	-0.77	-0.86	-0.88	-0.79	-0.82	-0.79	-0.82	-0.57	-0.60	0.21	0.20
Fishing	-1.00	-1.00	-0.88	-1.01	-0.64	-0.79	-0.68	-0.81	-0.60	-0.75	0.20	0.17
Minerals	-1.11	-1.11	-1.19	-0.93	-1.18	-0.93	-1.14	-0.93	-0.86	-0.80	-1.01	-0.94
Sugar	-1.82	-1.82	-0.63	-0.66	-0.84	-0.83	-0.59	-0.62	-0.40	-0.44	0.08	0.06
Misc Food	-2.68	-2.68	-0.72	-0.76	-0.83	-0.81	-0.67	-0.71	-0.52	-0.58	0.43	0.42
Cotton textiles	-2.61	-2.61	-0.70	-0.88	-0.54	-0.83	-0.56	-0.71	-0.55	-0.73	0.00	-0.06
Other textiles	-2.88	-2.88	-1.29	-1.60	-0.36	-0.79	-0.65	-0.84	-1.39	-1.64	-0.09	-0.17
Leather prod	-2.94	-2.94	-1.06	-1.07	-0.76	-0.74	-0.90	-0.92	-1.03	-1.05	-0.15	-0.16
Misc chemi	-2.53	-2.53	-1.04	-0.77	-1.62	-0.97	-1.06	-0.85	-1.09	-0.88	-1.11	-1.06
Cement	0.00	0.00	-0.84	-0.88	-0.88	-0.95	-0.82	-0.86	-0.56	-0.62	-0.56	-0.57
Metal prod	-1.21	-1.21	-0.83	-0.74	-1.17	-0.89	-0.82	-0.73	-0.66	-0.60	-0.67	-0.65
Machinery	-2.86	-2.86	-0.98	-0.84	-1.23	-0.85	-0.96	-0.83	-1.63	-1.56	-0.81	-0.78
Electrical gds	-2.95	-2.95	-1.02	-0.89	-1.09	-0.85	-0.90	-0.81	-1.60	-1.53	-0.73	-0.70
Electronic eq	-2.95	-2.95	-1.04	-0.94	-1.29	-0.93	-1.02	-0.93	-1.49	-1.44	-0.74	-0.72
Misc Manufac	-2.65	-2.65	-1.12	-1.06	-0.92	-0.83	-0.86	-0.82	-1.46	-1.44	-0.42	-0.41
Construction	0.00	0.00	-0.79	-0.76	-0.77	-0.71	-0.79	-0.76	-0.51	-0.50	0.00	0.00
Utility	0.00	0.00	-0.74	-0.71	-0.73	-0.70	-0.74	-0.71	-0.46	-0.45	0.00	0.00
Oth trans serv	0.00	0.00	-0.87	-0.97	-0.60	-0.78	-0.72	-0.81	-0.44	-0.54	-0.24	-0.27
Communi	-0.03	-0.03	-0.80	-0.88	-0.74	-0.84	-0.79	-0.87	-0.52	-0.61	0.14	0.12
Hotels & res	-0.02	-0.02	-0.68	-0.79	-0.63	-0.84	-0.58	-0.68	-0.34	-0.45	-0.10	-0.13
Insurance	-0.10	-0.10	-0.79	-0.89	-0.73	-0.84	-0.73	-0.83	-0.44	-0.55	0.19	0.17
Other services	-0.06	-0.06	-0.71	-1.10	-0.42	-0.83	-0.50	-0.82	-0.30	-0.62	0.17	0.08
Misc services	0.00	0.00	-0.84	-0.90	-0.78	-0.84	-0.77	-0.83	-0.56	-0.64	0.17	0.15

Note: PD = Domestic goods price, PV=Value-added price, PX=Aggregate output price, PQ=Price of composite goods, PE_FOB=FOB export price.
Source: Authors' calculations, based on simulation results.

the agricultural sectors. The price of value-added and producer prices fall for all sectors and the manufacturing sector in general experience higher fall in value-added prices and producer prices.

The current account balance is fixed in the short run and subsequently increases at a fixed rate. Thus, the increase in imports leads to a real devaluation and an increase in exports. The export response is generally higher in the long run, with most of the agricultural sectors, textile sectors and most of the services sector would experience rise in exports. In general, the agricultural sectors and the services sectors and a few sectors in the manufacturing, namely textile sectors, are the beneficiaries of this scenario. In contrast, production contracts in most of the manufacturing sectors. As a result, non-agricultural capital

Table 8.4: Percentage Changes in Volumes of Non-agricultural Commodities from the BaU Path										
	M		X		E		Q		D	
	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
Paddy	-2.55	-2.57	0.19	0.27	4.52	4.73	-0.04	0.05	-0.04	0.05
Wheat	-1.22	-1.22	0.24	0.35	6.68	6.91	-0.06	0.05	-0.06	0.05
Oilseeds	-1.47	-1.54	0.29	0.39	3.10	3.36	-0.08	0.01	-0.08	0.01
Cotton	0.00	0.00	0.39	0.69	4.07	4.57	0.27	0.57	0.27	0.57
Other agriculture	-1.44	-1.35	0.00	0.10	2.39	2.48	-0.12	-0.02	-0.08	0.02
Livestock	-0.89	-0.80	-0.11	-0.01	1.59	1.69	-0.11	-0.01	-0.11	-0.01
Forestry and logging	-0.25	-0.20	0.00	0.09	2.03	2.15	-0.14	-0.06	-0.12	-0.04
Fishing	0.09	-0.01	0.29	0.41	2.08	2.40	-0.10	0.00	-0.11	0.00
Minerals	-0.46	-0.46	-0.26	-0.74	0.01	-0.75	-0.43	-0.53	-0.35	-0.73
Sugar	1.63	1.68	-0.10	-0.01	1.23	1.37	-0.13	-0.04	-0.19	-0.10
Misc Food	2.80	2.86	-0.12	-0.01	2.10	2.26	-0.11	0.00	-0.23	-0.11
Cotton textiles	3.02	3.10	0.36	0.74	1.49	2.07	0.25	0.57	0.07	0.40
Other textiles	1.97	1.81	0.82	1.38	1.95	2.76	0.08	0.28	-0.48	-0.17
Leather product	2.51	2.64	-0.07	0.06	1.46	1.59	-0.04	0.10	-0.40	-0.26
Misc chemicals	1.76	2.15	-0.58	-0.73	-0.69	-1.17	-0.05	0.00	-0.54	-0.57
Cement	0.00	0.00	-0.24	-0.19	0.29	0.40	-0.27	-0.22	-0.27	-0.22
Metal products	0.14	0.22	-0.41	-0.49	-0.11	-0.33	-0.29	-0.31	-0.44	-0.50
Machinery	2.20	2.31	-0.66	-0.80	-0.36	-0.70	0.70	0.68	-0.70	-0.81
Electrical goods	2.32	2.46	-0.41	-0.56	-0.05	-0.34	0.65	0.66	-0.65	-0.72
Electronic equip	2.46	2.58	-0.46	-0.50	0.11	-0.08	0.62	0.63	-0.49	-0.52
Misc Manufac	1.62	1.74	-0.21	-0.22	0.68	0.60	0.20	0.26	-0.74	-0.71
Construction	0.00	0.00	-0.22	-0.18	0.00	0.00	-0.22	-0.18	-0.22	-0.18
Utility	0.00	0.00	-0.06	0.02	0.00	0.00	-0.06	0.02	-0.06	0.02
Other trans serv	-1.21	-1.23	0.41	0.58	1.38	1.67	-0.15	-0.03	0.09	0.24
Communication	-1.07	-1.04	0.11	0.25	2.00	2.26	0.08	0.23	0.09	0.23
Hotels & restaur	-0.93	-0.94	0.26	0.44	1.23	1.54	-0.05	0.09	0.06	0.21
Insurance	-1.04	-1.09	0.12	0.23	1.99	2.25	-0.12	-0.03	0.00	0.10
Other services	-0.82	-1.16	0.59	0.98	1.95	2.82	-0.05	0.08	0.16	0.41
Misc services	0.00	0.00	0.05	0.12	1.95	2.11	-0.09	-0.02	-0.09	-0.02

Note: M =Imports, X=Domestic Sales, E=Exports, Q= composite goods, D=Domestic Sales.
Source: Author's calculations, based on simulation results.

and labour migrate to the textile and garments sectors and away from the other manufacturing sectors, with relatively little movement in the agricultural sectors. The long run effects are more prominent than those of short run. In the long run, the non-agricultural capital stock response is much larger and tempers the reallocation of skilled and unskilled labour. There are also moderate capital stock increases in the agricultural and service sectors.

Among the agricultural sectors the most expanding sub-sector appears to be the cotton sector, whereas in the manufacturing sector output expands mostly in the other textile sub-sector. The largest reduction in output would be seen in the machinery sector. As result of increased demand in the expanding sub-sectors in agriculture and manufacturing, a number of services sectors also expand and the largest expansion would be seen in other services sub-sector.

Table 8.5: Percentage Changes in demand for Labor and Capital and Investment In the Non-Agricultural Sectors from the BaU Path								
	SKL		USKL		K		I	
	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	0.17	0.11	0.21	0.14	0.17	0.46	0.97	0.49
Wheat	0.25	0.18	0.29	0.22	0.19	0.53	1.13	0.57
Oilseeds	0.31	0.22	0.35	0.26	0.23	0.57	1.25	0.61
Cotton	0.47	0.53	0.51	0.56	0.26	0.86	1.60	0.93
Other agriculture	-0.09	-0.06	-0.05	-0.03	0.08	0.28	0.47	0.33
Livestock	-0.24	-0.17	-0.20	-0.14	0.02	0.17	0.18	0.21
Forestry and logging	-0.10	-0.09	-0.06	-0.05	0.08	0.26	0.44	0.30
Fishing	0.32	0.27	0.36	0.31	0.22	0.61	1.27	0.66
Minerals	-0.67	-0.99	-0.63	-0.96	-0.08	-0.62	-0.76	-0.66
Sugar	-0.24	-0.18	-0.20	-0.14	0.02	0.16	0.17	0.20
Misc Food	-0.25	-0.17	-0.21	-0.13	0.02	0.18	0.16	0.22
Cotton textiles	0.47	0.56	0.51	0.60	0.24	0.89	1.62	0.97
Other textiles	1.07	1.24	1.11	1.27	0.44	1.55	2.84	1.67
Leather product	-0.14	-0.05	-0.10	-0.01	0.05	0.29	0.38	0.35
Misc chemicals	-1.33	-1.02	-1.29	-0.98	-0.42	-0.67	-1.91	-0.65
Cement	-0.40	-0.46	-0.37	-0.42	-0.20	-0.11	0.08	-0.08
Metal products	-0.81	-0.71	-0.77	-0.67	-0.19	-0.37	-0.95	-0.33
Machinery	-1.10	-0.99	-1.06	-0.95	-0.30	-0.65	-1.52	-0.61
Electrical goods	-0.74	-0.75	-0.70	-0.71	-0.13	-0.41	-0.86	-0.37
Electronic equip	-0.95	-0.75	-0.91	-0.72	-0.29	-0.42	-1.14	-0.38
Misc Manufac	-0.41	-0.39	-0.37	-0.36	-0.02	-0.05	-0.21	-0.01
Construction	-0.30	-0.26	-0.26	-0.23	0.02	0.08	0.02	0.13
Utility	-0.10	-0.05	-0.06	-0.01	0.08	0.28	0.42	0.34
Other trans serv	0.46	0.43	0.50	0.47	0.27	0.78	1.57	0.83
Communication	0.06	0.07	0.10	0.11	0.14	0.41	0.72	0.46
Hotels & restaur	0.30	0.25	0.34	0.29	0.21	0.60	1.25	0.64
Insurance	0.08	0.06	0.12	0.09	0.15	0.39	0.75	0.44
Other services	0.80	0.82	0.84	0.85	0.38	1.15	2.23	1.22
Misc services	-0.03	-0.06	0.01	-0.02	0.11	0.28	0.55	0.32

All the expanding sub-sectors in agriculture, manufacturing and services sectors would attract more of skilled and unskilled labour and capital. In the short run, among the agricultural sub-sectors, cotton would experience largest rise in demand for the factors of production. In the manufacturing sector, other textile sub-sector would face largest rise in demand for the factors. Also, the services sub-sectors would see increased demand for the factors. All other contracting sectors would however confront reduction in demand for factors. The long run effects of demand for skilled and unskilled labour seem to be higher than the short run effects. However, the long run effects of demand for capital appear to be higher than the short run effects. Since in the long run the rate of return to capital declines more than the fall in rate of return to labour categories (see Table 8.1). All the expanding sectors would also see increased investment while the contracting sector would experience fall in investment. The long run effects of investment appear to be smaller than the short run effects.

8.5. Welfare Effects

Under the Doha scenario, a fall in nominal income for all households is observed in both the short run and the long run (see Table 8.6). In the rural area this reduction is smallest among RH2 (rural agricultural labor) and, in the urban area, UH4 (urban other households). The consumer price indices also decline both in the short and

Table 8.6: Income and Welfare Effects (percentage change from BaU path)										
Variable	Period	Rural					Urban			
		RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
Income	2008	-0.75	-0.70	-0.72	-0.78	-0.77	-0.72	-0.68	-0.72	-0.65
	2030	-0.69	-0.63	-0.65	-0.76	-0.74	-0.63	-0.61	-0.68	-0.58
CPI	2008	-0.57	-0.56	-0.49	-0.53	-0.50	-0.54	-0.54	-0.50	-0.52
	2030	-0.68	-0.67	-0.63	-0.63	-0.63	-0.67	-0.67	-0.63	-0.68
EV	2008	-0.13	-0.10	-0.17	-0.20	-0.20	-0.11	-0.08	-0.17	-0.05
	2030	-0.02	0.02	-0.03	-0.10	-0.08	0.01	0.05	-0.03	0.08
RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour, RH3 = rural other labour, RH4 = rural agricultural self employed, RH5 = rural other households UH1 = urban self employed, UH2 = urban salaried class, UH3 = urban casual labour, UH4 = urban other households Source: Authors' calculations, based on simulation results										

long run though the long run impacts are stronger than the short run impacts. Since the fall in the is larger than the fall in CPIs, all households, in the short run, would experience negative growth in real consumption, However, in the long run, for some household categories, like RH2 (rural

agricultural labour), UH1 (urban self employed), UH2 (urban salaried class) and UH4 (urban other households), the fall in income would be lower than the fall in CPIs, and therefore they would experience rise in real consumption. The figures of EVs are very much in line with real consumption growth.

8.6. Poverty Effects

Table 8.9: Poverty Effects (percentage point change from the BaU Poverty Levels)										
Poverty Index	Period	Rural					Urban			
		RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
P0	2008	0.10	0.08	0.09	0.02	0.02	0.05	0.04	0.07	0.01
	2030	0.03	-0.05	0.02	0.03	-0.01	-0.06	-0.09	0.03	-0.13
P1	2008	0.09	0.07	0.07	0.02	0.02	0.04	0.04	0.06	0.01
	2030	0.02	-0.04	0.02	0.02	-0.01	-0.05	-0.07	0.02	-0.11
P2	2008	0.07	0.05	0.06	0.01	0.01	0.03	0.03	0.04	0.01
	2030	0.02	-0.03	0.01	0.02	-0.01	-0.04	-0.05	0.02	-0.08

P0 = Head count povert, P1 = poverty gap, P2 = poverty gap squared
RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour,
RH3 = rural other labour, RH4 = rural agricultural self employed,
RH5 = rural other households
UH1 = urban self employed, UH2 = urban salaried class,
UH3 = urban casual labour, UH4 = urban other households
Source: Authors' calculations, based on simulation results

If we compare the results under the agricultural trade liberalization (Chapter 6) with those of NAMA liberalization (Chapter 7) we would find that under agricultural trade liberalization poverty would decline for all categories of households, whereas poverty would rise under NAMA for these household groups. The net impact of these two opposite effects under the full Doha scenario would much depend on the relative strength of these two effects. It appears from Table 8.9, a full Doha scenario would result in a rise in head-count poverty for all household categories in the short run, though the long run effects are much less pronounced, and in fact for some household categories, head-count poverty declines in the long run. In the rural area, RH2 (rural agricultural labour) and in the urban area UH1 (urban self employed), UH2 (urban salaried class) and UH4 (urban other households) would experience fall in head-count poverty in the long run. Among these household groups, the fall in head-count poverty appears to be most prominent for the UH4 (urban other households). The poverty gap and squared poverty gap indices also suggest similar pattern as is observed for the head-count poverty.

CHAPTER 9:
THE IMPACT OF SERVICES TRADE LIBERALISATION

9.1. Introduction

Services trade liberalisation is one of the major areas of negotiations under the Doha round. However, there are difficulties in modelling services trade liberalisation because of the lack of data on the protection of services sector. Given this context, in the current chapter we have considered a simple approach to model the services protection in Indian economy and we have examined the impact of liberalisation of this protection on the Indian economy using the dynamic CGE model for India.

9.2. Simulation Design

There are many forms of barriers and protection in the services trade and it is very difficult to quantify them. In the current exercise we assume that five services sectors (where there are imports of services) have a tariff equivalent protection equal to the average tariff rate on the manufacturing and agricultural sectors and we simulate a full liberalisation of these protections. In addition we also assume that along with the liberalisation there would be a 10 percent rise in foreign direct investment into these services sectors.

9.3. Macroeconomic Effects

Table 9.1: Macroeconomic Effects (% change from the base year value)		
Variable	**2008**	**2030**
Real GDP	0.22	0.39
Welfare	0.13	0.19
Headcount Ratio	-0.08	-0.13
Imports	0.77	0.85
Exports	1.04	1.21
Urban CPI	-0.86	-0.82
Rural CPI	-0.83	-0.79
Skilled wage rate	-0.69	-0.72
Unskilled wage rate	-0.68	-0.74
Agricultural capital rental rate	-0.62	-0.46
Non-agricultural capital rental rate	-0.43	-0.45
Note: Welfare is measured as the sum of individual household equivalent variations. Source: Authors' calculations, based on simulation results.		

