Welfare and Poverty Impacts of Policy Reforms in Bangladesh: A General Equilibrium Approach

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April 2004

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Abstract

Our study assesses the impacts of different policy reforms like domestic trade liberalization, implementation of WTO agreements in textile sector and WTO negotiations of service liberalisation like free movement of natural persons and examines their welfare and poverty implications for the economy of Bangladesh. We use a comparative static computable general equilibrium (CGE) model based on 1995-96 Social Accounting Matrix (SAM) of the Bangladesh economy. The 1995-96 SAM of Bangladesh is characterised by 26 production sectors, 7 factors of production and 7 household groups. The household groups differ with respect to employment status, income levels and expenditure patterns. Since poverty outcomes are manifested and measured at the household level, we concentrate on how the meso-environment facing the households, particularly the poor households, is affected by these policy reforms. The direct effect of trade liberalization through the price channel depends on how changes in prices of importable due to tariff changes, affect the prices faced by households of the imported commodities and get transmitted to other commodities as well. On the other hand, implementation of WTO agreements for textile and apparels (T&A) and thus phasing out of MFA regime from 2005 will likely to affect the prices of T&A in the international market and, therefore, may affect the volume of export of Bangladesh ready-made garments (RMG), which may have important impact on poverty and welfare of the households in Bangladesh. Finally, if free movements of natural persons are allowed, which is an agenda for many developing countries under the WTO negotiations, it may raise the remittances for the Bangladesh economy significantly, which may have important poverty and welfare implications.

Our study carries out three simulations to examine the welfare and poverty impacts of policy reforms on the 7 representative household groups. Equivalent variations (EVs) and FGT measures are applied to estimate welfare and poverty changes respectively. The first simulation entail full liberalisation of tariffs and resultant reduction in government revenues are mobilized by enhancing (i.e. by 55 percent) the existing production taxes and imposing new taxes on construction sector such that pre-simulation budgetary position of the government is retained; in the second simulation export of RMG is reduced by 25 per cent; and in the third simulation the remittances are increased by 50 per cent. The summary of the simulation outcomes is as follows: (1) In the *first simulation*, it is observed that, EVs are negative for all household groups. The values of the EVs of rural households envisage relatively larger losses for the well-off groups (e.g. large farmer and non-farm) compared to the poor household groups (e.g. labour and small farmer). The pattern is however reverse in the case of urban group with the EV of poor household group (i.e. worker low skilled) fell more than that of urban rich household groups (e.g. medium-skilled and professional). It also appears that welfare losses are larger for rural household groups compared to their urban counter parts. In the *first simulation,* poverty status of all household groups has deteriorated. The loss, however, is marginally higher for the urban households compared with the households who reside in the rural location. (2) In the *second simulation* (fall in export of RMG by 25 per cent), interestingly though incomes of all households decline, equivalent variations and consumption growth of all households increase indicating improvements in welfare. This result may seem to be counter-intuitive. The possible explanation behind such result may be the fact that in our static CGE setting due to the fall in export of RMG, there is an increase in the domestic supply, which results in fall in the domestic prices of goods. This fall in prices may be higher than the fall in income, which results in increase in real income. However, this improvement may not sustain in the long-run. There are improvements in poverty profiles for the rural households, and, except for the head-count poverty measure, the gap and severity of urban poverty increase. (3) In the *third simulation*, a 50 per cent increase in remittances raises welfare for all the household groups and the welfare improvement is higher for urban professional household, rural large-farm and non-farm households. On the other hand, the poverty profiles of the rural households deteriorate, and though there is an improvement in urban head-count index the gap and severity of urban poverty increase.

Welfare and Poverty Impacts of Policy Reforms in Bangladesh: A General Equilibrium Approach

1. Introduction

In this paper we assess the macroeconomic impacts of three policy reforms such as domestic trade liberalization, implementation of WTO agreements in textile sector and WTO negotiations of service liberalisation like free movement of natural persons and examine their welfare and poverty implications for the economy of Bangladesh.

Our study looks at above three specific issues using a computable general equilibrium technique. We develop a standard multi-sector, multi-factor and multi-household computable general equilibrium (CGE) model of the Bangladesh economy and apply it to examine the impacts of policy reforms on allocation of resources, distribution of income, and poverty status of different household groups.

The paper is organized as follows. Section 2 briefly discusses the issues which are going to be examined in this study. Section 3 portrays some key features of the Bangladesh economy. An outline of the computable general equilibrium model and its features are discussed in section 4. Section 5 presents design of three simulations. The macroeconomic, welfare and poverty outcomes of three policy simulations with a general equilibrium model of the Bangladesh economy are discussed in Section 6. Finally, section 7 provides the concluding observations and some major policy implications.

2. An Overview of the Issues

2.1. Domestic Trade Liberalisation[2]

After a period of restricted trade regime until the mid seventies Bangladesh initiated a more liberalised trade regime.[3] The pace and extent of trade liberalisation accelerated during the late eighties and early nineties when more comprehensive programme of stabilisation and economic reforms were put in place under the structural adjustment programmes prescribed by World Bank and IMF.[4]

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[2] This section draws significantly from Mujeri and Khondker (2004).

[3] The period of restricted trade regime was characterised by inward looking policies of creating an import-substituting industrial base through a protective domestic environment, conserving foreign exchange, maintaining a stable balance of payment and dominant role of public sector in almost every aspect of the economy. However, this regime has been criticised on grounds of inefficient allocation of resources, rent-seeking activities, anti-export bias, development of an incompetent industrial structure, slow growth of the economy and problems with balance of payment deficit. Under the structural adjustment programmes, more open, liberal, export-oriented and private-sector based policies were put in place. The programmes were targeted towards reforms in different aspects of the economy including fiscal, financial, trade and industrial policy reforms; public resource management; privatization; and institutional and sectoral reforms.

