

Implications of WTO Agreements and Domestic Trade Policy

Reforms for Poverty in Bangladesh: Short vs. Long Run Impacts

by

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Summary

We examine the impacts of WTO agreements and domestic trade policy reforms on production, welfare and poverty in Bangladesh. A sequential dynamic computable general equilibrium (CGE) model, which takes into account accumulation effects, is used allowing for long run analysis. The study is based on 2000 SAM of Bangladesh including fifteen production sectors, four factors of production (skilled and unskilled labour, agricultural and non-agricultural capital) and nine household groups (five in rural areas and four in urban areas) based on the year 2000 household survey. To examine the link between the macro effects and micro effects in terms of poverty we use the representative household approach with actual intra-group income distributions.

The study presents five simulations for which the major findings are: **(1)** the Doha scenario has negative implications for the overall macro economy, household welfare and poverty in Bangladesh. Terms of trade deteriorate and consumer prices, particularly food prices, increase more than nominal incomes, especially among poor households; **(2)** Free world trade has similar, but larger, impacts; **(3)** Domestic trade liberalisation induces an expansion of agricultural and light manufacturing sectors, favourable changes in the domestic terms of trade. Although the short run welfare and poverty impacts are negative, these turn positive in the long run when capital has adjusted through new investments. Rising unskilled wage rates make the poorest household the biggest winners in terms of welfare and poverty reduction; **(4)** Domestic liberalisation effects far outweigh those of free world trade when these scenarios are combined; **(5)** Remittances constitute a powerful poverty-reducing tool given their greater importance in the income of the poor.

Introduction

The current round of WTO negotiations, commonly referred to as the Doha Round, is likely to have profound and far-reaching impacts on developing countries such as Bangladesh. Furthermore, as these negotiations target especially the agricultural sector, it is the poorest members of these countries who will be most directly affected. This is because the poor, who are located overwhelmingly in rural areas, both consume proportionately more agricultural goods and derive a larger share of their income from the agricultural sector. It is unclear whether the net effects of Doha reforms will help or harm these most vulnerable populations, as the specific reforms and their channels of impacts are numerous and complex. Reforms, in both developed and developing countries may encompass quota/tariff removal/reduction, the elimination of export taxes, the removal of domestic agricultural support and accompanying domestic fiscal reforms to replace lost tariff revenues. The channels of influence are likely, in turn, to simultaneously influence household income (wage rates, returns to capital, remittances, etc.) and consumer prices in contrasting manners.

To address these important issues, we examine the poverty effects of Doha agreements and domestic trade policy reforms in a sequential dynamic computable general equilibrium (CGE) framework. The model takes into account accumulation effects and thus allows long run poverty analysis. In addition, it enables us to track the adjustment path in the economy, which may include substantial poverty effects.

The remainder of this paper is as follows. Sections two and three present the issues and the methodology of this study. In section four we analyse the implications for production and poverty in Bangladesh of the Doha agreement, world and domestic trade liberalisation and increased remittances. Conclusions are in section five.

1. An Overview of the Issues

Current Doha Round negotiations involve developed country reforms that have at least three very important components from Bangladesh's perspective: agricultural trade liberalisation, the liberalisation of textile and garment trade, and freer international movement of workers. Furthermore, the Doha Round will require domestic reforms in Bangladesh, notably in the area of trade liberalisation. We examine each of these issues in turn in the sections below.

1.1 Agricultural Trade Liberalization

It is generally suggested that the implementation of Doha agreements on agricultural trade are likely to increase the prices of food grains and commercial crops in the world market (Panagariya 2002, Beghin *et al.* 2002). However, the implications for the developing countries of increased agricultural prices are unclear and it is argued that the potential exporting countries could benefit and the net food importing countries may turn out to be the loser (Panagariya 2002). There are competing predictions of the impact of Doha round agreements based on simulations results of various global trade models. Some studies foresee expansion of world trade, real output, wages and incomes in developing countries (Beghin *et al.* 2002, Conforti and Salvatici 2004). On the other hand, some studies raise concerns about the potential negative impacts for the net food importing countries (François *et al.* 2003, Fabiosa *et al.* 2003).

1.2 Liberalisation of Textile and Garments Trade

Ready-made Garment (RMG) exports have been one of Bangladesh's dominant sources of foreign exchange earnings over the last decade. There is a considerable debate among economists about the implications of the Agreement on Textiles and Clothing (ATC) phase out for developing countries (Hertel, *et al.* 1996, Hertel and Martin 2000, Yang *et al.* 1997). There are two concerns for Bangladesh: the first is the declining prices of textile and garments in the

international market followed by the ATC phase out (MacDonald et al., 2001; Diao and Somwaru 2001); and the second concern relates to the rising cost of material inputs for RMG exports of Bangladesh after the removal of the ATC. It has been projected by some studies that, with the end of the ATC on January 1, 2005, Bangladesh is going to lose the export advantage it has enjoyed over other competitors (Lips *et al.* 2003, Yang and Mlachila 2004).

1.3 Free Movement of Natural Persons

It has been argued that liberalising the movement of natural persons, i.e. even by a small relaxation of restrictions on labour mobility would produce huge gains in terms of efficiency and poverty reduction in the world (Winters and Walmsley 2002, Rodrik 2004). However, regarding the liberalisation of the movement of natural persons, little progress has been made in the WTO Rounds. In this paper, we argue that free movement of natural persons may substantially raise remittances into the Bangladesh economy. Among the very few studies, looking into the welfare and poverty impact of remittances for developing countries, Rizwana and Kemal (2002) find that remittances, together with domestic trade liberalisation, play a major role in poverty reduction in Pakistan.

1.4 Domestic Trade Liberalisation

The standard arguments in favour of trade liberalisation are that it expands 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 these changes lead to higher economic growth and reduced poverty. In Bangladesh, trade liberalisation programmes and associated economic reforms during the eighties and the nineties significantly liberalised its external trade and foreign exchange regimes. Specific measures included the following. Import procedures were simplified and the number of tariff

bands was dramatically reduced. 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 also been a significant reduction of the number of commodities under quantitative restrictions (QRs). In 1987 the number of commodities under the four-digit code subject to QRs was 550, which declined to 124 under the Import Policy of 1997-2002. In addition, there have also been moves towards a more market-determined exchange rate regime. Finally, different export promotion measures were put in place with the aim to diversify exports, improve quality, encourage higher value added, and develop industries through backward linkages. However, there is considerable debate over whether these measures are consistent with other trade liberalisation measures undertaken in the economy.

2. Methodology

To assess the effects of trade policies on trade, production, factor markets and poverty in Bangladesh we use a general equilibrium framework. We build a dynamic CGE model and calibrate it with a social accounting matrix for the year 2000. We follow the representative household approach and use the 2000 Bangladeshi Household Expenditure Survey (HES) to subsequently estimate poverty effects of different trade policy shocks. In the following sections we briefly describe the model and the data used.

2.1 Model Features

Much current debate focuses on the role of growth in alleviating poverty. However, the majority of CGE models used in poverty and inequality analysis are static in nature. The inability of this kind of model to account for growth effects makes them inadequate for long run analysis

of the poverty impacts of economic policies. They exclude accumulation effects and do not allow the study of the transition path of the economy where short run policy impacts are likely to be different from those of the long run. To overcome this limitation we use a sequential dynamic CGE model. This kind of dynamics is not the result of intertemporal optimisation by economic agents. Instead, these agents have myopic behaviour. It is basically a series of static CGE models that are linked between periods by updating procedures for exogenous and endogenous variables. Capital stock is updated endogenously with a capital accumulation equation, whereas population (and total labour supply) is updated exogenously between periods. It is also possible to add updating mechanisms for other variables such as public expenditure, transfers, technological change or debt accumulation. Below we present a brief description of the static and dynamic aspects of the model. A complete list of equations and variables is presented in the chapter annex.

Static Module. In each sector there is a representative firm, which earns capital income, pays dividends to households and foreigners and pays direct income taxes to the government. We adopt a nested structure for production. Sectoral output is a *Leontief* function of value added and total intermediate consumption. Value added is in turn represented by a CES function of capital and composite labour. The latter is also represented by a CES function of two labour categories: skilled labour and unskilled labour. Both labour categories are assumed to be fully mobile in the model. In the different production activities we assume that a representative firm remunerates factors of production and pays dividends to households.

Households earn their income from production factors: skilled and unskilled labour, agricultural and non-agricultural capital. They also receive dividends, intra-household transfers, government transfers and remittances and pay direct income tax to the government. Household savings are a fixed proportion of total disposal income. Household demand is represented by a linear expenditure system (LES) derived from the maximisation of a *Stone–Geary* utility

function. The model includes nine household categories according to characteristics of the household head, as identified in the HES household survey. Five of these categories correspond to rural households and four are reserved for urban households. Minimal consumption levels are calibrated using guess-estimates of the income elasticity and the *Frisch* parameters.

