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WELFARE AND POVERTY IMPACTS OF POLICY REFORMS IN BANGLADESH: A GENERAL EQUILIBRIUM APPROACH

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

Abstract[*]

Our study assesses the impacts of different policy reforms, such as domestic trade liberalisation, implementation of WTO agreements in the textile sector and WTO negotiations on the movement of natural persons, and examines their welfare and poverty implications at the household level in the economy of Bangladesh. We use a comparative static computable general equilibrium (CGE) model based on the 1995-96 Social Accounting Matrix (SAM) of the Bangladesh economy. This study carries out three simulations. The first simulation entails full liberalisation of tariffs and the resultant reduction in government revenues are mobilised by enhancing the existing production taxes and imposing new taxes on construction sector; in the second simulation, export of ready-made garments (RMG) are reduced by 25 percent; and in the third simulation the remittances are increased by 50 percent. Equivalent variations (EVs) and Foster-Greer-Thorbecke (FGT) measures are applied to estimate welfare and poverty changes respectively. The prime observation is that rural poverty, as measured by the head count ratio, is observed to increase under all three simulations. The gap and severity of the rural poor have also worsened in all three simulations indicating worse poverty profiles for the rural poor compared to the base-run scenario. Urban head count poverty has also deteriorated in the first and second simulations, while has improved only in the third simulation. The gap and severity of poverty for the urban population have, however, deteriorated in all three simulations.

INTRODUCTION

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

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

AN OVERVIEW OF THE ISSUES

Domestic Trade Liberalisation[1]

After a period of restricted trade regime until the mid seventies, Bangladesh initiated a more liberalised trade regime. The period of restricted trade regime was characterised by the inward looking policies of creating an import-substituting industrial base through a protective domestic environment, conserving foreign exchanges, maintaining a stable balance of payment and the dominant role of public sector in almost every aspect of the economy. However, this regime has been criticised on the grounds of inefficient allocation of resources, rent-seeking activities, anti-export bias, the development of an incompetent industrial structure, slow growth of the economy and problems with the balance of payment deficit. Under structural adjustment programmes, more open, liberal, export-oriented and private-sector based policies were put in place. The programmes were targeted towards the reforms in different aspects of the economy including fiscal, financial, trade and industrial policy reforms; public resource management; privatisation; and institutional and sectoral reforms. The pace and extent of trade liberalisation accelerated during the late eighties and the early nineties when a more comprehensive programme of stabilisation and economic reforms was put in place under the structural adjustment measures prescribed by the World Bank and the IMF. The structural adjustment programmes were initiated in 1987 and, in fact, implemented through the Structural Adjustment Facility (SAF) and the Enhanced Structural Adjustment Facility (ESAF) of the IMF and the World Bank (Sobhan, 1991; and Mujeri *et. al.*, 1993).

The standard arguments of the benefits of trade liberalisation encompass the ideas that trade liberalisation, by relaxing the constraints, expands the scope of the small domestic market, provides access to foreign direct investment, facilitates technology transfer, creates marketing networks, and provides 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. The vital issue is whether the benefits of trade liberalisation 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.[2] It is, however, safe to argue that, in the context of a developing country, such as 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 economy there are concerns whether Bangladesh has benefited from the liberalisation of trade implemented so far. Though, studies, such as World Bank (1999), Ahmed (2001) mention the 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 liberalisation creates a 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 the nineties significantly liberalised its external trade and foreign exchange regimes. Following the implementation of these reforms there has been rationalisation 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 reforms and the 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 in 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 in 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 the quantitative restrictions is also manifested in the fact that whereas in 1992, about 12 percent of around 10000 tariff lines were subject to quantitative restrictions, in 1999 it came down to less than 4 percent. The restrictions are also relaxed in the later years and, at present, less than 0.5 percent of imports, mainly in the textile category, are 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 the exchange rate flexibility and the export competitiveness. The currency (Taka) was made convertible for all current account transactions. Finally, in 2003 Bangladesh initiated a floating exchange rate system.

- Under the export-oriented industrialisation strategy, different export promotion measures were put in place with the aim of diversifying the export basket, improving the quality of exports, stimulating higher value added exports, and developing the 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. However, there are debates whether some of these measures are consistent with other trade liberalisation measures undertaken in the economy.