[4] The structural adjustment programmes were initiated in 1987 and, in fact, implemented through Structural Adjustment Facility (SAF) and the Enhanced Structural Adjustment Facility (ESAF) of the IMF and the World Bank. See Sobhan (1991) and Mujeri *et. al*. (1993) for a detailed discussion.

The standard arguments of benefits of trade liberalisation encompass the ideas that trade liberalisation, by relaxing the constraints, expands the scope of the small domestic market, provide access to foreign direct investment, facilitate technology transfer, create marketing network, and provide much-needed managerial and technical skills. It is also argued that trade liberalisation generates higher economic growth and helps in reducing poverty. However, there are some important concerns that trade liberalisation is associated with some costs, such as increased volatility of the economy, adverse effects from immature opening-up of the economy, increased poverty and inequality, etc. The vital issue is whether the benefits of trade liberalization would outweigh the costs and what the net benefit of trade liberalisation is. However, both the theory and empirical literature on trade liberalisation are inconclusive on the net benefits of trade liberalisation.[5] It is, however, safe to argue that, in the context of a developing country like Bangladesh, in order to outweigh the costs of trade liberalisation by the benefits there are some critical factors which must be addressed properly. These are the country's institutional capabilities to (i) manage the overall economic development process in general and trade liberalisation programme in particular; (ii) address and eliminate the structural bottlenecks of the economy; and (iii) strengthen the domestic economy through pragmatic policies and programmes.

In the context of Bangladesh there are concerns whether Bangladesh has been benefited from the liberalisation of trade implemented so far. Though, studies like World Bank (1999), Ahmed (2001) mention positive impact of trade liberalisation on the economy of Bangladesh, some other studies point out that Bangladesh gained relatively little from the trade reforms of the 1990s (Mujeri 2002a, 2002b). One important point to mention here that almost all of these studies discuss the impact of trade liberalisation from a rather macro perspective and thus the meso perspective or the welfare and distributional aspects of trade liberalisation still remain inadequately addressed. It is, thus, worth mentioning that the distributional consequences of trade liberalisation as reflected in the differential impact on the welfare and poverty status of various socio-economic groups need to be addressed properly in order to get a clearer picture of the impact of trade liberalisation. This issue is vital for Bangladesh in its fight against poverty. If trade liberalization creates disproportionate burden and adjustment costs for the poor groups in the society, it becomes important to undertake countervailing measures such that the process becomes more equitable.

In Bangladesh, trade liberalisation programmes and associated economic reforms during the eighties and nineties significantly liberalized its external trade and foreign exchange regimes. Following the implementation of these reforms there has been rationalization and simplification of the trade regime in Bangladesh. Because of the trade reforms, there has been significant lowering of tariff rates, phasing out of the quantitative restrictions, simplification of the import procedures, introduction of tax

[5] The theoretical models of endogenous growth suggest positive association between openness and growth through several channels e.g. embodied technology, availability of inputs, technical assistance and learning, and reduced networking costs (see Grossman and Helpman, 1991). For evidence on positive relationship between openness and growth, see Greenaway *et. al*. (1997), Edwards (1998), Frankel and Romer (1999). For a strong critique of the arguments favouring the positive association, see Harrison (1996), Harrison and Hanson (1999), Rodriguez and Rodrik (1999).

reforms and introduction of various export promotion measures. The major changes due to the reforms are summarised as follows:

- Import procedures were simplified and the number of tariff bands was reduced significantly. Twenty-four slabs of import duty rates of 1980s were replaced with only 4 slabs in 2000.
- In 1992 the highest customs duty rate was 350 percent. It was reduced to 37.5 percent in 2000. The un-weighted average tariff rate declined to 22 percent in 1999 from 114 percent in 1989 while import-weighted average tariff rate declined to 19 percent from 114 percent over the same period.
- There has been a significant reduction of the number of commodities under quantitative restrictions. In 1987 the number of commodities under the four-digit code subject to quantitative restrictions was 550, which declined to 124 under the Import Policy of 1997-2002. The decline in quantitative restriction is also manifested in the fact that whereas in 1992, about 12 percent of around 10,000 tariff lines were subject to quantitative restrictions, in 1999 it came down to less than 4 percent. The restriction is also relaxed in the later years and, at present, only less than 0.5 percent of imports, mainly in the textile category, is subject to quantitative restrictions.
- There have been moves towards a more market-determined exchange rate regime. The policy of multiple exchange rate system was replaced by a unified exchange rate in 1992 and the domestic currency (Taka) was pegged to a currency-weighted basket. Since 1992 a policy of creeping devaluation had been followed to maintain exchange rate flexibility and export competitiveness. The currency (Taka) was made convertible for all current account transactions. Finally, in 2003 Bangladesh initiated a fully flexible exchange rate system.
- Under the export-oriented industrialisation strategy, different export promotion measures were put in place with the aim of diversification of the export basket, improving quality of exports, stimulating higher value added exports, and developing industries for backward linkages. The export-promoting measures undertaken are: special bonded warehouses facilities, establishment of export processing zones, duty drawback scheme, rebate on insurance premiums, income tax rebate, export-credit guarantee scheme, incentives for exporting non-traditional industrial products, export promotion fund, Value Added Tax refunds, tax holiday, and retaining foreign exchange from export earnings.

The aforementioned policy reform measures contributed to a significant increased trade orientation for Bangladesh economy during the 1990s. The importance of foreign trade in domestic economy increased considerably, as is evident from increased share of trade in goods in both PPP GDP and goods GDP and also by the dynamism of trade regime, which is estimated by the difference in growth in real trade and growth in real GDP. Table 1 provides relative trade-orientation values for South Asian countries. Table 1 suggests that: (i) there has been rapid trade-orientation of the Bangladesh economy; (ii) The trade regime in Bangladesh was more dynamic compared with India, Pakistan and Sri Lanka during the period under consideration; and (iii) even though the trade-orientation of the Bangladesh economy compares

favourably with the South Asian average, it is less than the average for low income countries.