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

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

Dynamic Module. In every period capital stock is updated with a capital accumulation equation. We assume that the stocks are measured at the beginning of the period and that the flows are measured at the end of the period. We use an investment demand function to determine how new investments will be distributed between the different sectors. This can also be done through a capital distribution function.² Note that investment here is not by origin (product) but rather by sector of destination. The investment demand function we use here is similar to those

proposed by Bourguignon *et al.* (1989), and Jung and Thorbecke (2003). The capital accumulation rate (ratio of investment to capital stock) is increasing with respect to the ratio of the rate of return to capital and its user cost. The latter is equal to the dual price of investment times the sum of the depreciation rate and the exogenous real interest rate. The elasticity of the accumulation rate with respect to the ratio of return to capital and its user cost is assumed to be equal to two. By introducing investment by destination, we respect the equality condition with total investment by origin in the SAM. Besides, investment by destination is used to calibrate the sectoral capital stock in base run.

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

The model is formulated as a static model that is solved sequentially over a 20 period time horizon.³ The model is homogenous in prices and calibrated in a way to generate "steady state" paths. In the baseline all the variables are increasing, in level, at the same rate and the prices remain constant. The homogeneity test, e.g. a shock on the numéraire the nominal exchange rate, with the "steady state" characteristics, generates the same shock on prices, and unchanged real values, along the counterfactual path. This method is used to facilitate welfare and poverty analysis since all prices remain constant along the business as usual (BaU) path.

2.2 The Bangladesh Social Accounting Matrix for 1999/2000

In our study we calibrate our model numerically to a 1999/2000 Social Accounting Matrix (SAM) of Bangladesh. The main sources of information for the SAM are: (a) 1999/2000 Input-output table prepared by Sustainable Human Development Project, Planning Commission, Government of Bangladesh; (b) Household Expenditure Survey 2000 by Bangladesh Bureau of Statistics; (c) Labour Force Survey 2000 by Bangladesh Bureau of Statistics; and (d) National Income Estimates by Bangladesh Bureau of Statistics.

We use an aggregate version of the SAM of Bangladesh that includes 15 sectors, four factors of production: skilled and unskilled labour, agricultural and non-agricultural capital. An important feature of the SAM is the decomposition of the households into nine groups. Households are classified in terms of location - urban and rural. In case of rural households, occupation and ownership of agricultural capital by the household is the main criterion to differentiate household groups. Initially making a preliminary distinction between agricultural and non-agricultural occupation groups, the agricultural group is then classified into four classes according to ownership of agricultural capital. Thereby there are five groups: Landless (No cultivable land); marginal farmers (up to 0.49 acre of land); small farmers (0.5 to 2.49 acres of land); large farmers (2.50 acres of land and above); Non- Agricultural. Urban households are classified into four categories according to the educational level of the household head. These are: Illiterates (no education); Low Education (class I to class IX); Medium Education (class X to class XII); High Education (graduate and above).

Table 15.1 summarises the basic structure of the 2000 Bangladesh SAM. Import duty rates ranges from as low as 1 percent to as high as 55.2 percent. The highest import duty is imposed on the petroleum sector, whereas the lowest is for the Ready-made Garment. The

sectoral import penetration ratio (ratio of imports to domestic demand) is highest for Ready-made Garment (44 percent), followed by Petroleum (43 percent). Sectors with the highest shares of total import are Machinery (32.8 percent), followed by Petroleum (12 percent). The sectoral export-orientation ratio (exports as a share of output) is highest for Ready-made Garment (92 percent), followed by Leather (31 percent). Apart from these two sectors, export-orientation is quite low in other sectors. Ready-made Garment exports account for 67 percent of total exports. Together, the service and construction sectors account for 60 percent of total value-added in the economy. The contribution of agriculture and manufacturing sectors in total value-added are 17 percent and 23 percent respectively. The highest shares of intermediate consumption in output are for Rice-Ata Milling (85 percent), followed by Other Food (81 percent). The share of intermediate consumption in total demand is highest for the Cereal Crop sector (113 percent).

Table 15.2 presents household income composition based on the SAM. It shows that factor income represents the largest source of income for all household categories. Unskilled labour income and non-agricultural capital income each represent 35 percent of total household income. Skilled labour income and agricultural capital income come second with shares in households' income of 16.06 percent and 10.32 percent. Unskilled labour is the primary source of income for, in declining order of importance, landless, illiterate, marginal farmers, non-agriculture and small farmer households. Low, medium and high education households receive the most important share of their income from non-agricultural capital, although the latter two categories also receive a significant share of skilled labour income, whereas low education households are heavily dependent on unskilled labour income. Large farmers have agricultural capital income as their principal source of income. Given these substantial differences in income sources, we may expect that trade liberalisation will have very different income effects depending on how factor remunerations are affected.

2.3 The year 2000 household survey

To examine the link between the macro effects and micro effects in terms of poverty we use the representative household approach. The results of the model at the aggregate level, for the nine household categories, are subsequently linked to the household survey assuming that each household in the latter has the same variation in its income (or consumption) as the group or category to which it belongs in the model. We follow a non-parametric analysis and use the observed distribution of all the households in the survey, their sample weights and the number of individuals in each household. The latter includes 7439 households of which almost 80 percent live in rural areas (see table 15.9). The base run poverty profile will be presented in the next section.

3. Simulation design and analysis

In this section we perform different simulations, discuss the macro and sectoral effects, and analyse their implications for welfare and poverty in Bangladesh. It is worthwhile to note that the pre-simulation of ATC removal (abolition of ATC quotas, the admission of China in the WTO and the expansion of the European Union) shows negative impacts for the overall macro economy, household welfare and poverty in Bangladesh. At the sectoral level, the export-oriented sectors, especially the Ready-made Garment sector, shrink. In both rural and urban areas, it is the poorest household categories that bear most of the burden of these negative shocks. Further experiments of ATC-quota removal combined with domestic tariff cuts show that losses at the sectoral and household levels are reduced with domestic trade liberalisation.

However, since the aim of this study is to isolate the effects of the Doha agreements and trade liberalisation, we assume that these elements are already embedded in the BaU scenario

(from the beginning of 2005) as well as in the rest of the scenarios described herein. The following simulations are implemented from 2005 and onwards.

- Doha: Rest of world (ROW) reductions in tariffs, subsidies and domestic support with no domestic tariff cuts: Special and differential treatment (SDT).
- Full-Lib-Row: ROW full trade liberalisation with no domestic tariff cuts
- Full-Lib-Own: Full domestic trade liberalisation with no ROW trade liberalisation
- Full-Lib: ROW and full domestic trade liberalisation
- Remit: Increase in remittances

Before discussing the results it is important to note that in static CGE models counterfactual analysis is made with respect to the base run that is represented by the initial SAM. However, in dynamic models the economy grows even in the absence of a shock and the analysis should therefore be done with respect to this growth path. Also, since our model is dynamic, it takes into account not only efficiency effects, present in static models, but also accumulation effects. The latter are linked to the ratio of capital rates of return to the cost of investment goods. We pay special attention to these elements in our simulation analysis.

3.1 Doha Sceranio

Overview of shocks (Table 15.4). The present simulation involves the removal of all exports subsidies, domestic support and tariffs in the rest of the World. This scenario provides special and differential treatment for least developing countries like Bangladesh which are not required to cut tariffs at all. We perform this simulation by introducing the changes in world export prices (PWE), world import prices (PM) and world demand for Bangladeshi exports (DEX) as estimated from the GTAP world model. Doha generally leads to increases in world prices for Bangladeshi imports and exports, as well as an increase in world demand for these

exports. These increases are particularly strong in the agricultural, food processing and textile/garment sectors.

Macro Effects (Table 15.3). At the aggregate level, real GDP is not affected in the short run and increases only slightly in the long run (0.02 percent).⁵ The results also indicate a small decrease in welfare and a short-run increase in the poverty headcount, although these effects diminish in the long run. In addition, we observe a decline in domestic terms of trade and trade in both the short run and, to a lesser degree, the long run as world import prices increase more than world export prices for Bangladesh. The increase in world prices and demand lead to higher factor returns, particularly for agricultural capital and unskilled workers. We also note that the consumer price index increases more in rural areas than in urban areas. The fact that consumer prices – and thus the poverty line – increases faster than wage rates is consistent with the decline in domestic terms of trade, the drop in welfare and the rise in poverty. In sum, the aggregate results suggest that the Doha scenario is accompanied by small negative impacts that are likely to be dissipated in the long run.

Sectoral Effects (Tables 16.4-16.7). Simulations run with the GTAP world model show that the removal of subsidies, tariffs and domestic support in developed countries lead to strong increases in the world prices and demand for agricultural goods, particularly for Commercial Crop and Livestock-Poultry sectors (Table 15.4). Among the manufacturing sectors, the Textile and Ready-made Garment sectors also register a strong increase in world prices and demand. Faced with rising import prices, import volumes decline in all agricultural sectors except Forestry (Table 15.6), for which the increase in import prices is smallest. This leads to an increase in domestic demand for agricultural goods (except Forestry) in both the short and long run. Regarding the industrial sectors (except Rice Atta-Milling and Food) import volumes expand as import prices stagnate, leading to a decrease in local demand for competing domestic output. In

both the short and long run, rising world export prices and demand lead to export growth in the Commercial Crop and Ready-made Garment sectors and a contraction of exports in all other sectors, especially food and leather. As consumers substitute demand toward domestic goods and producers reorient production toward exports, we observe that prices on the domestic market increase, especially in the Commercial Crop sector (Table 15.4). Note that, as initial import penetration ratios and export orientation ratios are generally fairly small (Table 15.1), variations in local sales are proportionately smaller than the corresponding variations in imports and exports.

