# Remittances, trade liberalisation, and poverty in Pakistan: The role of excluded variables in poverty change analysis

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# Remittances, Trade Liberalisation, and Poverty in Pakistan: The Role of Excluded Variables in Poverty Change Analysis

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This paper explores the impact of two shocks, trade liberalisation policies and decline in remittances, on welfare and poverty in Pakistan. It begins by reviewing the economy, which reveals that during the Nineties although import tariffs were reduced by 55 percent, poverty however remained higher in this period than in the Eighties. At the same time, Pakistan has experienced a slow down in the inflow of remittances, which reduces the incomes of households and puts pressure on the exchange rate resulting in reduction in the inflow of imports despite a reduction in import duties. Thus, in the absence of the effects of decline in remittances, the analysis of the impact of trade liberalisation policies may render biased results. This study overcomes this constriction and analyses the impact of trade liberalisation policies in the absence and presence of decline in remittances in a CGE framework with all the features necessary for trade policy analysis with poverty and remittances linkages. The simulation results show that a decline in remittances reduces the gains from trade liberalisation. The negative impact of remittance decline dominates the positive impact of trade liberalisation in urban areas. But, the positive impact of trade liberalisation dominates the negative impact of a decline in remittances in the case of rural areas. Poverty rises in Pakistan as a whole. It shows that the decline in remittance inflows is a major contributory factor in explaining the increase in poverty in Pakistan during the Nineties.

*JEL classification:* O53, O24, C68, I32
*Keywords:* Pakistan, Remittances, Trade Policy, CGE, Poverty

## I. INTRODUCTION

With a view to protect its nascent industries against imports, Pakistan has pursued protectionist trade policies since the 1950s. The industries enjoyed quite high levels of protection in the 1950s, 1960s, and 1970s. The import regime comprised of both tariff and non-tariff barriers. The latter included outright bans, quota restrictions, and imports allowed to specific users through an elaborate licensing system. These policies led to wasteful use of resources by encouraging import substitution even in those industries

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where the country did not have long-run comparative advantage. Consequently, the distortion in resource allocation adversely affected the country's economic and social conditions. Inefficiency in resource use has been one of the factors in the slow growth of output that has led to high levels of poverty in Pakistan.[1] This calls for changes in policies and incentives and the market mechanism that help to reduce poverty.

Pakistan adopted trade liberalisation policies in 1981 by reducing quantitative restrictions and rationalising the tariff structure, which reduces the rate of protection. Removal of import restrictions has a two-fold impact on poverty.[2] The first effect is that a move towards free trade would increase the returns to the factor of production, which is abundant in the country. In the case of Pakistan, labour is the abundant factor. Second, the reduction in import duties, especially on raw materials and machinery, is expected to result in a reduced cost of production and a reduction in prices. Similarly, reduction in import duties on consumer goods implies the reduction in the prices of imported finished products and import substitution activities. This helps in increasing real incomes. Tariff reduction, therefore, is expected to help in an improvement in aggregate welfare and a reduction in poverty.

The empirical evidence on poverty and income inequality in Pakistan, however, contradicts the optimism of the proponents of trade liberalisation. Because Pakistan has experienced a rise in poverty and income inequality during the period of trade liberalisation. However, such an outcome may be defensible in view of the fact that along with the liberalisation in imports, Pakistan has also experienced a slow down in the inflow of remittances. The reduction in remittance inflow reduces the incomes of households and puts pressure on the exchange rate resulting in a reduction in the inflow of imports despite a reduction in import duties. Therefore, without incorporating remittances in the analysis to explore the impact of trade liberalisation on poverty, the results may be biased. In this study, we include the decline in remittances in presence of trade liberalisation for poverty change analysis. Poverty is expected to decline if the impact of trade liberalisation dominates the impact of decline in remittances, but would tend to rise if the impact of the reduction in remittances dominates.

The present study proposes to assess the impact of two phenomenon on poverty by exploring the question: whether trade liberalisation or decline in remittances or both are responsible for the increase in poverty and inequality in Pakistan? The examination is done through the computable general equilibrium (CGE) framework. The model used in this study is closely related to previous CGE models built in various studies [see Decaluwe, *et al*. (1999)]. This paper presents a similar model that is developed for trade policy analysis in Pakistan under the Micro Impact of Macro Adjustment Policies (MIMAP) project by Siddiqui and Iqbal (1999b) and extended in the latter studies for MIMAP [see Siddiqui, *et al*. (1999a) and Kemal, *et al*. (2001); Siddiqui and Kemal (2006)].

The plan of the study is as follows. The next section reviews the economy of Pakistan with particular reference to trade policies, structure of trade, remittance inflow and poverty levels. Section III summarises the results of the studies focusing on trade

[1]One-third of the population still lives below the poverty line.

[2]The Stolper-Samuelson theorem suggests that the per capita income differentials due to existing factor endowment differentials tend to disappear over time after trade liberalisation [for details see Krugman and Obstfeld (1994)].

liberalisation, remittances and poverty linkages. Section IV presents data for the base year, discusses the methodology and model briefly. The results of the analysis are presented in Section V and Section VI concludes the paper.

## II. REVIEW OF ECONOMY

### (a) Trade Policies

Pakistan has maintained a complex system of trade policy regime since 1952. Import bans, quota, licensing requirements, other restrictions[3] imposed to protect the domestic industry, and high tariffs have introduced serious distortions. The high tariffs imposed for protecting domestic industries and to raise revenues, have become counter-productive. They have resulted in smuggling and corruption. Neither the revenue nor the protection objectives were achieved. Besides, until the mid-1980s, the non-tariff restrictions have remained binding, as the prices of imported goods, in general, have been higher than the landed cost. In 1981, about 41 percent of industrial value added was protected by import bans and another 22 percent by various forms of import restrictions [Kemal, *et al*. (1994)].

Pakistan has initiated reforms in the trade regime in the early 1980s, with a view to creating an efficient and competitive manufacturing industry through an easy access to raw material, intermediate goods and machinery. The trade policy has been gradually liberalised and the producers have been exposed to the global market as it strives to make the local industry efficient and competitive. In the 1980s quota restrictions were removed. In the 1990s the Restricted List was eliminated and those items that were to be restricted due to Health and Safety Requirements and Procedural Requirements have been added to the Negative List. For protecting the industries, tariffs are being used instead of quantitative restrictions (QRs). During 1983-84 to 1993-94, 724 items were removed from the Negative List. Over all, the number of intermediate goods, consumer goods and capital goods on the negative list were reduced from 142 to 16, 32 to 7 and 221 to 107, respectively. At present, the negative list comprises only of 62 products mostly on religious, environmental, security and health grounds. Import licensing has gradually declined since 1981. And by the year 1993, it was eliminated. Now only an insignificant portion of total imports is subject to quantitative restrictions (QRs).[4] All these changes resulted in a decline in protection rates.

Table 1 presents the implicit nominal protection rate (NPRI) that takes into consideration the tariff equivalent of quota and the explicit nominal protection rate (NPRE). It shows that the percentage of industries where NPRI>NPRE fell from 34.4 percent to 2 percent of manufacturing industries over the 1981-91 period. This indicates that quota restrictions were almost non-existent in the later period. Table 1 also shows

Table 1

[3]Import of capital goods was restricted through licensing, value limit and specificity of importers [World Bank (1989)].

[4]The banned items, on the "Negative List", also include some textile products such as woven cotton fabrics, woven synthetic fabrics, bed linens, curtains, certain knitted fabrics and apparel items, tents, carpets and textiles floor coverings. However, all of these have been removed in 2001.

*Industries Protected by Tariff and Non-tariff Barriers*

| Nominal Protection | Percentage of Industries | |
|---|---|---|
| | 1980-81 | 1990-91 |
| NPRI > NPRE | 34.4 | 2.0 |
| NPRI < NPRE | 57.8 | 71.7 |
| NPRI = NPRE | 7.8 | 26.3 |

*Source:* Kemal, *et al*. (1994).

that NPRI fell short of NPRE, i.e., tariffs were prohibitively high, for 71.7 percent of the industries in 1990-91 compared with 57.8 percent in 1980-81 and the percentage of industries where tariffs were the binding constraints have increased from 7.8 percent to 26.3 percent industries over 1981-91. In the presence of non-tariff barriers, tariffs play a minor role. However, with the removal of non-tariff barriers the protection levels becomes transparent. During the adjustment period tariffs have played a larger role in providing protection to industries.

After reducing QRs, Government of Pakistan (GOP) focused on a rationalisation of the tariff structure; reducing tariff rates and their dispersion. During 1988-91, tariffs were reduced on 1134 items and increased on 462 items. The maximum tariff rate was reduced from 225 percent to 100 percent. It was further reduced to 65 percent in June 1995. The number of tariff slabs was reduced from 17 to 10 during the same time period. Recently, the maximum tariff rate was reduced to 25 percent except for automobiles and alcoholic drinks and the number of tariff slabs has been reduced to four [Pakistan (Various Issues a, b)].

Tariff rationalisation during the Nineties resulted in a decline in tariff rates on all categories of imports. On final capital goods, the tariff rate declined from 19.5 percent to 7.3 percent, on final consumer goods from 24.6 percent to 9.6 percent, on raw material for capital goods from 31.9 percent to 15.4 percent and on raw material for the consumer goods from 19.5 to 10.6 percent. The average tariff rate was reduced by 55 percent, from 22.2 percent in 1987-88 to 9.7 percent in 1999-2000 (Table 2). Recently, these tariff rates further reduced by 3, 6, 10 and 7 percentage points, respectively. On average, tariff rate declined by 4 percentage points during the period 2000-04.

Table 2

*Tariff Structure by Commodity Group (Percentages)*

| Years | Final Imports of | | Raw Material | | Average Tariff Rate |
|---|---|---|---|---|---|
| | Capital Goods | Consumer Goods | Capital Goods | Consumer Goods | |
| 1980-81 | 32.15 | 28.42 | 34.06 | 13.79 | 22.06 |
| 1984-85 | 15.02 | 17.66 | 94.09 | 12.94 | 19.19 |
| 1987-88 | 19.54 | 24.56 | 31.92 | 19.53 | 22.22 |
| 1988-89 | 18.55 | 14.32 | 24.38 | 18.38 | 17.37 |
| 1989-90 | 19.77 | 11.53 | 23.32 | 20.12 | 17.48 |
| 1994-95 | 12.48 | 13.90 | 31.56 | 20.85 | 17.84 |
| 1999-00 | 7.29 | 9.55 | 15.36 | 10.60 | 9.86 |
| 2003-04 | 3.83 | 3.53 | 5.10 | 3.53 | 6.03 |

*Source:* Data on imports and tariff revenue are taken from *Economic Survey* [Pakistan (Various Issues b)] and *CBR Year Book* [Pakistan (Various Issues a)], respectively.