Table 1: Bangladesh's Trade Orientation: A South Asian Perspective

	Trade in goods as % of				Dynamism of trade regime
	PPP GDP		Goods GDP		
	1988	1998	1988	1998	1988-1998
Bangladesh	4.2	7.0	29.9	56.1	7.2
India	3.3	3.9	18.2	33.6	4.5
Pakistan	9.3	8.2	54.8	53.4	0.1
Sri Lanka	11.5	17.9	88.0	118.8	2.9
South Asia	4.2	4.8	24.2	40.5	...
Low income countries	6.8	8.3	38.6	62.5	...

Note: The trade in goods as a share of PPP GDP is the sum of merchandise exports and imports measured in current US dollars divided by the value of GDP converted to international dollars using purchasing power parity (PPP) rates. The trade in goods as a share of goods GDP is the sum of merchandise export and imports divided by the value of GDP less value added in services (all in current US dollars). The growth in real trade less growth in real GDP is the difference between annual growth in trade in goods and services and annual growth in GDP using constant price series.
Source: World Bank (2000).

2.2. WTO Agreements on Textile and Apparels

Ready-made garments (RMG) exports have been Bangladesh's one of the dominant sources of foreign exchange earnings in the last decade. From a small base of only 865 million dollars in 1991, RMG exports have grown to 4857 million dollars in 2001, accounting for 75 percent of export earnings and 48 percent of total foreign exchange earnings in 2001. Table 2 suggest that Bangladesh's export basket is very much concentrated around RMG export. Therefore, any shock on RMG export is very much likely to have significant impact on total export earnings as well as on foreign exchange earnings in Bangladesh.

Table 2: Dynamics of Bangladesh RMG Exports

	1991	1994	1995	1996	1997	1998	1999	2000	2001
RMG Export (Million US$)	865.4	1553.3	2228.5	2547.1	3001.2	3781.6	4021.3	4351.3	4857.3
Total Export (Million US$)	1717	2533.9	3472.6	3882.4	4418.3	5160.5	5312.2	5748.1	6467.8
RMG Export as percent of Total Export	50.4	61.2	64.1	65.5	67.8	73.2	75.7	75.7	75.1

Source: Export Promotion Bureau (EPB), Bangladesh

There are considerable debates among the economists about the implications of Multi-Fibre Agreement (MFA) phase out for developing countries (Hertel, *et al,* 1996; Hertel and Martin, 2000, Yang *et al,* 1997). Studies which envisage positive impacts suggest that the vast majority of these countries will be benefited from the removal of

trade restrictions on textile and clothing, with some gaining proportionately more than others through increased market share and the rent transfer effect of bilateral quotas. However, sceptics raise some concerns that the distribution of welfare gains from trade liberalisation in textile and clothing will be skewed, where countries like China, Indonesia and South Asian countries are likely to gain more compared to countries of Latin America and sub-Saharan Africa. Moreover, the higher-cost exporting countries like Hong Kong, South Korea, Taiwan who enjoy the largest share of exports to the markets of developed countries under the MFA, will likely to cede ground to lower-cost exporting countries like China and India. There is, however, a concern that the relatively new and low-cost exporting countries, like Bangladesh and Sri Lanka, may lose considerable market share because of their small size, lack of product diversification and low productivity.

It has been projected that with the end of the MFA on January 1, 2005, Bangladesh is going to lose the export advantage it has enjoyed over other competitors. Though Bangladesh exports RMG to a number of countries, its main markets are the EU and US. Currently, Bangladesh possesses unconstrained access to EU markets, where many of its competitors' exports are constrained by quotas. On the other hand, in the US market, Bangladesh is allocated with a sizeable quota, while its competitors' exports are limited by relatively small quotas. For instance, China's exports of clothing to EU are strongly constrained by quotas while Bangladesh's exports are not. However, with the phasing out of MFA the situation is likely to change. Implementation of WTO agreements for textile and apparels (T&A) and thus phasing out of MFA regime from 2005 will likely to affect the prices of T&A in the international market (MacDonald et al., 2001; Diao and Somwaru, 2001). Thus, if trade reform occurs, prices received by Bangladeshi exporters of ready-made garments (RMG) are likely to decline and Bangladesh may loose market share to China and other countries, as these countries gain more access to EU and US markets.

It has become another concern about the raising cost of raw-materials for RMG exports of Bangladesh after the removal of MFA. The ratio of the value of imports of raw-materials for RMG exports to the value of total RMG exports in Bangladesh is quite high (about 70 percent in 2000), which indicates lower value-addition in RMG sector. Bangladesh imports raw materials for RMG from countries such as India, China and Thailand under back-to-back L/C facilities. It is projected that under a quota free regime these countries will prefer to substitute export of raw-materials (i.e., grey fabrics) to countries such as Bangladesh by export of apparels to North American markets. It suggests that, Bangladesh is going to face a double challenge in the areas of accessing raw materials at competitive prices and competing with hitherto restricted countries under a quota-free context. It is now an issue of critical importance for the future of Bangladesh RMG industry that whether the Bangladesh RMG export sector will be able to withstand the challenge posed by these newly emerging competitors in the post-MFA phase. This certainly depends on the strength of the Bangladesh textile sector in general and RMG in particular.

It is estimated that about 1.6 million labourers are engaged in about 3000 RMG units in Bangladesh. We have already understood the importance of RMG sector for the economy of Bangladesh. Therefore, the concerns about the future of RMG sector in Bangladesh are also linked with the implications for welfare and poverty in Bangladesh after the MFA phase out.