The macroeconomic impacts are reported in Table 9.1. This scenario would lead to a rise in real GDP and aggregate welfare both in the short and long run and the long run impacts are larger than the short run impacts. Aggregate head-count poverty falls in the short run and it declines further in the long run. Exports and imports register positive growth in the short run and some larger growth in the long run. The consumer prices indices, both for the rural and urban households decline. All the factors returns would register negative growth and their long run deviations from the BaU path appear to be larger than the short run deviations.

9.4. Sectoral Effects

Because of the removal of restriction on import in the services sectors the import prices as well as the domestic prices in these sectors fall. As a result of the sectoral inter-linkages, and because of the fact that the rate of factor returns have declined, domestic prices in most of the manufacturing and agricultural sectors fall. The value-added price fall in lesser

Table 9.2: Percentage Changes in Prices of from the BaU Path												
	PM		PD		PV		PX		PQ		PE_FOB	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	0.00	0.00	-0.63	-0.64	-0.71	-0.71	-0.61	-0.61	-0.48	-0.47	-0.11	-0.10
Wheat	0.00	0.00	-0.59	-0.61	-0.70	-0.71	-0.57	-0.59	-0.44	-0.45	-0.10	-0.09
Oilseeds	0.00	0.00	-0.63	-0.69	-0.62	-0.70	-0.57	-0.63	-0.47	-0.53	-0.11	-0.12
Cotton	0.00	0.00	-0.39	-0.61	-0.40	-0.68	-0.38	-0.59	-0.23	-0.44	-0.11	-0.16
Other agri	0.00	0.00	-0.63	-0.66	-0.67	-0.71	-0.61	-0.64	-0.45	-0.48	-0.11	-0.11
Livestock	0.00	0.00	-0.65	-0.66	-0.70	-0.71	-0.65	-0.66	-0.49	-0.49	-0.11	-0.11
Forestry	0.00	0.00	-0.60	-0.71	-0.57	-0.69	-0.57	-0.67	-0.35	-0.44	-0.12	-0.13
Fishing	0.00	0.00	-0.68	-0.80	-0.62	-0.72	-0.58	-0.68	-0.53	-0.63	-0.12	-0.13
Minerals	0.00	0.00	-0.20	-0.56	-0.11	-0.46	-0.17	-0.46	0.11	0.02	-0.07	-0.16
Sugar	0.00	0.00	-0.59	-0.60	-0.64	-0.69	-0.56	-0.57	-0.41	-0.42	-0.11	-0.10
Misc Food	0.00	0.00	-0.64	-0.64	-0.68	-0.71	-0.62	-0.61	-0.46	-0.45	-0.11	-0.10
Cotton textiles	0.00	0.00	-0.55	-0.75	-0.19	-0.64	-0.47	-0.63	-0.36	-0.54	-0.14	-0.18
Other textiles	0.00	0.00	-0.76	-1.09	-0.16	-0.66	-0.44	-0.64	-0.43	-0.68	-0.17	-0.23
Leather products	0.00	0.00	-0.45	-0.59	-0.53	-0.75	-0.39	-0.52	-0.23	-0.36	-0.13	-0.16
Misc chemicals	0.00	0.00	-0.22	-0.32	-0.35	-0.50	-0.18	-0.25	-0.02	-0.09	-0.05	-0.06
Cement	0.00	0.00	-0.46	-0.49	-0.49	-0.54	-0.44	-0.47	-0.31	-0.33	-0.05	-0.05
Metal products	0.00	0.00	-0.37	-0.42	-0.45	-0.60	-0.35	-0.39	-0.12	-0.15	-0.08	-0.09
Machinery	0.00	0.00	-0.54	-0.52	-0.69	-0.66	-0.49	-0.46	-0.12	-0.10	-0.08	-0.07
Electrical appli	0.00	0.00	-0.60	-0.70	-0.44	-0.64	-0.40	-0.46	-0.18	-0.23	-0.10	-0.11
Electronic equip	0.00	0.00	-0.55	-0.48	-0.71	-0.57	-0.52	-0.46	-0.18	-0.14	-0.08	-0.05
Misc Manufact	0.00	0.00	-0.60	-0.71	-0.41	-0.66	-0.42	-0.50	-0.20	-0.27	-0.11	-0.13
Construction	0.00	0.00	-0.63	-0.63	-0.80	-0.82	-0.63	-0.63	-0.47	-0.46	0.00	0.00
Utility	0.00	0.00	-0.56	-0.61	-0.76	-0.82	-0.56	-0.61	-0.41	-0.45	0.00	0.00
Other trans serv	-7.26	-7.26	-1.15	-0.85	-0.41	-0.77	-0.48	-0.65	-2.16	-1.91	-0.07	0.00
Communication	-7.26	-7.26	-0.86	-0.65	-0.54	-0.68	-0.45	-0.64	-0.75	-0.53	-0.11	-0.06
Hotels & resta	-7.26	-7.26	-0.86	-0.64	-0.22	-0.69	-0.42	-0.53	-1.42	-1.23	-0.06	0.00
Insurance	-7.26	-7.26	-1.24	-0.75	-0.24	-0.68	-0.37	-0.51	-1.76	-1.32	-0.12	-0.02
Other services	-7.26	-7.26	-1.71	-1.11	-0.35	-0.73	-0.34	-0.54	-2.78	-2.30	-0.14	-0.01
Misc services	0.00	0.00	-0.72	-0.74	-0.61	-0.66	-0.48	-0.50	-0.56	-0.58	-0.13	-0.13

Note: PD = Domestic goods price, PV=Value-added price, PX=Aggregate output price, PQ=Price of composite goods, PE_FOB=FOB export price. Source: Author's calculations, based on simulation results.

extents for the services sectors in general because of the increased flow of foreign direct investments into these sectors. The FOB export prices also fall for most of the sectors which indicates rise in export competitiveness for the export-oriented sectors.

Table 9.3: Percentage Changes in Volumes from the BaU Path										
	M		X		E		Q		D	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	-0.95	-1.06	0.05	0.05	0.06	0.98	0.01	0.11	0.01	0.11
Wheat	-0.86	-1.01	0.07	0.05	0.01	0.95	0.02	0.10	0.02	0.10
Oilseeds	-0.86	-1.05	-0.20	-0.12	0.12	0.16	0.08	-0.01	-0.08	-0.01
Cotton	0.00	0.00	0.61	0.75	0.14	0.62	0.59	0.72	0.59	0.72
Other agri	-0.85	-1.02	-0.12	-0.01	0.12	0.09	0.06	-0.06	-0.08	-0.03
Livestock	-0.91	-1.04	-0.06	-0.05	0.14	0.06	0.05	-0.06	-0.06	-0.05
Forestry	-0.69	-0.90	0.27	0.22	0.18	0.32	0.08	0.00	0.21	0.16
Fishing	-0.95	-1.20	0.28	0.22	0.21	0.33	0.07	-0.02	0.07	-0.01
Minerals	0.12	-0.02	0.49	1.04	0.69	0.63	0.19	0.20	0.42	0.83
Sugar	-0.80	-0.93	-0.14	-0.03	0.06	0.09	0.05	-0.06	-0.08	-0.03
Misc Food	-0.90	-1.02	-0.11	-0.02	0.13	0.01	0.02	-0.11	-0.06	-0.07
Cotton textiles	-0.23	-0.41	0.77	0.94	0.43	0.86	0.55	0.64	0.60	0.71
Other textiles	-0.64	-1.04	1.14	1.53	0.70	0.36	0.24	0.23	0.50	0.61
Leather products	-0.05	-0.19	0.73	0.85	1.27	1.58	0.53	0.59	0.62	0.70
Misc chemicals	-0.24	-0.42	0.19	0.20	0.45	0.59	0.03	-0.04	0.10	0.06
Cement	0.00	0.00	-0.24	-0.33	0.54	0.51	-0.28	-0.37	-0.28	-0.37
Metal products	-0.33	-0.41	0.28	0.28	0.82	0.89	0.08	0.05	0.23	0.22
Machinery	-0.92	-0.99	0.00	-0.11	0.82	0.68	-0.50	-0.59	-0.11	-0.22
Electrical appli	-0.93	-1.06	0.38	0.46	0.99	1.15	-0.42	-0.47	-0.03	-0.02
Electronic equip	-0.97	-1.03	-0.10	-0.27	0.79	0.54	-0.46	-0.58	-0.15	-0.32
Misc Manufact	-0.74	-0.91	0.52	0.60	1.13	1.34	-0.20	-0.27	0.16	0.16
Construction	0.00	0.00	-0.25	-0.33	0.00	0.00	-0.25	-0.33	-0.25	-0.33
Utility	0.00	0.00	0.03	-0.04	0.00	0.00	0.03	-0.04	0.03	-0.04
Other trans serv	4.41	4.68	2.96	3.29	0.68	0.00	1.27	1.15	1.49	1.69
Communication	5.10	5.21	2.38	3.61	1.12	1.57	1.33	1.55	0.39	0.62
Hotels and restar	4.35	4.48	1.78	2.06	0.55	1.01	1.01	1.16	1.07	1.28
Insurance	4.35	4.78	2.89	3.14	1.23	1.43	1.00	1.13	1.02	1.23
Other services	3.19	3.84	2.00	2.55	1.42	1.61	1.10	1.03	1.76	2.07
Misc services	0.00	0.00	0.11	0.16	1.28	1.39	0.08	0.02	0.08	0.02

Note: M =Imports, X=Domestic Sales, E=Exports, Q= composite goods, D=Domestic Sales. Source: Author's calculations, based on simulation results.

The current scenario would entail two opposite effects. Because of trade liberalization domestic services sectors would tend to contract. On the other hand, because of increased flow of FDI into these sectors these sectors would expand. The net impact would depend on the relative strength of these two effects. Table 9.3 shows that the services sectors under consideration expand both in the short and long run, which suggests much stronger impact of the later effects. Exports from these services sectors also increase. Because of the rise in competitiveness in general

we also observe increased export performance from some of the agricultural and manufacturing sectors.

Table 9.4: Percentage Changes in demand for Labor and Capital and Investment In the Non-Agricultural Sectors from the BaU Path								
	SKL		USKL		K		I	
	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	0.12	0.09	0.11	0.11	0.04	0.36	0.33	0.48
Wheat	0.15	0.08	0.14	0.09	0.03	0.37	0.28	0.51
Oilseeds	-0.34	-0.27	-0.33	-0.28	0.04	-0.19	-0.12	-0.31
Cotton	0.93	0.91	0.92	0.92	0.21	0.45	1.33	0.33
Other agri	-0.22	-0.14	-0.21	-0.16	0.00	-0.31	-0.13	-0.44
Livestock	-0.14	-0.09	-0.13	-0.10	-0.03	-0.36	-0.30	-0.49
Forestry	0.45	0.38	0.44	0.39	0.07	-0.08	0.33	-0.21
Fishing	0.42	0.35	0.41	0.36	0.06	-0.11	0.28	-0.23
Minerals	1.04	1.43	1.03	1.45	0.24	0.93	1.57	0.91
Sugar	-0.27	-0.19	-0.25	-0.20	-0.02	-0.26	-0.04	-0.39
Misc Food	-0.20	-0.11	-0.19	-0.13	-0.00	-0.34	-0.18	-0.48
Cotton textiles	0.27	0.13	0.26	0.28	0.33	0.67	0.51	0.34
Other textiles	0.32	035	0.35	0.41	0.44	0.52	0.83	0.52
Leather product	0.35	0.38	0.27	0.32	0.21	0.48	0.38	0.31
Misc chemicals	-0.55	-0.54	-0.54	-0.55	-0.12	-0.07	-0.52	-0.02
Cement	-0.01	-0.02	-0.00	-0.01	-0.31	-0.49	-0.19	-0.58
Metal products	0.56	0.52	0.55	0.53	0.12	0.06	0.53	-0.05
Machinery	-0.08	-0.06	-0.07	0.08	-0.07	-0.39	-0.38	-0.52
Electrical goods	0.66	0.64	0.65	0.66	0.14	0.18	0.76	0.06
Electronic equip	0.04	0.01	0.05	0.01	0.12	0.47	0.59	0.58
Misc Manufac	0.83	0.77	0.82	0.78	0.20	0.31	1.09	0.19
Construction	-0.25	-0.30	-0.26	-0.29	-0.19	-0.74	-1.02	-0.90
Utility	0.05	-0.01	0.04	0.00	-0.06	-0.46	-0.45	-0.62
Other trans serv	1.23	1.20	1.24	1.18	3.03	1.64	3.03	1.78
Communication	0.50	0.44	0.51	0.42	1.51	0.89	1.51	1.01
Hotels & restaur	1.12	0.89	1.13	0.88	2.77	1.34	2.77	1.46
Insurance	1.25	0.97	1.26	0.95	2.93	1.42	2.93	1.54
Other services	1.45	1.42	1.46	1.41	3.41	1.86	3.41	2.01
Misc services	0.32	0.30	0.30	0.32	0.07	0.16	0.07	0.26

Liberalization in the services trade, along with increased flow of foreign direct investment, results in rise in net investments into these sectors. There are also increased demands for skilled and unskilled labour as well capital in these sectors. As a result, some of the sectors with weaker linkages with the services sectors experience contraction and reduced demand for the factors of production. Among the services sectors, the largest rise in investment would be in other services. This sector would also experience higher increased demand for factors compared to any other sectors.

9.5. Welfare Effects

The nominal incomes of the households as well as the CPIs fall both in the short and long run. However, the reductions in incomes are smaller than the fall in CPIs, which suggests rise in real consumption of the households. The figures of EVs are very much in line with real consumption growth. All

Table 9.5: Income and Welfare Effects (percentage change from BaU path)										
Variable	Period	Rural					Urban			
		RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
Income	2008	-0.72	-0.74	-0.67	-0.56	-0.67	-0.67	-0.64	-0.69	-0.57
	2030	-0.70	-0.71	-0.60	-0.51	-0.63	-0.62	-0.69	-0.62	-0.51
CPI	2008	-0.75	-0.77	-0.77	-0.65	-0.71	-0.70	-0.75	-0.77	-0.60
	2030	-0.81	-0.87	-0.87	-0.71	-0.76	-0.76	-0.82	-0.87	-0.64
EV	2008	0.13	0.13	0.15	0.15	0.17	0.11	0.09	0.10	0.17
	2030	0.17	0.22	0.20	0.21	0.23	0.17	0.11	0.12	0.28
RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour, RH3 = rural other labour, RH4 = rural agricultural self employed, RH5 = rural other households UH1 = urban self employed, UH2 = urban salaried class, UH3 = urban casual labour, UH4 = urban other households Source: Authors' calculations, based on simulation results.										

household categories would register rise in EVs both in the short and long run. In the short run, RH5 (rural other households) and UH4 (urban other households) would experience the largest rise in EVs compared to the BaU path. However, in the long run, UH4 (urban other households) would register the largest rise in EV.

9.6. Poverty Effects

Table 9.6: Poverty Effects (percentage point change from the BaU Poverty Levels)											
Poverty Index	Period	Rural					Urban			
		RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
P0	2008	-0.07	-0.12	-0.07	-0.12	-0.16	-0.04	-0.05	-0.08	-0.09
	2030	-0.15	-0.19	-0.10	-0.15	-0.21	-0.07	-0.09	-0.12	-0.14
P1	2008	-0.07	-0.16	-0.09	-0.12	-0.06	-0.09	-0.13	-0.07	-0.07
	2030	-0.12	-0.20	-0.11	-0.15	-0.06	-0.13	-0.15	-0.10	-0.10
P2	2008	-0.08	-0.15	-0.12	-0.11	-0.13	-0.10	-0.08	-0.10	-0.08
	2030	-0.10	-0.18	-0.15	-0.15	-0.16	-0.14	-0.15	-0.14	-0.10

P0 = Head count povert, P1 = poverty gap, P2 = poverty gap squared
RH1 = rural non-agricultural self employed, RH2 = rural agricultural labour,
RH3 = rural other labour, RH4 = rural agricultural self employed,
RH5 = rural other households
UH1 = urban self employed, UH2 = urban salaried class,
UH3 = urban casual labour, UH4 = urban other households
Source: Authors' calculations, based on simulation results.

Services trade liberalization, along with increased flow of foreign investment into the services sectors, would result in drop in head-count poverty for all the household categories. In the rural area, RH5 (rural other households) and in the urban area UH4 (urban other households) would experience largest fall in head-count poverty. Also the depth (P1) and severity (P2) of poverty decline for all household categories. The long run poverty reducing effects are stronger than the short run effects for all three indices of poverty.

CHAPTER 10:
CONCLUSION

The objective of this research has been to examine the impact of Doha round negotiations on the economy of India. This research looked into the impact of agricultural trade liberalisation and the impact of NAMA negations under the Doha negotiations, the combined effects of agricultural and NAMA negotiations, and the impact of liberalisation of the domestic services sectors. With a view to addressing these important issues, this study has examined the effects of the Doha agreement for India in a sequential dynamic computable general equilibrium (CGE) framework. A Social Accounting Matrix for the year 2006 has been used as the database. The major findings of these exercises are as follows:

Agricultural Trade Liberalisation

- Agricultural liberalization under the Doha round would have very little effect on Indian GDP.

- The welfare effects are positive and the effects are stronger in the long run.

- The paddy, wheat, oilseeds and cotton would emerge as the major beneficiaries of the liberalization

- All the household categories appear to gain positive real consumption growth and welfare.

- Poverty falls for all household categories both in the short and long run.

- In sum, the agricultural trade liberalization would generate positive outcomes for the Indian economy.

Trade Liberalisation under NAMA Negotiation

- The NAMA scenario would lead to a rise in real GDP despite the fact that a number of manufacturing sector would contract. This is because of the more than offsetting effect of the expansion of textiles as well as some services and agricultural sectors.

- The textile, cotton and few services sectors appear to be the gainers from such a scenario.

- All the household categories would experience fall in real consumption and welfare because of the fact that their fall in nominal income is much higher than the fall in CPIs.

- Poverty indices would rise for all household categories and the households relying more on non-agricultural capital income as well as on unskilled labour income would experience higher incidence of poverty.

- In sum, the NAMA scenario would lead to some negative outcomes for the Indian economy.

The full Doha scenario

- The Doha scenario would lead to rise in real GDP in the short run and the effect is stronger in the long run.