**(b) Structure of Trade**

Like most of the developing countries, Pakistan is dependent on agricultural-based exports. For a diversification of exports, it has to rely on imported raw materials, machinery, and capital goods for industrialisation. A comparison of the structure of trade during the Eighties and Nineties shows that the composition of imports by economic classification has not changed much over twenty years in spite of trade liberalisation. The share of imported capital goods in total imports has increased from 28 percent in 1980-81 to 37 percent in 1985-86, but due to a slow down in the economy, especially in the industrial sector, import of capital goods declined to 25 percent by 2000-01. Recent increases in growth boosted investment which resulted in a sharp increase in imports of capital goods to 36 percent in 2004-05. The share of raw materials for consumer goods also shows a declining trend over the whole period, it declined from 50 percent in 1980-81 to 40 percent in 1985-86, but since then it has increased to around 46 percent by 2004-05. On the other hand, the share of imported inputs for capital goods has remained less than 10 percent throughout the period. The share of imports of final consumer goods increased from 14 percent to 18 percent over the 1980-86 time period and in the next 20 years its share declined to 10 percent (Table 3).

The structure of exports shows significant changes over time. The share of exports of primary goods, in 2005, is one-fourth of the 1980-81 level. The share of exports of semi-manufactured goods has increased from 11 percent to 24 percent over the 1980-81 to 1990-91 period, but declined to 10 percent in the subsequent period. The exports of manufactured goods, however, show a consistently rising trend; its share increases from 45 percent to 79 percent over the twenty-five year period (Table 3).

Reductions in quantitative restrictions (QRs), reductions in tariff rates, increase in imports, increase in exports, the sum of exports and imports as a percentage of GDP are the usual indicators used to measure the degree of openness. QRs were almost non-existent in the 1990s. On average, the tariff rate declined by 73 percent during 1981-2005. It is important to note that in spite of the reduction in trade restrictions, imports as a percentage of GDP show a declining trend over the twenty-five year period: imports declined from 22.3 percent of GDP in 1980-81 to 20.5 percent of GDP in 2005[5] (Table 4). However, exports as a percentage of GDP show an increasing trend, from 12.8 percent of GDP in 1980-81 to 16.4 percent of GDP in 2004-05. The most commonly used indicator for openness is the total of exports and imports as a ratio of GDP, this indicator shows that despite a decline in imports, openness shows a slight increase, from 35.2 percent to 36.9 percent over twenty-five years (Table 4). The reduction in both tariffs and non-tariff barriers may seem surprising, but it needs to be underscored that during the 1990s because of inadequate foreign exchange reserves, the government had to resort to frequent devaluation making the imports expensive. Furthermore, low-level of economic activity constrained the demand for surplus goods.

[5]The following factors are responsible for this decline. First, remittances declined very significantly, from $2.9 billion in 1982-83 to $1 billion in 1999. They were used to finance the trade deficit for a long time. Second, steep devaluation resulted in a lower level of imports. Third, economic activity slowed down in the 1990s.

Table 3

*Structure of Trade by Economic Classification (Percentages)*

| | Imports of | | | | | Exports | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Capital Goods | Raw Material for | | Consumer Goods | Total | Primary | Semi-manufactured | Manufactured | Total |
| Years | | Capital Goods | Consumer Goods | | | | | | |
| 1980-81 | 28 | 8 | 50 | 14 | 100 | 44 | 11 | 45 | 100 |
| 1985-86 | 37 | 5 | 40 | 18 | 100 | 35 | 16 | 49 | 100 |
| 1990-91 | 33 | 7 | 44 | 16 | 100 | 19 | 24 | 57 | 100 |
| 1995-96 | 35 | 6 | 45 | 14 | 100 | 16 | 22 | 62 | 100 |
| 2000-01 | 25 | 6 | 55 | 14 | 100 | 13 | 15 | 72 | 100 |
| 2004-05 | 36 | 8 | 46 | 10 | 100 | 11 | 10 | 79 | 100 |

*Source: Economic Survey* [Pakistan (Various Issues b)].

Table 4

*Openness in Pakistan (Percentages)*

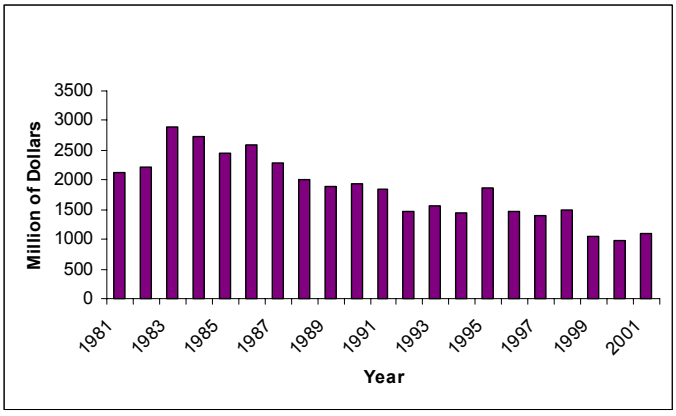
| Years | Imports/GDP | Exports/GDP | Openness [(X+M)/GDP] |
|---|---|---|---|
| 1980-81 | 22.33 | 12.84 | 35.17 |
| 1984-85 | 22.60 | 10.57 | 33.17 |
| 1990-91 | 18.49 | 16.93 | 35.42 |
| 1994-95 | 19.26 | 16.57 | 35.82 |
| 2000-01 | 19.38 | 17.40 | 36.78 |
| 2004-05 | 20.50 | 16.4 | 36.9 |

Source: *Economic Survey* [Pakistan (Various Issues b)].

### (c) Remittances

Remittances have played a key role in the growth process of Pakistan. A comparison of remittance inflow with key economic indicators provides an assessment of the importance of remittances at the macro and micro level. During the Seventies and early Eighties, the inflow of remittances was very large, about $37 billion. In 1983 when remittances were at their peak, at 10.06 percent of GDP, they financed 96.6 percent of the trade deficit and 84.8 percent of the current account balance (Table 5). Remittances from the Middle East through official channels accounted for 14 percent of the growth in GNP (home country's income) and it was 24 percent when unofficial channels were also included [Burney (1988)].[6] Since the mid-eighties, remittances started to decline and reached one-third of the amount remitted in 1982-83, i.e., $1.06 billion in 1998-99 from 2.9 billion in 1982-83 (Figure 1). This led to a rapid depletion of international monetary reserves, which affected the financing of the trade deficit (Table 5). This may be the reason for a decline in imports despite trade liberalisation;[7] a sharp decline in remittances retarded the efforts of liberalisation. Since September 11, 2001, remittances have increased very sharply and reached 4 billion dollars.

**Fig. 1. Historical Trend of Inflow of Remittances**




[6]GNP growth rate declined more than GDP growth rate, 7.9 percent in 1981-85 to 4.1 percent in 1996-00. This may be due to the decline in remittances [Siddiqui and Kemal (2006)].

[7]In a number of less developed countries (LDCs), severe deficits on current and capital accounts have therefore led to a rapid depletion of their international monetary reserves and a slowdown in economic growth.

Table 5

*Contribution of Remittances in Key Economic Indicators (Percentages)*

| Years | Financing through Remittances of | | Remittances/ GDP | Remittances/ Private Consumption |
|---|---|---|---|---|
| | Current Account Balance | Trade Deficit | | |
| 1980-81 | 67.11 | 76.56 | 7.53 | 9.98 |
| 1982-83 | 84.81 | 96.55 | 10.06 | 13.33 |
| 1985-86 | 67.74 | 85.31 | 8.14 | 10.67 |
| 1990-91 | 45.98 | 74.43 | 4.06 | 5.94 |
| 1995-96 | 24.20 | 39.44 | 2.26 | 3.13 |
| 2000-01 | 53.6 | 71.4 | 1.5 | 1.89 |
| 2004-05 | 52.1 | 67.3 | 3.7 | 4.50 |

*Source*: *Economic Survey* [Pakistan (Various Issues b)].

In addition to financing of imports at the national level, remittances have also played an important role at the micro level. Migrants remit a significant amount to Pakistan, on average 78 percent of their total earnings, and thereby increase the income of households. Studies by Burney (1988) and Kazi (1988) indicate that remittance income have been used for current consumption, retiring of debt or for repair of houses.[8] The importance of remittances at the household level can be gauged from the fact that remittances were 13 percent of private consumption expenditure. Since 1982-83, the ratio (Remittances to Private Consumption) has shown a declining trend, i.e., 13.3 percent in 1982-83 declining to 1.9[9] percent in 2000-01. The decline in remittance income of households may be an important reason for the rise in poverty in Pakistan during the Nineties. Empirical studies indicate that remittances improve the recipients' standard of living. Migrant workers from Pakistan, on average, received incomes five to eight times higher than they received from employment in their home country, remitting on average 78 percent of their earnings [Burney (1988)]. Therefore, a reduction in the flow of remittances is expected to have a dual impact on poverty. First, it reduces the impact of trade liberalisation by limiting the inflow of imports. Second, it reduces the income, as well, as consumption of households. Figure 2 shows that remittance inflow increased during 1970-83 and declined thereafter till 2000. After September 11, 2001, remittance inflow increases significantly.

**(d) Poverty**

Poverty has increased irrespective of the choice of the measures of poverty; head count, gap, and severity index [Mehboob-ul-Haq Centre for Human Development (1999)]. It has increased in Pakistan during the Nineties (adjustment period) compared to in the Eighties (pre-adjustment period). Table 6 presents

[8]Remittances are not utilised significantly to enhance the capital stock. At the sector level, the only sector, which appears to have benefited from the inflow of remittances, in terms of increased private investment, is ownership of dwellings.

[9]To some extent the decline in remittances at the household level is understated. The remittances were also received through the *hundi* system.

absolute poverty based on a basic need poverty line and Table 7 presents relative poverty based on a poverty line of 75 percent of average income in the country. Table 6 shows that the number of poor has increased from 29.2 percent in 1987-88 to 35.7 percent in 1993-94 and declined in 1999. The other two ratios, poverty gap and severity index, also show that poverty has increased during the adjustment period. The relative poverty measured by head count ratios increases from 45.6 percent population to 51 percent over 1987-88 to 1993-94 period. The other two indicators, income gap and severity index, increased from 25.9 percent to 31 percent and 4.4 percent to 7.1 percent over the same period of time, respectively.

Table 6

*Poverty Indicators Basic Need Approach (Based on Distribution of Income)*

| | | Pre-adjustment | | Post-adjustment | | | | |
|---|---|---|---|---|---|---|---|---|
| Measure (Percent) | Area | 1986-87 | 1987-88 | 1990-91* | 1992-93 | 1993-94 | 1998-99** | 2004-05 |
| Head Count | Pakistan | 28.6 | 29.2 | 29.4 | 35.9 | 35.7 | 32.6 | 35.7 |
| | Urban | 28.8 | 28.9 | 31.3 | 29.7 | 29.9 | 24.2 | – |
| | Rural | 28.1 | 30.1 | 29.1 | 39.1 | 37.3 | 35.9 | – |
| Income Gap | Pakistan | 20.6 | 21.1 | 26.3 | 28.9 | 27.9 | 7.0 | – |
| | Urban | 21.2 | 21.7 | 25.5 | 26.6 | 24.1 | 5.0 | – |
| | Rural | 20.2 | 20.1 | 26.1 | 28.3 | 27.5 | 7.9 | – |
| Severity Index | Pakistan | 1.8 | 1.9 | 3.1 | 4.5 | 4.1 | 1.51 | – |
| | Urban | 1.9 | 2.0 | 3.2 | 3.4 | 2.8 | 2.51 | – |
| | Rural | 1.7 | 1.9 | 3.0 | 4.8 | 4.2 | 2.2 | – |

*Source:* Mehboob-ul-Haq Centre for Human Development (1999). *Poverty lines for the year 1990-91 for Pakistan, rural and urban areas are 276.7, 257.6 and 307.9 Rs respectively. **World Bank (2002) For the income gap ratio, they use percentage in total.