The aforementioned policy reform measures contributed to a significant increase in trade orientation for the Bangladesh economy during the 1990s. The importance of foreign trade

in the domestic economy increased considerably, as is evident from the increased share of trade in goods in both PPP GDP and goods GDP, and also by the dynamism of the 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 1988-1998
	PPP GDP		Goods GDP		
	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).

WTO Agreements on Textile and Apparels

Ready-made garments (RMG) exports have been one of the dominant sources of foreign exchange earnings in the last decade in Bangladesh. 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 the total export earnings and 48 percent of the total foreign exchange earnings in 2001. Table 2 suggests that Bangladesh's export basket is very much concentrated around RMG exports. Therefore, any shock on RMG exports is likely to have a significant impact on the total export earnings, as well as on the foreign exchange earnings in Bangladesh.

Table 2: Dynamics of Bangladesh RMG Exports

	1991	1994	1995	1996	1997	1998	1999	2000	2001
RMG Exports (Million US$)	865.4	1553.3	2228.5	2547.1	3001.2	3781.6	4021.3	4351.3	4857.3
Total Exports (Million US$)	1717	2533.9	3472.6	3882.4	4418.3	5160.5	5312.2	5748.1	6467.8
RMG Exports as percent of Total Exports	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 regarding the implications of phasing out of the Multi-Fibre Agreement (MFA) for the 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 benefit from the removal of trade restrictions on textiles and clothing, with some gaining proportionately more than the 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 the global liberalisation of trade in textile and clothing will be skewed, where countries, such as China, Indonesia and the South Asian countries are likely to gain more compared to the countries of Latin America and sub-Saharan Africa. Moreover, the higher-cost exporting countries, such as Hong Kong, South Korea and Taiwan, who enjoy the largest share of exports to the markets of the developed countries under the MFA, will likely to cede ground to lower-cost exporting countries, such as China and India. There is, however, a concern that the relatively new and low-cost exporting countries, such as Bangladesh and Sri Lanka, may lose considerable market shares 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 European Union (EU) and the United States (US). Currently, Bangladesh possesses unconstrained access to the 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 the EU are strongly constrained by quotas while Bangladesh's exports are not. However, with

the phasing out of the MFA the situation is likely to change. Implementation of the WTO agreements for textile and apparels (T&A) and thus phasing out of the MFA regime from 2005 will likely 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 the Bangladeshi exporters of RMG are likely to decline and Bangladesh may loose a considerable market share to China and other countries, as these countries gain more access to the EU and US markets.

It has become another concern regarding the rising cost of raw-materials for the RMG sector in Bangladesh after the removal of MFA. The ratio of the value of imports of raw-materials for the RMG sector to the value of total RMG exports by Bangladesh is quite high (about 70 percent in 2000), which indicates a low value-addition in the RMG sector. Bangladesh imports raw materials for the RMG from countries, such as India, China and Thailand under the back-to-back L/C facilities. It is projected that under a quota free regime these countries will prefer to substitute the export of raw-materials (i.e. grey fabrics) to countries, such as Bangladesh by the export of apparels to the 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 the RMG sector in particular.

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

A number of CGE studies have looked into the implications of the WTO agreements on textiles and clothing for the economy of Bangladesh. In a comparative static CGE framework Arndt *et al* (2002), assume a significant decline in RMG exports followed by the phasing out of the MFA regime and simulate for a 25 percent decline in RMG exports (including knitwear). The simulation results imply that the reduced revenues from Bangladesh RMG exports affect all households through a reduction in labour demand in textile industries, the

resulting fall in consumer demand and output for other sectors, and a depreciation of the real exchange rate that raises the costs of imported goods.

Lips *et al* (2003), using the GTAP model, analyse the impact of the Agreement on Textiles and Clothing (ATC) and a worldwide tariff reduction on textiles and wearing apparels on Bangladesh. The simulation results indicate that phasing out of very restrictive export quotas leads to a remarkable increase of wearing apparel productions in India and China, whereas, wearing apparel output in Bangladesh is reduced by more than 10 percent and Bangladesh faces a welfare loss.