As mentioned above, the efficiency (reallocation) and long run accumulation effects together determine the impacts on production and factor reallocation. As a result of rising export and domestic prices, output prices increase in all sectors in both the short and long run, with the short-run exception of leather (Table 15.5). Value added prices increase more (less) than output prices in sectors where inputs costs rise proportionately less (more). In the short run, we note that the increase in value added price is greatest for agricultural and light manufacturing (food processing and textile/garments) sectors, which are precisely the sectors with the largest increases in import prices, export prices and/or export demand as a result of the Doha agreement (Table 15.4). These variations in value added prices influence the capital rental rate and labour wage rates and lead to a reallocation of resources (Table 15.5). As a result, output expands in these sectors and contracts in heavy manufacturing sectors such as Leather, Petroleum, Chemical products, Machinery and Other industries (Table 15.6), which all face generally negative or weakly positive variations in world prices and demand under Doha.

To understand the impacts on factor remunerations, it is important to recall that labour is mobile across sectors both in short and the long run, whereas capital is mobile only after the first year and through new investments. Therefore, we see much stronger short-term variations in the

returns to capital. In the case of the Doha simulation, agricultural capital is the clear "winner" given the expansion of agricultural output, whereas the relative returns to non-agricultural capital decline (Table 15.3). Both skilled and unskilled labour factors move from contracting to expanding sectors. As the expanding sectors, which are primarily agricultural or light manufacturing, tend to be relatively more intensive in unskilled labour, unskilled wage rates increase more than skilled wage rates.

In the long run, resource allocation effects are similar, although output effects – positive and negative – are much stronger (Table 15.6). It is noteworthy that, in the long run, output effects are driven increasingly by the reallocation of capital investments, rather than labour mobility. Initial increases in capital rental rates in the expanding sectors lead to a long-term reallocation of investment from industrial sectors to agriculture sector. As a result, the long-term impacts on the returns to agricultural and non-agricultural capital are nearly equal.

In summary, through increases in export prices/demand and import prices, the Doha agreement benefits unskilled labour-intensive agricultural (particularly Commercial Crops) and light manufacturing (Other Food Processing and Textiles/Ready-made Garments) sectors. On the other hand, almost all other manufacturing and services sectors shrink, especially the Leather sector. This leads to a particularly strong short-term increase in the returns to agricultural capital and, once investment responds, long-term increases in unskilled wage rates.

Welfare Effects (Table 15.8). In order to explore the welfare impacts of Doha as measured by equivalent variations (EV), we examine effects on household incomes, consumption and the consumer price index (CPI). Nearly 80 percent of Bangladesh's population is rural; primarily composed of non-agricultural, small farmer and landless households (Table 15.9). Factor remunerations represent the vast majority of household income in Bangladesh (Table 15.2). Given that the rates of remuneration of all factors increase (Table 15.3), nominal income

increases for all household groups. The higher rate of accumulation of agricultural capital (Table 15.7), which is owned primarily by small and, a fortiori, large farmers, explains why these two household categories register the greatest increase in income. Landless households also emerge as relative winners given the large share of their income that is derived from unskilled wages. In contrast, households headed by medium-educated heads are revealed to be the comparative losers in nominal income terms as a result of their reliance on non-agricultural capital and skilled labour income. Long run effects are somewhat smaller, especially for large farmer households, as investment in agricultural capital eats into their rents. Generally speaking, nominal income gains are greater for rural households.

Consumer prices increase more than nominal income for all but large farmer households. As a result, real consumption declines for all household groups except large farmers. Consumer prices generally increase more for rural households under Doha, as they consume relatively more agricultural goods. This offsets the higher nominal income gains among rural households such that real consumption and welfare vary in roughly the same proportion for urban and rural households, with the exception of large farmers. More importantly for poverty analysis, we note that consumer prices tend to rise more for the poorer household groups, due to their more intensive consumption of agricultural goods. Consequently, the reductions in real consumption and welfare are greatest for precisely the poorest household groups: landless and marginal farmers, non-agricultural rural households and urban households for which the head of household is illiterate (Table 15.9). In the long run real consumption and welfare changes are smaller with respect to the baseline scenario, although they follow the same pattern.

Poverty Effects (Tables 16.9-16.10). Foster-Greer-Thorbecke (FGT) poverty indices are used to evaluate the impacts of our simulation on the poverty profiles of the nine representative households (Foster et al., 1984).⁶ We apply the variations in consumption for each household

group from the dynamic model to generate new consumption vectors for individual households from the Bangladeshi household survey.⁷ We use two different poverty lines for rural and urban households which are endogenously determined by the model taking into account the rural and urban CPIs. Table 15.9 reports the base-case (year 2000) poverty profiles. It is evident that poverty is more acute in rural areas than in urban areas. Among rural households, poverty is most severe for landless and marginal farmers. Regarding urban households, households with illiterate heads are the poorest. This table also presents the short run (year 2005) and the long run (year 2020) poverty indices measured along the BaU path. It suggests that accumulation effects, captured by our model, play a major role in alleviating poverty, as poverty falls dramatically. The large farmer category registers the greatest decrease in poverty. High agricultural capital income shares that characterise this category explain this decline in poverty level.

Changes in poverty indices are determined by changes in the poverty line and change in nominal consumption (or income). The poverty line represents the cost of a basic needs basket of goods. If the change in poverty line is greater (smaller) than the change in nominal consumption, then poverty is likely to decrease (increase). Poverty effects are reported in Table 15.10. The results show that the average poverty headcount ratio increases by 0.03 percent in the short run, while it remains unchanged in the long run. The average poverty gap and squared poverty gap show an increase in the depth and severity of poverty in both the short and, to a slightly lesser extent, long run. In rural areas, poverty increases for all households except large farmers, which emerge as the "winners" from Doha. Regarding urban households, poverty increases for all but households with highly educated heads. As mentioned above, all poverty effects are similar, but smaller, in the long run. Generally speaking, it appears clear that the poorest household categories lose most from Doha, whereas large farmers are the biggest beneficiaries.

Conclusion: In summary, the Doha scenario is predicted to lead to increases in world demand for Bangladeshi agricultural and light manufacturing exports. As a result, the returns to and stock of agricultural capital increase proportionately more, along with unskilled wage rates. At the same time, rising import and export prices lead to increases in consumer prices, especially among rural and poor households, such that overall poverty increases. Indeed, poverty increases for all household categories except large farmers, for whom poverty declines through agricultural capital accumulation, and high-educated urban households, for whom initial poverty rates are nil. Landless farmers and illiterate urban households have relatively smaller poverty increases due to their reliance on unskilled wage income and the greater share of agricultural goods in their consumption. The biggest losers are marginal farmers and low- and medium-educated urban households, which are more dependent on skilled wages. There is no clear urban-rural difference in poverty effects, as rising agricultural prices simultaneously increase rural incomes and consumer price indices.

3.2 ROW free trade with no domestic trade liberalisation

Overview of shocks (Table 15.4). When tariffs are eliminated in the rest of the World, (Full-Lib Row), world export and import prices, and world export demand, all increase strongly in the agricultural sectors. World export demand also increases in the "other industry" sector, while at the same time declining for leather, food and textiles (Table 15.4). World prices for Bangladeshi imports also increase for the rice milling and other food processing sectors. Changes in all other sectors are minimal. Generally speaking the shocks in world prices and demand are much greater than in the Doha simulations.

Macro Effects (Table 15.3). The macro indicators suggest that the impacts of free world trade are quite similar to those of the Doha scenarios, although much more pronounced. In

particular, welfare falls more and poverty increases more in both the short and long run, as domestic terms of trade, imports and exports all decline more. Factor returns and consumer prices also increase more.

Sectoral Effects (Tables 16.4-16.7). At the sectoral level, increases in world prices and demand in the agricultural sector translate into an expansion of the Bangladeshi agriculture and food processing sectors, similar to but stronger than in the Doha scenarios. The largest expansion, both in terms of output and exports, and the greatest reduction in imports, are all observed in the commercial crop sector, where world prices and demand increase most. On the other hand, the greatest contraction is observed in the leather sector. As a result, short-term returns to agricultural capital increase strongly (3.38%) and capital investment is reoriented toward the agricultural sector with a 14% increase in the commercial crop sector.

Welfare Effects (Table 15.8). Regarding income, consumption and welfare effects, the patterns are quite similar, although generally much stronger. Consumer price increases dominate nominal income increases. As a result, all households register greater welfare losses both in the short and the long run, except large farmer households, which experience greater welfare gains, and small farmer households for whom welfare losses are roughly equal to the Doha scenarios. Once again, these results are driven by agricultural capital accumulation in these two household categories.