Table 7

*Relative Poverty Indicators for Pakistan, Urban and Rural Areas*

| | | Pre-adjustment Period | | During Adjustment Period | | |
|---|---|---|---|---|---|---|
| Measure (Percent) | Area | 1986-87 | 1987-88 | 1990-91* | 1992-93 | 1993-94 |
| Head Count | Pakistan | 47.5 | 45.6 | 52.9 | 51.6 | 51.0 |
| | Urban | 52.5 | 49.3 | 57.0 | 54.2 | 53.5 |
| | Rural | 38.6 | 37.9 | 49.6 | 46.5 | 43.0 |
| Income Gap | Pakistan | 25.9 | 25.3 | 33.1 | 33.0 | 31.6 |
| | Urban | 27.8 | 26.9 | 33.4 | 33.2 | 32.1 |
| | Rural | 22.7 | 22.2 | 32.1 | 30.3 | 28.6 |
| Severity Index | Pakistan | 4.4 | 4.1 | 7.9 | 7.8 | 7.1 |
| | Urban | 5.5 | 4.9 | 8.6 | 8.2 | 7.4 |
| | Rural | 2.9 | 2.7 | 7.0 | 6.2 | 5.1 |

*Source:* Mehboob-ul-Haq Centre for Human Development (1999). *Poverty Line = 75 Percent of the Average Income (Based on Distribution of Income) Poverty lines for the year 1990-91 for Pakistan, rural and urban are 388, 348 and 441 rupees respectively.

## III. REVIEW OF LITERATURE

A number of empirical studies[10] have analysed the impact of trade liberalisation based on the Stolper-Samuelson theorem—one of the central results of the Heckscher-Ohlin theory. The studies analyse the change in poverty and welfare when a country is moving from autarky to free trade. These studies demonstrate how changes in output prices caused by changes in tariffs translate into the change in the prices of the factors of production with positive production and zero economic profit condition. Convergence in relative prices of the factors of production[11] may reduce inequality through increased demand for labour, the most abundant factor in developing countries like Pakistan. However, the empirical results are very sensitive to the country sample, time period and specification of the model. The Stolper-Samuelson theorem suggests that the per capita income differentials due to existing factor endowment differentials tend to disappear over time after trade liberalisation [Krugman and Obstfeld (1994)]. The change in the relative prices of goods together with a change in income affects households' consumption. Tariff reductions reduce import prices and benefit consumers by supplying cheap consumer goods. Depending on the elasticity of substitution, in presence of trade liberalisation, consumers start to substitute imports for domestically produced goods. Consequently, the demand for domestic goods falls and domestic prices decline further.

Bourguignon, de Melo, and Suwa (1989) show that devaluation that is pro-trade helps the poor in the low income countries as it encourages export-oriented industries, which employ more workers. On the other hand, import rationing worsens inequality because the rationing premium accrues to capitalists. Clarete and Whalley (1988) explore the ways in which trade policies and other domestic distortions interact in the small open developing economy. Using a price-taking open economy numerical general equilibrium model of the Philippines, they report that in the presence of import quota and rent-seeking activities, tariff removal makes the country worse off. Another model with special emphasis on distributional issues is developed by Dervis, de Melo, and Robinson (1982) for three archetype economies. They suggest that the distributional implications of an external shock depend on the initial structure of the economy and the choice of adjustment policies.

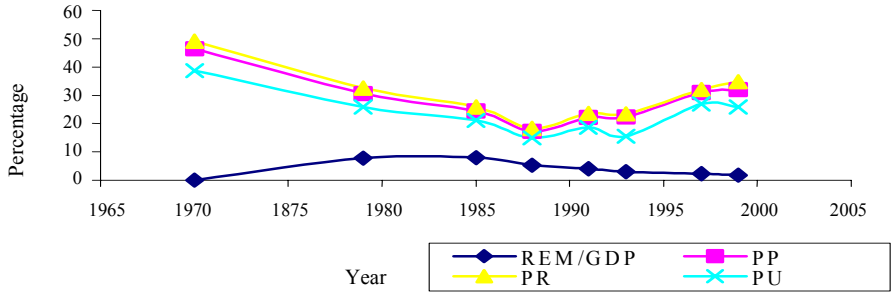
Decaluwe, *et al*. (1999) and Cockburn (2002) explicitly incorporate poverty and income distribution in a CGE framework. Decaluwe, *et al.* (1999) developed a beta-distribution based approach on the basis of parameters chosen according to the characteristics of households and a basic need poverty line determined by quantity of basic need commodities. The change in monetary value of the poverty line with the change in prices is determined endogenously in the model. The study shows that a reduction in tariffs is beneficial to the alleviation of poverty. Cockburn (2002) analyses the impact of trade liberalisation on poverty using micro simulation. He argues that trade liberalisation can only be properly analysed in a CGE model with disaggregated household data, and developed a model for Nepal incorporating all households from a nationally representative household survey. He emphasises that complex income and consumption effects could not be analysed in an aggregate CGE model. Using the micro simulation method, the study shows that urban poverty falls and rural poverty rises and income inequality increases with the rise in income.

[10]Guisinger and Scully (1991), Decaluwe, *et al*. (1999), Siddiqui and Iqbal (1999), Cockburn (2002), Kemal, *et al*. (2002), etc.

[11]Stolper-Samuelson theorem of price equalisation.

The literature related to the "impact of remittances on poverty" explains how the recipients typically use remittances and how they affect economic indicators in the country. Studies show that remittances are mainly used for current consumption; the rest is spent on the maintenance of dwellings. During the large inflow of remittances, investment in ownership of dwellings increases by a higher percentage [Burney (1988)]. Migrants who belong to the low-income class before migration save less and spend more on current food and consumer durables as compared with medium and high-income groups. Another study by Kruijk (1987) exploring the sources of income inequality points out that, in addition, to labour and property income, exogenous factors like migration to the Middle East had played a very important role in reducing poverty during the mid-Seventies and early Eighties.[12] The direct and indirect effects of remittances suggest remittances are beneficial for trade in goods and services,[13] income growth, and contribute to savings (though a negligible amount). Therefore, it can safely be concluded that remittances can (and do) make important contributions to welfare enhancing and poverty reduction. During the Nineties, remittances have declined sharply in Pakistan, it may be the major factor giving rise to poverty.

**Fig. 2. Poverty and Inflow of Remittances (Percentages)**




REM/GDP—Ratio of Remittances to GDP
PP—Poverty in Pakistan, PR—Poverty in Rural area, PU—Poverty in Urban area

## IV. DATA AND METHODOLOGY

A consistent data set for the year 1989-90, using the Input-Output table for 1989-90 [Pakistan (1996)], Household Integrated Economic Survey (HIES) [Pakistan (1993)] and SAM 1989-90 [Siddiqui and Iqbal (1999a)], is constructed. Production activities in agriculture, mining, manufacturing and services are classified on the basis of their characteristics viz. import competing and exporting orientations. Agriculture is subdivided into the crop and non-crop sectors. The manufacturing sector is aggregated into five activities: food, textiles, chemicals, machinery and other manufacturing. The services sector is classified into three activities, two

[12]See Irfan (1997), Amjad and Kemal (1997) and Usman, *et al*. (2000).

[13]In addition to providing money for basic needs such as food, clothing, housing improvements, and education, it provides hard currency for consumer goods such as small household appliances.

tradable and one non-tradable sector. The main characteristics of these sectors are as follows: The crop sector provides raw material for exports in particular to the textile industry, the major export supplying sector accounting for 67 percent of total exports. 'Chemicals' and 'Machinery' are the major import competing sectors and the rest of the sectors have mixed characteristics. The imports account for 30.9 percent and 55.6 percent of the expenditure on chemical and machinery, respectively. The shares of imports of these sectors in the overall imports of the country are 18.4 percent and 37.5 percent, respectively [Siddiqui and Kemal (2006)].

Earlier studies show that a large percentage of remittance income accrues to poor households as 81 percent of migrants belong to production workers and only 19 percent to the professionals. Social Accounting Matrix (SAM) 1989-90 provides information on the sources of household income by income groups. In this study, we classify households by occupation in urban and rural areas as the two areas present different levels of poverty. They are aggregated by occupation of head of households into five categories; professionals, clerks, agriculture skilled workers, production worker and miscellaneous. We identify five sources of household income;[14] labour, capital, dividends from firms, transfers from government and transfers from the rest of the world. The first three sources of income are endogenously determined in the model. The distribution of remittance income across the households is fixed in the model. Therefore urban households who receive a larger share of remittances 77 percent of remitted income, experienced larger negative effects of a decline in remittances.

Table 8

*Sources of Income for Rural and Urban Households (Percentages)*

| | Wages | Capital | Dividends | Transfers from Government | Remittances | Total |
|---|---|---|---|---|---|---|
| Professional | 59.46 | 24.23 | 14.81 | 0.41 | 1.09 | 100 |
| Clerks | 28.53 | 38.41 | 18.86 | 0.31 | 13.88 | 100 |
| Agriculture Worker | 13.01 | 76.42 | 0.00 | 0.16 | 10.41 | 100 |
| Production Worker | 51.52 | 34.38 | 5.15 | 0.18 | 8.78 | 100 |
| Miscellaneous | 23.52 | 63.58 | 1.72 | 1.72 | 9.47 | 100 |
| **Urban Total** | **33.99** | **45.96** | **9.40** | **0.71** | **9.95** | **100** |
| Professional | 19.18 | 80.48 | 0.00 | 0.05 | 0.29 | 100 |
| Clerks | 38.95 | 56.53 | 0.01 | 1.45 | 3.06 | 100 |
| Agriculture Worker | 13.82 | 81.55 | 0.43 | 2.27 | 1.93 | 100 |
| Production Worker | 56.77 | 31.22 | 3.75 | 0.98 | 7.29 | 100 |
| Miscellaneous | 16.97 | 54.37 | 19.22 | 4.57 | 4.87 | 100 |
| **Rural Total** | **26.51** | **63.61** | **4.40** | **2.09** | **3.40** | **100** |

*Source:* Social Accounting Matrix, 1989-90.

[14]Income refers to total receipts.