Yang and Mlachila (2004), using the GTAP model, also evaluate the effects on the Bangladeshi economy of phasing out of the textile and clothing quotas. The simulation results suggest that the planned abolition of the quotas in 2005 will alter the competitiveness of various exporting countries. As Bangladesh relies heavily on textile and clothing exports, therefore, is potentially very vulnerable to this change in competitiveness. Assessing the quota restrictiveness and the export similarity, and analysing Bangladesh's supply constraints, the paper concludes that Bangladesh could face significant pressure on its balance of payments, output, and employment when the quotas are eliminated.

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 the 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, such as 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 the free movement of natural persons is allowed it may significantly raise remittances for the Bangladesh economy, which may have important poverty and welfare implications at the household levels. The flow of remittances to Bangladesh by Bangladeshi 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)

A few studies have looked into the welfare and poverty impacts of increased remittances for developing countries in a general equilibrium framework. Rizwana and Kemal (2002) examine the impact of trade liberalisation and a decline in remittances on poverty in Pakistan. It is found that tariff reduction in the absence of a decline in remittances reduces poverty and raises welfare of the households in both the rural and urban areas in Pakistan. On the other hand, trade liberalisation in the presence of a decline in remittances reduces

welfare in urban households, but rural households still show an increase over the base year. Also, poverty increases in urban households but not in rural households. The study concludes that, the decline in remittance inflows is a major contributory factor in explaining the increase in poverty in Pakistan.

Our present study is a pioneering attempt to evaluate the poverty and welfare implications of the increase in remittances for the economy of Bangladesh in a computable general equilibrium framework.

CHANGING PERSPECTIVES OF BANGLADESH ECONOMY: SOME KEY FEATURES[3]

Over the last two decades Bangladesh has undergone major changes in the 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: Khondker and Mujeri (2004).

Table 4 suggests that during the last two decades the structure of the economy changed significantly as the share of agriculture in GDP declined to 25.6 percent by 2000 from 33.2 percent in 1980. The fall in the share of agriculture had been accompanied by the rise in the share of industry, which increased from 17.1 percent in 1980 to 25.7 percent in 2000, thanks to the remarkable performance of manufacturing exports during the 1990's. The share of service sector remained stable at around 49 percent throughout the whole period.

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

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).

Table 5 suggests that during the 1990's both the exports and imports registered high growth compared to the period of 1980's. Export volume and value increased by 15 percent and 11 percent respectively in the 1990's, whereas during the 1980's, the annual average growth rates of export volume and export value were 1 percent 7.8 percent respectively. In the case of imports, the annual average growth rate of volume was negative during the 1980s. However, import volume registered substantially high annual average growth rate (21 percent) during the 1990's. On the other hand, the annual average growth rate of import value also increased significantly, from 3.6 percent in the 1980's to 10.7 percent in the 1990's. 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 1980's.

Table 6 presents the intertemporal poverty and inequality situations in Bangladesh. This table provides information on the 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 changes overtime in inequality in the rural and urban areas.

Table 6: Poverty and Inequality Situation in Bangladesh

	Exchange Rate (1 US$ =)	Poverty line Income (Tk/Person/ Month)	Mean Consumption (Tk/Person/ Month)	Head Count Ratio (%)	Gini index (%)	
	Taka				Consumption	Income
Urban						
1984	24.94	301.72	396.53	50.2	29.8	37.0
1989	32.14	453.65	695.19	43.9	32.6	38.1
1992	38.20	534.99	817.12	44.9	31.9	39.8
1996	40.90	650.45	1,372.47	29.4	37.5	44.4
2000	50.31	724.56	1,291.53	36.6	36.6	45.2
Rural						
1984	24.94	268.92	284.84	59.6	24.6	35.0
1989	32.14	379.08	435.39	59.2	26.5	36.8
1992	38.20	469.13	509.67	61.2	25.5	36.4
1996	40.90	541.77	661.47	55.2	27.5	38.4
2000	50.31	634.48	820.20	53.0	29.7	36.6
Memorandum Item						
National Head		1984 -58.5 % and 1989 -57.1 %		1992 -58.8 % and 2000 - 49.8 %		
Count Ratio		(Annual reduction rate: –0.23%)		(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: Khondker and Mujeri (2004).