- In the short run, the aggregate welfare declines. However, in the long run the negative effect on welfare appears to be very minimal.

- In general, the agricultural sectors and the services sectors and a few sectors in the manufacturing, namely textile sectors, are the beneficiaries of this scenario. In contrast, production contracts in most of the manufacturing sectors.

- Among the agricultural sectors the most expanding sub-sector appears to be the cotton sector, whereas in the manufacturing sector output expands mostly in the other textile sub-sector. The largest reduction in output would be seen in the machinery sector.

- In the short run, all household categories would experience fall in real consumption and welfare because of the fact that their fall in nominal income is much higher than the fall in CPIs. However, in the long run, for some household categories, like rural agricultural labour, urban self employed, urban salaried class and urban other households, the fall in income would be lower than the fall in CPIs, and therefore they would experience rise in real consumption. The figures of EVs are very much in line with real consumption growth.

- It appears that a full Doha scenario would result in a rise in poverty indices for all household categories in the short run, though the long run effects are much less pronounced, and in fact for some household categories, poverty indices decline in the long run.

- In sum, the Doha scenario would lead to a mixed results.

Services Trade Liberalisation

- The liberalisation in the services sectors would lead to a rise in real GDP and aggregate welfare both in the short and long run and the long run impacts are larger than the short run impacts.

- The services trade liberalisation scenario would entail two opposite effects. Because of trade liberalization domestic services sectors would tend to contract. On the other hand, because of increased flow of FDI into these sectors these sectors would expand.

The net impact would depend on the relative strength of these two effects. It appears that the services sectors under consideration expand both in the short and long run, which suggests much stronger impact of the later effects. Exports from these services sectors also increase. Because of the rise in competitiveness in general we also observe increased export performance from some of the agricultural and manufacturing sectors.

- Liberalization in the services trade, along with increased flow of foreign direct investment, results in rise in net investments into these sectors. Among the services sectors, the largest rise in investment would be in other services. This sector would also experience higher increased demand for factors compared to any other sectors.

- The nominal incomes of the households as well as the CPIs fall both in the short and long run. However, the reductions in incomes are smaller than the fall in CPIs, which suggests rise in real consumption of the households. The figures of EVs are very much in line with real consumption growth.

- Services trade liberalization, along with increased flow of foreign investment into the services sectors, would result in drop in poverty indices for all the household categories. The long run poverty reducing effects are stronger than the short run effects.

- In sum, the services trade liberalisation scenario would lead to some positive outcomes for the Indian economy.

ANNEX 1

AN EXTENDED SOCIAL ACCOUNTING FOR INDIA, 2006: METHODOLOGY AND RESULTS

Introduction and objective

A Social Accounting Matrix (SAM) is a generalization of the production relations and extends this information beyond the structure of production to include: (a) the distribution of value added to institutions generated by production activities; (b) formation of household and institutional income; (c) the pattern of consumption, savings and investment; (d) government revenue collection and associated expenditures and transactions; and (e) the role of the foreign sector in the formation of additional incomes for household and institutions. In particular, the accounting matrix of a SAM identifies the economic relations through six accounts: (1) total domestic supply of commodities; (2) activity accounts for producing sectors; (3) main factors of productions (e.g. labour types and capital); (4) current account transactions between main institutional agents such as-households and unincorporated capital, corporate enterprises, government and the rest of the world and the use of income by the representative households; (5) the rest of the world; and (6) one consolidated capital account (domestic and rest of the world) to capture the flows of savings and investment by institutions and the rest of the world respectively.

Social accounting matrices can serve two basic purposes: (i) as a comprehensive and consistent data system for descriptive analysis of the structure of the economy and (ii) as a basis for macroeconomic modeling. As a data framework, a SAM is a snapshot of a country at a point in time (Pyatt and Thorbecke, 1976). To provide as comprehensive a picture of the structure of the economy as possible, a particular novelty of the SAM approach has been to bring together macroeconomic data (such as national accounts) and microeconomic data (such as household surveys), within a consistent framework. The second purpose of a SAM is the provision of a macroeconomic data framework for policy modeling. The framework of a SAM can often help in establishing the sequence of interactions between agents and accounts which are being modeled. A SAM provides an excellent framework for exploring both macroeconomic and multi-sectoral issues and is useful starting point for more complex models (Robinson, 1989).

The prime of objective this study is to produce an updated SAM for India for 2006 using existing 2003-04 SAMs (Saluja et. al., 2004 and Ojha et. al., 2004), supplemented with official information on production, consumption and macro-economic aggregates and the Household Income and Expenditure. In addition to capturing the structure of Indian economy for 2006, the SAM 2006 is served as a consistent data base to construct a dynamic CGE model for Indian economy to assess the '*Doha impact on India*'. Among others, the new SAM 2006 includes a representation of commodity taxes (both on domestic and imported) on commodities rather than on institutional purchases captured by in other India SAMs in particular in Saluja et al and Ojha et al. The key features of the new SAM 2006 in comparison to the SAMs produced by Saluja and Ojha are discussed below.

The paper is organized in five sections. Section 2 provides a review of the past India SAMs and key features of the new SAM 2006. Section 3 provides a detailed description of the SAM structure and the methodology adopted to update/construct the SAM 2006. Major adjustments that were invoked to reconcile conflicting data sources are also highlighted in this section. Derivation of the factor account estimates is presented in section 4. Estimates of data sets for the institutions, including household, are discussed in section 5. An analysis of SAM results is presented the final section.

Review of India SAM

The main features of the India SAM built by various researchers and institutions are provided in the table below.

Table 1: Salient Features of India SAMs

	Base Year	Coverage	
		Sectors	**Factors/Institutions**
Sarkar,H. & Subbarao, (1981).	1979-80	**3:** agriculture, industry and services.	Non-agricultural wage income class, non-agricultural non-wage income class, agricultural income class, and government
Sarkar, H. & M. Panda, (1986).	1983-84	**6:** agriculture (2), industry (2), infrastructure and services.	Non-agricultural wage income class, non-agricultural non-wage income class, agricultural income class, and government.
Bhide, S. and S. Pohit, (1993).	1985-86 .	**6:** agriculture (2), livestock & forestry, industry (2), infrastructure and services.	Government, non-agricultural wage income earners, non-agricultural profit income earners, and agricultural income earners
Pradhan, B. and A. Sahoo, (1996).	1989-90	**8:** agriculture (2), mining and quarrying, industry (2), construction, electricity combined with water and gas distribution, and services (3).	Government, agricultural self-employed, agricultural labour, and non- agricultural self-employed and other labour.
Pradhan, B. Sahoo, A. and M.R. Saluja, (1999).	1994-95	**60:** agriculture (4), livestock products (2), forestry sector, mining (4), manufacturing (27), machinery and equipment (6), construction, electricity, transport (2), gas and water supply, other services (11).	Government, self employed in agriculture (rural & urban), self employment in non-agriculture (rural & urban), agricultural wage earners (rural & urban), other households (rural & urban), private corporate, and public non-departmental enterprises.
Pradhan, B. K. M.R. Saluja and S. K. Sing (2006).	1997-98	**57:** agriculture (4), livestock products (2), forestry, mining, manufacturing (27), machinery and equipment (6), construction, electricity, transport (2), gas and water supply, other services (11).	Government, self employed in agriculture (rural & urban), self employment in non-agriculture (rural & urban), agricultural wage earners (rural & urban), other households (rural & urban), private corporate, and public non-departmental enterprises.
Sinha, A. Siddiqui. K. A, and Munjal. P (2007).	1999-00	**13:** agriculture (informal), formal manufacturing (9), construction (informal), other services (formal & informal), and government service.	Casual labour (rural & urban), regular wage earner (rural & urban), own account worker (rural & urban), employer (rural & urban), and government.
M.R.Saluja & Yadav.B (2006).	2003-04	**73:** agriculture (12), livestock products (4), forestry, mining (4), manufacturing (28), machinery and equipment (7), construction, energy, gas distribution, water supply, transport (2), other services (10).	Five rural households' expenditure classes, 5 urban households expenditure classes, private corporation, public enterprises and government.
V. P. Ojha, Barun Deb Pal, Sanjib Pohit and Joyashree Roy	2003-04	**36:** agriculture (4), livestock products, forestry, fishing, mining (4), manufacturing (11), machinery and equipment, construction, energy (4), water supply, transport (5), other services (2).	Three factors-labour, capital and land. Nine household groups based location and occupation. Other current institution includes private corporation, public enterprises and government.

Source: Based on Table 2, Page 6 (V. P. Ojha et al 2006)

Although a number of SAMs were available for India, our concentration was on two recent SAMs (i.e. Saluja et al 2004 and Ojha et al 2004) to assess whether the exsiting SAMs are adequate to construct a dynamic CGE model for India to conduct 'Doha' simulations. Thorough reviews of these two SAMs reveal followings concerns which were addressed in SAM 2006. We treat this exercise as major extension to the existing 2004 SAM structures of India.

i.   In the existing India SAMs commodity taxes were booked under institutional purchases (e.g. against household and government purchases etc.) instead against domestic commodity supply and imports. Moreover, effective indirect tax rates as percent of household consumption/purchase have been found same for various representative household groups (please see Table 2). Equality of effective indirect tax rates by representative household groups' envisaged that indirect tax reform unlikely to produce differentiated impacts on household consumption and hence on commodity demand and supply. Such booking of commodity tax and tariff is not useful for tax and trade policy simulations and analysis. Thus commodity tax and tariff booked under institutional purchases has been transformed into commodity tax and tariff against commodity supplies. We believe this is a major modification on the existing India SAM structures.

Table 2: Effective Indirect Tax Rates by Representative Household Groups

	Saluda et al SAM 2004									
Household Groups	RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4	UH5
Tax Rate as % of HH Consumption	3.52597	3.52598	3.52598	3.52598	3.52599	3.52598	3.52598	3.52600	3.52600	3.52600
	Ohja et al SAM 2004									
Household Groups	RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4	
Tax Rate as % of HH Consumption	3.65054	3.63456	3.67651	3.68424	3.73739	3.72742	3.78544	3.73960	3.88510	

ii.   Since gross fixed capital formation and changes in stocks are booked under the 'consolidated capital account' it is not clear whether the use concept or origin concept of capital formation was adopted in the above two 2004 SAMs. The 'consolidated capital account' of a SAM usually show the capital formation (or origin of investment) by few capital producing sectors such as livestock, construction, machinery etc. In line with SAM convention, in SAM 2006 the origin concept has been adopted. This is a major improvement on the existing India SAM structures.

iii. Serious inconsistency was observed with regard to the treatment of stock changes (i.e. inventory investment) in both of these two 2004 SAMs. Since services are produced and consumed instantaneously, supply of services can never be stocked. Contrary to the concept, stocks were recorded against various services in both of these two 2004 SAMs (for instance, electricity, communications, other services, and transport etc.). Appropriate treatment of stocks, that is, stock of goods only has been incorporated in SAM 2006. We again believe this is a major improvement on the existing India SAM structures.

iv.   Labour market classification of the existing 2004 SAMs has been extended by incorporating classifications based on 'skilled' and 'unskilled' labour types in 2006 SAM. This extension allows a deeper understanding of distribution of factorial income generation in the production process to the representative household groups as a result of intervention at the commodity and activity levels via tax, subsidy and tariff rate changes. This is a major extension on the existing India SAM structures.

Construction of 2006 India SAM

The 2006 SAM for India identifies the economic relations through **eight accounts**: (1) total domestic supply of 73 commodities; (2) production accounts for 73 activities; (3) 4 factors of productions-2 labour types and 2 capital categories; (4) current account transactions between 4 current institutional agents- households and unincorporated capital, corporate enterprises, government and the rest of the world; household account includes 9 representative groups (5 rural and 4 urban); and (8) one consolidated capital account. The classifications for SAM 2006 have been derived from the classifications of the existing 2004 SAMs constructed by Saluja et al and Ojha et al. The India SAM 2006 is thus represented by 167 accounts – activity (73); commodity (73); factors of production (4); indirect tax account (2); household (9); corporation (1); rest of the world (1); and consolidated (1). The structure of the India SAM is described in Table 3.

Table 3: Description of India SAM Accounts for 2006

Set	Description of Elements
Activity (73)	
Agriculture, Forestry & Fishing (17)	Paddy, Wheat, Other cereals, Pulses, Sugarcane, Oilseeds, Jute, Cotton, Tea & coffee, Rubber, Tobacco, Other crops, Milk and milk products, Animal services, Other livestock products, Forestry and logging, Fishing
Mining & Quarrying (04)	Coal and lignite, Crude petroleum and natural gas, Iron ore, Other Minerals
Manufacturing (35)	Sugar, Khandsari-boora, Edible & Vanaspati, Misc food products, Beverages & tobacco products, Cotton textiles, Wool synthetic, silk fiber textiles, Jute- hemp- mesta textiles, Textile products Furniture and wood products, Paper- paper products. & newsprint, Printing and publishing, Leather products, Rubber and plastic products, Petroleum products, Coal tar products, Inorganic heavy chemicals, Organic heavy chemicals, Fertilizers, Pesticides, Paints, varnishes and lacquers, Miscellaneous chemicals, Cement, Other non metallic mineral products, Iron & steel, Non-ferrous basic metals, Metal products, Other non electric machinery, Electrical appliances, Communication equipments, Electronic equipments (incl.TV), Other electrical Machinery, Rail equipments, Other transport equipments, Miscellaneous Manufacturing
Construction (01)	Construction
Electricity, Gas and Water Supply (03)	Electricity, Gas, Water supply
Trade, Hotels, Transport & Communication (06)	Railway transport services, Other transport services, Storage and warehousing, Communication, Trade, Hotels and restaurants
Financial, Real Estate & Business Services (03)	Banking, Insurance, Ownership of dwellings
Community, Social & Personal Services (04)	Education and research, Medical and health, Other services, Public administration
Commodity (73)	**Same as activity classification.**
Factors of Production (9)	
Labour (2)	Labour: Unskilled
	Labour: Skilled
Capital (2)	Capital and Land
Institutions (5)	
Households (9)	Rural non-agricultural self employed, Rural agricultural labour, Rural other labour, Rural agricultural self employed and Rural other households
	Urban self employed, Urban salaried class, Urban casual labour and Urban other households
Other Institutions (4)	Government; Corporation; Rest of the World and Capital

The year 2006 was chosen as the base year to update/construct the India SAM as most of data of the key components of activity-commodity and institutional accounts are available for the year 2006. However, the input-output table is not available for 2006 and hence an earlier input-output for the year 2003-04 has been used to update the inter-industry transaction matrix for the base year. The updated the inter-industry transaction matrix has been used with the activity-commodity data (i.e. supply and demand vectors by the classified activity-commodity sets–explained above) to derive a consistent input-output table for 2006. The consistent activity-commodity accounts then formed the base on which the factors and institutional accounts were disaggregated to derive the India SAM 2006.

The construction of 2006 SAM is based on several data sets drawn from diverse sources. They are listed below.

1. Main Economic Aggregates and Population (1999-2000 to 2005-2006)
2. Relationship: National Income and Other Aggregate (1999-2000 to 2005-2006)
3. Consolidated Account of Nation - National Disposable Income and Its Appropriation (At Current Prices) in India (1999-2000 to 2005-2006)
4. Consolidated Account of Nation - Capital Finance (At Current Prices) in India (1999-2000 to 2005-2006)
5. Consolidated Account of Nation - External Transactions (At Current Prices) in India (1999-2000 to 2005-2006)
6. Gross Domestic Product at Factor Cost by Kind of Economic in India at current/1999-2000 Prices (2003-2004 to 2006-2007)
7. Net Domestic Product (NDP) by Economic Activity in Rural and Urban Areas (at Current Prices) (1999-2000)}
8. Quarterly Estimates of GDP (At 1999-2000 Prices) in India (2005-2006 and 2006-2007)
9. Consolidated Account of Nation - Gross Domestic Product and Expenditure (At Current Prices) in India(1999-2000 to 2005-2006)
10. Consolidated Account of Nation - National Disposable Income and Its Appropriation (At Current Prices) in India (1999-2000 to 2005-2006)
11. Performance of Public Sector (At Current Prices) in India (1999-2000 to 2005-2006)
12. Consolidated Account of Nation - Gross Domestic Product and Expenditure (At Current Prices) in India (1999-2000 to 2005-2006)
13. Imports of Principal Commodities by India (2000-2001 to 2007-2008)
14. Product-wise Exports from India (2003-2004 to 2005-2006 and April-January, 2005-2006 and 2006-2007)
15. Commodity-wise Central Excise Revenue Released in India (2005-2006 and 2006-2007)
16. Value of Imports and Customs Import Duty Collected in India (1997-1998 to 2006-2007
17. Amount Collected from Indirect Taxes in India (2005-2006 to 2007-2008)
18. Macro Economic Aggregates and Population (At Current Prices) in India (1999-2000 to 2005-2006)
19. National Sample Survey Organization 2000-2001
20. Social Accounting Matrix 2004 by Saluja et al (2004)
21. Social Accounting Matrix 2004 by Ojha et al (2004)
22. Basanta K. Pradham, M. R. Saluja and Shalabh K. Singh (2006) edited "Social Accounting Matrix for India: Concepts, Construction and Applications"

The updating/construction procedure proceeded in two steps. In the first step, a 'proto-SAM' was constructed using the data collected from diverse sources. Since the data came from different sources as well as for different years, in line with the expectation, the estimated 'proto-SAM' was

unbalanced. In the second step, the SAM was balanced by adjusting the activity and commodity (i.e. private consumption, intermediate demand vectors) accounts as explained below.

The updating a SAM is not only an exercise in putting together a complete data set, but also an estimation process on the basis of insufficient and partly inconsistent data. In this current exercise, the first step to generate a consistent and balanced SAM is to build a macroeconomic SAM (i.e. the Macro SAM). The main objective of the Macro SAM is to summarize and to show the circular flow in the economy in general and inter-dependence between commodity, activity, consumption, and flow-of-funds without sectoral or institutional detail. Thus, in the second step a preliminary disaggregated SAM (i.e. also referred to as the Micro SAM) is constructed using available disaggregated information drawn from various data producing agencies. Subject to data availability, the disaggregated SAM segregates most of the Macro SAM accounts to desired sectoral and institutional breakdowns. While ensuring balance between the receipts and outlays for all accounts, the disaggregated or micro SAM must reproduce the control totals of the macro SAM. The correspondence between accounts of the aggregated micro SAM and macro SAM thus ensure its desired consistency with the national account data.