Table 8 reports the share of households' incomes from different sources. In the urban sector, professionals receive 59.5 percent of their income and production workers receive 51.5 percent of their income from labour. The other three groups in the urban area receive higher percentage from capital. All households in the rural area receive a higher percentage of their income from capital except production workers who receive 56.8 percent of their income from labour. In the urban households, the share of remittances in total household income ranges from 1 percent to 14 percent and mean level is 9.95 percent. In the rural area, it ranges 0.3 percent to 7.3 percent with mean of 3.4 percent. It needs to be underscored that the share of remittances in the incomes of professional groups, who are relatively rich in both the urban and rural area is only 1.0 percent and 0.2 percent of their total income, respectively. On the other hand, urban households—clerks—receive 35.8 percent of remittances. In the rural area, production workers receive 8.43 percent of remittances (Table 9). Both types of households are relatively poor and 31.5 percent and 36.3 percent of households, respectively, are below the poverty line (Table 9).

Table 9

*F-G-T Indicators of Poverty and Remittances Share (Percentages)*

| Households by Occupation | Households | Base Year (Pα-Measures) Head Count | Poverty Gap | Severity Index | Share of Remittances |
|---|---|---|---|---|---|
| Professional | 2.71 | 19.92 | 4.68 | 1.15 | 0.92 |
| Clerks | 14.91 | 31.52 | 3.77 | 2.42 | 35.76 |
| Agriculture Worker | 2.12 | 35.33 | 7.43 | 1.44 | 5.06 |
| Production Worker | 13.83 | 40.08 | 5.51 | 1.26 | 13.62 |
| Miscellaneous | 7.11 | 23.44 | 9.39 | 3.25 | 21.92 |
| **Urban Total** | **40.68** | **32.44** | **7.27** | **2.36** | **77.28** |
| Professionals | 9.07 | 25.2 | 5.2 | 1.42 | 0.22 |
| Clerks | 2.37 | 34.25 | 7.38 | 2.33 | 3.31 |
| Agriculture | 11.56 | 28.3 | 6.43 | 2.12 | 4.68 |
| Production Worker | 22.29 | 36.3 | 7.31 | 2.22 | 8.41 |
| Miscellaneous | 14.03 | 23.19 | 4.58 | 1.41 | 6.09 |
| **Rural Total** | **59.32** | **30.47** | **6.49** | **2.05** | **22.72** |

*Source:* Social Accounting Matrix, 1989-90.

Using the above-mentioned consistent data set, the computable general equilibrium (CGE) model is used to simulate the impact of tariff reduction and the decline in remittances. The model is similar in many respects to the CGE model developed for the MIMAP-project, which has been developed to analyse the impact of trade liberalisation on welfare and poverty[15] in Pakistan. The main characteristics of the model are discussed below.

In the neo-classical framework, this model contains six blocks of equations; income and saving, production, foreign trade, demand, prices, and market equilibrium. The model has four institutions: households, firms, government and rest of the world. The ownership

[15]For details see Siddiqui and Iqbal (1999b) and Siddiqui, *et al*. (2006).

of factors of production and their returns determine factor income. All wage income accrues to households, as they own all labour. In addition, households receive income in the form of remittances from the rest of the world, transfers from firms as dividends and transfers from government as social security benefits. Transfers from government and rest of the world are exogenous. The effect on income of households due to trade policy shock is determined through changes in the endogenous sources of income: wage income, capital income, and dividends from firms. The household's dividend income is defined as fixed share from the firms' capital income. After subtracting income tax from the household's total income, we get the disposable income of the household. Household savings are defined as a fixed share of households' disposable income. The second institution—the firm receives income from two sources; receipts from capital and transfers from the government. The firm's capital income is defined by subtracting the sum of the household's capital income from production activities. Transfers from the government to firms are given exogenously. Its expenditure includes tax payments to the government, dividends to households, and transfers to the rest of the world. Subtracting all these from the firm's income, savings of the firms are calculated. The third institution, government receives tax revenue from various sources; international trade, production, households' income and tax on capital income of the firms. These five types of taxes endogenously determine government revenue. In addition, the government also receives transfers from the rest of the world, which are fixed exogenously. Subtracting transfer payments to households and firms and government consumption expenditure from government revenue we get government savings. The fourth institution is the rest of the world. Its income includes income from sales of imports and transfers from firms, and outlay includes expenditure on exports, remittance income to households and transfers to government.

Domestic production has eleven sectors—ten tradable and one non-tradable.[16] All production activities employ factors of production; labour and capital. Labour is assumed to be homogeneous and mobile across the sectors, while capital is sector-specific. Production functions are specified by a technology in which gross output has separable production function for value added and intermediate inputs. Leontief technology between intermediate and output and within intermediates is assumed. The value added is defined by the Constant Elasticity of Substitution (CES) production functions. Assuming perfect competition and market clearing conditions, labour demand function for *i*th sector is derived from the Constant Elasticity of Substitute (CES) production function. Returns to capital are determined by the zero profit condition.

Goods for the domestic market and for foreign market (exports) with the same sector classification are of different qualities. The Constant Elasticity of Transformation (CET) function describes the possible shift between domestic and external markets. Domestically produced goods sold in the domestic market are imperfect substitutes for imports (Armington assumption). The import aggregation function presents demand for composite goods (imported and domestically produced goods). For non-traded goods, total demand is equal to total domestic supply. Profit maximisation or cost minimisation gives desired exports supply and imports demand functions of relative prices (domestic to foreign prices). The equilibrium in the foreign market is determined with inflow and out

[16]For detail see Siddiqui and Kemal (2006).

flow of goods and transfers across the border. Nominal exchange rate and current account balance are given exogenously, while the real exchange rate is implicit in the model. Keeping the *CAB* and nominal exchange rate constant, real exchange rate depreciate leading to cheap exports.

In the model, we have four types of demand for goods and services: household consumption, government consumption, intermediate inputs, and demand for goods for investment purposes. Total household consumption is defined as residual after subtracting saving from disposable income. Household demand is specified by the linear expenditure system (LES). It is derived from maximising a Stone-Geary utility function subject to the household's budget constraint.[17] Using the Frisch parameter[18] and income elasticities, which are given in the model exogenously; we derive the minimum consumption of a good by a household group. Government expenditure includes expenditure on goods and services, transfers to households, and transfers to firms. Government current expenditure on the *i*th commodity is derived by Cobb-Douglas utility function and is defined as fixed share in total expenditure. The private and public consumption are aggregated to get total consumption expenditure. The sum of input requirements by the production sector for each commodity produced determines intermediate demand for the *i*th commodity. Demand for goods for investment purposes is the fixed value share in total investment.

For welfare analysis, we fixed total demand for investment and government consumption in real terms so that increase in welfare may not be at the expense of government consumption or investment. We deflate current investment demand by its deflator and get investment in real terms. Deflating current government expenditure with its deflators gives government consumption in real terms.

The model contains different prices associated with each good. We retain the small country assumption. World prices of exports and imports are given. Domestic price of exports and imports are defined after including taxes, if any. Imports are restricted through tariff barriers and sales tax is also imposed on imported goods. Producer price is the weighted average of the domestic price of goods for the domestic market and the domestic price of goods for the export market. There is a sales tax on all goods, so domestic price is determined after including taxes. Consumer prices are the weighted average of domestic price and import price of the *n*th commodity for traded goods and for non-tradables it is equal to the domestic price. GDP deflator (*Pindex)* is the weighted price index of all goods. The two deflators for investment goods and government consumption are defined as the weighted average of all commodities.

The final block presents equilibrium conditions. Total investment is equal to total domestic saving and foreign savings. Total consumption expenditure on the *i*th good is the sum of expenditures by different household groups and government, intermediate use by different production activities and demand for investment purposes. Walras' law holds. Total labour demand is equal to labour supply, which is given exogenously. We use the external sector closure rule in the model. We assume price-taking behaviour for exports as well as for imports in the international market[19] i.e., world export price and world import price are exogenous to the model.

[17]Maximising $u(X) = \sum_i fi\ (Xi) = \sum \alpha_i - log(\gamma_i)$ subject to constraint $\sum P_i X_i = Y$.

[18]For a detailed discussion of Linear Expenditure Systems, see Deaton and Muellbaur (1987).

[19]Small open economy assumption.

The model described above has been calibrated to the data of the Pakistan economy for the year 1989-90. Policy parameters, all tax rates, savings rates are calculated from the base year data. Shift and share parameters in the demand and supply equations, are also generated from base year data. For the consumption function, household specific income elasticities for each commodity are estimated from micro data from the Household Integrated Economic Survey. Elasticities for import aggregation and export transformation functions are taken from different studies.[21] Elasticities for production function are taken from Kemal (1981) and Malik, *et al*. (1989). The elasticities which were not available are fixed after discussion.

The study focuses on welfare and poverty outcome of policy shocks. Equivalent variations (EV) are estimated to see the change in welfare of the households. We use Foster, Greer, and Thorbecke (FGT) (1984) $P\alpha$ measures for poverty analysis, Where P0 measures the households below the poverty line, P1 measures poverty gap and P2 measures severity of the poverty.[21] We use micro data from the national representative Household Integrated Economic Survey [Pakistan (1993)] of more than six thousand households. Basic need-poverty line is estimated on the basis of adult equivalent calorie intake for the base year.[22] For the non-food items, we take the average of the expenditure of the households' two percentage points above and below the food poverty line. The poverty lines are estimated separately for urban and rural areas to eliminate the impact of price differentials between the regions.

Poverty estimates for the base year are given in Table 9. In urban and rural areas, production workers are the poorest group of households, where 40.1 percent and 36.3 percent of households respectively live below the poverty line. Table 9 clearly shows that the poor receive a higher percentage and rich households receive a lower percentage of remittances. For example, clerks in the urban area receive 35.8 percent of remittances. In the rural area, production workers' share is highest, at 8.4 percent of remittances. The other two groups, agriculture skilled workers and clerks can be classified as poor households where about one-third of households are below the poverty line in both, urban and rural areas. The professionals and miscellaneous groups are classified as rich households (Table 9) in urban and rural areas. They receive only 0.9 percent and 0.2 percent of remittances, respectively.

For poverty change analysis,[23] the real value of poverty (quantity) is kept fixed in every simulation [see Decaluwe, *et al*. (1999)]. However, the poverty analysis approach differ from Decaluwe, *et al*. (1999) in some aspects, it uses micro data from the HIES instead of assuming β-distribution. The monetary value of the poverty line is obtained by multiplying the product with their respective prices. If *qi* is the quantity and *Pci* is the price for *i*th good then we define the monetary value of basic need poverty (*BNPm*) line for the base year as follows:

$$BNPm = \sum qio*Pcio$$

[20]For detail see Kemal, *et al*. (2002).

[21]$P\alpha = 1/n\ \Sigma\{(Z-Y\imath)/Z\}^{\alpha}$ where $n$ is total number of households, $Z$ is basic need poverty line, $Y\imath$ is income and $\alpha = 0$ for head count ratio, $\alpha = 1$ for poverty gap measure and $\alpha = 2$ measure the severity of poverty.

[22]Detail is given in Ercelawn (1990) and Ravallion (1994).

[23]For detail see Decaluwe, *et al*. (1999).

Prices are determined endogenously in the model. As prices rise or fall after the simulation, the monetary value of the poverty line rises or falls as well. The change in poverty line is determined as follows

$$\Delta BNPm = \sum qio*Pci1 - \sum qio*Pcio$$

*Note: o* indicates the base year and 1 indicates after the shock.