Table 6 suggests that, during 1992-2000, the national head-count ratio of poverty declined by 9 percent, indicating an annual rate of poverty reduction of around 1 percent in this period as against an annual average decline by 0.23 percent during 1984-1989. This implies that the fall in national poverty rate is higher during the 1990's compared to that in the 1980's. This is partly due to the effect of growth of per capita real GDP in the 1990's. 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 1980's, 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 1990's, which coincided with the period of rapid trade liberalisation. The Gini index of consumption expenditure remained largely unchanged till 1992 for both the rural and urban areas. But, the urban Gini index for

consumption expenditure increased from 32 percent in 1992 to 37 percent in 2000. In the rural areas, the inequality in consumption expenditure also increased. The Gini index of income suggests a similar trend of deterioration of income distribution for both the rural and urban areas.

POLICY REFORMS AND POVERTY: ANALYSIS IN A CGE FRAMEWORK

In this section, we discuss the main features of the general equilibrium model of Bangladesh economy. 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 (7)	• ***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: (i) 1993/94 Input-output table prepared by Bangladesh Institute of Development Studies (BIDS 1998); (ii) 1995/96 Household Expenditure Survey by Bangladesh Bureau of Statistics (BBS, 1998a); (iii) Labour

Force Survey by Bangladesh Bureau of Statistics (BBS, 1998b); and (iv) National Income Estimates by Bangladesh Bureau of Statistics.

The equations of the CGE model applied in our present exercise are given in the Appendix. The main assumptions of the CGE model are 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 reflect differences in quality, suggesting an imperfect substitutability between them.
- Savings of domestic institutions 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 the Features of CGE Model 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 of Substitution (CES) production function 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 constraints refer to domestic commodity and factor markets; the nominal constraint represents two macro balances: the current account balance 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.

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 mobilised by enhancing (i.e. by 55 percent) the existing production taxes and imposing new taxes on construction sector such that the pre-simulation budgetary position of the government is retained. The base values of all other parameters are retained.[4]

Simulation 2 (RMG Export Shock): In this simulation, the quantity of export of RMG is decreased by 25 percent. 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.

SIMULATION OUTCOMES

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 (%)	Growth Rates (%)		
	Base Case	Simulation 1	Simulation 2	Simulation 3
Real GDP		**-0.15**	**-1.17**	**0.16**
Agriculture	0.22	0.35	0.27	0.56
Manufacturing	0.22	1.10	-0.23	-3.69
Service	0.56	-0.58	-0.02	1.24
Traded	0.33	1.13	0.03	-2.50
Non-traded	0.67	-0.57	-0.02	1.25
Consumption		**-0.42**	**-0.39**	**2.44**
Imports		4.53	-3.43	9.97
Exports		15.87	-14.04	-9.90

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

The real GDP growth in the first simulation is negative (-0.15 percent) compared to the base case. The revenue neutral tariff elimination (the loss of import revenue is recovered from the indirect tax system) leads to a drop of demand (mainly domestic) with consequent repercussion on production and resource reallocation. Service sector's growth is hampered due to a deficient domestic demand and the imposition of a new tax on construction sector in particular. As a result, the growth of service sector is 0.58 percent less than the base case. The manufacturing sector, on the other hand, experiences a positive growth (1.10 percent over the base case) mainly due to the rise in export prices relative to domestic prices. The observed pattern of manufacturing sector growth is reflected by the high growth of the export sector (16 percent) compared to the base case. The growth of imports by 4.5 percent is moderate considering the full elimination of tariffs.

The patterns of growth effects under the second simulation are different from the first simulation. In the second simulation, the resources move from manufacturing and service sectors to generate growth in the agriculture sector. It is quite understandable that as the RMG sector accounts for more than 75 percent of the total export earnings, a 25 percent decrease in the RMG export would have a negative impact on the export growth. 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. The consumption growth suffers from a deterioration of 0.39 percent. The real GDP also declines by 1.17 percent.

In the third simulation, real GDP increases 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 a negative growth, while the agriculture and service sector registrar positive growth compared to the base case. Such re-allocation resembles the character of the 'Dutch disease'. The resources are also reallocated in favour of the growth in the non-traded sector at the expense of a negative growth in the 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 a higher demand for imports which results in a 10 percent growth in import. On the other hand, exports decline by almost 10 percent.