2.3. WTO Negotiations and Free Movement of Natural Persons

It has been argued that liberalising the movement of natural persons, i.e., by introducing a temporary visa system in rich countries permitting movement of labour up to 3 percent of the total labour force, would increase world incomes by nearly $160 billion (Winters and Walmsley, 2002). However, regarding the liberalisation of the movement of natural persons little progress was made in the Uruguay Round. The agreements so far achieved in Uruguay Round – and in various regional talks like the NAFTA and the EU's Europe Agreements with East and Central European countries – mostly concerned with relatively highly skilled workers (McCulloch, *et. al*. 2001).

McCulloch, *et. al* (2001) argue that when skilled personnel leave a developing country for a developed one, typically their incomes are increased significantly. This contributes to raising the national income of the developing country, but its poverty implication is not so clear. Since skilled workers were initially non-poor, it does not entail direct contribution to poverty alleviation. But, if the higher incomes of these skilled workers lead to greater remittances in the developing country, there could be a positive effect. Furthermore, working abroad may facilitate individuals to acquire greater skills and these benefits would be doubled if they eventually returned home. On the contrary, liberalising the movement of low-and medium-skilled workers from the developing countries to the developed one is a far more secure route to general income growth and poverty alleviation in the developing countries. As because, developed countries are poorly endowed with low-and medium skilled people, the income increase for these people is likely to be proportionately larger and by moving, they also reduce the over-supply of labour at home. Moreover, far more workers would potentially be affected at the less skilled than at the highly skilled end of the spectrum. Thus, it is argued that developing countries should concentrate their negotiating efforts on the free movement of natural persons.

In this paper, we argue that if free movements of natural persons are allowed it may significantly raise the remittances for the Bangladesh economy, which may have important poverty and welfare implications at the household levels. The flow of remittances to the country by Bangladesh's migrant workers has been quite robust throughout the 1990s, rising from US$764.0 million in 1991 to US$1882 million by 2000. As shown in Table 3, barring three years, remittances have registered double digit growth rates during the 1990s.

Table 3: Dynamics and Growth of Remittance in Bangladesh: 1991-2001

Indicators	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Remittances (in million US$)	763.9	849.7	944.6	1088.7	1197.6	1217.0	1475.4	1525.4	1705.7	1943.3	1882.1
Growth of Remittances (%)	0.4	11.2	11.2	15.3	10.0	1.6	21.2	3.4	11.8	14.3	-3.4
Remittances as % of Exports	44.5	42.6	39.6	43.0	34.5	31.3	33.3	29.5	32.0	33.9	29.1

Source: Rahman (2001)

3. Changing Perspectives of Bangladesh Economy: Some Key Features[6]

Over the last two decades Bangladesh has undergone major changes in structure of its economy, trade, poverty and inequality. The changes in economic structure are reported in Table 4.

Table 4: Changes in Economic Structure during 1980-2000

A. Structure	Share (percent) in GDP at constant 1995/96 prices			
	1980	1990	1995	2000
Agriculture	33.2	29.5	26.0	25.6
Industry	17.1	20.8	24.3	25.7
Services	49.7	49.7	49.7	48.7
Total	100	100	100	100

B. Growth	Percent at constant 1995/96 prices			
	1981-1990	1981-2000	1991-1995	1995-2000
Agriculture	2.3	2.8	1.6	4.9
Industry	5.8	6.4	7.5	6.4
Services	3.7	4.8	4.1	4.8
GDP	3.8	4.3	4.4	5.2
Per capita GDP	1.6	2.3	2.4	3.6

Source: Mujeri and Khondker, (2004).

Table 4 suggests that during the last two decades the structure of economy changed significantly as the share of agriculture in GDP declined to around 26 percent by 2000 from 33 percent in 1980. The fall in share of agriculture has been accompanied the rise in share of industry, which increased from 17 percent in 1980 to around 26 percent in 2000, thanks to remarkable performance of manufacturing exports during the 1990s. The share of service remained stable at around 49 percent throughout the whole period.

It is also evident from Table 4 that the average rate of GDP growth was higher during the 1990s compared to that of during 1980s. The average GDP growth rate was less than 4 percent during 1980s, which increased to more than 5 percent during the period of 1995-2000, suggesting the average growth rate was relatively higher during the liberalization period. The increased economic growth and lowered population growth contributed to accelerated per capita GDP growth during the 1990s.

Table 5: Structural Change and Growth in Merchandise Trade

	1981	1985	1990	1995	2000
Exports (as % of GDP)	5.3	5.6	6.1	10.9	14.0
Imports (as % of GDP)	14.5	13.2	13.5	17.3	19.2
Openness (Export + Import as % of GDP)	19.8	18.8	19.6	28.2	33.2
Average Annual Growth (%)		**1980-90**		**1990-99**	
Export Volume		1.0		14.9	
Export Value		7.8		11.3	
Import Volume		-4.3		20.5	
Import Value		3.6		10.7	

Source: World Bank (2000, 2002).

[6] This section also draws significantly from Mujeri and Khondker (2004).

Table 5 suggests that during the 1990s both the exports and imports registered high growth compared to the period of 1980s. Export volume and value increased by 15 percent and 11 percent respectively in the 1990s, whereas during the 1908s, the average annual growth rate for export volume was around 1 percent and for export value was 8 percent. In case of imports, the average annual growth rate of volume was negative during the 1980s, which registered substantially high average growth rate (21 percent) during the 1990s. On the other hand, the average growth rate of import value also increased significantly, from 3.6 percent in the 1980s to 11 percent in the 1990s. Openness of the economy (expressed as exports plus imports as percent of GDP) increased to 33 percent in 2000 from around 20 percent in the early 1980s.