Poverty Effects (Tables 16.9-16.10). Poverty increases more for all households (except the small farmers and the large farmers) compared to the Doha scenarios. For small farmer households, poverty increases slightly less, whereas poverty decreases more for large farmers.

Conclusion: Free world trade has very similar, but much stronger, effects as compared to the Doha agreement. The agricultural and garment sector expands leading to higher returns to agricultural capital and unskilled labour and the accumulation of agricultural capital stock.

Poverty increases as a result of increased consumer prices, although poverty declines among larger farmers and remains unchanged for small farmers given their high agricultural capital endowments. Marginal farmers and low/medium-educated urban households are the biggest losers as a consequence of their reliance on skilled wages and non-agricultural capital rents.

3.3 Domestic trade liberalization with no free world trade

Overview of shocks (Table 15.4). In this scenario, nicknamed Full-Lib Own, we focus solely on the impact of domestic trade liberalisation with world prices and demand held constant. Note that the elimination of domestic tariffs leads to strong reductions in domestic import prices, particularly in the sectors with the highest initial tariff rates (Table 15.1) petroleum, other industry, livestock, forestry, chemicals and leather. There is no clear agriculture-industry distinction in terms of initial tariff rates, as both sectors contain sub-sectors with high and low initial tariffs.

Macro Effects (Table 15.3). The impacts on GDP and welfare illustrate the importance of analysing trade liberalisation in a dynamic framework; both measures decline in the short run and then strongly increase in the long run, as compared to the business-as-usual simulation. The short run negative impact is explained by the fact that trade liberalisation contracts the import-competing and highly protected sectors, while capital cannot be quickly reallocated to the expanding export-oriented sectors. Impacts are also much larger than under the previous scenarios. We observe positive growth in domestic terms of trade both in the short and the long run given the decline in domestic import prices. Imports and exports register strong positive growth, particularly in the long run. Reduced domestic import prices lead to a fall in consumer prices both for rural and, slightly more, for urban households. Skilled and unskilled wage rates decline, although less so in the long run when capital is reallocated toward the expanding sectors.

The reduction in unskilled wage rates is somewhat smaller, given the expansion of unskilled labour-intensive textile-garment sectors. The user cost of capital also declines both in the short and the long run.

Sectoral Effects (Tables 16.4-16.7). Tariff elimination leads to an immediate reduction in the domestic price of imports that is proportional to the initial sectoral tariff rates (Table 15.1). Domestic consumers respond by increasing import demand, once again in rough proportion to the fall in import prices, with the strongest increases in the leather, petroleum, livestock, other industry and forestry sectors. The three sectors that had low initial tariff rates (commercial crops, rice-ata milling and ready-made garments) register negative import growth in the short run, as consumers substitute toward goods for which prices drop more dramatically. In the long run, import volumes grow more (or contract less) in all sectors except leather.

The current account balance is fixed in the short run and subsequently increases at a fixed rate. Thus, the increase in imports leads to a real devaluation and an increase in exports. The export response is generally smaller in the long run, with the dramatic exception of leather, textiles and, especially, ready-made garments. In the long run, the Ready-made Garment sector flourishes, and its export volume increases by nearly 57 percent compared to the BaU scenario. With a negative sloping demand curve for exports, FOB export prices fall.

As consumers substitute toward cheaper imports and producers reorient production toward the export market, local sales of domestic goods contract in all but the commercial crop and textile/garment sectors, and most dramatically in the petroleum and other industry sectors. In the long run, all the agricultural sectors have small positive growth in domestic sales, whereas this is only true for textile/garments among the manufacturing sectors.

Output expands most in the three textile/garment sectors (Ready-made Garments, Leather and Textiles). Export-intensive ready-made garments and leather benefit from export expansion

and all three sectors register input cost savings, as evidenced by the positive evolution in value added prices despite falling output prices (Table 15.5). Greatly increased import competition for textiles is offset by increased input demand from the Ready-made Garment sector. In contrast, production contracts in the heavier manufacturing sectors for which export demand stagnates or declines. As a result, non-agricultural capital and labour migrate to the textile/garments sectors and away from the other manufacturing sectors, with relatively little movement in the agricultural sectors. In the long run, the non-agricultural capital stock response is much larger and tempers the reallocation of skilled and unskilled labour. There are also moderate capital stock increases in the agricultural and service sectors.

In the short run, factor returns fall by roughly 10 percent as a result of declining domestic prices (Table 15.3). Overall investment falls in response to the average reduction in capital returns with respect to the user cost of capital. This makes the long-term reduction in wage rates somewhat smaller, especially for unskilled wages. The average returns to capital falls slightly more in the non-agricultural sector (Table 15.3), although these rates converge after long-term adjustment in sectoral investment rates (Table 15.7). Returns to capital fall relatively to wage rates.

Welfare Effects (Table 15.8). We observe a fall in nominal income for all households in both the short and long run. This reduction is smallest among the poorest households – urban households with illiterate or low-educated heads and rural landless or marginal households - given their reliance on unskilled wages. Medium- and High-educated urban households, as well as non-agricultural rural households, are the biggest losers as a result of their high endowments in non-agricultural capital and skilled labour. In the short run, real consumption decreases for all households, as nominal income falls more than consumer prices. However, the opposite is true in

the long run. The figures of EVs are very much in line with the figures of consumption growth with the poorest household categories emerging as the biggest winners.

Poverty Effects (Tables 16.9-16.10). In the short run, poverty increases for all households, except those headed by highly-educated heads, for which there is no change, and those headed by illiterate heads, for which poverty falls. However, in the long run poverty falls for all households, especially among the poorer households.

Conclusion: In conclusion, domestic liberalisation leads to strong expansion of agricultural and textile/garment sectors, as a result of their lower initial tariffs (and thus lesser import competition), substantial input cost savings, export growth and, in the case of textiles, increased demand from the garments sector. As a result, unskilled wages fall less than skilled wages and returns to agricultural capital fall relative to non-agricultural capital. In the short-term, consumer prices fall less than nominal incomes leading to welfare losses and poverty increases. However, when investment is reoriented toward the high return sectors, nominal income losses become smaller than consumer price reductions, resulting in welfare gains and poverty reductions. The poorest rural and urban household categories emerge as the principal beneficiaries, whereas the wealthiest household categories benefit less. No clear urban-rural distinction is noted.

3.4 Full liberalization of world and domestic trade

Overview of shocks (Table 15.4). This simulation, Full-Lib, simply combines the shocks of the preceding two simulations involving simultaneous world and domestic free trade.

Macro Effects (Table 15.3). At the macro level, the effects of full liberalisation are quite similar to those under domestic liberalisation. However, under the influence of simultaneous free world trade, welfare and poverty effects are increased in the short run and the positive long run

gains are reduced. In addition, the positive impact on domestic terms of trade, import and exports are reduced. Furthermore, we note that the reductions in both the urban and rural CPIs and in both the skilled and unskilled wage rates are less than those under domestic liberalisation.

Sectoral Effects (Tables 16.4-16.7). Sectoral effects also closely follow those of domestic liberalisation. However, free world trade-induced changes in import/export prices and export demand in favour of agricultural sectors do introduce some changes with respect to domestic liberalisation alone. In particular, free world trade accentuates the long-run expansion of agricultural sectors (particularly commercial crops), dampens the expansion of textile/garments, while at the same time reinforcing the contraction of the heavy industrial sectors.

Welfare Effects (16.8). The pattern of changes in welfare largely resembles those of the domestic liberalisation scenario. However, short-term welfare losses tend to be greater and long-term welfare gains tend to be smaller, with the exception of large farmers who experience welfare gains in the short- and long-terms.

Poverty Effects (Tables 16.9-16.10). The similarity to the domestic liberalisation scenario carries over to the three poverty measures, although poverty increases more in the short run and less in the long run for most household categories. The principal exceptions are large farmers who experience a reductions in poverty in the short run and larger poverty reductions in the long-terms.

Conclusion: This simulation illustrates the much more substantial and favourable impacts of domestic liberalisation relative to free world trade. Indeed, as free world trade increases poverty for all but large farmers, it counteracts the positive effects of domestic liberalisation, but only to a very limited degree. Large farmers emerge as the principal beneficiaries of free world trade.

3.5 Increase in remittances (Remit)

Overview of shocks (Table 15.4). This simulation assumes increased international mobility of natural persons. We introduce a fifty percent increase in remittances and increase the current account balance by the same amount. Based on data on the evolution of the number of workers abroad and remittances, we calculate the migration of workers required to support this increase in remittances. It amounts to only a small fraction of the total effective labour supply, namely a decrease in skilled and unskilled labour supply of 0.2 and 0.1 percent respectively. We expect that these shocks will translate into an increase in imports and a decrease in exports. In addition a higher level of transfers is likely to improve household welfare and contribute to poverty reduction.

Macro Effects (Table 15.3). The inflow of remittances increases real GDP and welfare, while reducing poverty, especially in the long run. Remittances also provide additional foreign currency, which finances a small increase in imports and an equivalent reduction in exports. As a result, the domestic terms of trade effect is negative. The increase in domestic income raises domestic consumer prices, wage rates and the user cost of capital. While returns to capital increase in the short-term, they fall in the long run.