Welfare Effects

In order to measure the welfare impacts of the simulations, we have calculated the Equivalent Variations (EVs). The EV measures, in money terms, how much income needs to

be given to the consumer at the 'pre-policy change' level of prices in order to enable him to enjoy the utility level which arises after the policy change is effected ('post-policy change level of utility'). The results are given in Table 10. The positive EV values, in Table 10, 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

Household Groups	Base value Consumption (Billion Tk)	Simulation 1 Consumption Growth (%)	EV	Simulation 2 Consumption Growth (%)	EV	Simulation 3 Consumption Growth (%)	EV
Rural							
Agricultural Labourers	95.59	-0.08	-0.62	-0.16	-0.31	1.71	1.99
Small Farmers	176.25	-0.14	-1.35	-0.22	-0.80	1.97	4.56
Large Farmers	188.63	-0.27	-1.66	-0.33	-1.10	2.39	6.25
Non-farms	268.77	-0.08	-1.60	-0.18	-1.05	1.89	6.83
Urban							
Worker-Low Skilled	168.94	-0.07	-0.87	-0.17	-0.64	1.91	4.16
Worker-Medium Skilled	151.75	-0.05	-0.95	-0.18	-0.58	2.03	5.10
Professionals	329.07	0.03	-0.79	-0.17	-1.08	2.18	10.10
Total	**1379.00**	…	…	…	…	…	…

It is observed that, the EVs are negative for all household groups under the first simulation. The values of the EVs of the 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, reversed in the case of the urban households, as the EV of poor household group (i.e. worker low skilled) fell more than those of the urban rich household groups (e.g. medium-skilled and professional). It also appears that welfare losses are larger for the rural household groups compared to their urban counter parts. The pattern of consumption growth is almost similar to the pattern of the EVs, except that only the professional group experiences a positive increase in consumption compared to the base case.

In the case of second simulation, the values of the EVs and consumption growth are negative for all household groups. However, the welfare losses accrue more to the richer household groups both in the rural and urban areas compared to the poorer household groups.

In the third simulation, both the EVs and consumption growth are positive for all household groups.[5] However, the richer households (the urban professional households and the rural large farm households) registrar higher welfare gains compared to the poorer households. However, the rural non-farm household group also gain positive consumption and EVs growth. Higher participation of the non-farm household in the non-traded and service sectors, which registrar high growth, is a possible reason behind this outcome.

Implications for Poverty

To evaluate the impacts of three policy simulations on the poverty profiles of seven representative households in our model, we apply Foster-Greer-Thorbecke (FGT) measure of poverty (Foster, *et al*, 1984). The FGT indices allow us to compare three measures of poverty: the head count ratio, the poverty gap index and the 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. We also need to 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 the rural and urban household groups. This information is derived from the 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 the rural and urban areas.

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

Table 11: Base Values of Poverty Profiles

| Household | Income (Tk per capita per month) | | | | Population Share (%) | Beta | | FGT Poverty Measure | | |
	Minimum	Maximum	Mean	Poverty line		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. The changes in incomes alter the minimum and the maximum incomes within each household group. On the other hand, due to the changes in prices, the monetary values of the rural and urban poverty lines are revised. We then use the new set of simulated values

of incomes 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

Household	Income (Tk per capita per month)				Population Share (%)	Beta		FGT Poverty Measure		
	Minimum	Maximum	Mean	Poverty line		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	13.0	6923	671	631	78.65	2.9	37	(0.69)	(0.87)	(0.98)
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	70.0	25611	1312	703	21.33	1.7	33	(1.73)	(1.92)	(2.06)
Simulation 3	82.0	29763	1524	798	21.33	1.7	33	(-2.60)	(0.80)	(0.82)

Table 12 indicates that the incidence of rural poverty, as measured by the head count ratio, increases by 0.46 percent than the base head count ratio under the first simulation. It suggests an increase in rural poverty as a result of the complete elimination of tariff with consequent adjustment in production taxes. Rural poverty deteriorates further under the second simulation (e.g. the head-count ratio increased by 0.69 percent) due to a fall in consumption of all rural household groups. Two other measures of poverty (i.e. the poverty gap and severity) also suggest that the poverty profiles in the rural area have worsened both under the first and second simulations. Contrary to the usual anticipation, all the three FGT measures of poverty deteriorate for rural household groups in the case of the third simulation. It is envisaged that the increases in incomes of the rural household groups are not high enough to offset the larger increases in the general price levels. Another relevant point is that, the increase in remittance may lead to an increased demand for commodities (hence activities) that require less engagement of rural labourers and households, implying that they are not benefited from the remittance induced production growth.