Table 6 presents the intertemporal poverty and inequality situations in Bangladesh. This table provides information on head-count index of poverty for both the rural and urban areas. Also, Gini indices on the basis of consumption and income are given to show the overtime changes in inequality in the rural and urban areas.

Table 6: Poverty and Inequality Situation in Bangladesh

	Poverty line (Tk/Person/Month)	**Mean Consumption** (Tk/Person/Month)	**Head Count Ratio (%)**	**Gini index (%)**	
				Consumption	**Income**
Urban					
1984	301.72	396.53	50.2	29.8	37.0
1989	453.65	695.19	43.9	32.6	38.1
1992	534.99	817.12	44.9	31.9	39.8
1996	650.45	1,372.47	29.4	37.5	44.4
2000	724.56	1,291.53	36.6	36.6	45.2
Rural					
1984	268.92	284.84	59.6	24.6	35.0
1989	379.08	435.39	59.2	26.5	36.8
1992	469.13	509.67	61.2	25.5	36.4
1996	541.77	661.47	55.2	27.5	38.4
2000	634.48	820.20	53.0	29.7	36.6
Memorandum Item					
National Head Count Ratio		1984 -58.5 % and 1989 -57.1 % (Annual reduction rate –0.23%)		1992 -58.8 % and 2000 - 49.8 % (Annual reduction rate –1%)	

Note: The figures are based on the Household Expenditure Surveys of the Bangladesh Bureau of Statistics (BBS). The poor have been estimated using the cost of basic needs (CBN) method and are taken as those living below the poverty line which corresponds to an intake of 2,122 kcal/person/day and a nonfood allowance corresponding to nonfood expenditure among household whose food expenditure equals the food poverty line.

Source: Mujeri and Khondker (2004).

Table 6 suggests that during 1992-2000, national head-count ratio of poverty declined by 9 percent indicating an annualised rate of poverty reduction of around 1 percent in this period as against an annual average 0.23 percent decline during 1984-1989. This suggests that the fall in national poverty rate is higher during the 1990s compared to that in the 1980s. This is partly due to the effect of growth of per capita real GDP in 1990s. It is also observed that both urban and rural poverty have declined during this period, although, the incidence of rural poverty remains higher than that of urban poverty. Table 6 also indicates that over the entire period since the early 1980s, the improvement in poverty incidence is rather slow with substantial variations over different sub-periods and between rural and urban areas.

With respect to the inequality it is evident from Table 6 that the Gini index of both consumption and income increased sharply during the early 1990s, which coincided with the period of rapid trade liberalization. The Gini index of consumption expenditure remained largely unchanged till 1992 for both rural and urban areas. But, the urban Gini index for consumption expenditure rose from 32 percent in 1992 to 37 percent in 2000. In rural areas, inequality in consumption expenditure also increased. The trends of income inequality were similar with a sharp increase in Gini index during the mid-1990s. A similar trend of deterioration of income distribution may also be noted for both rural and urban areas.

4. Policy Reforms and Poverty: Analysis in a General Equilibrium Framework

In this section, we discuss the main features of the general equilibrium model of Bangladesh economy which facilitates some simulation results on welfare and poverty impacts of the policy reform measures under consideration. Our model is numerically calibrated to a 1995/96 Social Accounting Matrix (SAM) of Bangladesh. Table 7 provides the information on the disaggregation of factors, households, activities and institutions in the SAM.

Table 7: Factors, Institutions and Households in the SAM for Bangladesh

Set	Description of Elements
Factors of Production	
Labour (6)	• *Female*: 3 categories according to skill levels (low, medium and high) **Low:** grades 0-5**; Medium:** grades 6-10**; High:** grades 11 and above • *Male*: 3 categories according to skill levels (low, medium and high) **Low:** grades 0-5**; Medium:** grades 6-10**; High:** grades 11 and above
Capital (1)	• 1 type only
Institutions	
Households (7)	• *Rural **Agriculture***: 3 categories according to land ownership **Labourer household:** 0-0.49 hectares**; Small Farmers:** 0.5-2.49 hectares**, Large Farmers:** >2.5 hectares. • *Rural **Non-Farm***: 1 category according to occupation • *Urban:* 3 categories according to the level of education of the household's head **Low Skilled:** grades 0-5**; Medium Skilled:** grades 6-10**;** and **Professional: grades** 11 and above
Others (2)	• *Government* • *Rest of the World*
Activities	
Agriculture (7)	• *Crops **Non-traded***: Rice (Aman and Boro) • *Crops **Traded***: Other Grains and Commercial Crops • *Non-crops **Non-traded***: Forestry • *Non-crops **Traded***: Livestock and Fish
Industries (12)	• *Food Processing **Traded***: Rice Milling, Atta and Flour, Other Food and Tobacco • *Textiles **Traded***: Clothing, Ready Made Garments and Leather. • *Others **Traded***: Chemicals, Fertilizer, Petroleum Products, Machinery and Miscellaneous Industries
Services (6)	• ***Non-Traded***: Construction, Gas, Trade Services, Social Services, Public Administration, Financial Services and Other Services

The main sources of information for the SAM 1995/96 are (a) 1993/94 Input-output table prepared by Bangladesh Institute of Development Studies (BIDS 1998); (b) Household Expenditure Survey 1995/96 by Bangladesh Bureau of Statistics (BBS, 1998a); (c) Labour Force Survey by Bangladesh Bureau of Statistics (BBS, 1998b); and (d) National Income Estimates by Bangladesh Bureau of Statistics.