Overview of the India Macro SAM for 2006

The macro SAM for the year 2006 contains 31 non-zero entries. The India macro SAM is "anchored" primarily to the 'National Accounts' data and other macro aggregates provided by the India Bureau of Statistics, India Economic Review and the Central Board of Excise and Customs. Table 4 shows the macro totals for the India economy based on information obtained from the above sources.

Table 4: Macro aggregates for 2006

	NA 06	SAM 06	Balance
	(1)	(2)	3= (1) –(2)
Net GDP at Factor	287173100	287173100	0
+ Consumption of Fixed Capital	37920000	37920000	0
+ Indirect Tax	43286800	43286800	0
(-) Subsidies	11662300	11662300	0
= Gross Domestic Product (GDP)	356717600	356717600	0
Imports Goods/Services	83067800	83067800	0
Supply (Ts =GDP + Imports + Rent)	**439785400**	**439785400**	**0**
Private Consumption (Cp)	*206463800*	*212096600*	*5632800*
Government Consumption (Cg)	40451100	40451100	0
Exports Goods/Services (E)	72512400	72512400	0
Gross fixed capital formation (GFCF)	100076000	100076000	0
Change in stocks (Sc)	10403600	10403600	0
Valuables (Vb)	4245700	4245700	0
Demand (Td =Cp + Cg + E + GFCF + Sc + Vb)	**434152600**	**439785400**	**5632800**
Computational imbalance (=>Ts – Td= 0)	*5632800*	*0*	*-5632800*
Imbalance as % of Total Supply (NA 06)	1.3		1.3
Imbalance as % of GDP (NA 06)	1.6		1.6

(Million Rupees)

Source: Consolidated Account of Nation - Gross Domestic Product and Expenditure (At Current Prices) in India.

The compilation of macro aggregates for 2006 produced by above sources reveal a computational discrepancy (i.e. 1.3 % of GDP) between supply and the final use. In order to remove this discrepancy, in line with the approaches adopted in national accounts and input-output computation, private consumption is re-estimated by deducting public consumption and gross fixed capital formation from the total absorption. As a result the private consumption increases to Indian Rupees 212,096,600 million from the initial estimate of Indian Rupees 206,463,800 million.

The complete Macro SAM for 2006 containing the national accounts and other data including transfers, taxes and foreign transactions is shown in Table 5. The distribution of labor value-added to households and capital value-added channeled through the enterprise account is derived from information contained in the Ojha SAM (2004). Indirect and Direct taxes data by major commodity types are obtained the Central Board of Excise and Customs (2006). Savings of households and enterprises have been adjusted to fulfill the macroeconomic balance of the SAM. Government savings are computed as the difference between total government receipts and total government spending.

Table 5: India Macro SAM 2006

(Billion Indian Rupees)

SAM Accounts	SNA Accounts	Code		Activity	Commodity	Factors					Domestic Institutions			Capital	Rest of the Word	Total of Income A/C
				1	2	3					4			5	6	
						Labour	Capital	Land	Indirect Tax	Import Duty	Household	Government	Corporation			
Activity A/C	Activities	1		0	594600	0	0	0	0	0	0	0	0	0	0	594600
Production A/C	Commodities	2		254915	0	0	0	0	0	0	213097	40451	0	114725	72512	695701
Distribution of Primary Income	Income Generation by Institutions	3	Compensation To Employees	168816	0	0	0	0	0	0	0	0	0	0	-2497	166319
			Operating Surplus	140134	0	0	0	0	0	0	0	0	0	0	0	140134
			Land Return	16143	0	0	0	0	0	0	0	0	0	0	0	16143
			Indirect Tax	14592	10526	0	0	0	0	0	0	0	0	0	0	25118
			Import Duty	0	7507	0	0	0	0	0	0	0	0	0	0	7507
Use of Income	Primary Income of Institutions	4	Household	0	0	166319	81659	16143	0	0	0	31148	0	0	10683	305953
			Government	0	0	0	4606	0	25118	6507	8594	0	10797	0	0	55621
			Corporation	0	0	0	15948	0	0	1001	0	0	0	0	0	16949
Consolidated Capital AC	Capital Account	5		0	0	0	37920	0	0	0	84262	-15978	6152	0	2369	114725
Rest of World	Rest of the World-Imports (current)	6		0	83068	0	0	0	0	0	0	0	0	0	0	83068
Total of Expenditure A/C				594600	695701	166319	140134	16143	25118	7507	305953	55621	16949	114725	83068	2221838

Note: Based on the SNA-SAM Relationship

The Accounts of the India SAM 2006

Compilation of the disaggregated SAM involves a process where the non-zero entries of the macro SAM are disaggregated into desired level of classification to provide comprehensive flows of the accounts of the economy. A number of factors are considered while deciding on the level of disaggregation. Since the objective of this exercise is to spilt the balanced disaggregated SAM into rural-urban for better handling of the policy impacts on location (as opposed to national only) special care were taken to decide the number of sectors, factors and household groups. However, level of disaggregation is largely dictated by the data availability. Various sources were used and several informed judgments were needed due to missing information or inconsistencies between different data sets to compile data sets for the disaggregated SAM.

Table 6: Account Description

Macro SAM AC	Disaggregated SAM AC (Micro SAM)	Description	Links with SALUJA SAM 04
Activity	73. Activities	Agri-17; Min-03; Manuf-07; Cons-01; Util-03; Trans-06; BusiSrv-03; OthSrv-04	73 activities
Commodity	73. Commodities	Agri-17; Min-03; Manuf-07; Cons-01; Util-03; Trans-06; BusiSrv-03; OthSrv-04	73 commodities
Indirect tax	2. Indirect Tax	Bases: Domestic 1 & Trade 1	2 Domestic 1 & Trade 1
Factor	4. Factors	Labour – 2 and Capital -2	4 types Labour-2 & Capital-2*
Household	9. Household	Rural – 5 and Urban -4	9 types- 5 Rural & 4 Urban**
Enterprise	1. Enterprise		1 Enterprise
Rest of the World	1. Rest of the World		1 Rest of the World
Capital Public	1. Capital Public		1 Capital Public
Account=8	Accounts=167		Accounts=1

Notes:
* Factor classification has been borrowed from a classification used by IFPRI for SAM 2002 for Bangladesh.
** Household classification correspondence to the classification adopted in Ojha SAM.

Activity and Commodity Accounts

Activity and commodity accounts of a SAM deal with the supply and demand components of the economy. Derivation of activity-commodity accounts thus imply generation of each element of supply and demand by the representative (elaborated in Table 6) activity-commodity classification. In the current exercise it envisages derivation of supply and demand components by 73 representative activities and commodities.

Value Added: According to the 'National Accounts' of India, estimates of value added are provided for 8 sectors (this is referred to as 'NA 8 sector'). Value added data by 8 sectors are available for 2006 which is the base for the value added update. These value added information are used to derive the value added by 73 SAM activity sectors. The generation of value added by 73 SAM activity accounts from 8 sector information is discussed below.

In the **first** step a mapping is defined to establish a correspondence between the NA 8 sectors and SAM 73 activities. Classification of value added sectors according to these groups is shown in the Table 7.

Table 7: Classification of SAM Value added Sectors by Groups

NA 8 Sector	SAM 73 Activity
Agriculture, Forestry and Fishing (1)	Paddy, Wheat, Other cereals, Pulses, Sugarcane, Oilseeds, Jute, Cotton, Tea & coffee, Rubber, Tobacco, Other crops, Milk and milk products, Animal services, Other livestock products, Forestry and logging, Fishing (1..17)
Mining and Quarrying (2)	Coal and lignite, Crude petroleum and natural gas, Iron ore, Other Minerals (18..21)
Manufacturing (3)	Sugar, Khandsari-boora, Edible & Vanaspati, Misc food products, Beverages & tobacco products, Cotton textiles, Wool synthetic, silk fiber textiles, Jute- hemp- mesta textiles, Textile products ,Furniture and wood products, Paper- paper products. & newsprint, Printing and publishing , Leather products, Rubber and plastic products, Petroleum products, Coal tar products, Inorganic heavy chemicals, Organic heavy chemicals, Fertilizers, Pesticides, Paints, varnishes and lacquers, Miscellaneous chemicals, Cement, Other non metallic mineral products, Iron & steel, Non-ferrous basic metals, Metal products, Other non electric machinery, Electrical appliances, Communication equipments, Electronic equipments (incl.TV), Other electrical Machinery, Rail equipments, Other transport equipments, Miscellaneous Manufacturing (22..56)
Construction (4)	Construction (57)
Electricity, Gas and Water Supply (5)	Electricity, Gas, Water supply (58..60)
Trade, Hotels, Transport and Communication (6)	Railway transport services, Other transport services, Storage and warehousing, Communication, Trade, Hotels and restaurants (61..66)
Financial, Real Estate and Business Services (7)	Banking, Insurance, Ownership of dwellings (67..69)
Community, Social and Personal Services (8)	Education and research, Medical and health, Other services, Public administration (70..73)
Set Definition: j=1..8	K= 1…73; a=1…17; b=18..21; c=22..56; e=57; d=58..60; f=61..66, m=67..69; x=70..73
	K= 1…73; g=1…57 (goods); and s= 58-73 (services).

In the **second** step, value added for SAM 73 sectors is derived using the value added information of the 8 sectors. For example, value added for agriculture sub-sector for 2006 ($_{NA}VA_j^{06}$) is distributed between the 17 SAM agriculture activities using their observed shares in 2004 SAM (i.e. $shVA_a^{04}$) to generate value added for 2006 for these 17 sectors (VA_a^{06}). This is specified below as:

$$VA_a^{06} = shVA_a^{04} \cdot {_{NA}VA_j^{06}} \qquad (1)$$

This procedure is applied to derived 2006 value added for the remaining 56 SAM sectors using the value added of the remaining 7 NA sectors. Adding of the derived value added using the above procedures generates the value added for the 73 SAM activities for 2006.

$$VA_K^{06} = VA_a^{06} + VA_b^{06} + VA_c^{06} + VA_d^{06} + VA_e^{06} + VA_f^{06} + VA_m^{06} + VA_x^{06} \qquad (2)$$

Intermediate Input Use: Inter-industry transaction matrix for 2006 is not available from which input use for the SAM 73 activities can be obtained. In the absence of updated technical coefficients for the base year, the observed technical coefficients of 2004 (i.e. T_K^{04}) have been applied to the value

added vector of 2006 to derive the intermediate input use by 73 SAM activities (i.e. $IU_K^{06} = T_K^{04} \cdot VA_K^{06}$) for 2006.

Indirect Tax: Information of indirect tax mobilized from the domestic bases for 2006 ($_{CBEC}IT_W^{06}$) by selected commodity (i.e. referred as w) is obtained from the 'Central Board of Excise and Customs (CBEC)'. The sector classification used by CBEC is different from the 73 SAM activity classifications. Hence a mapping scheme relating the CBEC classification to SAM sector classification was defined. This procedure is however also supplemented by tax shares obtained from the 2004 Saluja-SAM. Thus using both the CBEC information and 2004 tax shares of indirect tax by 73 SAM activities the indirect tax vector for 2006 (IT_K^{06}) was derived.

Outputs or Domestic Supply: The estimates of input use (IU_K^{06}) and indirect tax (IT_K^{06}) are added to the value added (VA_K^{06}) to derive domestic output. This is specified as:

$$Q_K^{06} = IU_K^{06} + IT_K^{06} + VA_K^{06} \qquad (3)$$

Imports of Goods and Services: Information of imports of goods for 2006 year ($_{NA}M_Z^{06}$) is acquired from the NA. Again, the sector classification (i.e. denoted as z) used by NA varies from the 57 SAM activity goods classifications (i.e. g). Hence a mapping scheme linking the NA classification to SAM sector classification is used to derive imports by 57 SAM activities for 2006 ($M_g^{06} = {}_{NA}M_Z^{06}$). The observed service import shares of the 2004 Saluja-SAM were used to generate service imports for the year 2006 ($M_s^{06} = shM_s^{04} \cdot {}_{NA}M^{06}$). The total imports for 2006 are thus composed of estimated goods imports and services imports.

$$M_K^{06} = M_g^{06} + M_s^{06} \qquad (4)$$

Revenue from import bases for 2006 fiscal year ($_{CBEC}dM_W^{06}$) is obtained from the CBEC. The goods sector classification used by CBEC is different from the 57 SAM goods import classifications. Hence a mapping scheme relating the CBEC classification to SAM classification is used to derive import duty by 57 goods imports for 2006 ($dM_g^{06} = {}_{CBEC}dM_W^{06}$). The total import duties for 2006 are thus composed of duties on imports.

$$dM_K^{06} = dM_g^{06} \qquad (5)$$

Total Supply: Main components of supply side of an economy are domestically produced goods and services or outputs (Q_K^{06}) and imports of goods and services (M_K^{06}). Total supply of goods and services (SS_K^{06}) for 2004/05 by 23 SAM activities is generated by adding outputs to imports. Total supply is given as:

$$SS_K^{06} = Q_K^{06} + M_K^{06} + dM_K^{06} \qquad (6)$$

The estimates of supply and its components by NA 8 sectors are reported in tables below.

Table 8: Estimates of Total Supply and Components

(Million Indian Rupees)

Activity/ Commodity	Input Use	Value Added	Indirect Tax	Import	Import Duty	Total Supply
Agriculture, Forestry & Fishing	23454283	59505800	-1213073	1372654	64082	83183747
Mining & Quarrying	1899366	9048300	214909	23259582	1202059	35624217
Manufacturing	134943417	51974600	21720404	45660299	5240572	259539293
Construction	36211272	22211000	1959752	0	0	60382024
Electricity, Gas & Water Supply	4197821	6598000	427377	0	0	11223198
Trade, Hotels, Transport & Communication	31329351	82493700	1091511	5636314	441493	120992370
Financial, Real Estate & Business Services	7897549	46449300	147930	608449	47660	55150888
Community, Social & Personal Services	14982025	46812400	768976	6530501	511535	69605438
Total	254915085	325093100	25117786	83067800	7507402	695701174
Share of Total SS (%)	36.64	46.73	3.61	11.94	1.08	100.00

<u>Private or Household Consumption:</u> Vector of private or household consumption has been obtained from the information of 'National Sample Survey Organisation (NSSO)' 2001 and Ohja SAM 2004. Commodity classification of NSSO is different than the SAM commodity classification. Hence in the *first step*, NSSO consumption estimates are mapped to 73 SAM commodities classification to derive commodity shares. Derivation of private consumption vector for 2006 is shown below.

$$pC_K^{06} = \ shpC_K^{01} \cdot pC^{06} \qquad\qquad (7)$$

Where, $shpC_K^{01}$ and pC^{06} refer to normalized share of initial estimates of private consumption vector based on NSSO 2001/Ojha 04 and 'adjusted macro control total for the private consumption.

<u>Government Consumption:</u> Government consumption usually confines to three sectors such as 'public administration' and 'education' and 'health'. The rationale is that different of purchase (e.g. agriculture, commodities and services) by government are included under the sector public administration. However, in India, more disaggregated data for government consumption is used where government consumption is recoreded against agriculture and livestock products; minerals products; manufacturing commodities; electricity; water supply; transport and other services. Information of government expenditure for 2006 fiscal year ($_{NA}gC^{06}$) used to derive government consumption by 73 SAM activities for 2006 ($gC_K^{06} = \ _{NA}gC^{06}$).

<u>Exports of Goods and Services:</u> Information on exports of goods for 2006 ($_{NA}E_Z^{06}$) is obtained from National Accounts. Again the sector classification of NA is different from the 57 SAM-goods classification. Hence a mapping scheme linking the NA classification to SAM goods sector classification is used to derive exports by 57 SAM goods for 2006 ($E_g^{06} = \ _{NA}E_Z^{06}$). The observed services export shares of the 2004 Saluja-SAM were used to generate service exports for the year 2006 ($E_s^{06} = shE_s^{04} \cdot E^{06}$). The total exports for 2006 are thus composed of estimated goods and services imports.

$$E_K^{06} = E_g^{06} \ + \ E_s^{06} \qquad\qquad (8)$$

<u>Investment:</u> National account experts and Input-output and SAM builders are well conversant to the special treatment of goods and services with respect to capital formation and stock change. It is well known that only goods can be stored. Furthermore, only some specific goods can generate investment or form capital which assists further production. On the other hand, services must be consumed instantaneously implying that it cannot be stored and hence last for longer time duration to be able to form capital. Thus, recording of stocks and capital formation against some services in some SAMs of India appear erroneous. Therefore, in SAM 2006, stocks and capital formations are recorded only against goods and not against services. National accounts section contains information on origin of capital formation or investment, stock change and valuables for 2006. These information is used to derive gross fixed capital vector invoking 2004 SAM shares (i.e. I_K^{06} = $shI_K^{04} \cdot I^{06}$).

<u>Final Demand:</u> Above estimates of consumption, exports and investment are added together to derive final demand vector for the 73 SAM commodities (FD_K^{06}). This is specified as:

$$FD_K^{06} = pC_K^{06} + gC_K^{06} + E_K^{06} + I_K^{06} \qquad\qquad (9)$$

<u>Intermediate Input Demand:</u> Final demand (FD_K^{06}) has been deducted from the total supply (SS_K^{06}) to derive intermediate input demand by 73 SAM commodities ($ID_K^{06} = SS_K^{06} - FD_K^{06}$). The resulting input demand in the first instance did not produce equality between supply and demand vectors. Hence an iterative balancing technique was used to re-estimate the input demand vector such that use of it ensures the equality between sectoral supply and demand. In this process specific elements of the consumption vector, value added vector and intermediate input vector have been modified not only to ensure supply-demand but also to restrict significant deviation of the technical coefficients for the year 2006 from the observed technical coefficients of 2004. In order to verify the degree of deviation of the technical coefficients the estimated backward linkages are reported in Annex 1. Except for one or two activities, significant deviations are not observed between year 2006 and year 2004. The finalized estimates of the intermediate input demand are then added to the estimates of final demand to equate demand and supply ($ID_K^{06} + FD_K^{06} - SS_K^{06}$ = 0). The estimates of demand are reported in the table below.