Sectoral Effects (Tables 16.4-16.7). Three main forces drive the sectoral effects. First, investment increases as a result of increased domestic consumer demand and resulting increases in returns to capital. This leads to an increase in construction and forestry output, as most forest products are sold as inputs to construction. Second, increased household income raises demand for the main household consumer goods: milled rice-ata, services and food. Increased Rice-Ata milling output in turn increases demand for cereal crops. Finally, the reduction in exports falls primarily on the garment sector, which provides two-thirds of Bangladeshi exports. As the

construction sector employs 60 percent of workers and is very labour intensive, its expansion translates into a substantial increase in wage rates relative to capital returns.

Welfare Effects (Table 15.8). Rural households, with the exception of large farmers, benefit most given the higher share of remittances and wages in their total income (Table 15.2). They are followed closely by the poorest urban households. In addition, consumer price indices increase slightly less for rural households given their lower consumption of services, for which consumer prices increase strongly. As a result, real consumption and welfare gains tend to be higher among rural households, with the exception of large farmers who have smaller share of remittance and wage income.

Poverty Effects (Tables 16.9-16.10). Poverty declines for all poverty measures and all household categories. However, it is the rural household categories that benefit most, due to the direct impact of remittance income and smaller increases in their consumer price indices.

Conclusion: Increased remittances directly raise household income and welfare, while strongly reducing poverty. Rising domestic demand increases investment and, consequently, construction output, which raises wage rates relative to capital returns. Rural households benefit most, with the exception of large farmers, as they derive proportionately more income from remittance and wages and have smaller increases in their consumer price indices. More generally, an increase in remittances is shown to be a powerful tool to combat poverty, as poorer households are more dependent on this income source.

4. Conclusions

This study examines the impact of WTO agreements and domestic trade policy reforms on production, welfare and poverty in Bangladesh. The research applies a sequential dynamic

computable general equilibrium (CGE) model, which takes into account accumulation effects, and allows long run analysis.

The Doha agreement is found to have negative implications for the overall macro economy, household welfare and poverty in Bangladesh, as terms of trade deteriorate and consumer prices rise more than nominal incomes. Agricultural and light manufacturing sectors expand in response to rising world export prices and demand, increasing the relative returns to agricultural capital and unskilled labour. While nominal income consequently increases more for rural households, particularly landowners, consumer prices also increase more for rural households given their high consumption of agricultural goods. More importantly, consumer prices increase more for the poorest household categories, for whom agricultural (food) consumption is proportionately higher. The net effect is greater welfare losses and poverty increases among the poorest households. The greatest beneficiary of the Doha agreement appears to be rural large farmers who capitalise on rising returns to agricultural capital (primarily land). These results hold whether developing countries are provided special and differential treatment or not.

Free world trade has an almost identical pattern of effects as the Doha agreement, although these effects are much stronger. In particular, overall poverty increases by nearly one percent in the short term and a half percent in the long term. Once again, large farmers are the big winners and the poorest household categories emerge as the biggest losers. In contrast, domestic trade liberalisation induces an expansion in agricultural and textile/garment sectors under the quadruple influence of low initial tariffs, input cost saving, export growth and rising domestic demand. Unskilled wages rise relative to skilled wages, and the returns to agricultural capital increase relative to non-agricultural capital. Although the short run welfare and poverty impacts are negative, when capital is able to adjust through investment in the long run, welfare increases

and poverty declines. Contrary to the Doha and free world trade scenarios, the poorest household categories are the biggest winners due to the increase in unskilled wage rates. Domestic liberalisation is found to far outweigh the effects of free world trade when we combine these two scenarios. Finally, an increase in remittances is shown to substantially reduce poverty, as poor households benefit proportionately more from this source of income.

References

- Abbink, G.A; Braber, M.C; and Cohen, S.I. 1995. *A SAM-CGE demonstration model for Indonesia: A Static and Dynamic specifications and experiments*. International Economic Journal, 9 (3): 15-33.
- Bangladesh Bureau of Statistics. 2000a. *Household Expenditure Survey 1999-2000*. Ministry of Planning. Government of the People's Republic of Bangladesh. Dhaka.
- Bangladesh Bureau of Statistics. 2000b. *Labour Force Survey 1999-2000*. Ministry of Planning. Government of the People's Republic of Bangladesh. Dhaka.
- Beghin, J.C.; Roland-Holst, D. and Van der Mensbrugge, D. 2002. *Global Agricultural Trade and the Doha Round: What are the Stakes for North and South*. Paper presented at the OECD - World Bank Forum on Agricultural Trade Reform, Adjustment, and Poverty, Paris, May 23-24, 2002 and at the Fifth Conference on Global Economic Analysis, Taipei, June 5-7, 2002.
- Boccanfuso, D.; Decaluwé, B. and Savard, L., *Poverty, Income Distribution and CGE Modeling: Does the Functional Form of Distribution Matter?*, CIRPÉE Working paper 03-32, Université Laval, Canada.
- Bourguignon, F.; Branson, W.H. and de Melo, J. 1989. *Macroeconomic Adjustment and Income Distribution: A Macro-Micro Simulation Model*. OECD, Technical Paper No.1.
- Conforti, P and Salvatici, L. 2004. *Agricultural trade liberalisation in the Doha round. Alternative scenarios and strategic interactions between developed and developing countries*. FAO (Food and Agriculture Organisation). Commodity and Trade Policy Research Working Papers 10.
- DAD (Distributive Analysis-Analyse Distributive) Software. J-Y. Duclos, A. Araar and C. Fortin. CIRPEE, Université Laval, Canada.
- Diao, X. and A. Somwaru. 2001. *Impact of the MFA Phase-out on the World Economy: An Intertemporal, Global General Equilibrium Analysis*. IFPRI (International Food Policy Research Institute): TMD Discussion Paper 79. Washington DC.
- Fabiosa, J.; Beghin, J.; de Cara S.; Fang, C.; Isik, M. and Matthey H. 2003. *Agricultural markets liberalisation and the Doha round*. Proceedings of the 25th International Conference of Agricultural Economists (IAAE). 22 August 2003. Durban, South Africa
- Foster, J.E.; Greer J. and Thorbecke.E. 1984.. *A Class of Decomposable Poverty Measures*, Econometrica, 52: 761-776.
- François, J.; H.; van Meijl, H. and van Tongeren, F. 2003. *Trade Liberalisation and Developing Countries under the Doha Round*. Tinbergen Institute Discussion Paper 2003-060/2. University of Rotterdam: The Netherlands.

- Hertel, T.W. and Martin, W. 2000. *Liberalising Agriculture and Manufacturers in a Millennium Round: Implications for Developing Countries*, *World Economy* 23: 455-69
- Hertel, T.W.; Martin, W.; Yanagishima, K. and Dimaranan, B. 1996. "Liberalizing Manufactures Trade in a Changing World Economy", in Martin, W., and Winters, A. (eds), *The Uruguay Round and the Developing Countries*, Cambridge University Press, Cambridge. pp:183-215.
- Jung, H.S. and Thorbecke, E. 2003. *The Impact of Public Education Expenditure on Human Capital, Growth, and Poverty in Tanzania and Zambia: A General Equilibrium Approach*. *Journal of Policy Modeling*. 25: 701–725.
- Lips, M.; Tabeau, A.; van Tongeren, F.; Ahmed, N. and Herok, C. 2003. *Textile and Wearing Apparel Sector Liberalisation – Consequences for the Bangladesh Economy*. Paper presented at the 6th Conference on Global Economic Analysis, The Hague, The Netherlands.
- MacDonald, S.; Somwaru, A.; Meyer, L and Diao, X. 2001. *The Agreement on Textiles and Clothing: Impact on U.S. Cotton*. Cotton and Wool Situation and Outlook. November 2001
- Panagariya, A. 2002. *Developing Countries at Doha Round: A Political Economy Analysis*. Department of Economics, University of Maryland, USA. Mimeo.
- Rizwana, S. and A.R. Kemal. 2002. *Remittances, Trade Liberalisation and Poverty in Pakistan: The Role of Excluded Variables in Poverty Change Analysis*. Pakistan Institute of Development Economics, Mimeo.
- Rodrik, D. 2004. *Globalisation and Growth-looking in the wrong places*. *Journal of Policy Modeling*. 26: 513–517.
- Winters, A., and Walmsley, T.L. 2002. *Relaxing the Restrictions on the Temporary Movement of Natural Persons*. Mimeo. Brighton: University of Sussex.
- Yang, Y. and Mlachila, M. 2004. *The End of Textile Quotas: A Case Study of the Impact on Bangladesh*. Paper for presentation at the 7th Annual Conference on Global Economic Analysis. Washington, D.C.
- Yang, Y.; Martin, W and Yanagishima, K. 1997. *Evaluating the Benefits of Abolishing the MFA in the Uruguay Round Package*, in Hertel, T. W. (ed.), *Global Trade Analysis: Modelling and Applications*. Cambridge University Press: New York. 253 - 279.