Changes in prices shift the poverty line and the change in income of the group shifts the density function left or right depending on the negative or positive change in income [Siddiqui, *et al*. (2006)]. These two changes determine the change in poverty after the policy shock in the country. We calculated these poverty indicators before and after the shocks. First, we simulate the impact of tariff reduction in the base year equilibrium. Second, tariff and remittances are reduced simultaneously to see how the impact of trade liberalisation changes in the presence of a decline in remittances.

The list of equations along with endogenous and exogenous variables is given in Appendix A. The General Algebraic Modelling System (GAMS) software package is used to solve and simulate the model.

## V. SIMULATION RESULTS

The results of two simulation exercises are discussed here. First, a tariff cut on imports by 55 percent is introduced in the model to examine the impact of trade liberalisation on welfare and poverty keeping remittances constant. A reduction in trade barriers has a two-fold impact on households: (1) a reduction in distortions in domestic prices relative to world prices, results in a reallocation of resources from the protected sectors to the unprotected sectors. In turn, it affects payments to factors of production. This change in factor rewards results in a change in households' incomes depending on their ownership of the factors of production. (2) The consumer reallocates expenditure from expensive goods (domestic goods produced by import competing sectors) to relatively cheaper goods (imports) and reduces expenditure on domestically produced goods.

In the second exercise, we reduce remittances by 44 percent in the presence of tariff reduction of 55 percent. A decline in remittances results in a decline in the income of households depending on their share in remittances. The households, who receive larger share of total remittances experience a larger negative effect of the decline in total remittances i.e., 77 percent of total remittances, accrue to urban households. The decline in income affects the household welfare. The tabulated results indicate reallocation of resources, the change in factor rewards, household income and expenditure, welfare and poverty in Pakistan in response to the policy shocks.

### Simulation 1. Trade Liberalisation

In the first simulation, we reduce the tariff rate by 55 percent across the board on all imports. Table 10 describes the effects on the macro economic variables. The reduction in the tariff rate leads to a decline in the relative prices of all imports significantly except in the mining and the other traded sectors—the unprotected sectors in the base year. The reduction in protection reduces competitiveness of sectors and producers reduce their production and

shift resources towards unprotected sectors. Consumers substitute cheap imported goods for the domestic goods that lead to a large inflow of total imports, i.e., a 4.5 percent increase over the base year.

Depending on the elasticity of substitution and the share of imports in total consumption in the base year, demand for all imports increases except in unprotected sectors: mining and other traded (Table 10). The reduction in domestic costs caused by the tariff cut increase the profitability of the export sectors. This leads to the expansion of output and employment in the export sector notably in 'textiles'.[24] However, the increased inflow of imports is by no means enough to eliminate the import competing sectors. Output declines significantly in Chemical, Machinery and 'Other Manufacture' sectors by 2.8 percent, 2.0 percent and 2.0 percent, respectively (Table 10).

Increase in imports with fixed current account balance and nominal exchange rate lead to depreciation of the real exchange rate, which boosts exports. The strength of this export response depends on the fall in domestic prices, the capacity of local producers to substitute between local and export markets, and initial export intensities. However, this increase in exports is not fully compensated by the decline in domestic demand. Only the crop and textile sectors show an increase in domestic production after the shock, 0.1 percent and 5.4 percent, respectively, indicating trade liberalisation benefits the export sector of Pakistan more. Depending on the elasticity of substitution, elasticity of transformation and share of imports and domestically produced goods in their respective domestic demand, domestic demand for the textile sector increases by 3 percent.

The fall in output in a number of sectors leads to a decline in demand for factors of production. Released factors of production from inefficient sectors, which are relatively more protected, move towards efficient or unprotected sectors that are more productive. Resultantly, labour demand increases in the export-oriented sectors 'crop' and 'textile' by 0.43 percent and 16.3 percent, respectively. Returns to capital increase in 'Textile' sector by 6.1 percent. The expansionary effects in some sectors, mainly in export sectors cannot outweigh the contraction effects in the import competing sectors, chemicals and machinery. Thus, both returns to labour and capital (an index) decline by 0.5 percent and 1.5 percent, respectively (Table 10). The results confirm the proposition that trade liberalisation affects more negatively sector specific factors of production.

The significant disparity in poverty levels among the different groups of households requires an investigation into the variation in the various income sources after the policy shock. The reduction in factors prices, wages and returns to capital, by –0.51 percent and –1.5 percent have a negative impact on the household's nominal income. The production workers households suffer the least decline in income in the urban as well as in the rural area, 0.85 percent and 0.81 percent respectively (Table 11). These are the poorest group of households in their respective regions. This implies that trade liberalisation is relatively less harmful for the poor. However, variation in change in income across the income groups is not very significant.

The change in consumer prices affects the household specific consumer price index (CPI). Table 11 shows that a decline in the CPI is larger than the decline in income for each household group, that result in higher real income of households. This exercise

[24]Textile is a major exportable sector, i.e., textile sector exports are 67.7 percent of total exports and 44 percent of total output.

Table 10

*Simulation Results: Variation Over Base Year Values (Percentages)*

| Sectors | Imports | Domestic Demand | Exports | Production | Domestic Price | Producer Price | Import Price | Wage Rate | Returns to Capital | Consumer Price | Labour Demand |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Trade Liberalisation (55 Percent Reduction in Tariff on all Imports)** | | | | | | | | | | | |
| Crop | 1.05 | 0.08 | 2.07 | 0.10 | –1.63 | –1.62 | –2.56 | –0.5 | –0.02 | –1.66 | 0.43 |
| Non-crop | 34.87 | –0.58 | 3.20 | –0.38 | –2.83 | –2.68 | –20.70 | –0.5 | –2.20 | –3.30 | –2.55 |
| Mining | –3.83 | –1.20 | 1.83 | –1.09 | –3.70 | –3.57 | –1.51 | –0.5 | –4.33 | –2.90 | –3.47 |
| Food | 10.71 | –0.64 | 4.07 | –0.37 | –3.04 | –2.86 | –11.39 | –0.5 | –2.68 | –4.11 | –1.75 |
| Textile | 13.47 | 3.01 | 8.34 | 5.41 | –4.12 | –2.26 | –11.0 | –0.5 | 6.06 | –4.42 | 16.32 |
| Chemicals | 6.65 | –2.94 | 4.35 | –2.79 | –4.71 | –4.62 | –11.37 | –0.5 | –12.04 | –7.18 | –9.39 |
| Machinery | 4.07 | –2.04 | 5.43 | –1.98 | –6.96 | –6.90 | –12.32 | –0.5 | –6.81 | –10.31 | –5.72 |
| Other Manufacturing | 8.78 | –2.27 | 6.17 | –1.98 | –5.37 | –5.19 | –12.85 | –0.5 | –8.34 | –7.10 | –5.58 |
| Other Trade (Sector 1) | –4.18 | –0.50 | 3.36 | –0.27 | –3.66 | –3.45 | –0.03 | –0.5 | –2.21 | –3.60 | –1.55 |
| Other Trade (Sector 2) | –2.34 | –0.81 | 0.93 | –0.81 | –1.92 | –1.92 | 0 | –0.5 | –2.20 | –1.56 | –0.03 |
| Non Traded Sector | – | – | – | –0.01 | – | –2.84 | –9.99 | –0.5 | – | –4.26 | –1.2 |
| Total* | 4.50 | –0.46 | 6.84 | 0.20 | –3.39 | –3.04 | | –0.5 | –1.50 | | |
| **Trade Liberalisation in Presence of Decline in Remittances (Reduction in Tariff Rate by 55 Percent and Remittances by 44 Percent)** | | | | | | | | | | | |
| Crop | –5.70 | –0.94 | 8.35 | –0.88 | –7.20 | –7.15 | –2.56 | –3.41 | –7.58 | –7.03 | –3.9 |
| Non-crop | 22.05 | –1.84 | 9.87 | –1.21 | –8.31 | –7.85 | –20.70 | –3.41 | –8.60 | –8.62 | –7.96 |
| Mining | –5.59 | –0.64 | 4.06 | –0.47 | –5.62 | –5.41 | –1.51 | –3.41 | –5.02 | –4.14 | –1.5 |
| Food | 0.88 | –2.69 | 11.53 | –1.86 | –8.69 | –8.18 | –11.39 | –3.41 | –13.53 | –9.03 | –8.48 |
| Textile | 8.57 | 6.92 | 21.24 | 13.49 | –9.94 | –5.35 | –11.00 | –3.41 | 11.96 | –9.99 | 41.87 |
| Chemicals | 2.77 | –3.14 | 8.42 | –2.91 | –7.24 | –7.09 | –11.37 | –3.41 | –15.04 | –8.75 | –9.76 |
| Machinery | 2.28 | –1.64 | 8.17 | –1.56 | –8.90 | –8.83 | –12.32 | –3.41 | –8.26 | –11.03 | –4.53 |
| Other Manufacturing | 3.24 | –2.98 | 11.01 | –2.49 | –8.59 | –8.28 | –12.85 | –3.41 | –12.88 | –9.56 | –6.97 |
| Other Trade Sector 1 | –8.53 | –1.03 | 7.12 | –0.55 | –7.46 | –7.02 | –0.03 | –3.41 | –6.74 | –7.35 | –3.12 |
| Other Trade Sector 2 | –7.29 | –2.74 | 2.64 | –2.74 | –5.81 | –5.80 | 0.00 | –3.41 | –8.90 | –4.74 | 0.07 |
| Non Traded Sector | – | – | – | 0.03 | – | –5.50 | –9.99 | –3.41 | – | –7.85 | –4.02 |
| Total* | 0.59 | –0.92 | 17.13 | 0.75 | –7.81 | –6.87 | –2.56 | –3.41 | –6.32 | –7.03 | – |

Table 11

*Variation in Income and Consumer Price Index of Households (Percentages)*

| | Trade Liberalisation (55 Percent Reduction in Tariff on all Imports) | | Trade Liberalisation in Presence of Decline in Remittances (Tariff Rate by 55 Percent and Remittances by 44 Percent) | |
|---|---|---|---|---|
| | Nominal Income | Household Consumer Price Index | Nominal Income | Household Consumer Price Index |
| **Urban Households** | | | | |
| Professional | –0.88 | –3.45 | –4.97 | –7.29 |
| Clerks | –1.00 | –3.44 | –10.70 | –7.66 |
| Agriculture Worker | –1.21 | –3.46 | –9.85 | –7.86 |
| Production Worker | –0.85 | –3.43 | –8.12 | –7.78 |
| Miscellaneous | –1.10 | –3.44 | –9.09 | –7.35 |
| Urban Total | –1.00 | –3.44 | –9.03 | –7.58 |
| **Rural Households** | | | | |
| Professional | –1.31 | –3.42 | –5.87 | –7.92 |
| Clerks | –1.04 | –3.40 | –6.25 | –7.94 |
| Agriculture Worker | –1.30 | –3.25 | –6.50 | –7.95 |
| Production Worker | –0.81 | –3.36 | –7.35 | –7.97 |
| Miscellaneous | –1.19 | –3.47 | –7.37 | –8.06 |
| Rural Total | –1.16 | –3.34 | –6.70 | –7.97 |
| **Pakistan Total** | **–1.07** | **–3.39** | **–7.95** | **–7.77** |

shows, that with a given level of government expenditure and investment demand, trade liberalisation generates a welfare (equivalent variation) gain to every household group in the urban and rural areas. In urban areas, the welfare gain to the poorest household group (production worker) is not very different from the welfare gain to the relatively rich households (professionals), 2.69 percent and 2.68 percent, respectively. While in the rural areas, the welfare gains to the poorest (production worker) is the highest, 2.6 percent. The aggregate welfare gain is larger for urban households compared to rural households, at 2.6 percent and 2.3 percent, respectively (Table 12).