Table 9: Estimates of Total Demand and Components

(Million Indian Rupees)

Activity/ Commodity	Input Demand	Private Consumption	Public Consumption	Export	GFC	Total Demand
Agriculture, Forestry & Fishing	28245205	47890274	118913	3133440	3795916	83183747
Mining & Quarrying	31018393	58956	56453	2691781	1798634	35624217
Manufacturing	115102627	50116652	1677122	41147946	51494946	259539293
Construction	1948438	0	797781	0	57635805	60382024
Electricity, Gas and Water Supply	8377649	2430977	414572	0	0	11223198
Trade, Hotels, Transport & Communication	43382234	59059335	996825	17553975	0	120992370
Financial, Real Estate & Business Services	24391515	30188584	236852	333937	0	55150888
Community, Social & Personal Services	2449024	23352508	36152583	7651322	0	69605438
Total	254915085	213097286	40451101	72512401	114725300	695701174
Share of Total Demand (%)	36.64	30.63	5.81	10.42	16.49	100.00

Factors Accounts

Factors of production (FP) play an important role in the process of producing and distributing the fruits of growth and development, i.e. by providing factor services to production activities and in return factors receive value-added in the form of wages and salaries, profits and rents. The level of the distribution is in accordance to the level and kind of endowments; hence, the income subsequently transferred to household groups (i.e. as owners of labour and capital) will be heavily influenced, thereby typifying household behaviour.

The FP can be classified into three main categories of factor ownership (a) labour, (b) fixed assets and (c) capital services. Unlike the first the last two are not straightforward. It must be taken into account that only households provide labour services, whereas fixed assets, land and capital services are provided both by households and other institutions (i.e. corporation and government). Classifications of labour types should aim at grouping individuals into homogeneous groups of income-earners. For the grouping differences regarding average factor incomes and gender within or between labour groups must be taken into account. Among others, the most important could be labour skills reflecting different occupational categories or different income groups of earners using gender as an additional criterion. More concretely, for most production activities the factor labour can be distinguished according to highly-skilled professionals, managers, traders, government employees, personal services employees, blue-collar labourers or street vendors. For agricultural activities these could be agricultural farm owners, farm administrators and land workers of distinct labour types: landless farmers, subsistence farmers, etc. It is should be clear that all or most could be classified according to gender.

Information from developing countries as well as India appears to be no different, inevitably show a high incidence of self-employed or family-based activities, hence, differences according to the ownership of fixed assets and capital incomes generated by unincorporated and corporate sectors should be taken into account. Incomes from unincorporated capital (mainly family enterprises) can additionally distinguish imputed wage for the self-employed worker and the remaining capital income. A desirable classification of factors of production is presented below.

Table 10: A Desirable Factor Classification

Labour	Capitalist and Others
1. Self-employed Labour	1. Unincorporated or mixed income
2. High Skilled Professionals and Managers	2. Corporate
3. Medium Skilled Professionals and Technicians	3. Rentiers
4. Government and non-Government Office Clerks (employees)	
5. Workers (Transport Workers, Mechanics and Other Industrial Workers)	
6. Artisans and Handicraftsmen	
7. Informal (Street-vendors and non economic services n.e.s.)	
8. Agricultural Owners/Administrators	
9. Agricultural Workers	
10. Agriculture Subsistence farmers	

Even though the above classification of factors appears to be desirable it was not possible at this point to derive a desirable classification of factors as stated above. In the present version of the SAM

2006 the factors are classified into two types of labour, one aggregate type of capital and one aggregate type of land. The factor classifications are based on the information of Saluja and Ojha SAMs for India. The aggregate one labour category is further split between 'skilled' and 'unskilled' labour categories using the information contained in table 23 of NSS 62nd Round (July 05 – June 06) report "Employment and Unemployment: Situation in India 2005-06".

Factor Income by Activities: Detailed information on sectoral employment for the different factor categories was extracted from the 2004 SAMs for India. The information of two India SAMs are added together to define a factor-sector share matrix 2004 ($shyF_{Fk}^{04}$). Derived value added vector by 73 SAM activities for 2006 (VA_K^{06}) is distributed among 4 factor types using the factor-activity share matrix 2004 ($shyF_{Fk}^{04}$) to update the factorial income matrix by activity for 2006 (yF_{Fk}^{06}). The derivation is shown below.

$$yF_{Fk}^{06} = shyF_{Fk}^{04} \cdot VA_K^{06} \qquad\qquad (10)$$

Distribution of sectoral value added by the 4 representative factors and 8 NA sectors is reported below.

Table 11: Estimates of Factor Incomes by Activities

(Million Indian Rupees)

Activity	Labour		Capital		
	Unskilled	Skilled	Capital	Land	Value Added
Agriculture, Forestry & Fishing	25097273	8333952	9931342	16143234	59505800
Mining & Quarrying	857277	2004348	6186675	0	9048300
Manufacturing	8510054	12766312	30698234	0	51974600
Construction	12175763	6085171	3950066	0	22211000
Electricity, Gas & Water Supply	881557	4518518	1197924	0	6598000
Trade, Hotels, Transport & Communication	24096892	18819144	39577665	0	82493700
Financial, Real Estate & Business Services	6013459	16234423	24201418	0	46449300
Community, Social & Personal Services	2642525	19779526	24390349	0	46812400
Share of Value Added (%)	24.7	27.2	43.1	5.0	100.0

Institutions Accounts

Current account transactions are captured between 4 institutional agents; households and unincorporated capital, corporate enterprises, government and the rest of the world. Household account includes 9 representative groups (5 rural and 4 urban). One consolidated capital account is also defined to capture the flows of savings and investment by institutions and the rest of the world respectively.

Household Accounts

Households (HHs) should be conceptualized as consumption units, different from income earning agents (e.g. labourers, rentiers and capitalists), which receive "transfers" from the factor of production which they own and "sell" to production activities. This distinction is important because the income sources of earning agents can be diverse, (as many as the activities which use the factor(s) owned by the agents), while 'income' to households (viewed as a group of income earning agents) may come from the different factor endowments which the members of the household possess and may simultaneously come from several factor endowments.

Generally, in specifying household classifications the following criteria are considered:

1) Regional differences, i.e. urban and rural households;
2) Educational level of the head of the household;
3) Gender of the head of the household; and
4) Access to productive forms of material wealth particularly, agricultural land and land rights.

The above criteria can be justified on the grounds that:

a) Urban-rural income differentials are usually large. The average per capita disposable income of urban households is considerably higher than that of rural households. And often female headed household are more vulnerable;
b) Among the factors that can help to generate homogeneity the most relevant appear to be classifications according to homogeneity in consumption expenditure or savings patterns;
c) In urban areas differences in household income levels and consumption patterns are closely related to the educational level of the household head, while for rural households the size of farm landholdings appears to be most significant determinant; and
d) Significant differences in consumption pattern and in income generating capacity are found between those rural households primarily engaged in agricultural activities and those whose main income source is derived from non-agricultural activities.

The 2006 SAM distinguishes nine household types, classified according to location and occupation of the household's head. Household classifications contained in SAM 2006 are based on classifications adopted in SAM 2004 built by Ojha et al and NSSO (2001). The details are provided in the table below.

Table 12: Household Types and Their Definition

SAM HH Classification	HIES Classification
rNgSe	Rural non-agricultural self employed
rAgLb	Rural agricultural labour
rOtLb	Rural other labour
rAgSe	Rural agricultural self employed
rOtHh	Rural other households
uSe	Urban self employed
uSclass	Urban salaried class
uCaLb	Urban casual labour
uOthHh	Urban other households

Main sources of household's income are factor returns and various transfer from domestic and external institutions. Generation of household income from these sources is discussed below.

Household Income from Factors: Direct factor incomes (i.e. wages and mixed income) constitute the major source of household income. Compensation to employees or labour factor payments is paid entirely to the household groups, as they are the only suppliers of the labour factor. Control totals for labour incomes by the 2 factor types are already estimated above which must be distributed among the 9 representative households according to their factor endowments. Factor endowment information ($shfY_{FH}^{04}$) are contained in Ojha SAM 2004[1]. Control totals for factor income (yF_{Fk}^{06}) are applied on the factor endowment shares to generate households income from factors ($fY_{FH}^{06} = shfY_{FH}^{04} \cdot \sum_K yF_{FK}^{06}$). This procedure ensures that the observed factor endowment structure (i.e. reflecting the factorial income distribution) of 2004 as well as the factor control totals for 2006 are preserved.

Household Receipts from Other Sources: Besides labour and mixed incomes, households also receive income from other sources, namely remittances or factor incomes from abroad, government transfers and transfers from the corporations.

Information of foreign remittance for 2006 fiscal year ($rowR^{06}$) is obtained from the 'national accounts'. Remittance share information by household groups ($shfR_H^{04}$) are contained in Ojha SAM 2004. Control totals for remittance ($rowR^{06}$) are applied on the remittance shares to generate households income from remittance ($rowR_H^{06} = shfR_H^{04} \cdot_{row} R^{06}$). This procedure ensures that the observed remittance structures of 2004 as well as the remittance control totals are preserved.

Similar procedures are also applied to distribute institutional transfers by representative household groups. Again institutional transfer (i.e. by government) share information by the representative household groups are obtained from Ojha SAM 2004. Control totals for the institutional transfers are applied on these shares to generate households' income from government transfers ($gTr_H^{06} = shgTr_H^{04} \cdot_{NA} gTr^{06}$).Total receipts by household groups are derived from all the above sources and this is defined as:

$$R_H^{06} = \sum_F fY_{FH}^{06} + rowR_H^{06} + gTr_H^{06} \qquad (10)$$

Estimated household's receipts from different sources are provided in table below.

Table 13: Estimates of Household's Receipts from Different Sources

(Million Indian Rupees)

Household Groups	Labour Income	Capital Income	Land Income	Government Transfer	Remittance	Total
Rural non-agricultural self employed	13776741	10751290	0	3463153	376935	28630799
Rural agricultural labour	26631113	81514	0	2376747	471997	29561371
Rural other labour	8285405	482953	0	562246	43343	9373948
Rural agricultural self employed	23155433	26486492	16143234	9212617	739979	75925384
Rural other households	5849906	15736395	0	2865433	1198990	25650725
Urban self employed	16922342	17484928	0	4501810	3085971	42340274

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[1] This was supplemented by additional information from SAM 2002 produced for Bangladesh by IFPRI.

Household Groups	Labour Income	Capital Income	Land Income	Government Transfer	Remittance	Total
Urban salaried class	60759661	3769027	0	6701980	2463190	73693859
Urban casual labour	8768417	1196171	0	397058	131419	10493065
Urban other households	2170275	5670283	0	1067055	2171177	11283944
Income Share (%)	54.36	26.69	5.28	10.18	3.49	100.00
Ojha SAM 2004 Income Share (%)	53.55	26.14	5.17	10.30	4.83	100.00

Household Expenditure Pattern: Consumption expenditure constitutes the major component of their outlays. Consumption expenditure by the 9 representative household groups and 73 SAM commodities is estimated using the expenditure structure contained in the NSSO and 2004 Ojha SAM. Both NSSO and 2004 Ojha SAM provides detailed breakdown of expenditure by 9 household groups and products. In particular, the product classifications adopted in NSSO and 2004 Ojha SAM which are different are mapped to 73 commodity groups. Household consumption by 73 SAM commodities (pC_K^{06}) has already been derived using the private consumption control total and the private consumption structure for the 73 SAM commodities. Derived consumption vector is then distributed among the 9 household groups using their derived expenditure structures ($shpC_{HK}^{06}$). The procedure generates a consumption matrix for 2006 by 9 representative household groups and 73 SAM commodities ($pC_{HK}^{06} = shpC_{HK}^{06} \cdot pC_K^{06}$).

Household Outlays: Other notable expenditures incurred by household groups are income tax payment. Income tax payment shares contained in 2004 Ojha SAM ($shdT_H^{04}$) and NA income tax payment control total ($_{NA}dT^{06}$) are used to derive income tax payments by household groups ($dT_H^{06} = shdT_H^{04} \cdot {_{NA}dT^{06}}$).

Total outlays by household groups are defined as:

$$P_H^{06} = \sum_K pC_{HK}^{06} + dT_H^{06} \qquad\qquad (11)$$

Household savings are determined by deducting household payments from household income in such way that savings close the account as well as reflect a savings pattern reflected in 2004 Ojha SAM. The household's outlays by these three categories are shown in Table 14.

Table 14: Estimates of Household's Outlays by Categories

(Million Indian Rupees)

Household Groups	Consumption	Direct Tax	Savings	Total Outlay	Savings %	Savings % Ojha SAM
Rural non-agricultural self employed	16819470	236638.39	11344613	28400721	13.6	13.4
Rural agricultural labour	27724194	0	1737344.5	29461538	2.0	1.9
Rural other labour	8882390	0	492281.88	9374671.9	0.6	0.4
Rural agricultural self employed	52930760	2758024.1	20419199	76107982	22.8	22.6
Rural other households	17762022	945059.16	7484221.9	26191303	8.8	8.3
Urban self employed	28875863	0	13392240	42268103	16.1	16.7
Urban salaried class	45289623	1584401.4	25515873	72389897	31.6	32.3
Urban casual labour	6763871.5	2647239.1	1091470.1	10502581	1.0	0.6
Urban other households	8049093.9	422337.87	2784450.7	11255882	3.5	3.9

Household Groups	Consumption	Direct Tax	Savings	Total Outlay	Savings %	Savings % Ojha SAM
Outlay Share (%)	69.4	2.8	27.8	100.0	100.0	100.00
Ojha SAM 2004 (Share (%))	70.0	3.3	26.7	100.0		

Other Institutions Accounts

Receipts and outlays of other three current institutions are discussed below.

Government Account: Sources of government income include tax and non-tax revenues. The main sources of tax revenue are (i) indirect taxes on imports and domestic production and (ii) direct taxes in the form of corporate and income taxes. Amounts for all of the four elements of tax revenues (i.e. IT_K^{06}, dM_K^{06}, dT_H^{06} and cT^{06}) are already defined in the supply-demand section. The main sources of other than tax revenue (nT^{06}) are the income from the government owned corporations, financial institutions etc. Moreover, part of the value added which accrues to government in accordance to her participation in the production process is also included under the 'non tax' head. Total government receipt (gR^{06}) is thus defined as:

$$gR^{06} = \sum_K IT_K^{06} + \sum_K dM_K^{06} + \sum_H dT_H^{06} + cT^{06} + nT^{05} \qquad (12)$$

Government spends most of her income on purchase of goods and services (gC_K^{06}) and transfer programmes (gTr_H^{06}). Rest of the income constitutes government savings. Government savings (gS^{06}) act as the balancing factor between its receipts and outlays. The balancing condition envisages that receipt must equate the outlay. This is specified as:

$$gR^{06} = \sum_K gC_K^{06} + \sum_H gTr_H^{06} + gS^{06} = 0 \qquad (13)$$

Corporate Account: Part of the value addition accrues to the corporation in accordance to its participation in the production of goods and services (cVA^{06}). Part of corporate income is transferred to government in the form of corporation tax (cT^{06}). Rest of the corporate income constitutes savings for the corporation. Corporate savings (cS^{06}) act as the balancing factor between corporate receipts and outlays. The balancing condition envisages that receipt must equate the outlay. This is specified as:

$$(cVA^{06} + mTr^{06}) - cT^{06} + cS^{06} = 0 \qquad (14)$$

Rest of the World Account: Rest of the world account records inflow and outflow of foreign resources in a country in a fiscal year. The major sources of inflows are: imports of goods and services and foreign assistance (i.e. $rowS^{06}$ also known as foreign savings). Major form of outflow includes exports of goods and services, net factor returns and net current transfer (remittances). Amounts for all of these four elements which are defined above are assembled in this account to complete the account as well as to verify its balance. The balancing condition envisages that sum of inflows must equates the sum of the outflows. This is specified as:

$$\sum_K M_K^{06} + rowS^{06} - \sum_K E_K^{06} + \sum_{FK} yF_{Fk}^{06} + \sum_H rowR_H^{06} = 0 \qquad (15)$$

Some Key Features of SAM 2006

Salient features of the SAM 2006 are discussed here in terms of economic structure and the household profile. In order to examine structural changes, the SAM 2006 results are compared with results produced by Saluja SAM and Ojha SAM.

Demand and Supply Structure

The 2006 structures of demand and supply are reported in Table 15 and Table 16. Key observations are discussed below.

Table 15: Composition of Demand in Various Data Sets

(In percent)

	NA 06	SAM 06		NA 04	SALUJA SAM 04
Final Demand Composition					
Private Consumption	47.0	48.3		53.3	56.3
Public Consumption	9.2	9.2		9.7	10.2
Exports Goods and Services	16.5	16.5		12.7	13.9
GFC	26.0	26.0		22.9	19.5
Statistical Discrepancy	1.3	0		1.4	0.0
Total Final Demand	100.00	100.00		100.00	100.00
Demand Composition					
Intermediate Demand	'----'	36.64		'----'	40.00
Final Demand	'----'	63.36		'----'	60.00
Total Demand	100.00	100.00		100.00	100.00

Source: SAM 2006, Saluja SAM 2004, and Consolidated Account of Nation - Gross Domestic Product and Expenditure (At Current Prices) in India

- According to national account 2006 (i.e. first column of the above table), total consumption (private + public) accounted for about 56 percent of final demand of India in 2006. Total investment is around 26 percent of final demand. The share of exports is around 27 percent. Statistical discrepancy is around 1.3 percent.

- Final demand composition according to national account 2004 (i.e. third column of the above table), show substantial difference from the final demand composition of 2006. Total consumption (private + public) in 2004 accounted for about 63 percent of final demand. This suggests that total consumption in 2006 declined by 7 percentage point compared to 2004. The fall is consumption in 2006 was compensated by rises in GFC (i.e. 3.2 percentage point rise) and exports of goods and services (i.e. 3.8 percentage point rise).