Figure 15.1: Aggregate welfare effects

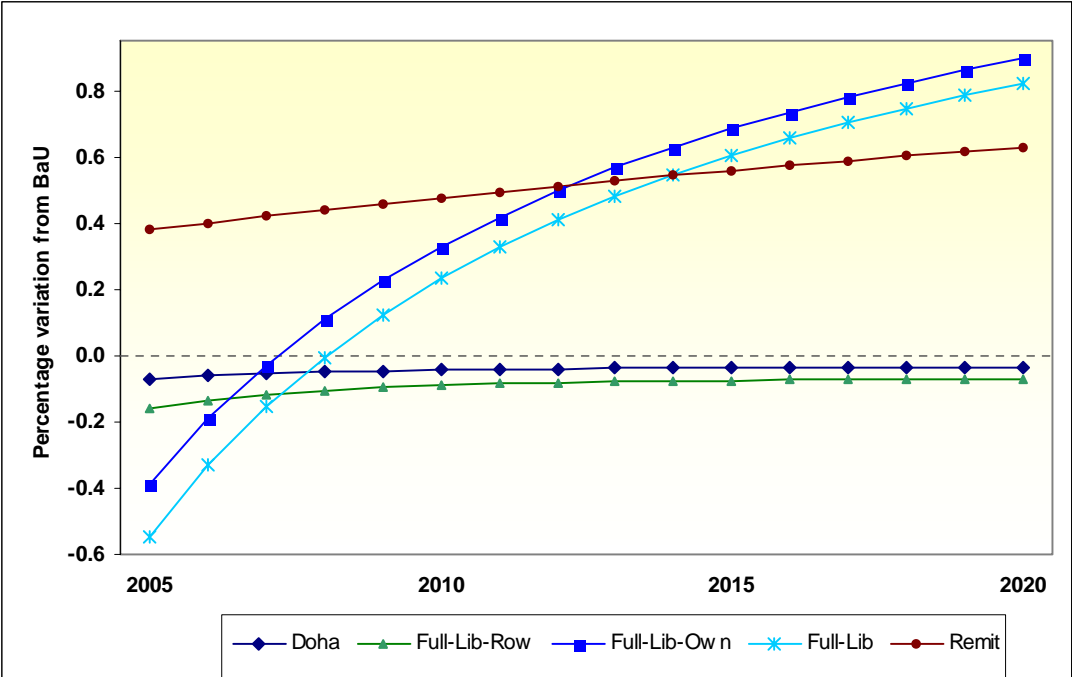


Table 15 1: Base run statistics

	Tariff rates	Import Pen. ratio	Import share	Export Orient. ratio	Export share	Value added share	Share of value added in production	Share of int. dmnd. in absorption	Export Demand Elasticity
(CROP) Cereal Crop	17.9	2.1	1.3	0.0	0.0	6.5	48.4	112.8	6.0
(COMC) Commercial Crop	7.1	15.4	8.5	3.5	2.7	5.0	45.0	50.0	4.9
(LIVS) Livestock-Poultry	23.9	3.8	2.1	4.9	4.3	3.6	28.7	50.1	6.8
(FORS) Forestry	22.5	0.1	0.0	0.0	0.0	1.5	52.5	63.9	6.7
(RATM) Rice-Ata Milling	3.6	1.8	1.8	0.0	0.0	3.2	15.0	8.1	5.2
(FOOD) Other Food	12.7	19.7	11.9	1.3	1.0	2.2	19.0	17.9	4.3
(LEAT) Leather	20.2	0.6	0.1	30.9	6.7	0.6	22.0	44.2	8.1
(TEXT) Textiles	10.6	8.1	3.4	5.5	3.5	2.8	29.8	54.6	7.5
(GARM) Ready-made Garment	1.0	44.1	2.9	91.9	67.0	3.4	32.8	4.8	7.4
(CHEM) Chemical-Fertiliser	20.8	29.4	9.9	4.2	1.6	1.7	28.4	77.9	6.6
(MACH) Machinery	16.8	38.7	32.8	0.1	0.1	4.8	37.9	55.3	7.8
(PETR) Petroleum	55.2	42.9	12.0	1.3	0.3	0.7	6.6	64.9	10.1
(OIND) Other Industries	27.3	20.5	10.4	4.0	2.5	3.3	30.7	69.7	6.4
(CNST) Construction	0.0	0.0	0.0	0.0	0.0	9.3	56.1	11.4	3.8
(SERV) Services	10.3	0.7	2.4	1.9	9.8	50.7	67.5	65.9	3.8

Source: SAM 2000 for Bangladesh.

Notes: The last column of the table presents the export demand elasticity based on GTAP model. The half of its value is used for the CES and CET substitution elasticities. Capital-labour substitution elasticity is assumed equal to 1.2 and skilled-unskilled labour substitution elasticity is equal to 0.8. The capital stock depreciation rate is equal to 5%.

Table 15. 2: Household income composition

	Skilled labor	Unskilled labor	Non Agricultural capital	Agricultural capital	Dividends	Intra-households transfers	Public Transfers	Remittances
Landless	3.19	90.63	0.00	0.00		5.30	0.37	0.51
Marginal Farmers	4.73	59.16	24.80	2.01		8.38	0.35	0.57
Small Farmers	17.07	37.67	24.57	15.67		4.26	0.10	0.66
Large Farmers	9.88	5.28	34.43	49.74		0.41	0.01	0.24
Non-agriculture	23.01	40.45	27.79	4.79		2.96	0.38	0.61
Illiterate	1.69	67.41	28.79	0.00		1.66	0.05	0.40
Low-Education	7.31	41.07	41.27	6.69		2.94	0.26	0.45
Medium-education	30.82	1.20	58.75	7.88	0.06	0.37	0.74	0.18
High-Education	20.08	0.26	59.72	14.95	0.20	1.14	3.43	0.21
All	16.06	35.08	35.00	10.32	0.02	2.52	0.53	0.43

Source: SAM 2000 for Bangladesh.

Table 15. 3: Macro results (percentage change from BaU path)

	Doha		Full-Lib ROW		Full-Lib Own		Full-Lib		Remit	
	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
Real GDP	0.00	0.02	0.00	0.05	-0.19	1.39	-0.19	1.44	0.10	0.42
Welfare	-0.06	-0.03	-0.16	-0.07	-0.39	0.89	-0.55	0.82	0.38	0.63
Headcount ratio	0.03	0.00	0.20	0.37	0.78	-4.81	1.07	-4.55	-0.79	-3.80
Domestic terms of trade*	-4.41	-3.70	-4.62	-3.88	11.29	9.45	10.77	8.95	-4.08	-3.33
Imports	-0.38	-0.33	-0.74	-0.88	12.05	26.61	11.40	25.62	1.45	1.50
Exports	-0.12	-0.00	-0.28	-0.51	19.18	43.29	18.91	42.48	-1.46	-1.51
Urban CPI	0.56	0.51	1.10	0.83	-9.61	-7.20	-8.61	-6.45	0.43	0.33
Rural CPI	0.61	0.53	1.21	0.88	-9.21	-6.96	-8.10	-6.16	0.42	0.31
Skilled wage rate	0.40	0.42	0.72	0.65	-11.06	-6.83	-10.43	-6.26	0.89	1.20
Unskilled wage rate	0.53	0.51	1.03	0.83	-9.33	-5.06	-8.39	-4.29	0.80	1.07
Agricultural capital rental rate	1.34	0.45	3.38	0.70	-9.08	-9.43	-5.84	-8.83	0.27	-0.33
Non-Agric. capital rental rate	0.30	0.44	0.38	0.67	-10.16	-9.51	-9.84	-8.93	0.23	-0.31
User cost of capital	0.34	0.38	0.53	0.51	-9.90	-7.71	-9.43	-7.28	0.44	0.21

Source: Simulations results.

Notes: SR refers to the year 2005 and LR refers to the last year 2020.

* Domestic terms of trade are represented by the ratio of the domestic export and import price indices.