The urban poverty is observed to deteriorate under the first and second simulations. Under the first simulation, the head count ratio, the gap and severity of poverty increase by 1.0, 3.9 and 4.2 percents respectively compared to their base values. These results suggest that, not only a portion of the urban population slips from the non-poor to poor categories, the situation of the population who still remains poor, also deteriorates further (as indicated by

the gap and severity). The head-count and two other measures of poverty are also observed to deteriorate under the second simulation. The extents of poverty deterioration among the urban households are also found to be larger than their rural counterparts. This suggests that the decline in RMG exports is likely to have greater impacts on the urban household groups.

In the third simulation only the head count poverty declines (by 2.6 percent) indicating an improvement in poverty of the households at the margin. However, a worsening of the two other measures (gap and severity) envisages a deterioration of poverty of the households who remain poor (i.e. suggesting a deterioration of their income distribution). This finding suggests that additional flow of remittance benefit only the urban households who are at the poverty threshold margin.

The prime observation is that the rural poverty, as measured by the head count ratio, is observed to increase due to the tax-adjusted tariff liberalisation (i.e. first simulation), decline in RMG exports (i.e., second simulation) and a remittance shock (i.e. third simulation). The gap and severity of the rural poor have also worsened in all three simulations, indicating worse poverty profiles for the rural poor. On the other hand, the urban head count poverty has also deteriorated in the first and second cases, while has improved only in the third case. The gap and severity of poverty of urban poor population have, however, deteriorated in all the three simulations envisaging that the trade reforms, export shocks and higher remittance inflows are likely to intensify the urban poverty.

CONCLUDING OBSERVATIONS

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

1. The trade liberalisation simulation in our model produces welfare losses for all 7 representative households. However, the patterns of losses are different in the rural and urban areas. In the rural area, the relatively well-off households are worse-off, whereas, in the urban area the poorer households suffer from higher welfare losses. With respect to poverty, both in the rural and urban areas, poverty deteriorate and the deterioration is much higher in the urban area than in the rural area. All these

indicate that the full potential of trade liberalisation is not readily translated into a poverty reduction in Bangladesh.

2. The fall in RMG export leads to a substantial fall in total exports and a moderate decline in GDP. As a result of the GDP fall, income of all household groups declines to worsen their welfare as measured by the equivalent variations. Poverty also deteriorates.

3. The increase in remittances in our model also produces mixed results. It is found that while the EVs and consumption of all households increase, the poverty profile of the rural households deteriorates. And though the head-count poverty improves in the urban area, the gap and severity of urban poverty increase. The reason behind this is due to the fact that remittances lead to an increased demand for commodities (hence activities) that require less engagement of rural labourers and households. On the other hand, an additional flow of remittances benefits only the urban households who are at the poverty threshold margin.

Notes

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

[2] The theoretical models of endogenous growth suggest a 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 a 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).

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

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

[5] The distribution of remittances among the households, as derived from the 1995-96 SAM of Bangladesh, follows the following pattern: among the rural households, the labour, the small farm, the large farm and the non-farm households receive 0, 2.6, 4.6 and 12.5 percents of the total remittances respectively. On the other hand, among the urban households, the low-skilled worker, medium-skilled worker and professional households receive 5.6, 35.7 and 39 percents of the total remittances respectively.