The main assumptions of the CGE model applied in our present exercise could be listed below:

- Labour factor is mobile across producing activities.
- Capital is immobile and sector specific.
- Primary factor supplies are exogenous and fixed.
- The world prices of imports and exports are exogenous invoking the small country assumption.
- Current account balance (deficit) is fixed.
- Imports and domestically produced goods are imperfect substitutes.
- Output produced for domestic and export markets reflects differences in quality suggesting imperfect substitutability between them..
- Savings of domestic institution adjust to equate to given investment.
- Nominal exchange rate acts as the numeraire.
- Excess demand conditions are satisfied.

The summary of the main features of the CGE model is presented in Table 8.

Table 8: Summary of CGE Model Features of the Bangladesh Economy

- A nested production structure is used for each sector. At the top level, real value added and intermediate inputs are combined via a Constant Elasticity Substitution (CES) production to produce gross output.
- Structure of demand is composed of demand for private and public consumption expenditure, investment demand and exports demand.
- Private consumption demand is specified by a Cobb-Douglas function which is combined with a nested CES function of composite products.
- The distribution of investment by sector is modelled using a fixed-coefficient specification. The Leontief specification applies to both domestically produced and imported investment.
- The distribution of government expenditure by sector is modelled using a fixed-coefficient specification.
- There are four constraints in the system. The real constraint refers to domestic commodity and factor market; the nominal constraint represents two macro balances: the current account balance of the rest of the world and the savings-investment balance.
- Sectoral supply is a composite of imports and output sold in the domestic market.
- Composite demand includes final demands (i.e. private and public consumption expenditure and investment) and intermediate input demand. Variations in the sectoral prices assure equilibrium between sectoral supply and demand.
- The inflows (transfers to and from domestic institutions) are fixed but imports and exports are determined endogenously in the model.
- For the savings-investment equilibrium, the model treats the investment decision as given and hence savings has to adjust to ensure the equality to the fixed value of investment. That means the model is savings-driven. The basic approach is to allow the savings propensity of one of the domestic institution to vary.

5. Simulation Design

In this present study we carry out the following three simulations and examine their respective welfare and poverty impacts on the 7 representative households in our CGE model of Bangladesh:

Simulation 1 (Domestic Trade Liberalisation): In this simulation, existing tariffs are completely eliminated and resultant reduction in government revenues are mobilized by enhancing (i.e. by 55 percent) the existing production taxes and imposing new taxes on construction sector such that pre-simulation budgetary position of the government is retained. The base values of all other parameters are retained.[7]

Simulation 2 (RMG Export Shock): In this simulation, the quantity of export of RMG is decreased by 25 per cent. The base values of all other parameters are retained.

Simulation 3 (Remittance Shock): In this simulation, the remittances are increased by 50 percent. The base values of all other parameters are retained.

6. Simulation Outcomes

6.1. Impacts on Macro Indicators

We first look at the impacts of three simulations on selected macro indicators. The resultant impacts are reported in Table 9.

Table 9: Effects of the Simulations on Selected Macro Indicators

	Shares (%) *Base Case*	**Growth Rates (%)**		
		Simulation 1	*Simulation 2*	*Simulation 3*
Real GDP		**-0.15**	**-0.17**	**0.16**
Agriculture	0.22	0.35	0.85	0.56
Manufacturing	0.22	1.10	-3.47	-3.69
Service	0.56	-0.58	1.01	1.24
Traded	0.33	1.13	-1.89	-2.50
Non-traded	0.67	-0.57	0.92	1.25
Consumption		**-0.42**	**0.74**	**2.44**
Imports		4.53	-3.43	9.97
Exports		15.87	-14.13	-9.90

Note: Real GDP is equal to the sum-total of consumption, investment, government consumption plus exports less imports in real terms for all sectors in the economy. The base shares represent value added shares and growth rates are growth of broad sectors compared to the base case.

The real GDP growth in *first simulation* is negative (-0.15 percent) compared with the base case. The revenue neutral tariff elimination (the loss of import revenue is

[7] This simulation is adopted from Khondker and Mujeri (2002)

recovered from the direct tax system) led to a drop of demand (mainly domestic) with consequent repercussion on production and resource reallocation. Service sector's growth hampered due to deficient domestic demand and imposition of new tax on construction sector in particular. As a result, growth of service sector was 0.58 percent less than the base case. The manufacturing sector, on the other hand, experienced positive growth (1.10 percent over the base case) mainly due to factors such as deficient domestic demand; depreciation of nominal exchange rate and rise of export prices relative to domestic prices. The observed pattern of manufacturing sector growth is reflected in high growth of the export sector by 16 percent compared to the base case. The growth of imports by 4.5 percent is moderate considering the full elimination of tariffs. Substantial depreciation of nominal exchange rates counters the large fall in the domestic import prices. These two opposing impacts on the domestic import price result in the moderate increase in import by about 5 percent.

The patterns of growth effects under the *second simulation* are different from the first simulation. In the second simulation, the resources move from manufacturing sectors to generate growth of the agriculture and service sector. The pattern of resource reallocation also results in the growth of non-traded sectors (0.92 percent) at the expense of the traded sectors (-1.89 percent). It is quite understandable that as RMG accounts for more than 75 percent of the total export earnings, a 25 percent decrease in RMG export would have negative impact on export growth and in fact, the simulation result suggests a 14 percent decline in the total exports compared to the base case. The growth of imports is also negative in the second simulation. Interestingly, the consumption growth is slightly positive, which may be counter-intuitive. The reason behind such positive consumption growth can be traced back in the fact that under this simulation the fall in price index (by 4%) is higher than fall in real GDP (by 0.17%), which leads to increase in real income.

In the *third simulation*, real GDP increase by 0.16 percent compared to the base case. The resources move from the manufacturing sector to the agriculture and service sector. The manufacturing sector suffers from negative growth, while the agriculture and service sector registrar positive growth compared to the base case. One of the reasons behind such re-allocation maybe due to the fact that such an inflow resembles the character of Dutch disease. The resources are also reallocated in favour of the growth in non-traded sector at the expense of negative growth in traded sector. Consumption increases by 2.44 percent which is a direct effect of the increase in real income. Increase in real income also leads to higher demand for imports which results in a 10 per cent growth in import, which is high. On the other hand, exports decline by almost 10 percent.