- A desirable property of a SAM is the exact or close association between NA values and SAM values. The final demand composition of SAM 06 is shown in the second column of the above table. Except for the private consumption component, all other components of the SAM 06 preserved exact correspondence with their counterpart values in NA 06. As mentioned in the earlier section, statistical discrepancy of 1.3 percent found in NA 06 was absorbed in the private consumption component of SAM 06. As a result, the share of private consumption increased to 48.3 percent from 47 percent share found in NA 06.
- The final demand composition of Saluja SAM 04 did not preserve the demand composition reported in the NA 04.

Table 16: Composition of Supply in Various Data Sets

(In percent)

	NA 06	SAM 06		NA 04	SALUJA SAM 04
GDP Composition					
Net GDP at Factor Cost	80.5	80.5		81.9	85.6
Consumption of Fixed Capital	10.6	10.6		10.3	9.6
Indirect Tax less Subsidies	8.9	8.9		7.8	4.8
Gross Domestic Product	100.0	100.0		100.0	100.0
Supply Composition (Excluding Intermediate Use)					
Domestic	81.1	81.1		86.2	84.4
Imports	18.9	18.9		13.8	15.6
Total Supply	100.00	100.00		100.00	100.00
Supply Composition					
Intermediate Use	'----'	36.64		'----'	40.00
Final Use (including taxes, tariff, imports etc.)	'----'	63.36		'----'	60.00
Total Supply	100.00	100.00		100.00	100.00

Source: SAM 2006, Saluja SAM 04, and Consolidated Account of Nation - Gross Domestic Product and Expenditure (At Current Prices) in India

- Unlike the demand composition, substantial differences are not observed between GDP compositions between 2006 and 2004. The largest component of GDP is factor returns which accounted for about 81 percent in 2006 and 82 percent in 2004. Consumption of fixed capital or depreciation was around 10 percent both in 2006 (i.e. 10.6 percent) and in 2004 (i.e. 10.3 percent). Share of the net indirect tax however rose more than 1 percentage point in 2006 compared to 2004.

- Decomposition of supply by domestic and external sources reveals substantial difference between 2006 and 2004. The share of imported supply in 2006 is 19 percent envisaging 5 percentage points rise from 2004 share (i.e. 14 percent). The rise in imported share in 2006 is compensated by fall of domestic supply in 2006 (i.e. 81 percent) compared to the share of domestic supply on 2004 (i.e. 86 percent).

- Again the desirable property of exact/close association between NA values and SAM values has been preserved for the GDP and supply compositions in SAM 06.

- Both GDP and supply compositions of SAM 04 show substantial variations from the compositions reported in NA 04. For instance, share of net factor GDP in SAM 04 is 86 percent compared to the 82 percent share reported in NA 04.

- Observed changes in demand and supply compositions of 2006 (i.e. contained both by NA 06 and SAM 06) compared to 2004 compositions suggest that intermediate use and demand of SAM 06 would vary from the intermediate use and demand reported in SAM 04. In line with the expectation, these variations are captured by variations in endogeneity degrees and linkages of SAM 06 compared to SAM 04.

Structure of 2006 Indian Economy by Key Sectors

The economic structure of India as contained in SAM 2006 by 73 producing activities is presented by 8 national account sectors for comparison with national account data for the same year. According to the SAM 2006 data, three service sectors together accounts for about 54 percent of gross domestic product. National account also report 54 percent contribution by service sectors. *The service sector has thus emerged as the leading sector in India for income generation.* Service sector is followed by agriculture sub-sector accounting for about 18 percent of GDP. The contribution of manufacturing sub-sector is around 16 percent of GDP. National account estimates also report 18 and 16 percent contributions by agriculture and manufacturing sub-sectors respectively. Exact correspondences between national account data and SAM 2006 for other sub-sectors are also found and reported below. Establishing exact correspondence between national account estimates and SAM is an important criterion to validate the SAM.

Figure 1: Value added shares by NA 06 and SAM 06
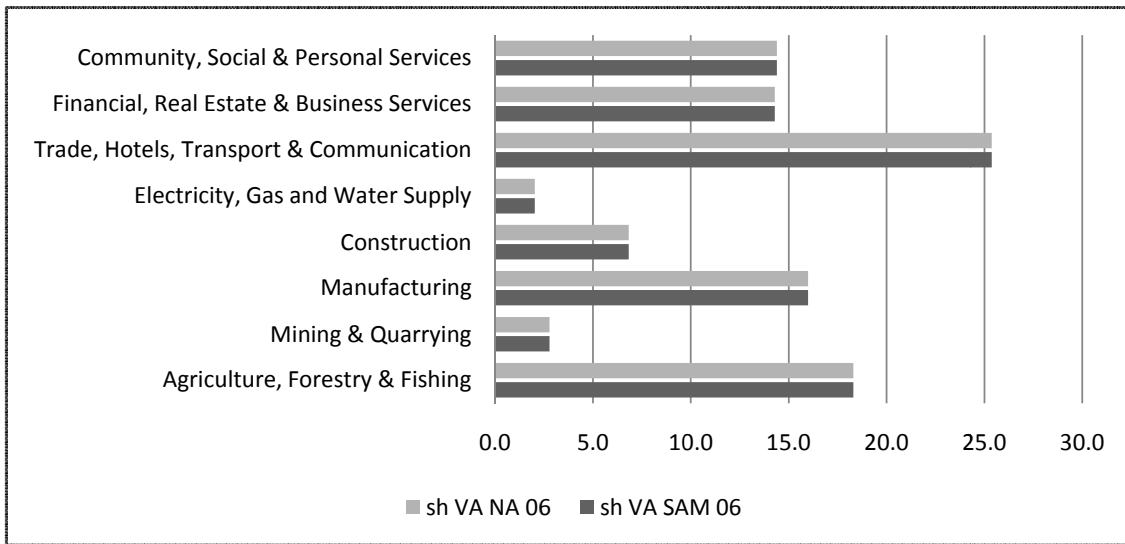
The desirable characteristic of the exact or close correspondence between national account data and estimates generated by the SAM has been preserved in SAM 2006.

Activity Level Endogeneity Degree and Linkages

The representation of economic structure of an economy as contained in a SAM is best understood by assessing the activity level endogeneity degree and backward linkage. To proceed with the analysis of multipliers and linkages it is necessary to calculate the matrix of technology coefficients (e.g. Leontief I-O technology coefficients). The inverse of the coefficient matrix after deducting for the identity matrix represents the so-called matrix of production multipliers.

The backward linkages, which are the total column sum of the inverse, provide valuable information about the degree of integration of an activity across and with the rest of the economy. Using this indicator it is possible to determine which activities contribute most to growth as a result of an exogenous increase in final demand, say exports. Forward linkages on the other hand help us to understand the importance of a commodity for the rest of the economy in terms of intermediate demand or marketing. Therefore a commodity that exhibits high forward linkages it is said to be important in the process of expansion or high growth, in this context potential bottleneck can be identified.

List of activities with highest backward linkages are shown in table below.

Table 17: Ten Economic Activities with the Highest Backward Linkage SAM 06

C ode	Activity	Endogeneity Degree	Backward Linkages	Forward Linkages
34	Leather products	0.684	2.660	2.307
47	Non-ferrous basic metals	0.739	2.448	3.135
52	Electronic equipments(incl.TV)	0.683	2.333	1.093
46	Iron & steel	0.728	2.328	4.805
28	W ool synthetic, silk fiber textiles	0.728	2.327	1.186
23	Khandsari, boora	0.861	2.311	1.012
24	Edible & Vanaspati	0.869	2.305	1.032
51	Communication equipments	0.681	2.289	1.254
22	Sugar	0.842	2.286	1.041
55	Other transport equipments	0.656	2.281	1.113

- The activities with backward linkages over 2.2 are Leather Products, Metal Products, Iron and steel etc. In economic terms these are the activities to be incentivized if fast growth is a strategy. However, due consideration has to be given to the importance of the sector in the total economy. In our case the activities that show high backward linkages are not surprisingly by and large coincide with the endogeneity degree but the order is not the same.

- The highest degree of endogeneity, 65% and higher is observed for several manufacturing commodities and some primary activities. The finding seems to support the thesis that manufacturing of primary activities with high input structure tend to have higher backward linkages.

- Activities with higher (highest) backward linkages usually are associated with lower (lowest) forward linkages. Except for few activities, such inverse associations between the backward and forward linkages are also found in the case of SAM 2006.

Table below shows the list of activities with lowest backward linkages.

Table 18: Ten Economic Activities with the Lowest Backward Linkage SAM 06

C ode	Activity	Endogeneity Degree	Backward Linkages	Forward Linkages
73	Public administration	0.017	1.033	1.048
69	Ownership of dwellings	0.062	1.131	1.001
19	Crude petroleum, natural gas	0.100	1.165	7.908
70	Education and research	0.106	1.171	1.043
16	Forestry and logging	0.100	1.180	1.309
17	Fishing	0.132	1.227	1.029
9	Tea & coffee	0.160	1.273	1.039
65	Trade	0.189	1.294	8.145
67	Banking	0.194	1.296	5.488
64	Communication	0.195	1.367	2.372

- It is important to note that activities with relatively low backward linkages are associated with low endogeneity degrees. Relatively low backward linkages for these activities may be due to their heavy reliance of imported raw material or higher payments to the primary factors.

- At the other end it is also interesting to see that mainly service activities as well as nature based activities (e.g. forestry, crude petroleum etc.) are the one showing the lowest endogeneity degree. In most economies services are indeed poorly linked with the rest of the economy; therefore this is not surprising in the case of India.

- As mentioned above, due to observed changes in demand and supply compositions of 2006 compared to 2004 compositions suggest that intermediate use and demand of SAM 06 would vary from the intermediate use and demand reported in SAM 04. These variations are captured by variations in endogeneity degrees and linkages of SAM 06 compared to SAM 04. The list of activities with highest and lowest backward linkages of SAM 04 is reported in Table 19.

Table 19: Ten Economic Activities with the Highest and Lowest Backward Linkage SAM 04

C ode	Activity	Endogeneity Degree	Backward Linkages	Forward Linkages
Activities with Highest Backward Linkages				
52	Electronic equipments(incl.TV)	0.770	2.681	1.059
42	Paints, varnishes and lacquers	0.744	2.581	1.301
47	Non-ferrous basic metals	0.756	2.561	2.885
28	W wool synthetic, silk fiber textiles	0.746	2.553	1.450
40	Fertilizers	0.819	2.540	2.252
46	Iron & steel	0.733	2.532	5.200
51	Communication equipments	0.695	2.515	1.308
37	Coal tar products	0.883	2.468	1.513
54	Rail equipments	0.646	2.456	1.257
24	Edible & Vanaspati	0.880	2.447	1.232
Activities with Lowest Backward Linkages				
9	Tea & coffee	0.143	1.254	1.049
17	Fishing	0.130	1.250	1.047

C ode	Activity	Endogeneity Degree	Backward Linkages	Forward Linkages
19	Crude petroleum, natural gas	0.119	1.236	4.073
70	Education and research	0.127	1.225	1.008
11	Tobacco	0.103	1.220	1.040
13	Milk and milk products	0.142	1.207	1.168
10	Rubber	0.094	1.205	1.114
16	Forestry and logging	0.089	1.177	1.433
69	Ownership of dwellings	0.070	1.145	1.000
73	Public administration	0.000	1.000	1.000

Household Receipt and Outlay Profiles

Household classifications contained in SAM 2006 are based on classifications adopted in SAM 2004 developed by Ojha et al. Household classifications of Ojha SAM were based on NSSO (2001) data (please see NSSO 2000-01, pp A-20). Since the income and outlay profiles of the nine representative household groups captured in the Ojha SAM are based on NSSO, they represent profiles of the all household groups of the country. Since the household accounts of SAM 06 adhere to the classifications and profiles of Ojha SAM 04 and close or exact correspondence between the household profiles of these two SAMs envisaged that SAM 06 satisfactorily represent the household profiles of India. Income and outlay profiles of SAM 06 are provided in Table 20 and Table 21 respectively.

Table 20: Household Income Profile

(In percent)

Household Groups	Labour Unskilled	Labour Skilled	Labour (Unskilled + Skilled)	Capital	Land	Transfer Gov.	Remittance	Total Income
Income Profile SAM 2006								
Rural non-ag. self employed	4.4	11.8	8.3	13.1	0.0	11.1	3.5	9.3
Rural agricultural labour	24.4	8.3	16.0	0.0	0.0	7.6	4.4	9.6
Rural other labour	6.9	3.3	5.0	0.6	0.0	1.8	0.4	3.1
Rural ag. self employed	19.7	8.7	13.9	32.9	100.0	29.6	6.9	24.9
Rural other households	3.8	3.2	3.5	19.9	0.0	9.2	11.2	8.6
Urban self employed	10.7	9.7	10.2	21.7	0.0	14.5	28.9	13.8
Urban salaried class	17.8	53.5	36.5	3.0	0.0	21.5	23.1	23.7
Urban casual labour	10.2	0.8	5.3	1.5	0.0	1.3	1.2	3.4
Urban other households	2.0	0.6	1.3	7.2	0.0	3.4	20.3	3.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Income Profile OJHA SAM 2004								
Rural non-ag. self employed			8.3	13.2	0.0	11.1	3.5	9.2
Rural agricultural labour			16.0	0.1	0.0	7.6	4.4	9.6
Rural other labour			5.0	0.6	0.0	1.8	0.4	3.0
Rural ag. self employed			13.9	32.4	100.0	29.6	6.9	24.5
Rural other households			3.5	19.3	0.0	9.2	11.2	8.4
Urban self employed			10.2	21.4	0.0	14.5	28.9	13.9
Urban salaried class			36.5	4.6	0.0	21.5	23.1	24.1
Urban casual labour			5.3	1.5	0.0	1.3	1.2	3.4
Urban other households			1.3	6.9	0.0	3.4	20.3	3.8
Total			100.0	100.0	100.0	100.0	100.0	100.0

- Household income profiles of SAM 06 closely correspondence the household income profiles of SAM 04 and hence NSSO profiles. Almost 37 percent of labour income accrues to unban salaried class followed by rural agricultural labour household (16 percent) and rural agricultural self-employed households.

- Almost 68 percent of capital income (i.e. mixed income) accrues to the three self-employed household groups namely rural agricultural self-employed (33 percent); urban self-employed (22 percent); and rural non-agricultural self-employed (13 percent). These three household groups are closely followed by two other household groups receiving around 27 percent capital income. Remaining 5 percent of capital income is thus shared by other four labour household groups.

- Around 60 percent of the government transfers are received by the rural household groups. Two major beneficial rural households are rural agricultural self-employed (30 percent) and rural non-agricultural self-employed (11 percent).

- Foreign remittances are received predominantly by three urban household groups namely urban self-employed (29 percent); urban salaried class (23 percent); and urban other households (20 percent). Together they receive more than 72 percent of foreign remittance. Among rural household major remittance recipients are rural other households and rural agricultural self-employed groups.

Table 21: Household Outlay Profile

(In percent)

Household Groups	SAM 06			OJHA SAM 04			
	Consumption	Direct Tax	Savings	Consumption	Direct Tax	Savings	Tax on Purchase
Rural non-ag. self employed	7.9	2.8	13.5	7.9	2.8	13.4	7.8
Rural agricultural labour	13.0		2.1	13.0		1.9	12.7
Rural other labour	4.2		0.9	4.2		0.4	4.1
Rural ag. self employed	24.8	32.1	24.2	24.8	32.1	22.6	24.6
Rural other households	8.3	11.0	8.9	8.3	11.0	8.3	8.4
Urban self employed	13.6		15.9	13.5		16.7	13.6
Urban salaried class	21.3	18.4	30.3	21.2	18.4	32.3	21.6
Urban casual labour	3.2	30.8	1.3	3.2	30.8	0.6	3.2
Urban other households	3.8	4.9	3.3	3.8	4.9	3.9	3.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Consumption Pattern

The basic needs (BN) classification is introduced to capture the situation of the household groups in terms of those wants which characterizes their well being situation. For reasons of importance 10 types of wants have been distinguished. The household consumption matrix of SAM 06 has been re-classified by 10 basic needs using a mapping between 73 SAM commodity classification and 10 basic needs classification (please see Table 23). The consumption by basic needs categories and by nine household groups is shown in figure below.

Figure 2: Consumption Pattern by Basic Needs and Household Groups
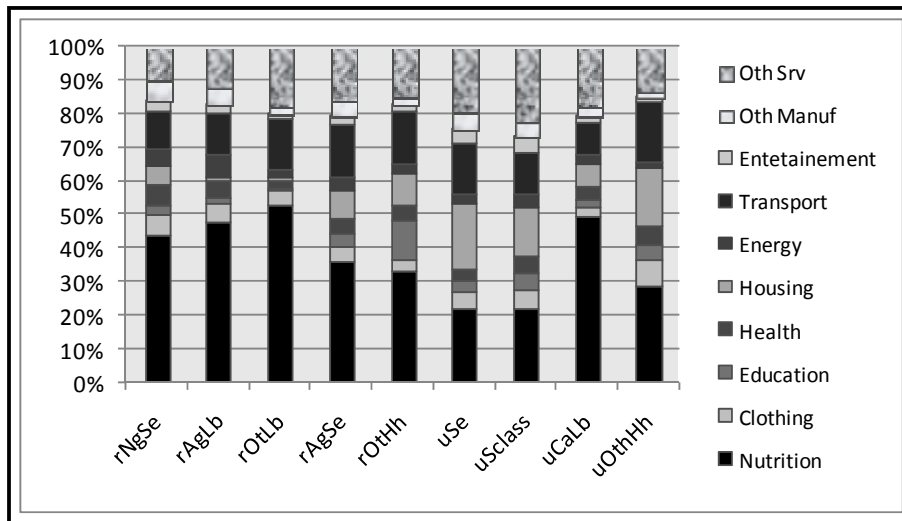
- On average, households in India spent around 33 percent of their resources on nutrition. Income spent by rural household nutrition is almost double (i.e. 40 percent) than that spent by their urban counter part (25 percent).

- Out of five rural households, three households have found to spend more than 40 of their income on nutrition. They are: rural agricultural other labour (52 percent); rural agricultural labour (48 percent); and rural non-agricultural self-employed (44 percent). Out of four urban households, two households have spent more than 25 of their income on nutrition. They are: urban casual labour (49 percent); and urban other household (29 percent).