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Appendix: Model Specification

Equation	Description
Price Block	
$PM_i = \overline{PWM_i} \cdot ER \cdot (1 + tm_i + tv_i)$	Import Price
$PE_i = PWE_i \cdot ER$	Export Price
$P_i \cdot Q_i = PD_i \cdot D_i + PM_i \cdot M_i$	Composite Price
$PX_i \cdot X_i = PD_i \cdot (1 - td_i - tv_i) \cdot D_i + PE_i \cdot E_i$	Activity Price
$PN_i = \sum_j \tau_{ji} \cdot P_j$	Input price
$PV_i \cdot V_i = PX_i \cdot X_i - PN_i \cdot INT_i$	Value added price
$PK_i = \sum_j \kappa_{ij} \cdot P_j$	Capital Price
Production and Supply Block	
$X_i = AX_i \cdot [\eta_i \cdot V_i^{-\phi_i} + (1 - \eta_i) \cdot N_i^{-\phi_i}]^{-1/\phi_i}$	Gross Output (CES aggregate of value-added and intermediate input)
$N_i = V_i \cdot [\dfrac{PN_i \cdot (1 - \eta_i)}{PV_i \cdot \eta_i}]^{\frac{1}{1+\phi_i}}$	Composite Intermediate
$V_i = AV_i \cdot [\sum_f \alpha_{if} \cdot FD_{if}^{-\mu_i}]^{-\frac{1}{\mu_i}}$	Value added function
$FD_{if} = V_i \cdot \left[\dfrac{\alpha_{if} \cdot PV_i}{AV_i^{\mu_i} \cdot W_f \cdot \varpi_{if}}\right]^{\frac{1}{1+\mu_i}}$	Factor Demand
$FY_f = \sum_i W_f \cdot \varpi_{if} \cdot FD_{if}$	Factor Income
$Q_i = AQ_i \cdot [\delta_i \cdot M_i^{-\rho_i} + (1 - \delta_i) \cdot D_i^{-\rho_i}]^{-1/\rho_i}$	Composite Supply (Armington Function)
$M_i = D_i \cdot [\dfrac{PD_i \cdot \delta_i}{PM_i \cdot (1 - \delta_i)}]^{\frac{1}{1+\sigma_i}}$	Import-Domestic Demand Ratio
$Q_i = M_i + D_i$	Composite commodity aggregation for perfect substitutes
$Q_i = D_i$	Composite supply for Non-imported commodities
$Q_i = M_i$	Composite supply for Non-produced imports
$X_i = AT_i \cdot [\gamma_i \cdot E_i^{-\phi_i} + (1 - \gamma_i) \cdot D_i^{-\phi_i}]^{1/\phi_i}$	Composite supply function
$E_i = D_i \cdot [\dfrac{PE_i \cdot (1 - \gamma_i)}{PD_i \cdot (1 - td_i)}]^{\varphi_i}$	Export Supply
$E_i = E_i^0 \cdot \left[\dfrac{PWE_i}{PWSE_i}\right]^{\eta_i}$	Export Demand

Institutional Income	
$YF_h = \sum_f \varepsilon_{h,f} \cdot FY_f$	Household Factor Income
$Y_h = \left[YF_h + \overline{RM_h} \right] \cdot (1 - th_h - s_h)$	Household Income
$YG = \sum_h th_h \cdot Y_h + \sum_i tm_i \cdot \overline{PWM_i} \cdot M_i \cdot ER + \sum_i td_i \cdot X_i \cdot PD_i$	Government Income
$CD_{ih} \cdot P_i = \beta_{ih} \cdot Y_h$	Consumption Demand
$\overline{GD_i} = \beta_i^g \cdot \overline{GTOT}$	Government Demand
$PK_i \cdot DK_i = \xi_i \cdot I$	Investment by Destination
$ID_i = \sum_j \kappa_{ij} \cdot DK_j$	Investment by Origin
$INT_i = \sum_j \tau_{ij} \cdot N_j$	Intermediate Demand
Equilibrium Condition	
$S = \sum_h SH_h + SG + SF$	Total Savings by Institutions
$Q_i = INT_i + \sum_h CD_{ih} + GD_i + ID_i$	Product Market Balance: Supply equals Demand
$\sum_i FD_{if} = FS_f$	Factor Market Balance: Demand equals Supply
$\sum_i \overline{PWM_i} \cdot M_i - \sum_i PWE_i \cdot E_i - \sum_h \overline{RM_h} - SF = 0$	Current Account Balance: Receipts equal to Outlays
$I = S = \sum_h SH_h + SG + SF$	Macro Balance: Investment equals Savings