Table 12

*Decomposition of Welfare Impact (Percentage Change)*

| Households by Socio Economic Groups | Trade Liberalisation (55 Percent Reduction in Tariff on all Imports) | Total Effect of Trade Liberalisation in Presence of Decline in Remittances (Reduction in Tariff Rate by 55 Percent and Remittances by 44 Percent) | Reduction in Remittance |
|---|---|---|---|
| **Urban Households** | | | |
| Professional | 2.69 | 2.50 | –0.19 |
| Clerks | 2.60 | –3.22 | –5.82 |
| Agriculture Worker | 2.53 | –2.05 | –4.58 |
| Production Worker | 2.68 | –0.38 | –3.06 |
| Miscellaneous | 2.48 | –1.85 | –4.33 |
| Urban Total | 2.58 | –1.56 | –4.14 |
| **Rural Households** | | | |
| Professional | 2.49 | 2.56 | 0.07 |
| Clerks | 2.39 | 1.77 | –0.62 |
| Agriculture Worker | 2.00 | 1.56 | –0.44 |
| Production Worker | 2.61 | 0.64 | –1.97 |
| Miscellaneous | 2.39 | 0.77 | –1.62 |
| Rural Total | 2.30 | 1.41 | –0.89 |
| **Pakistan Total** | **2.45** | **–0.19** | –2.64 |

The central issue in this study is to find the links between trade liberalisation and poverty in Pakistan. The results show that the income of all households declines after the shock of a tariff cut (Table 11). The density function (percentage of individuals with given income) shifts to the left (Figures 3 to 12). This shift in the density function increases the population below the poverty line (old) as more households move towards the lower income bracket if the poverty line does not change. However the results show that the value of the poverty line declines by 3.4 percent for urban households and by 3.3 percent for rural households due to change in consumer prices (Table 11). As a result, the poverty line shifts to the left. The poverty line shift more than compensates for the fall in income, which results in a reduction of the population below the poverty line in each household group (Figures 3 to 12).

Table 13 presents quantitative estimates of FGT indicators (Pα-measures) for absolute poverty; head count (Po), poverty gap (P1) and severity (P2). In the urban and the rural areas, the head count ratio declines between 2.4 to 14.4 percent and 3.4 to 9.6 percent, respectively. The poverty gap and the severity indices have both declined in all households in the urban as well as in the rural areas. From the table we may note that trade liberalisation is more beneficial for urban households as all poverty indicators (Pα-measures) decline more for households in the urban areas (who were relatively poor before simulation) compared to the households in the rural area. We can conclude that the policy shock benefits the poor.

Table 13

*Changes in F-G-T Indicators of Poverty (Percentages)*

| Households | Head Count | | | | Gap | | | | Severity | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base | Tariff cut | Tariff cut and Decline in Remit-tances | Decline in Remit-tances | Base | Tariff cut | Tariff cut and Decline in Remit-tances | Decline in Remit-tances | Base | Tariff cut | Tariff cut and Decline in Remit-tances | Decline in Remit-tances |
| Professional | 19.92 | –9.64 | 2.66 | 12.30 | 4.68 | –9.81 | 10.08 | 19.89 | 1.15 | –9.57 | 11.30 | 20.87 |
| Clerks | 31.52 | –7.30 | 6.85 | 14.15 | 3.77 | –7.40 | 9.02 | 16.42 | 2.42 | –9.50 | 11.57 | 21.07 |
| Agriculture | 35.33 | –14.44 | 0.00 | 14.44 | 7.43 | –12.89 | 3.09 | 15.97 | 1.44 | –13.89 | 3.47 | 17.36 |
| Production Worker | 40.08 | –7.09 | 4.92 | 12.00 | 5.51 | –7.56 | 8.63 | 16.19 | 1.26 | –8.62 | 10.15 | 18.77 |
| Others | 23.44 | –2.35 | 3.71 | 6.06 | 9.39 | –9.62 | 6.84 | 16.45 | 3.25 | –11.90 | 9.52 | 21.43 |
| **Urban (Total)** | **32.44** | **–7.09** | **5.09** | **12.18** | **7.27** | **–7.98** | **8.39** | **16.37** | **2.36** | **–9.32** | **10.59** | **19.92** |
| Professional | 25.2 | –3.57 | –3.57 | 0.00 | 5.20 | –8.46 | –8.65 | –0.19 | 1.42 | –11.27 | –11.27 | 0.00 |
| Clerks | 34.25 | –3.42 | –3.42 | 0.00 | 7.38 | –7.86 | –8.13 | –0.27 | 2.33 | –9.01 | –9.01 | 0.00 |
| Agriculture | 28.3 | –6.40 | –5.55 | 0.85 | 6.43 | –7.15 | –6.22 | 0.93 | 2.12 | –8.49 | –8.02 | 0.47 |
| Production Worker | 36.3 | –6.12 | –5.92 | 0.19 | 7.31 | –8.34 | –8.62 | –0.27 | 2.22 | –9.46 | –9.46 | 0.00 |
| Others | 23.19 | –9.57 | –9.14 | 0.43 | 4.58 | –8.08 | –8.30 | –0.22 | 1.41 | –9.22 | –9.93 | –0.71 |
| **Rural (Total)** | **30.47** | **–6.01** | **–5.61** | **0.39** | **6.49** | **–7.70** | **–7.55** | **0.15** | **2.05** | **–9.27** | **–8.78** | **0.49** |

## Density Functions and Shift in the Density Functions after the Shock (Urban Households)

**Fig. 3. Density Function (Professional)**

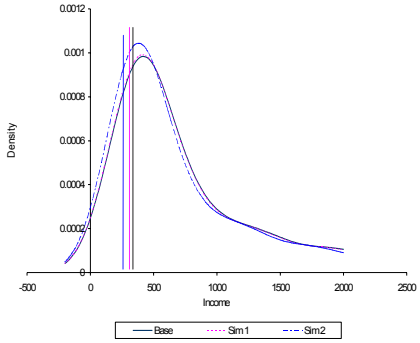



**Fig. 4. Density Function (Clerks)**

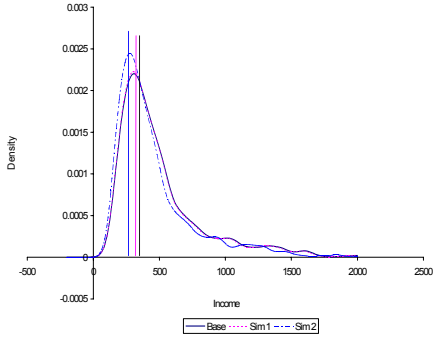



**Fig. 5. Density Function (Agriculture)**

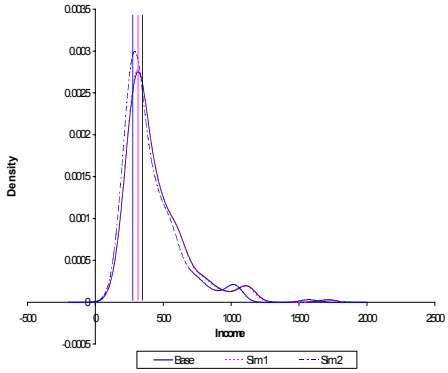



**Fig. 6. Density Function (Production Worker)**

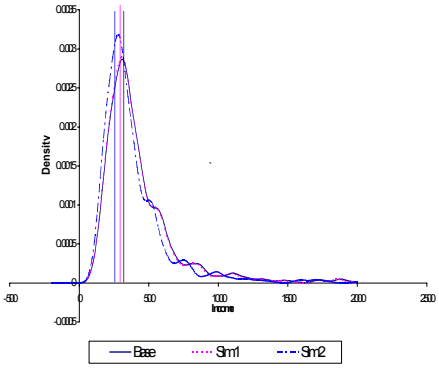
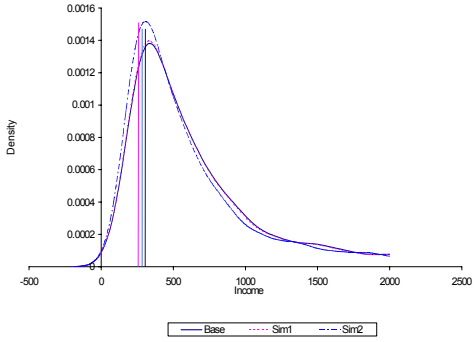



**Fig. 7. Density Function (Miscellaneous)**



## Density Functions and Shift in the Density Functions after the Shock (Rural Households)

**Fig. 8. Density Function (Professional)**

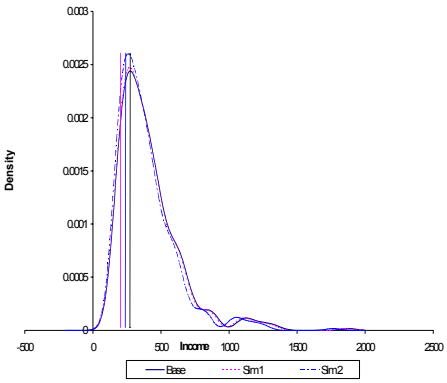



**Fig. 9. Density Function (Clerks)**

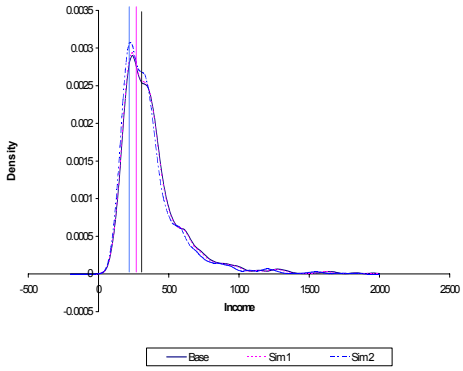



**Fig. 10. Density Function (Agriculture)**

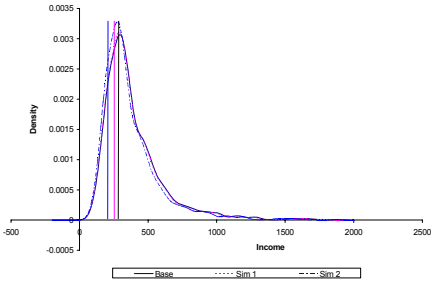



**Fig. 11. Density Function (Production Worker)**

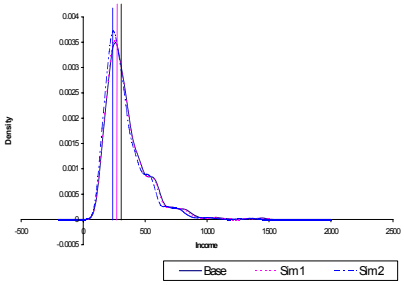
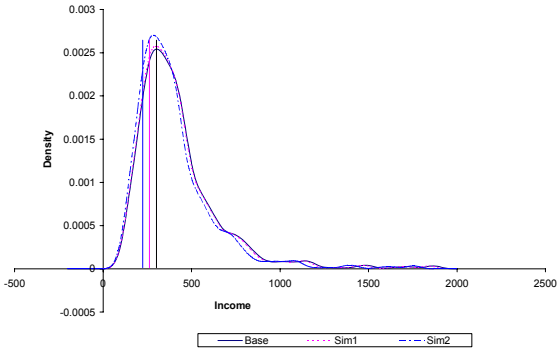