Table 15 4: Sectoral trade and consumer price effects and export demand shocks (percentage change from BaU path)

		CROP	COMC	LIVS	FORS	RATM	FOOD	LEAT	TEXT	GARM	CHEM	MACH	PETR	OIND	CNST	SERV	
Doha	PM	1.31	2.96	2.77	0.31	1.07	1.40	-0.17	0.59	0.10	0.08	0.07	0.09	0.17		0.04	
	DEX		6.5	0.92			-4.04	-5.16	0.27	1.66	-0.77	-0.71	0.27	0.54		0.06	
	PWE		0.73	0.14			0.23	0.13	0.42	0.38	0.00	-0.01	0.04	-0.03		-0.03	
	PE_fob	SR		1.62	0.40			-0.24	-0.28	0.51	0.57	0.04	0.03	0.14	0.18		0.14
		LR		1.36	0.32			-0.33	0.01	0.47	0.51	0.10	0.11	0.23	0.22		0.15
	PD	SR	0.52	1.08	0.72	0.40	0.48	0.79	0.10	0.62	0.38	0.31	0.23	0.23	0.37	0.40	0.42
		LR	0.45	0.46	0.50	0.43	0.46	0.58	0.83	0.54	0.26	0.46	0.40	0.42	0.47	0.42	0.45
	PC	SR	0.53	1.36	0.80	0.40	0.50	0.91	0.10	0.62	0.27	0.25	0.17	0.17	0.33	0.40	0.42
		LR	0.47	0.82	0.57	0.42	0.46	0.73	0.82	0.54	0.19	0.35	0.28	0.29	0.41	0.42	0.45
	Full-Lib-Row	PM	2.78	7.84	4.20	1.37	4.54	2.89	-1.23	0.49	-0.09	-0.55	-0.34	0.35	0.22		0.61
DEX			43.91	5.06			-8.94	-13.48	-1.57	0.79	1.88	0.45	1.63	15.78		2.16	
PWE			2.03	0.43			0.36	0.20	0.74	0.58	-0.29	-0.26	0.08	-0.21		-0.22	
PE_fob		SR		7.11	1.20			-0.70	-1.00	0.74	0.73	0.18	-0.03	0.35	1.68		0.50
		LR		6.25	0.97			-0.98	-0.36	0.68	0.74	0.32	0.17	0.41	1.66		0.47
PD		SR	0.99	2.59	1.37	0.75	0.93	1.62	-0.06	1.04	0.53	0.32	0.18	0.49	0.70	0.73	0.77
		LR	0.67	0.56	0.77	0.64	0.70	0.98	1.55	0.88	0.55	0.69	0.58	0.64	0.69	0.63	0.69
PC		SR	1.03	3.34	1.47	0.76	1.00	1.87	-0.07	1.00	0.27	0.07	-0.01	0.43	0.61	0.74	0.77
		LR	0.71	1.56	0.88	0.63	0.76	1.33	1.53	0.85	0.27	0.34	0.24	0.52	0.59	0.63	0.69
Full-Lib-Own		PM	-15.24	-6.66	-19.33	-18.37	-3.50	-11.31	-16.82	-9.64	-1.00	-17.25	-14.42	-35.59	-21.45		-9.38
	DEX	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
	PWE		0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
	PE_fob	SR		-3.25	-3.32			-3.21	-2.22	-2.59	-2.23	-3.96	-4.11	-5.57	-4.04		-3.71
		LR		-3.04	-2.56			-2.28	-4.07	-3.55	-5.91	-1.88	-2.07	2.02	-1.77		-2.74
	PD	SR	-10.67	-8.96	-10.04	-10.70	-9.83	-9.76	-6.04	-6.62	-5.08	-12.85	-12.45	-22.93	-13.51	-10.52	-11.12
		LR	-7.84	-7.67	-7.64	-8.28	-7.06	-7.17	-9.90	-6.69	-11.96	-8.15	-8.39	-11.03	-8.12	-8.40	-7.88
	PC	SR	-9.32	-7.14	-8.98	-9.25	-8.26	-8.60	-4.60	-5.34	-1.86	-12.79	-11.80	-28.48	-13.90	-9.07	-9.66
		LR	-6.59	-6.09	-6.74	-6.87	-5.56	-6.56	-8.56	-5.48	-6.29	-9.63	-9.40	-24.57	-9.87	-6.99	-6.47
	Full-Lib	PM	-12.88	0.66	-15.94	-17.25	0.88	-8.74	-17.84	-9.20	-1.09	-17.71	-14.71	-35.36	-21.28		-8.82
DEX			43.91	5.06			-8.94	-13.48	-1.57	0.79	1.88	0.45	1.63	15.78		2.16	
PWE			2.03	0.43			0.36	0.20	0.74	0.58	-0.29	-0.26	0.08	-0.21		-0.22	
PE_fob		SR		3.66	-2.15			-3.88	-3.27	-1.88	-1.52	-3.78	-4.13	-5.20	-2.42		-3.23
		LR		3.00	-1.63			-3.25	-4.29	-2.91	-5.23	-1.57	-1.91	2.42	-0.15		-2.29
PD		SR	-9.77	-6.55	-8.75	-10.03	-8.98	-8.26	-6.32	-5.66	-4.57	-12.57	-12.29	-22.51	-12.90	-9.87	-10.44
		LR	-7.25	-7.22	-6.96	-7.73	-6.43	-6.28	-8.34	-5.90	-11.48	-7.55	-7.90	-10.55	-7.54	-7.86	-7.28
PC		SR	-8.37	-4.02	-7.56	-8.57	-7.35	-6.86	-4.89	-4.41	-1.58	-12.75	-11.82	-28.17	-13.39	-8.40	-8.97
		LR	-5.94	-4.70	-5.91	-6.31	-4.87	-5.32	-6.99	-4.71	-6.00	-9.40	-9.25	-24.27	-9.40	-6.44	-5.86
Remit		PM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	DEX	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
	PWE		0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
	PE_fob	SR		0.15	0.12			0.12	0.18	0.17	0.23	0.18	0.14	0.19	0.16		0.17
		LR		0.07	0.04			0.02	0.12	0.12	0.28	0.11	0.06	0.14	0.07		0.10
	PD	SR	0.47	0.46	0.44	0.50	0.47	0.44	0.56	0.40	0.56	0.46	0.43	0.44	0.48	0.55	0.56
		LR	0.29	0.34	0.27	0.22	0.30	0.31	0.47	0.33	0.70	0.37	0.30	0.37	0.34	0.26	0.51
	PC	SR	0.45	0.38	0.41	0.48	0.44	0.34	0.54	0.35	0.31	0.31	0.25	0.24	0.37	0.53	0.54
		LR	0.26	0.26	0.24	0.20	0.28	0.23	0.45	0.28	0.37	0.25	0.17	0.20	0.26	0.24	0.48

Source: Simulations results.

Notes: SR refers to the year 2005 and LR refers to the last year 2020. DEX, PM, PWE, PE_fob, PD and PC represent respectively the change in world export demand, import price, the world price of exports, the FOB export price, the price of domestic goods sold on the domestic market and the consumer price. Regarding the change in tariffs, in Doha_All scenario the percentage change is reported in line Dtm, and in Full-Lib-Own and Full-Lib the scenarios all the tariffs are removed.

CROP: Cereal Crop, COMC: Commercial Crop, LIVS: Livestock-Poultry, FORS: Forestry, RATM: Rice-Ata Milling, FOOD: Other Food, LEAT: Leather, TEXT: Textiles, GARM: Ready-made Garment, CHEM: Chemical-Fertiliser, MACH: Machinery, PETR: Petroleum, OIND: Other Industries, CNST: Construction, SERV: Services

Table 15.5: Sectoral output, value added and factor price effects (percentage change from BaU path)