- On average, households in India spent around 10 percent of their resources on housing. There may be some under estimation of housing expenditure as imputed values for owner occupied houses are usually under-valued. However, expenditures on housing by urban household groups (i.e. 16 percent) are significantly higher than the expenditures reported by their rural counterparts (i.e. 6 percent).

- Household in India on average spent 14 percent of their total incomes on transport services. Significant differences have not been observed between transport expenditure patterns of rural and urban household groups.

- Another basic needs on which household in India on average spent around 17 percent of their total incomes is other services (i.e. this is mixed category inclusive of various types of services). In line with acceptation, expenditures on other services by urban household groups (i.e. 21 percent) are significantly higher than the expenditures reported by their rural counterparts (i.e. 15 percent).

Annex 1: Endogeneity Degree and Linkages

Table 22: Endogeneity Degree and Backward Linkages

	Activity	SAM 2006		SAM 2004	
		Endogeneity Degree	Backward Linkage	Endogeneity Degree	Backward Linkage
1	Paddy	0.341	1.583	0.312	1.611
2	Wheat	0.384	1.674	0.352	1.709
3	other cereals	0.343	1.619	0.313	1.673
4	Pulses	0.325	1.576	0.297	1.608
5	Sugarcane	0.331	1.565	0.177	1.339
6	Oilseeds	0.273	1.496	0.248	1.515
7	Jute	0.214	1.388	0.193	1.411
8	Cotton	0.266	1.491	0.241	1.513
9	Tea & coffee	0.160	1.273	0.143	1.254
10	Rubber	0.249	1.468	0.094	1.205
11	Tobacco	0.290	1.527	0.103	1.220
12	Other crops	0.207	1.368	0.139	1.291
13	Milk and milk products	0.357	1.518	0.142	1.207
14	Animal services(agricultural)	0.935	2.281	0.995	2.396
15	Other livestock products	0.302	1.441	0.276	1.409
16	Forestry and logging	0.100	1.180	0.089	1.177
17	Fishing	0.132	1.227	0.130	1.250
18	Coal and lignite	0.215	1.386	0.249	1.500
19	Crude petroleum, natural gas	0.100	1.165	0.119	1.236
20	Iron ore	0.220	1.387	0.255	1.506
21	Other Minerals	0.218	1.380	0.150	1.293
22	Sugar	0.842	2.286	0.864	2.212
23	Khandsari, boora	0.861	2.311	0.897	2.270
24	Edible & Vanaspati	0.869	2.305	0.880	2.447
25	Misc food products	0.801	2.239	0.816	2.342
26	Beverages & tobacco products	0.656	2.181	0.560	1.972
27	Cotton textiles	0.719	2.189	0.741	2.341
28	Wool synthetic, silk fiber textiles	0.728	2.327	0.746	2.553
29	Jute, hemp, mesta textiles	0.600	1.937	0.626	2.099
30	Textile products	0.629	2.176	0.653	2.350
31	Furniture and wood products	0.585	1.922	0.464	1.751
32	Paper, paper prods. & newsprint	0.535	1.879	0.705	2.404
33	Printing and publishing	0.521	1.936	0.465	1.968
34	Leather products	0.684	2.660	0.706	2.363
35	Rubber and plastic products	0.660	2.064	0.683	2.316
36	Petroleum products	0.673	1.786	0.688	1.893
37	Coal tar products	0.872	2.247	0.883	2.468
38	Inorganic heavy chemicals	0.632	2.128	0.655	2.327
39	Organic heavy chemicals	0.630	2.132	0.650	2.362
40	Fertilizers	0.800	2.081	0.819	2.540
41	Pesticides	0.630	2.183	0.654	2.398

	Activity	SAM 2006		SAM 2004	
		Endogeneity Degree	Backward Linkage	Endogeneity Degree	Backward Linkage
42	Paints, varnishes and lacquers	0.729	2.256	0.744	2.581
43	Misc chemicals	0.580	1.927	0.600	2.136
44	Cement	0.683	2.035	0.706	2.214
45	Other non metallic mineral products	0.564	1.939	0.589	2.046
46	Iron & steel	0.728	2.328	0.733	2.532
47	Non-ferrous basic metals	0.739	2.448	0.756	2.561
48	Metal products	0.601	2.210	0.622	2.360
49	Other non electric machinery	0.639	2.279	0.658	2.435
50	Electrical appliances	0.605	2.156	0.625	2.349
51	Communication equipments	0.681	2.289	0.695	2.515
52	Electronic equipments(incl.TV)	0.683	2.333	0.770	2.681
53	Other electrical Machinery	0.613	2.182	0.634	2.374
54	Rail equipments	0.622	2.277	0.646	2.456
55	Other transport equipments	0.656	2.281	0.673	2.411
56	Misc Manufacturing	0.590	2.177	0.604	2.341
57	Construction	0.600	2.095	0.549	2.066
58	Electricity	0.381	1.528	0.645	2.180
59	Gas	0.387	1.562	0.182	1.277
60	Water supply	0.355	1.610	0.364	1.713
61	Railway transport services	0.421	1.710	0.469	1.943
62	Other transport services	0.319	1.554	0.544	2.018
63	Storage and warehousing	0.286	1.468	0.416	1.802
64	Communication	0.195	1.367	0.223	1.451
65	Trade	0.189	1.294	0.222	1.391
66	Hotels and restaurants	0.626	2.121	0.671	2.150
67	Banking	0.194	1.296	0.215	1.353
68	Insurance	0.236	1.385	0.301	1.532
69	Ownership of dwellings	0.062	1.131	0.070	1.145
70	Education and research	0.106	1.171	0.127	1.225
71	Medical and health	0.471	1.897	0.701	2.261
72	Other services	0.729	2.259	0.266	1.540
73	Public administration	0.017	1.033	0.000	1.000

Table 23: Mapping between SAM Commodity Classification and Basic Needs Classification

Nutrition	Clothing	Education	Health	Housing	Energy	Transport	Entertainment	Other Manufacture	Other Service
Paddy									
Wheat									
Other cereals									
Pulses									
Sugarcane									
Oilseeds									
	Jute								
	Cotton								
Teacoffee									
	Rubber								
Tobacco									
Other crops									
Milk products									
									Animal services
Other livestock products									
					Forestry				
Fishing									
					Coal				
					Crude petroleum natural gas				
								Iron	
								Other Minerals	
Sugar									
Khandsari									
EdibleVanaspati									
Misc food prod									
Bev tobacco									
	Cotton text								
	W wool text								
	Jute text								
	Textile prod								
								Furniture wood products	
								Paper	
								Printing	
	Leather prod								
	Rubber prod								
					Petroleum products				
					Coal tar products				
								Inorganic heavy chemicals	
								Organic heavy chemicals	
								Fertilizers	
								Pesticides	
								Paints	
								Mis chemicals	
								Cement	
								Other non metallic mineral products	
								Ironsteel	
								Nonferrous basic metals	
								Metal products	
								Other non electric machinery	
								Electrical appliances	
								Communication equipments	
								Electronic equipments	
								Other electrical	

Nutrition	Clothing	Education	Health	Housing	Energy	Transport	Entertainment	Other Manufacture	Other Service
								Machinery	
								Rail equipments	
								Other transport equipments	
								Misc Manufacturing	
								Construction	
					Electricity				
					Gas				
					Water supply				
						Railway transport services			
						Other transport services			
									Storage
									Communication
									Trade
							Hotels		
									Banking
									Insurance
				Ownership dwellings					
		Education							
			Health						
									Other serv
									Public admin
21	**6**	**1**	**1**	**1**	**8**	**2**	**1**	**25**	**7**

ANNEX 2

EQUATIONS OF THE INDIA DYNAMIC CGE MODEL

Production

(1) $\quad XS_j = Min\left[\dfrac{CI_j}{io_j}, \dfrac{VA_j}{v_j}\right]$

(2) $\quad VA_i = A_i^{KL}\left[\alpha_i^{KL}LD_i^{-\rho_i^{KL}} + \left(1 - \alpha_i^{KL}\right)KD_i^{-\rho_i^{KL}}\right]^{-1/\rho_i^{KL}}$

(3) $\quad LD_i = A_i^{LL}\left[\alpha_i^{LL}QL_i^{-\rho_i^{LL}} + \left(1 - \alpha_i^{LL}\right)NQL_i^{-\rho_i^{LL}}\right]^{-1/\rho_i^{LL}}$

(4) $\quad CI_j = io_j XS_j$

(5) $\quad DI_{i,j} = aij_{i,j}CI_j$

(6) $\quad LD_i = \left(\dfrac{\alpha_i^{KL}}{1 - \alpha_i^{KL}}\right)^{\sigma_i^{KL}}\left(\dfrac{r_i}{w_i}\right)^{\sigma_i^{KL}}KD_i$

(7) $\quad NQL_i = \left(\dfrac{\alpha_i^{LL}}{1 - \alpha_i^{LL}}\right)^{\sigma_i^{LL}}\left(\dfrac{wq}{wnq}\right)^{\sigma_i^{LL}}QL_i$

Income and savings

(8)
$$YH_h = \lambda_h^{WQ} \cdot wq\sum_j QL_j + \lambda_h^{WNQ} \cdot wnq\sum_j NQL_j + \lambda_h^R\sum_{nag} r_{nag}KD_{nag}$$
$$+\lambda_h^L \cdot \sum_{ag} r_{ag}KD_{ag} + Pindex \cdot TG_h + Pindex \cdot TH_{h,hj} + Pindex \cdot TWH_h + DIV_h$$

(9) $\quad YDH_h = YH_h - DTH_h$

(10) $\quad SH_h = \nu \cdot \psi_h \cdot YDH_h$

(11) $\quad YF = \lambda^{RF}\sum_i r_i KD_i + \lambda^{LF} \cdot rl \cdot LAND$

(12) $\quad SF = YF - \sum_h DIV_h - e \cdot DIV^{ROW} - DTF$

(13) $\quad YG = \sum_i TI_i + \sum_i TIE_i + \sum_i TIM_i + \sum_h DTH_h + DTF$

(14) $\quad SG = YG - G - PINDEX\sum_h TG_h$

(15) $\quad TI_i = tx_i\left(P_i XS_i - PE_i EX_i\right) + tx_i\left(1 + tm_i\right) e\, PWM_i M_i$

(16) $\quad TIM_i = tm_i e\, PWM_i M_i$

(17) $\quad TIE_i = te_i PE_i EX_i$

(18) $\quad DTH_h = tyh_h YH_h$

(19) $\quad DTF = tyf \cdot YF$

Demand

(20) $CTH_h = YDH_h - SH_h$

(21) $PC_iC_{i,h} = PC_iC_{i,h}^{\min} + \gamma_{i,h}\left(CTH_h - \sum_j PC_jC_{j,h}^{\min}\right)$

(22) $G = CG_{ser}PC_{ser}$

(23) $INV_i = \dfrac{\mu_i IT}{PC_i}$

(24) $DIT_i = \sum_j DI_j$

Prices

(25) $PV_j = \dfrac{P_jXS_j - \sum_i PC_iDI_{i,j}}{VA_j}$

(26) $r_i = \dfrac{PV_iVA_i - w_iLD_i}{KD_i}$

(27) $w_i = \dfrac{wq \cdot QL_i - wnq \cdot NQL_i}{LD_i}$

(28) $PD_i = (1 + tx_i)\ PL_i$

(29) $PM_i = (1 + tx_i)\ (1 + tm_i)\ e \cdot PWM_i$

(30) $PE_i = \dfrac{e \cdot PE\_FOB_i}{1 + te_i}$

(31) $PC_iQ_i = PD_iD_i + PM_iM_i$

(32) $P_iXS_i = PL_iD_i + PE_iEX_i$

(33) $Pinv = \prod_i\left(\dfrac{PC_i}{\mu_i}\right)^{\mu_i}$

(34) $Pindex = \sum_i \delta_iPV_i$

International Trade

(35) $XS_i = B_i^E\left[\beta_i^E EX_i^{\kappa_i^E} + \left(1 - \beta_i^E\right)\ D_i^{\kappa_i^E}\right]^{\frac{1}{\kappa_i^E}}$

(36) $EX_i = \left[\left(\dfrac{PE_i}{PL_i}\right)\left(\dfrac{1 - \beta_i^E}{\beta_i^E}\right)\right]^{\tau_i^E} D_i$

(37) $EXD_i = EXD_i^o \cdot \left(\dfrac{PWE_i}{PE\_FOB_i}\right)^{elast_i}$

(38) $Q_i = A_i^M\left[\alpha_i^M M_i^{-\rho_i^M} + \left(1 - \alpha_i^M\right)D_i^{-\rho_i^M}\right]^{\frac{-1}{\rho_i^M}}$

(39) $M_i = \left[\left(\dfrac{PD_i}{PM_i}\right)\left(\dfrac{\alpha_i^M}{1 - \alpha_i^M}\right)\right]^{\sigma_i^M} D_i$

(40) $CAB = \sum_i PWM_iM_i + \lambda^{ROW}\sum_i r_iKD_i \Big/ e$
$+ DIV^{ROW} - \sum_i PE\_FOB_iEX_i$

Equilibrium

(41) $Q_i = DIT_i + \sum_h C_{i,h} + INV_i + Dstk_i$

(42) $EX_i = EXD_i$

(43) $LSQ = \sum_j QL_j$

(44) $LSNQ = \sum_j NQL_j$

(45) $IT + \sum_i PC_i Dstk_i = \sum_h SH_h + SF + SG + e \cdot CAB$

Dynamic Equations

(46) $KD_{i,t+1} = (1-\delta) KD_{i,t} + Ind_{i,t}$

(47) $LSQ_{t+1} = (1+ng) \cdot LSQ_t$

(48) $LSNQ_{t+1} = (1+ng) \cdot NQL_t$

(49) $C^{\min}_{i,h,\ t+1} = (1+ng) \cdot C^{\min}_{i,h\ ,t}$

(50) $\dfrac{In\, d_{\,i,t}}{K\,D_{\,i,t}} = A_i^{IK} \cdot \left(\dfrac{R_{\,i,t}}{U_{\,i,t}} \right)^2$

(51) $U_{i,t} = Pinv_t \cdot (ir + \delta_i)$

(52) $IT_t = Pinv_t \cdot \sum_i Ind_{i,t}$

(53) $SG_{t+1} = (1+ng) \cdot SG_t$

(54) $CAB_{t+1} = (1+ng) \cdot CAB_t$

(55) $TG_{t+1} = (1+ng) \cdot TG_t$

(56) $CG_{t+1} = (1+ng) \cdot CG_t$

(57) $Dstk_{t+1} = (1+ng) \cdot Dstk_t$

(58) $DIV_{t+1} = (1+ng) \cdot DIV_t$

(59) $DIV\_ROW_{t+1} = (1+ng) \cdot DIV\_ROW_t$

(60) $TWH_{t+1} = (1+ng) \cdot TWH_t$

(61) $TH_{h,hj,t+1} = (1+ng) \cdot TH_{h,hj,t}$

(62) $EXD^o_{t+1} = (1+ng) \cdot EXD^o_t$

Endogenous variables

$C_{i,h}$:		Household *h*'s consumption of good *i* (volume)
CF :		Composite agricultural capital-labor factor (volume)
CI_j :		Total intermediate consumption of activity *j* (volume)
CTH_h :		Household *h*'s total consumption (value)
D_i :		Demand for domestic good *i* (volume)
$DI_{i,j}$:		Intermediate consumption of good *i* in activity *j* (volume)
DIT_i :		Intermediate demand for good *i* (volume)
DTF :		Receipts from direct taxation on firms' income
DTH_h :		Receipts from direct taxation on household *h*'s income
EX_i :		Exports in good *i* (volume)
G :		Public expenditures
INV_i :		Investment demand for good *i* (volume)
IT :		Total investment
LD_j :		Activity *j* demand for labor (volume)
M_i :		Imports in good *i* (volume)
P_i :		Producer price of good *i*
PC_i :		Consumer price of composite good *i*
PD_i :		Domestic price of good *i* including taxes
PE_i :		Domestic price of exported good *i*
$Pindex$:		GDP deflator
$Pinv$:		Price index of investment
PL_i :		Domestic price of good *i* (excluding taxes)
PM_i :		Domestic price of imported good *i*
PV_j :		Value added price for activity *j*
Q_i :		Demand for composite good *i* (volume)
r_i :		Rate of return to capital in activity *i*
rl :		Rate of return to agricultural land
rc :		Rate of return to composite factor
SF :		Firms' savings
SG :		Government's savings
SH_h :		Household *h*'s savings
TI_i :		Receipts from indirect tax on *i*
TIE_i :		Receipts from tax on export *i*
TIM_i :		Receipts from import duties *i*
VA_j :		Value added for activity *j* (volume)
w :		Wage rate
XS_i :		Output of activity *i* (volume)
YDH_h :		Household *h*'s disposable income
YF :		Firms' income
YG :		Government's income
YH_h :		Household *h*'s income
LS :		Total labor supply (volume)
KD_i :		Demand for capital in activity *i* (volume)
CAB :		Current account balance
$Ind_{i,t}$:		Demand for capital in activity *i* (volume)

U_t :   Capital user cost
$C_{i,h}^{\min}$:   Minimum consumption of good *i* by household *h*

Exogenous variables

PWE_i :   World price of export *i*
PWM_i :   World price of import *I*
e :   Nominal Exchange rate (numéraire)

Parameters

Production functions
A_j :   Scale coefficient (Cobb-Douglas production function)
$aij_{i,j}$:   Input-output coefficient
α_j :   Elasticity (Cobb-Douglas production function)
io_j :   Technical coefficient (Leontief production function)
v_j :   Technical coefficient (Leontief production function)

CES function between capital and labor
A_i^{KL} :   Scale coefficient
α_i^{KL} : Share parameter
ρ_i^{KL} :   Substitution parameter
σ_i^{KL} : Substitution elasticity

CES function between skilled and unskilled labor

A_i^{LL} :   Scale coefficient
α_i^{LL} : Share parameter
ρ_i^{LL} :   Substitution parameter
σ_i^{LL} : Substitution elasticity