6.2. Welfare Effects

In order to measure the welfare impacts of the simulations, we have calculated the Equivalent Variations (EVs). The results are given in Table 10. In Table 10, the positive EV values are the manifestation of positive real consumption growth and the negative EV values are associated with negative real consumption.

Table 10: Effects of Simulations on Consumption Growth and EVs for different Households

	Base value	Simulation 1		Simulation 2		Simulation 3	
Household Groups	*Consumption (Billion Tk)*	*Consumption Growth (%)*	*EV*	*Consumption Growth (%)*	*EV*	*Consumption Growth (%)*	*EV*
Agricultural Labourers	95.59	-0.08	-0.62	0.55	0.52	1.71	1.99
Small Farmers	176.25	-0.14	-1.35	0.62	1.03	1.97	4.56
Large Farmers	188.63	-0.27	-1.66	0.68	1.07	2.39	6.25
Non-farms	268.77	-0.08	-1.60	0.69	1.88	1.89	6.83
Worker-Low Skilled	168.94	-0.07	-0.87	0.75	1.18	1.91	4.16
Worker-Medium Skilled	151.75	-0.05	-0.95	0.91	1.61	2.03	5.10
Professionals	329.07	0.03	-0.79	1.34	4.67	2.18	10.10
Total	**1379.00**	**...**	**...**	**...**	**...**	**...**	**...**

It is observed that, Equivalent Variations are negative for all household groups under *first simulation*. The values of the EVs of rural households envisage relatively larger losses for the well-off groups (e.g. large farmer and non-farm) compared to the poor household groups (e.g. labour and small farmer). The pattern is however reverse in the case of urban group with the EV of poor household group (i.e. worker low skilled) fell more than that of urban rich household groups (e.g. medium-skilled and professional). It also appears that welfare losses are larger for rural household groups compared to their urban counter parts. The pattern of consumption growth is almost similar to the pattern of EVs except the fact that only the professional group experienced a positive increase in consumption compared to the base case.

In the case of *second simulation*, the values of EVs are positive for all household groups and also consumption growths are positive for all households. However, the welfare gain accrues more to the high-income professional household group compared to other household groups. Among the less well-off household groups, only the non-farm group is observed to benefit due to their higher participation in non-traded and service activities, which exhibit high growth under the simulation. Under this simulation, interestingly though incomes of all households decline, we observe welfare improvements for all households. This result may seem to be counter-intuitive. The possible explanation behind such result may be the fact that in our static CGE setting due to the fall in export of RMG, there is an increase in the domestic supply, which results in fall in the domestic prices of goods. This fall in prices may be higher than the fall in income, which results in increase in real income. However, this improvement may not sustain in the long-run.

In the *third simulation*, both EVs and consumption growth are positive for all household groups. However, the richer households (the urban professional households and rural large farm households) registrar higher welfare gains compared to the poorer households with the exception of the rural non-farm household group. Higher participation of the non-farm household in non-traded and service sector, which registrar high growth may be a reason behind this outcome.

6.3. Implications for Poverty

With a view to evaluate the impacts of our three policy simulations on the poverty profile of the seven representative households in our model we apply Foster-Greer-Thorbecke (FGT) measure of poverty (Foster, *et al*, 1984). The FGT allows us to compare three measures of poverty: head count ratio; poverty gap index and squared poverty gap index. In order to estimate these three indices a poverty line income is first defined. Poverty line income is the minimum income which is required to maintain a subsistence level of consumption. The first indicator, the headcount ratio, is the proportion of population with a per capita income below the poverty line. This is the simplest measure of poverty. The second indicator, the poverty gap index, measures the depth of poverty, and it estimates the average distance separating the income of the poor from the poverty line as a proportion of the income indicated by the line. The final indictor, the squared poverty gap index, also measures the severity of poverty, quantifies the aversion of the society towards poverty.

We apply the method adopted by Decaluwe et al (1999) to measure poverty profiles of the households. To accomplish the task we need to specify explicitly the proposition of income distribution formulation corresponding to each of the seven household groups and define a poverty line income based on a unique and constant basket of basic needs. Endogenously determined commodity prices are used to get the monetary value of the poverty line. The following steps are used to derive the poverty profiles of the representative household groups:

1. We use "Beta" distribution functions in order to capture the income distribution formulation of the household groups. To implement "Beta" distribution function we estimate minimum income (minY), maximum income (maxY), value of shape parameter (p) and value of skewness parameter (q) of the distribution for each of the household groups. Table 11 presents the base year values of these four characteristics by rural and urban household groups. This information is derived from Household Expenditure Survey 1995/96 (HES 95/96).

2. It is assumed that any policy simulation will change only the mean, minimum and maximum incomes of each household group while leaving the shape and skewness parameters of the distributions unaffected. This implies constancy of intra-household distributions as intra-group distributions shift proportionally with the change in mean income. Analogously, minimum and maximum income of each household group will also alter.

3. The estimated rural and urban poverty lines are not the same, and in fact urban poverty line income is higher than the rural one. The difference is due to the differences in prices and baskets of basic need commodities in rural and urban areas.

The base-case profiles of poverty of the rural and urban households as reported in Table 11 suggests that the incidence of poverty is more prominent among the rural population compared to that among the urban population. In terms of head-count index it is found that almost 53 percent of the rural population is poor while in urban areas the figure is 28 percent. Moreover, poverty gap and severity of poverty are

higher in rural areas suggesting rural poverty situation is much worse than urban poverty.