**Fig. 12. Density Function (Miscellaneous)**



For the analysis of distributive effects of liberalisation, we draw graphs for variation in the density function for the urban and rural areas before and after a change in government policy; tariff reduction. In Figures 13 and 14 Variation-1 shows that majority of households in the lower income group change their income brackets i.e., households move from the middle-income bracket (500-1000) towards the lower income bracket (250-500). There is a very little variation in the higher income brackets. This suggests that the income disparity has increased after trade liberalisation in the urban as well as in the rural areas of Pakistan. The overall results show that absolute poverty has declined by all measures in Pakistan in the presence of trade liberalisation. The empirical results on poverty contradict these findings as poverty increases by all measures during the period of trade liberalisation (Table 6 and Table 7). In the next section we explore the other channels which may be the cause of the rise in poverty in Pakistan during the 1990s.

**Fig. 13. Variation in Density Function (Urban Households)**

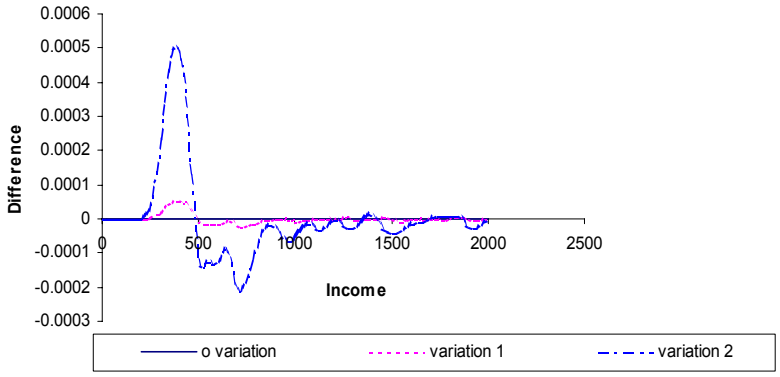
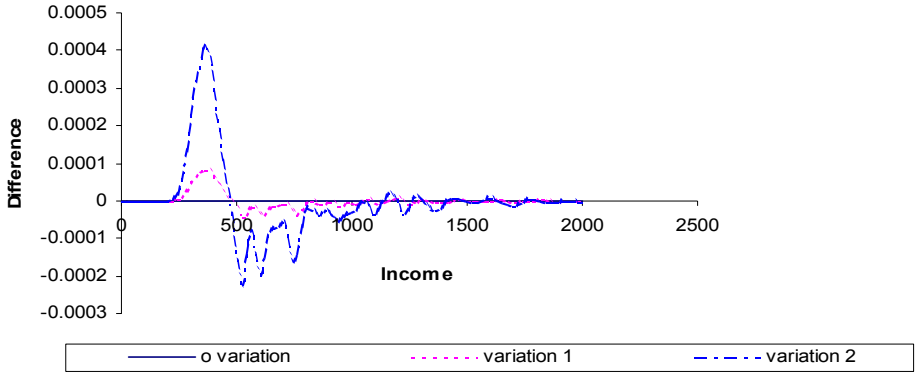



**Fig. 14. Variation in Density Function (Rural Households)**



**Simulation 2. Trade Liberalisation in the Presence of Decline in Remittances**

In this section, the results of the combined shock to the economy of a reduction in tariffs and a reduction in remittances are discussed. The tariffs and remittances are reduced simultaneously by 55 percent and 44 percent, respectively, (the actual decline over the 1990-2000). The cut in tariff reduces the domestic prices of all imports, which reduce competitiveness of the sectors protected in the base period, 1990. The sectors where the tariff was high in the base period i.e., non-crop, food, textiles, chemicals, machinery and other miscellaneous manufactured imports show an increase in imports. However, the total increase in imports is less than one percent compared to 4.5 percent in the first simulation. The decline in remittances restricts the inflow of imports because imports are financed by foreign remittances. With the Current Account Balance (CAB) constant, decline in remittances is partially compensated by a decline in imports and partially by a larger increase in exports from each sector as the real exchange rate depreciate. The exports from Pakistan increase by 17.1 percent compared to the increase in exports of 6.8 percent in the previous exercise (Table 10).

Aggregate domestic demand for domestic goods decline by 0.9 percent compared to decline in total demand for domestic goods, 0.46 percent in the previous exercise. The larger decline can be attributed to decline in the remittance income of households. The producer of exportable goods diverts a portion of his sales from the domestic to the export market. The largest increase in exports is from textiles, which leads to an increase in output from this sector. However, increase in the exports in all other sectors is not equal to the decline in domestic demand in their respective sectors. Therefore, output fell in those sectors. This leads to a reallocation of resources including factors of production.

The results show that demand for labour increases only in 'textiles' where domestic production increases. All other sectors show a decline in labour demand. The wage rate falls by 3.4 percent. Similarly, returns to capital increase only in the textile sectors. The overall results show that returns to capital decline by 6.3 percent (Table 10). If we compare the effects on macro variables in this and the previous exercise, it becomes clear that a decline in remittances has reduced the gains of trade liberalisation.

The adverse impact of decline in remittances on households depends on the households' share in total remittances. In addition to the decline in remittances, the fall in factor prices also has a negative impact on the households' nominal income (Table 11). Households' income decline by 5 to 10 times higher than in the previous exercise due to decline in remittances. In urban areas, the income of clerks declined by 10.7 percent, who receive 35.8 percent of remittances. In rural areas, the decline in income is between (–5.9 percent) to (–7.4 percent). The least decline is in the income of rich households (professionals) who receive only 0.2 percent of remittances (Table 9 and Table 11).

In this simulation, import prices fell by the same amount as in the first simulation but $P_D$ declined by a higher percentage due to reduction in household demand for goods and services. Resultantly, consumer prices fell for all commodities by a larger amount in this exercise (Table 11). The results show that rich households in urban and rural areas, (professionals) still gain in terms of equivalent variation at 2.5 percent and 2.6 percent respectively because, they are least affected through decline in remittance income. All other households lose in the urban areas. In rural areas all other households groups also gain but less than the rich households. However, the gain of trade liberalisation reduces with a decline in remittances.

Figures 3 to 12 reveal that a reduction in remittances in the presence of trade liberalisation shifts the density curves to the left more than in the previous exercise. These figures show that more households shift towards the lower income bracket in this exercise. The area specific consumer prices index decline by 7.6 percent and 8.0 percent for the urban and rural areas, respectively (Table 11). Resultantly, the poverty lines on the curves also shift to the left. The shifts in the poverty lines are more than compensated for some households, while for others the opposite is true. Households' specific poverty effects (Pα-measures) of trade liberalisation in presence of the decline in remittances are presented in Table 13. In urban areas, households below the poverty line increase in all household groups except for those, in the agricultural group of households. In rural areas, the head count ratio declines for each group of households. This suggests that trade liberalisation still benefits rural households in spite of the decline in remittances. An examination of the poverty gap and poverty severity indicators, P1 and P2, gives the same message (Table 13). Variation-2 in Figures 13 and 14 reveals distributive effects of liberalisation in the presence of a decline in remittances. The figures show a movement of households from the middle-income bracket (500-1000) towards lower income brackets is very large in this simulation. This suggests that a decline in remittances enhanced the adverse distributive impact of trade liberalisation. Income disparity increased due to the remittance decline.

***Decomposition Analysis***

A comparison of the results from the two exercises of the tariff cut and decline in remittance on welfare and poverty in Pakistan shows that trade liberalisation through tariff cuts increases the welfare of urban and rural households compared with the base year. But trade liberalisation in the presence of a reduced inflow of remittances reduces the welfare of urban households by 1.6 percent. However, rural households still gain in terms of welfare by 1.4 percent (Table 12). The third column in the Table 12 shows that the decline in remittances reduces welfare of each household in urban and rural households (except professional households in rural areas who receive only 1 percent of remittances), this is contrary to trade liberalisation effect where every household gains. The negative impact of remittance decline on urban households (–4.14 percent) is larger than the negative impact on rural households (–0.89 percent). In terms of total effects, the negative impact of remittance dominates the positive impact of trade liberalisation for urban households. The reverse is true for rural households as they still show a welfare gain.

Percentage changes in FGT-indicators for three effects: (1) tariff cut, (2) tariff cut and decline in remittances, and (3) decline in remittances only are presented in Table 13. The table shows that absolute poverty has declined in urban as well as in rural households because of trade liberalisation. However, with the decline in remittances poverty rises according to all Pα-measures in the both areas, urban and rural. The results of trade liberalisation in the presence of a decline in remittances shows that remittance impact dominates for urban households, but trade liberalisation impact dominates for rural households in terms of the total effect.

## VI. CONCLUSION

The paper explores the contribution of trade liberalisation policies and decline in remittance income of households to welfare and poverty in Pakistan. It analyses the impact of

trade liberalisation through tariff cut in the absence and the presence of decline in remittances on welfare and poverty in a CGE framework. Trade liberalisation boosts exports and benefits most the export-oriented labour-intensive sector, textiles. It is relatively more harmful to the sector specific factor of production, capital. The gains are larger for urban households than for rural households in terms of both welfare enhancement and poverty reduction. The study comes out with the conclusion that a tariff cut is welfare inducing and poverty reducing and trade liberalisation is not the cause of the rise in poverty in Pakistan during the 1990s.

In the second set of experiments, trade liberalisation in the presence of a decline in remittances reduces the gains of trade liberalisation. It reduces the welfare of urban households over the base year. Although rural households still show an increase in welfare over the base year, but less than the welfare gain with trade liberalisation only. According to all FGT indicators, poverty increases in urban households but not in rural households. This shock hurts more the relatively poorer group of households, clerks and production workers, who receive the major share of remittances.

Decomposition of impact of trade liberalisation and decline in remittances show explicitly that poverty increases according to all poverty measures in rural and urban areas of all households from a decline in remittances. However, the negative impact of remittance decline dominates the positive impact of trade liberalisation in urban areas and the positive impact of trade liberalisation dominates the negative impact of a decline in remittances in the rural area. We conclude from this that the decline in remittance inflows is a major contributory factor in explaining the rise in poverty in Pakistan. Trade liberalisation increases income inequality. Decline in remittances reinforces this impact.