CES function between imports and domestic production

A_i^{M} :   Scale coefficient
α_i^{M} : Share parameter
ρ_i^{M} :   Substitution parameter
σ_i^{M} : Substitution elasticity

CET function between domestic production and exports
B_i^{E} :   Scale coefficient
β_i^{E} :   Share parameter
κ_i^{E} : Transformation parameter
τ_i^{E} :   Transformation elasticity

LES consumption function

$\gamma_{i,h}$:   Marginal share of good *i*

Tax rates

te_i :   Tax on exports *i*
tm_i :   Import duties on good *i*
tx_i :   Tax rate on good *i*
tyh_h :   Direct tax rate on household *h*'s income
tyf :   Direct tax rate on firms' income

Other parameters

δ_j :   Share of activity *j* in total value added
λ_h^L :   Share of land income received by household *h*
λ^{LF} :   Share of land income received by firms
λ^{LROW} :   Share of land income received by foreigners
λ_h^R :   Share of capital income received by household *h*
λ^{RF} :   Share of capital income received by firms
λ^{ROW} :   Share of capital income received by foreigners
λ_h^W :   Share of labour income received by household *h*
ψ_h :   Propensity to save
μ_i :   Share of the value of good *i* in total investment
ng :   Population growth rate
δ :   Capital depreciation rate
γ_{1i} :   Parameter in the investment demand function
γ_{2i} :   Parameter in the investment demand function
ir :   Real interest rate

ANNEX 3

DETAILED RESULTS OF AGRICULTURAL LIBERALISATION

Table : Percentage Changes in Prices from the BaU Path

	PM		PD		PV		PX		PQ		PE_FOB	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	0.29	0.29	0.10	-0.03	0.26	0.09	0.18	0.05	0.20	0.06	1.71	1.68
Wheat	-0.57	-0.57	0.06	-0.08	0.30	0.09	0.18	0.04	0.15	0.01	2.69	2.67
Oilseeds	-0.49	-0.49	0.04	-0.06	0.23	0.09	0.15	0.05	0.14	0.03	0.93	0.91
Cotton	0.00	0.00	0.14	0.03	0.26	0.11	0.16	0.06	0.23	0.12	0.96	0.94
Other agriculture	-0.43	-0.43	0.10	0.04	0.17	0.09	0.12	0.06	0.18	0.12	0.59	0.58
Livestock	-0.73	-0.73	0.17	0.10	0.16	0.09	0.17	0.10	0.27	0.19	0.29	0.28
Forestry and logging	-1.47	-1.47	0.02	0.07	0.03	0.09	0.03	0.09	-0.11	-0.07	0.33	0.34
Fishing	-1.46	-1.46	0.13	0.01	0.22	0.09	0.19	0.08	0.22	0.09	0.43	0.41
Minerals	-1.58	-1.58	-0.74	0.06	-0.92	-0.13	-0.77	-0.12	-1.27	-1.08	-0.86	-0.65
Sugar	-3.00	-3.00	0.17	0.10	0.09	0.09	0.17	0.11	0.15	0.09	0.29	0.28
Misc Food	-4.00	-4.00	0.05	0.00	0.08	0.09	0.08	0.03	-0.02	-0.07	0.67	0.66
Cotton textiles	0.21	0.21	0.16	0.05	0.28	0.12	0.19	0.09	0.26	0.15	0.28	0.25
Other textiles	0.10	0.10	0.09	-0.08	0.29	0.13	0.17	0.08	0.19	0.06	0.25	0.21
Leather products	0.10	0.10	0.26	0.18	0.17	0.10	0.26	0.19	0.34	0.26	0.25	0.23
Misc chemicals	0.04	0.04	-0.46	-0.37	0.16	0.09	-0.55	-0.48	-0.26	-0.19	-0.79	-0.77
Cement	0.00	0.00	-0.21	-0.22	0.18	0.10	-0.22	-0.22	-0.12	-0.12	-0.36	-0.35
Metal products	0.08	0.08	-0.07	-0.12	0.28	0.10	-0.06	-0.10	0.07	0.03	0.03	0.02
Machinery	0.05	0.05	0.07	0.01	0.18	0.09	0.08	0.03	0.16	0.12	0.15	0.14
Electrical appliances	0.10	0.10	0.02	-0.08	0.28	0.11	0.05	-0.01	0.15	0.09	0.11	0.09
Electronic equipments	0.10	0.10	0.13	0.09	0.13	0.10	0.13	0.09	0.22	0.18	0.14	0.13
Misc Manufacturing	0.07	0.07	0.01	-0.08	0.27	0.11	0.06	-0.01	0.13	0.07	0.14	0.12
Construction	0.00	0.00	0.11	0.05	0.17	0.08	0.11	0.05	0.20	0.14	0.00	0.00
Utility	0.00	0.00	-0.13	-0.15	0.18	0.08	-0.13	-0.15	-0.03	-0.06	0.00	0.00
Other transport services	0.04	0.04	0.10	0.03	0.17	0.09	0.09	0.04	0.18	0.13	0.08	0.07
Communication	0.02	0.02	0.17	0.09	0.19	0.10	0.17	0.09	0.26	0.18	0.34	0.32
Hotels and restaurants	0.07	0.07	0.09	0.00	0.22	0.10	0.12	0.04	0.18	0.10	0.26	0.24
Insurance	0.01	0.01	0.16	0.08	0.19	0.10	0.17	0.10	0.24	0.16	0.37	0.36
Other services	0.02	0.02	0.16	0.04	0.22	0.11	0.21	0.11	0.23	0.13	0.35	0.33
Misc services	0.00	0.00	0.15	0.06	0.20	0.10	0.16	0.08	0.25	0.15	0.35	0.34

Note: PD = Domestic goods price, PV=Value-added price, PX=Aggregate output price, PQ=Price of composite goods, PE_FOB=FOB export price.

Source: Authors' calculations, based on simulation results.

Table: Percentage Changes in Volumes from the BaU Path

	M		X		E		Q		D	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	-0.28	-0.48	0.17	0.16	3.24	3.45	0.01	0.00	0.01	0.00
Wheat	0.95	0.72	0.24	0.23	5.34	5.58	0.00	-0.01	0.00	-0.01
Oilseeds	0.70	0.53	0.11	0.11	1.68	1.85	-0.10	-0.11	-0.10	-0.11
Cotton	0.00	0.00	0.15	0.25	1.76	2.03	0.10	0.20	0.10	0.20
Other agriculture	0.75	0.64	-0.02	-0.03	0.92	1.02	-0.03	-0.04	-0.05	-0.06
Livestock	1.32	1.20	-0.04	-0.05	0.19	0.30	-0.04	-0.05	-0.04	-0.05
Forestry and logging	1.96	2.01	-0.28	-0.31	0.31	0.20	0.02	0.01	-0.31	-0.34
Fishing	2.42	2.22	0.08	0.11	0.57	0.77	-0.01	-0.02	-0.02	-0.03
Minerals	0.35	0.61	-1.00	-2.22	-1.18	-3.25	0.02	-0.03	-0.93	-1.86
Sugar	4.74	4.62	-0.17	-0.18	0.07	0.16	-0.02	-0.04	-0.18	-0.20
Misc Food	6.13	6.04	-0.19	-0.20	0.99	1.06	0.00	-0.02	-0.25	-0.26
Cotton textiles	0.02	-0.06	0.13	0.26	0.32	0.59	0.08	0.17	0.09	0.18
Other textiles	0.01	-0.16	0.20	0.42	0.35	0.69	0.03	0.05	0.03	0.11
Leather products	0.19	0.16	-0.05	0.05	-0.08	0.13	-0.02	0.05	-0.05	0.04
Misc chemicals	-0.57	-0.48	0.01	-0.08	-0.48	-0.66	0.02	0.01	0.18	0.14
Cement	0.00	0.00	-0.05	-0.11	-0.33	-0.37	-0.04	-0.09	-0.04	-0.09
Metal products	-0.11	-0.15	0.13	0.16	0.31	0.41	0.06	0.06	0.12	0.14
Machinery	0.01	-0.11	0.00	-0.03	0.14	0.20	0.00	-0.08	-0.02	-0.06
Electrical appliances	-0.04	-0.16	0.14	0.24	0.24	0.44	0.02	-0.01	0.07	0.11
Electronic equipments	-0.01	-0.13	-0.06	-0.10	-0.06	-0.01	-0.05	-0.12	-0.06	-0.11
Misc Manufacturing	-0.04	-0.14	0.15	0.24	0.31	0.49	0.01	-0.01	0.05	0.09
Construction	0.00	0.00	-0.04	-0.08	0.00	0.00	-0.04	-0.08	-0.04	-0.08
Utility	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Other transport services	0.06	-0.04	-0.03	-0.01	-0.05	0.05	-0.01	-0.03	-0.02	-0.03
Communication	0.24	0.12	0.02	0.03	0.34	0.50	0.01	0.03	0.01	0.03
Hotels and restaurants	0.02	-0.11	0.05	0.08	0.34	0.49	0.00	-0.01	-0.01	0.00
Insurance	0.20	0.08	0.00	0.02	0.39	0.54	0.00	-0.01	-0.02	-0.02
Other services	0.17	0.03	0.06	0.14	0.35	0.58	0.01	0.01	-0.04	0.00
Misc services	0.00	0.00	0.02	0.02	0.39	0.54	0.00	-0.01	0.00	-0.01

Note: M =Imports, X=Domestic Output, E=Exports, Q= composite goods, D=Domestic Sales.
Source: Authors' calculations, based on simulation results.

ANNEX 4

DETAILED RESULTS OF NAMA LIBERALISATION

Table: Percentage Changes in Prices from the BaU Path

	PM		PD		PV		PX		PQ		PE_FOB	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	0.27	0.27	-0.94	-0.88	-0.96	-0.90	-0.91	-0.85	-0.74	-0.68	-0.29	-0.29
Wheat	0.16	0.16	-0.95	-0.87	-0.97	-0.90	-0.92	-0.84	-0.74	-0.67	-0.26	-0.25
Oilseeds	0.20	0.20	-0.97	-0.95	-0.90	-0.90	-0.89	-0.87	-0.77	-0.76	-0.25	-0.25
Cotton	0.00	0.00	-0.87	-0.90	-0.83	-0.89	-0.84	-0.87	-0.66	-0.70	0.17	0.15
Other agriculture	0.13	0.13	-0.96	-0.89	-0.97	-0.90	-0.93	-0.87	-0.72	-0.67	-0.20	-0.19
Livestock	0.07	0.07	-0.91	-0.83	-1.00	-0.90	-0.91	-0.83	-0.70	-0.63	-0.17	-0.16
Forestry and logging	0.26	0.26	-0.92	-0.95	-0.87	-0.91	-0.87	-0.90	-0.54	-0.57	-0.11	-0.12
Fishing	0.01	0.01	-1.02	-1.02	-0.86	-0.88	-0.88	-0.89	-0.81	-0.82	-0.22	-0.23
Minerals	0.03	0.03	-0.63	-1.09	-0.43	-0.88	-0.52	-0.88	0.07	-0.06	-0.17	-0.29
Sugar	0.18	0.18	-0.80	-0.76	-0.96	-0.91	-0.77	-0.72	-0.57	-0.53	-0.20	-0.20
Misc Food	-0.16	-0.16	-0.80	-0.77	-0.96	-0.89	-0.77	-0.75	-0.57	-0.55	-0.24	-0.24
Cotton textiles	-2.44	-2.44	-0.85	-0.90	-0.79	-0.91	-0.73	-0.78	-0.75	-0.80	-0.27	-0.29
Other textiles	-2.97	-2.97	-1.37	-1.49	-0.65	-0.87	-0.81	-0.89	-1.54	-1.64	-0.33	-0.36
Leather products	-3.04	-3.04	-1.30	-1.22	-0.94	-0.85	-1.13	-1.07	-1.31	-1.25	-0.38	-0.37
Misc chemicals	-2.57	-2.57	-0.74	-0.60	-1.62	-1.04	-0.64	-0.53	-0.93	-0.83	-0.36	-0.34
Cement	0.00	0.00	-0.71	-0.74	-1.03	-1.02	-0.69	-0.72	-0.51	-0.54	-0.22	-0.23
Metal products	-1.29	-1.29	-0.81	-0.68	-1.42	-0.99	-0.80	-0.68	-0.74	-0.64	-0.71	-0.68
Machinery	-2.91	-2.91	-1.06	-0.87	-1.40	-0.95	-1.05	-0.87	-1.76	-1.67	-0.95	-0.91
Electrical appliances	-3.04	-3.04	-1.07	-0.86	-1.34	-0.97	-0.98	-0.83	-1.74	-1.62	-0.84	-0.79
Electronic equipments	-3.04	-3.04	-1.17	-1.02	-1.42	-1.01	-1.15	-1.01	-1.68	-1.59	-0.87	-0.85
Misc Manufacturing	-2.72	-2.72	-1.16	-1.01	-1.18	-0.94	-0.94	-0.84	-1.58	-1.50	-0.57	-0.54
Construction	0.00	0.00	-0.91	-0.83	-0.95	-0.81	-0.91	-0.83	-0.70	-0.63	0.00	0.00
Utility	0.00	0.00	-0.68	-0.63	-0.91	-0.79	-0.68	-0.63	-0.48	-0.44	0.00	0.00
Other transport services	-0.04	-0.04	-0.99	-1.03	-0.77	-0.87	-0.82	-0.86	-0.61	-0.65	-0.32	-0.34
Communication	-0.06	-0.06	-0.96	-0.95	-0.92	-0.92	-0.96	-0.95	-0.75	-0.75	-0.19	-0.19
Hotels and restaurants	-0.08	-0.08	-0.79	-0.80	-0.83	-0.93	-0.72	-0.72	-0.51	-0.52	-0.35	-0.36
Insurance	-0.11	-0.11	-0.95	-0.96	-0.91	-0.92	-0.90	-0.91	-0.65	-0.67	-0.17	-0.18
Other services	-0.08	-0.08	-0.87	-1.10	-0.64	-0.90	-0.70	-0.89	-0.50	-0.69	-0.18	-0.23
Misc services	0.00	0.00	-0.99	-0.96	-0.97	-0.93	-0.93	-0.90	-0.79	-0.76	-0.18	-0.17

Note: 1. PD = Domestic goods price, PV=Value-added price, PX=Aggregate output price, PQ=Price of composite goods, PE_FOB=FOB export price.
Source: Authors' calculations, based on simulation results.

Table: Percentage Changes in Volumes from the BaU Path

	M		X		E		Q		D	
	2008	2030	2008	2030	2008	2030	2008	2030	2008	2030
Paddy	-1.86	-1.70	0.01	0.08	1.26	1.21	-0.06	0.02	-0.06	0.02
Wheat	-1.73	-1.53	-0.02	0.06	1.31	1.26	-0.08	0.01	-0.08	0.01
Oilseeds	-1.78	-1.68	0.14	0.20	1.42	1.46	-0.03	0.04	-0.03	0.04
Cotton	0.00	0.00	0.26	0.41	2.31	2.49	0.20	0.35	0.20	0.35
Other agriculture	-1.68	-1.50	0.00	0.08	1.49	1.45	-0.10	-0.01	-0.06	0.03
Livestock	-1.55	-1.35	-0.08	0.00	1.41	1.35	-0.09	0.00	-0.09	0.00
Forestry and logging	-1.66	-1.63	0.19	0.28	1.74	1.86	-0.16	-0.09	0.10	0.18
Fishing	-1.63	-1.55	0.20	0.28	1.53	1.61	-0.10	-0.01	-0.09	0.00
Minerals	-0.62	-0.84	0.60	1.28	1.30	2.50	-0.37	-0.41	0.37	0.85
Sugar	-1.54	-1.38	0.00	0.08	1.14	1.13	-0.12	-0.03	-0.07	0.01
Misc Food	-1.03	-0.89	-0.02	0.07	1.07	1.10	-0.11	-0.01	-0.07	0.03
Cotton textiles	2.48	2.60	0.26	0.45	1.20	1.44	0.17	0.36	0.02	0.21
Other textiles	1.95	1.95	0.62	0.88	1.61	1.97	0.05	0.19	-0.52	-0.33
Leather products	2.33	2.47	-0.04	-0.05	1.50	1.38	-0.04	0.00	-0.37	-0.35
Misc chemicals	2.16	2.39	-0.46	-0.51	0.10	-0.13	-0.06	-0.01	-0.66	-0.65
Cement	0.00	0.00	-0.19	-0.11	0.76	0.88	-0.24	-0.16	-0.24	-0.16
Metal products	0.20	0.31	-0.50	-0.62	-0.31	-0.62	-0.33	-0.37	-0.52	-0.62
Machinery	2.17	2.37	-0.66	-0.78	-0.46	-0.86	0.69	0.74	-0.68	-0.77
Electrical appliances	2.34	2.56	-0.52	-0.76	-0.23	-0.68	0.62	0.65	-0.70	-0.81
Electronic equipments	2.46	2.67	-0.41	-0.45	0.15	-0.13	0.65	0.70	-0.44	-0.47
Misc Manufacturing	1.63	1.82	-0.34	-0.45	0.41	0.14	0.18	0.24	-0.77	-0.80
Construction	0.00	0.00	-0.19	-0.12	0.00	0.00	-0.19	-0.12	-0.19	-0.12
Utility	0.00	0.00	-0.07	0.00	0.00	0.00	-0.07	0.00	-0.07	0.00
Other transport services	-1.30	-1.25	0.45	0.57	1.46	1.64	-0.14	-0.03	0.12	0.24
Communication	-1.27	-1.15	0.10	0.20	1.67	1.74	0.07	0.18	0.08	0.19
Hotels and restaurants	-1.00	-0.89	0.22	0.33	0.95	1.06	-0.05	0.07	0.07	0.19
Insurance	-1.24	-1.18	0.12	0.19	1.60	1.68	-0.12	-0.05	0.02	0.09
Other services	-0.99	-1.17	0.53	0.79	1.60	2.13	-0.05	0.04	0.20	0.36
Misc services	0.00	0.00	0.03	0.08	1.56	1.56	-0.09	-0.03	-0.09	-0.03

Note: 1. M =Imports, X=Domestic Output, E=Exports, Q= composite goods, D=Domestic Sales.
Source: Authors' calculations, based on simulation results.

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