Table 11: Base Values of Poverty Profiles

	Income (Tk per capita per month)				Population	Beta		FGT Poverty Measure		
Household	Minimum	Maximum	Mean	Poverty line	Share (%)	p	q	Head Count	Poverty Gap	Squared Poverty Gap
Rural	18	9140	697	650	78.65	2.9	37	0.535	0.197	0.099
Urban	73	26533	1359	725	21.35	1.7	33	0.287	0.109	0.057

Source: Estimated using the primary survey information of HES 1995/96 (BBS, 1998a).

When any policy shock is simulated in the model two things happen: first, the incomes of the representative household groups are changed, and second, the commodity prices are altered. These changes in incomes and prices result in change in the minimum and the maximum incomes within each household group and thus the monetary values of the rural and urban poverty lines are revised. We then use the new set of simulated values of income and prices to derive the three FGT indices of post-simulation poverty profiles. The results of the simulation exercises are presented in Table 12.

Table 12: Poverty Incidence by Location

	Income (Tk per capita per month)				Population	Beta		FGT Poverty Measure		
Household	Minimum	Maximum	Mean	Poverty line	Share (%)	p	q	Head Count	Poverty Gap	Squared Poverty Gap
Rural										
Simulation 1	15.2	8194	625	585	78.65	2.9	37	(0.46)	(0.67)	(0.82)
Simulation 2	16.0	8852	675	624	78.65	2.9	37	(-0.62)	(-0.89)	(-0.95)
Simulation 3	19.0	10090	769	715	78.65	2.9	37	(0.38)	(0.18)	(0.81)
Urban										
Simulation 1	66.0	23898	1224	653	21.35	1.7	33	(1.07)	(3.90)	(4.28)
Simulation 2	71.0	25961	1330	696	21.33	1.7	33	(-2.41)	(0.98)	(1.09)
Simulation 3	82.0	29763	1524	798	21.33	1.7	33	(-2.60)	(0.80)	(0.82)

Table 12 indicates that incidence of rural poverty as measured by the head count ratio increased by 0.5 percentage points than the base head count ratio under *simulation one*. It suggests that around 0.5 percent of the population would slip into poverty as a result of the complete elimination of tariff with consequent adjustment of production taxes. Rural poverty situation is improved under the *second simulation* (e.g. head-count dropped by 0.62 percent) due to consumption growth of majority of rural household groups. Other two measures of the poverty (i.e. poverty gap and severity) suggest that poverty situation of the rural poor have also improved. Contrary to usual anticipation, all the three FGT measures of poverty deteriorated for rural household group in the case of *third simulation*. This envisaged that income increase of rural household group is not high enough to offset the large increase in general price level. Another relevant point is that increase in remittance may lead to demand for commodities (hence activities) that require lesser engagement of rural labourers and households.

On the other hand, urban poverty is observed to deteriorate under first simulation. The head count ratio, gap and severity increased by 1.0, 3.9 and 4.2 percentage points compared to their base values. These results suggest that not only some of the poor population have been slipped from non-poor to poor categories, the population who still remained poor their situation have also deteriorated (as indicated by gap and severity). Head count urban poverty is observed to improve under second and third simulations. However, improvement was higher under the *third simulation* than the *second* simulation. In the *second simulation* only the head count poverty declined (2.4 percent) indicating an improvement of situation of households at margin. While worsening of other two measures (gap and severity) envisages deterioration of situation of household who remained poor (i.e. suggesting deterioration of their income distribution). Similarly only head count ratio improved in the *third simulation* while other two measures experienced deterioration. This finding suggests that additional flow of remittance may benefits only the urban household who are at poverty threshold margin.

The prime observation is that rural poverty as measured by head count ratio is observed to increase due to tax-adjusted tariff liberalisation (i.e. simulation 1) and remittance shock (i.e. simulation 3). The gap and severity of rural poor have also worsened (in both simulation 1 and 3) indicating worse poverty profiles for the rural poor. On the other hand, poverty situation improves in the case of RMG export shock (i.e. simulation 2). The gap and severity of rural poor also improves in the second case indicating better poverty profiles for the rural poor household group.

Urban head count poverty situation has also improved in second and third cases, while deteriorated in the first case. Gap and severity of urban poor population have however deteriorated in the second and third simulations envisaging that the benefits of RMG shocks and higher remittance accrue more to the urban households who were at poverty norm margins. However, households who could not cross the poverty norm experienced worsening of their situation. The gap and severity of urban poverty also increased under the first simulation.

7. Concluding Observations

Three simulations were conducted to assess welfare and poverty impacts of three policy reforms on the 7 representative household groups. Main observations are summarized:

1. The trade liberalisation simulation in our model produces welfare loss for all the 7 representative households. However, the patterns of losses are different in rural and urban areas. In the rural areas the relatively well-off households are worse-off, whereas, in the urban areas the poorer households suffer from higher welfare loss. With respect to poverty, both in rural and urban areas poverty situation deteriorates and the deterioration is much higher in urban areas than in rural areas. This indicates that the full potential of trade liberalisation is not readily translated into poverty reduction in Bangladesh.

2. The fall in RMG export in our model produces counter-intuitive outcomes. In spite of the fall in real GDP compared to the base case the consumption and welfare of the households increase. Also poverty situation improves. One of

the reasons behind this may be the static nature of our CGE model, and this calls for the examination of this exercise in a dynamic setting.

3. The increase of remittances in our model also produces mixed results and it is found that while the EVs and consumption of all the household increase the poverty profile of the rural households deteriorate. And though the head-count poverty improves in urban areas, the gap and severity of urban poverty increase. The reasons behind this may be the fact that remittance may lead to demand for commodities (hence activities) that require lesser engagement of rural labourers and households, and, on the other hand, additional flow of remittance may benefits only the urban household who are at poverty threshold margin.

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