## APPENDIX A

## COMPUTABLE GENERAL EQUILIBRIUM MODEL FOR PAKISTAN

### A. Foreign Trade Statistics

| | |
|---|---|
| 1. $X_n^s = B^T{}_n \left[\delta_n^T EX^{\rho_n^T} + (1-\delta_n^T) D_n^{\rho_n^T}\right]^{1/\rho_n^T}$ | Export Transformation (CET) |
| 2. $Q_n = B_n^s [\delta_n^s M^{-\rho_n^s} + (1-\delta_n^s) D_n^{\rho_n^s}]^{1/\rho_n^s}$ | Constant Elasticity of Substitution between Imports and Domestic Goods |
| 3. $Q_{NT} = X_{NT}$ | Domestic Demand for Non-traded Goods |
| 4. $Ex_n = (P_n^E / P_n^D)^{\sigma_n^T} \left[(1-\delta_n^T)/\delta_n^T\right]^{\sigma_n^t} * D_n$ | Export Supply |
| 5. $M_n = (P_n^D / P_n^M)^{\sigma_n^S} \left[(\delta_n/(1-\delta_n)\right]^{\sigma_n^S} * D_n$ | Import Demand |
| 6. $\sum P_n^{WM} * M_n + (1/e)\overline{TR_{FR}} - \sum \overline{P}_n^{WE} * EX_n - \overline{TR_{RH}} - \overline{TR_{RG}} = \bar{e} * \overline{CAB}$ | Equilibrium in Foreign Market |

### B. Income and Saving

| | |
|---|---|
| 7. $Y_H = \lambda_{lH} \sum {}^w L_i^D + \lambda_{KH} \sum R_i \overline{K_i} + DIV_H + \bar{e} * \overline{TR}_{RH} + \overline{TR}_{GH}$ | Households' Income |
| 8. $DIV_H = dvr_H * Y_{FK}$ | *Dividend, Income from Firms* |
| 9. $YD_H = (1-t_{yh}) * Y_H$ | Households Disposable Income |
| 10. $S_H = aps_H * YD_H$ | Households' Saving |
| 11. $TS_H = \sum S_H$ | Total Households' Saving |

12. $Y_{FK} = (1 - \sum \lambda_k) \sum (R_i K_i)$ — Firms' Capital Income
13. $Y_F = Y_{FK} + \overline{TR}_{GF}$ — Firms' Total Income
14. $S_F = Y_F - \overline{TR}_{FR} - \sum DIV_H - t_k * Y_{FK}$ — Firms' Saving
15. $TXS_i = tx_i * P_i * X_i^S$ — Taxes on Production
16. $TXM_n = tm_n * \bar{e} * P_n^{WM} M_n$ — Taxes on Imports
17. $TXE_n = te_n * \bar{e} * P_n^{WM} X_n$ — Taxes on Exports
18. $Y_G = \sum (ty_H * Y_H) + tk * Y_{FK} + \sum TXS_i + \bar{e} * \overline{TR}_{RG} + \sum TXM_n + \sum TXE_n$ — Government Revenue
19. $S_G = Y_G - \overline{TR}_{GF} - \sum \overline{TR}_{GH} - \sum C_{Gi}$ — Government Saving

**C. Structure of Production** — **C**

20. $X_i^S = IC_i / io_i$ — Output
21. $IC_i = io(i) * (X_i)$ — Intermediate Consumption from *i*th sector
22. $ICJ_{ij} = a_{ij} IC_j$ — Intermediate Demand of *i*th sector from *j*th
23. $VA_i = B_i[\delta_i K_i^{\sigma_i} + (1 - \delta_i)(L^D_i)^{-\sigma}]^{-1/\sigma i}$ — Production Function (CES)
24. $L_i^D = \left[ \{ \frac{(1 - \delta_i)}{\delta_i} \} \{ R_i / w \}^{1/\rho + 1} \right] * \overline{K_i}$ — Labour Demand
25. $R_i = (P_i^{VA} * VA_i - w * L_i^D) / K_i$ — Return to Capital

**D. Demand**

26. $CT_H = YD_H - S_H$ — Total Households Consumption
27. $C_i(h) == \{ P_{ci} \gamma_i + \beta^c_{hi} (CT_h - \sum P_c^i \gamma_i) \} / P_c^i$ — Households demand function (LES)
28. $CG_i = \beta^{\Gamma}_i CT_G / P_i^c$ — Government Consumption
29. $C_i = \sum CT_{Hi} + CG_i$ — Total Private and Public Consumption
30. $INTD_i = \sum a_{ij} IC_j$ — Intermediate Demand
31. $I_i = \beta_i^I * IT / P_i^c$ — Investment Demand
32. $CG_{ri} = CT_G / P_g$ — Government Total consumption in Real term

**E. Prices**

33. $P_n^M = (1 + tm_n) * (1 + tx) * \bar{e} * P_n^{WM}$ — Domestic Price of Imports
34. $P_n^E = (1 + te_n) * \bar{e} * P_n^{WE}$ — Domestic Price of Exports
35. $P_i X_i^S = (Pt_i * D_i^s + EX_i * P_i^E)$ — Producer Price
36. $P_i^{VA} * VA_i = (P_i * X_i^s) - \sum (P_i^c IC_{ji})$ — Value Added Price
37. $PD_i = Pt_i * (1 + tx_i)$ — Domestic Price after paying taxes
38. $P_n^C = (D_n / Q_n) * P_n^D + (M_n / Q_n) P_n^M$ — Composite Price of traded goods (consumer prices)
39. $P_{nt}^C = PD_{nt}$ — Composite Price of non-traded goods

40. $Pindex = \sum(\beta_i^X * P_i)$ GDP Deflator

41. $Pg = \Pi (P_i^c / \beta_i^g)\beta_i^I$ Deflator for Government Consumption

42. $P_I = \prod(P_i^C / \beta_i^I)^{\beta_i^I}$ Deflator for Investment

***F. Equilibrium***

43. $IT = \sum TS_H + S_G + S_F + \bar{e}^* \overline{CAB}$ *Saving-Investment Equilibrium*

44. $Q_i = C_i + INTD_i + I_i$ Commodity Market Equilibrium

45. $L_S = \sum (L_i^D)$ Labour Market Equilibrium

## VARIABLES

**Endogenous Variables**

| | | | |
|---|---|---|---|
| 1. $C_i$ | Total Consumption of ith Good | 42. $Y_{FK}$ | Firms Capital Income |
| 2. $CG_i$ | Government final Consumption of Good i | **Exogenous Variables** | |
| 3. $CT_G$ | Total Government Consumption | 1. CAB | Current Account Balance |
| 4. $CH_i$ | Household Consumption of Good i | 2. $CT_{GR}$ | Government final consumption in real terms |
| 5. $CT_H$ | Total Household Consumption | 3. e | Nominal Exchange Rate |
| 6. $D_i$ | Domestic Demand for domestically produced good | | $K_i$ ith Branch Capital Stock |
| 7. $DIV_H$ | Dividends distributed to Households from firms | 5. $L^S$ | Total Labour Supply |
| 8. $EX_n$ | Exports of nth good (FOB) | 6. $P_n^{WE}$ | World Price of Exports |
| 9. $IC_i$ | Total Intermediate Consumption of Good by ith sector | 7. $P_n^{WM}$ | World Price of Imports |
| 10. $IC_{ij}$ | Intermediate Consumption of Good J by ith sector | 8. $TR_{FR}$ | Firms transfers to the rest of world |
| 11. $INTD_I$ | Intermediate Demand of Good I | 9. $TR_{GF}$ | Government transfers to Firms |
| 12. $I_i$ | Consumption of Good for investment in sector ith sector | 10. $TR_{GH}$ | Government Transfers to Households |
| 13. IT | Total Investment | 11. $TR_{RG}$ | Foreign transfer payments to the Government |
| 14. $L_i^D$ | Labour Demand in sector *i* | 12. $TR_{RH}$ | Foreign transfers to Households |
| 15. $M_n$ | Imports of nth good (CAF) | **SYMBOLS** | |
| 16. Pg | Price deflator for government consumption | 1. **Symbols** | **Variable Names** |
| 17. $P_I$ | Price Deflator for Investment | 2. $a_{ij}$ | Input Output Coefficients |
| 18. $P_i$ | Producer Price | 3. $B_i$ | CES scale parameter of value added |
| 19. $Pt_i$ | Domestic price without taxes | 4. $B_e^T$ | CET scale parameter of Import aggregation function |
| 20. $P_i^C$ | Price of Composite good | 5. $B_c^s$ | CES scale parameter of export transformation function |
| 21. $P_n^D$ | Price of domestically produced and consumed good including taxes | 6. $\beta_{hi}^c$ | Percentage share of good i in hth household consumption |
| 22. $P_n^E$ | Domestic price of Exports including all taxes | 7. $\beta_i^G$ | Percentage share of good i in Public consumption |
| 23. $P_n^M$ | Domestic Price of Imports including all taxes | 8. $\beta_i^I$ | Percentage share of good i consumed for investment purposes |
| 24. $P_n^{VA}$ | Value Added Price | 9. $\beta_i^x$ | Percentage share of good i in total Production |
| 25. $P_{INDEX}$ | Producer price Index | 10. $\gamma_i$ | Subsistence expenditure by hth household |

| | Endogenous Variables | | Symbols |
|---|---|---|---|
| 26. $Q_i$ | Domestic Demand for Composite Good *i* | 11. $\lambda_{lH}$ | Household Share of Labour Income |
| 27. $R_i$ | Rate of Return on capital in branch *n* | 12. $\lambda_{kH}$ | Household Share of Capital Income |
| 28. $S_G$ | Government Saving (Fiscal Deficit) | 13. $io_I$ | Leontief technical coefficients (Intermediate Consumption of good i |
| 29. $S_H$ | Saving of Household h | | |
| 30. $S_F$ | Firms Savings | 14. $mps_h$ | Household marginal propensity to save |
| 31. $TS_H$ | Total Households Savings | 15. tk | Capital Income tax rate of firms |
| 32. $TXE_n$ | Taxes on Exports of nth sector | 16. $\sigma_i$ | CES elasticity of substitution of value added |
| 33. $TXM_n$ | Taxes on Imports of nth sector | 17. $\rho i$ | CES Substitution parameter of value added |
| 34. $TXS_i$ | Indirect taxes on ith sector production | 18. $\delta i$ | CES Distributive share of value added |
| 35. $VA_i$ | Value Added of sector i | 19. $\sigma_e^T$ | CET elasticity of transformation of export |
| 36. W | Wage rate | 20. $\rho^T_e$ | CET Substitution parameter of export transformation |
| 37. $X_i^s$ | Production of ith sector (Supply) | 21. $\delta^T_e$ | CET Distributive share of exports and domestic production |
| 38. $Y_H$ | Total Income Household h | 22. $\sigma^S_c$ | CES elasticity of substitution of imports |
| 39. $YD_H$ | Disposable income of Household h | 23. $\rho^S_c$ | CES Substitution parameter of imports |
| 40. $Y_F$ | Firms total income | 24. $\delta^S_c$ | CES Distributive share of imports and domestically produced goods |
| 41. $Y_G$ | Government Revenue | | |

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