		CROP	COMC	LIVS	FORS	RATM	FOOD	LEAT	TEXT	GARM	CHEM	MACH	PETR	OIND	CNST	SERV	
Doha	P	SR	0.52	1.11	0.71	0.40	0.48	0.78	-0.03	0.62	0.56	0.30	0.23	0.22	0.36	0.40	0.42
		LR	0.45	0.50	0.49	0.43	0.46	0.57	0.55	0.53	0.49	0.44	0.40	0.42	0.46	0.42	0.44
	PV	SR	0.59	1.72	1.04	0.45	0.46	0.76	-1.45	0.43	0.74	0.03	0.10	-0.35	0.16	0.48	0.44
		LR	0.47	0.48	0.46	0.45	0.47	0.47	0.37	0.49	0.54	0.44	0.43	0.43	0.46	0.46	0.46
	R	SR	0.65	2.67	1.27	0.43	0.42	0.94	-2.54	0.38	0.95	-0.26	-0.15	-0.74	-0.08	0.45	0.39
		LR	0.45	0.47	0.44	0.44	0.45	0.45	0.31	0.49	0.58	0.44	0.40	0.42	0.44	0.44	0.44
	w	SR	0.52	0.52	0.52	0.48	0.51	0.51	0.47	0.51	0.52	0.45	0.51	0.43	0.51	0.51	0.48
		LR	0.50	0.50	0.50	0.47	0.49	0.49	0.47	0.49	0.50	0.45	0.49	0.44	0.49	0.49	0.47
Full-Lib-Row	P	SR	0.99	2.77	1.36	0.75	0.93	1.59	-0.36	1.03	0.71	0.32	0.18	0.49	0.75	0.73	0.76
		LR	0.67	0.80	0.78	0.64	0.70	0.95	0.92	0.87	0.72	0.68	0.58	0.64	0.73	0.63	0.69
	PV	SR	1.29	4.72	1.94	0.95	1.01	1.43	-3.71	0.10	0.48	-0.57	-0.24	-0.14	0.47	0.96	0.82
		LR	0.74	0.78	0.72	0.70	0.73	0.74	0.55	0.74	0.75	0.70	0.68	0.70	0.73	0.72	0.73
	R	SR	1.49	7.67	2.35	0.96	1.02	1.74	-6.26	-0.54	0.00	-1.51	-0.97	-0.61	0.12	0.94	0.70
		LR	0.68	0.74	0.68	0.68	0.68	0.70	0.44	0.70	0.69	0.69	0.60	0.70	0.69	0.67	0.68
	w	SR	1.00	1.00	1.01	0.92	0.98	0.97	0.90	0.97	1.00	0.83	0.99	0.80	0.97	0.98	0.90
		LR	0.82	0.82	0.82	0.77	0.80	0.80	0.75	0.80	0.81	0.71	0.81	0.69	0.80	0.80	0.76
Full-Lib-Own	P	SR	-10.67	-8.73	-9.67	-10.70	-9.83	-9.66	-4.74	-6.39	-2.47	-12.39	-12.44	-22.53	-13.05	-10.52	-10.96
		LR	-7.84	-7.48	-7.36	-8.28	-7.06	-7.09	-7.74	-6.51	-6.43	-7.83	-8.38	-10.77	-7.82	-8.40	-7.77
	PV	SR	-10.39	-7.04	-9.84	-10.33	-9.94	-11.41	6.57	-2.28	13.14	-16.25	-14.56	-64.68	-17.60	-9.08	-10.41
		LR	-7.62	-7.52	-8.26	-8.43	-7.78	-7.87	-8.15	-6.68	-4.78	-8.49	-8.84	-21.07	-8.09	-7.85	-7.20
	R	SR	-11.07	-5.12	-10.02	-10.50	-10.16	-12.63	17.13	3.44	37.72	-20.03	-17.44	-79.40	-22.73	-8.71	-10.98
		LR	-9.37	-9.30	-9.60	-9.61	-9.39	-9.59	-9.46	-7.63	-4.38	-10.03	-10.92	-27.78	-9.92	-9.55	-9.37
	w	SR	-9.47	-9.47	-9.44	-9.94	-9.61	-9.64	-10.08	-9.63	-9.51	-10.45	-9.56	-10.65	-9.66	-9.62	-10.05
		LR	-5.20	-5.20	-5.17	-5.68	-5.34	-5.37	-5.83	-5.37	-5.24	-6.20	-5.29	-6.40	-5.40	-5.35	-5.79
Full-Lib	P	SR	-9.77	-6.12	-8.39	-10.03	-8.98	-8.19	-5.29	-5.45	-1.78	-12.12	-12.28	-22.11	-12.38	-9.87	-10.28
		LR	-7.25	-6.77	-6.67	-7.73	-6.43	-6.23	-6.87	-5.73	-5.77	-7.25	-7.90	-10.29	-7.18	-7.86	-7.17
	PV	SR	-9.23	-2.56	-7.95	-9.47	-9.05	-10.18	2.44	-2.21	13.72	-16.81	-14.78	-64.88	-17.19	-8.21	-9.68
		LR	-6.96	-6.83	-7.63	-7.81	-7.13	-7.21	-7.72	-5.99	-4.06	-7.89	-8.27	-20.81	-7.45	-7.20	-6.56
	R	SR	-9.73	2.30	-7.70	-9.63	-9.27	-11.17	9.65	2.85	37.87	-21.39	-18.27	-79.69	-22.60	-7.85	-10.37
		LR	-8.77	-8.65	-9.01	-9.02	-8.80	-8.98	-9.18	-6.98	-3.67	-9.46	-10.46	-27.68	-9.33	-8.97	-8.78
	w	SR	-8.56	-8.56	-8.52	-9.11	-8.72	-8.75	-9.28	-8.75	-8.60	-9.71	-8.66	-9.94	-8.78	-8.73	-9.23
		LR	-4.45	-4.45	-4.41	-4.98	-4.60	-4.64	-5.15	-4.63	-4.49	-5.56	-4.55	-5.79	-4.66	-4.61	-5.10
Remit	P	SR	0.47	0.45	0.42	0.50	0.47	0.44	0.44	0.39	0.26	0.45	0.43	0.43	0.47	0.55	0.55
		LR	0.29	0.33	0.26	0.22	0.30	0.30	0.35	0.32	0.32	0.36	0.30	0.37	0.33	0.26	0.50
	PV	SR	0.54	0.46	0.38	0.56	0.49	0.49	0.27	0.31	-0.12	0.41	0.44	0.26	0.48	0.70	0.61
		LR	0.27	0.29	0.08	0.09	0.23	0.26	0.21	0.26	0.25	0.29	0.23	0.20	0.26	0.24	0.57
	R	SR	0.34	0.19	0.20	0.44	0.27	0.26	-0.05	-0.07	-0.97	0.11	0.22	-0.05	0.25	0.61	0.26
		LR	-0.32	-0.32	-0.36	-0.36	-0.34	-0.33	-0.31	-0.35	-0.49	-0.30	-0.29	-0.29	-0.31	-0.34	-0.28
	w	SR	0.81	0.81	0.81	0.83	0.81	0.82	0.84	0.82	0.81	0.86	0.81	0.87	0.82	0.81	0.84
		LR	1.08	1.08	1.08	1.12	1.09	1.09	1.13	1.09	1.09	1.16	1.09	1.17	1.10	1.09	1.13

Source: Simulations results.

Notes: SR refers to the year 2005 and LR refers to the last year 2020. P, PV and R and w represent respectively the producer price, the value added price, the rate of return to capital and the wage rate of the composite labour.

CROP: Cereal Crop, COMC: Commercial Crop, LIVS: Livestock-Poultry, FORS: Forestry, RATM: Rice-Ata Milling, FOOD: Other Food, LEAT: Leather, TEXT: Textiles, GARM: Ready-made Garment, CHEM: Chemical-Fertiliser, MACH: Machinery, PETR: Petroleum, OIND: Other Industries, CNST: Construction, SERV: Services

Table 15.6: Sectoral volume effects (percentage change from BaU path)

		CROP	COMC	LIVS	FORS	RATM	FOOD	LEAT	TEXT	GARM	CHEM	MACH	PETR	OIND	CNST	SERV
Doha	M SR	-2.29	-3.83	-6.39	0.29	-1.53	-1.15	0.71	0.09	0.58	0.57	0.44	0.38	0.47		0.70
	LR	-2.43	-4.98	-7.04	0.37	-1.56	-1.46	3.18	-0.05	0.37	0.97	0.78	1.01	0.75		0.75
	EX SR		2.02	-0.85			-2.07	-1.93	-0.43	0.23	-1.06	-0.99	-0.74	-0.77		-0.58
	LR		3.30	-0.30			-1.68	-4.21	-0.11	0.68	-1.45	-1.63	-1.64	-1.04		-0.60
	D SR	0.04	0.69	0.24	-0.01	-0.03	0.17	-0.38	-0.02	-0.47	-0.19	-0.20	-0.31	-0.16	-0.02	-0.03
	LR	0.10	1.04	0.30	-0.03	0.01	0.31	-0.95	0.15	-0.24	-0.29	-0.51	-0.67	-0.22	-0.04	-0.03
	XS SR	0.04	0.74	0.18	-0.01	-0.03	0.14	-0.88	-0.04	0.16	-0.23	-0.20	-0.31	-0.19	-0.02	-0.04
	LR	0.10	1.12	0.27	-0.03	0.01	0.28	-2.06	0.13	0.59	-0.34	-0.51	-0.69	-0.26	-0.04	-0.04
Full-Lib-Row	M SR	-4.98	-10.13	-8.63	-2.04	-8.72	-2.37	3.96	1.64	1.25	2.16	1.45	0.34	1.15		0.21
	LR	-5.71	-13.65	-10.25	-2.39	-9.16	-3.35	9.71	1.10	1.31	3.18	2.24	0.88	1.13		0.10
	EX SR		13.39	-0.22			-4.67	-4.65	-1.57	-0.31	-1.22	-1.37	-1.08	2.70		-0.59
	LR		17.99	1.27			-3.52	-9.45	-1.11	-0.39	-2.15	-2.88	-1.74	2.78		-0.47
	D SR	0.17	1.81	0.35	0.01	0.01	0.32	-0.92	-0.45	-1.04	-0.74	-0.58	-0.37	-0.40	-0.01	-0.09
	LR	0.34	2.83	0.57	0.06	0.13	0.73	-2.11	-0.36	-1.07	-0.96	-1.35	-0.60	-0.35	-0.02	-0.05
	XS SR	0.17	2.25	0.32	0.01	0.01	0.25	-2.13	-0.51	-0.38	-0.76	-0.58	-0.37	-0.27	-0.01	-0.10
	LR	0.34	3.43	0.60	0.06	0.13	0.67	-4.60	-0.40	-0.45	-1.01	-1.35	-0.62	-0.22	-0.02	-0.06
Full-Lib-Own	M SR	16.37	-5.12	42.61	35.48	-16.34	2.48	67.91	17.52	-9.36	12.43	6.31	58.03	27.07		-4.45
	LR	29.44	0.13	57.55	49.06	-8.18	9.03	50.28	30.69	-20.47	28.70	18.35	110.95	49.45		3.39
	EX SR		17.60	25.78			15.08	19.99	21.76	18.13	30.53	38.68	78.34	30.20		15.45
	LR		16.30	19.32			10.40	40.04	31.14	56.93	13.37	17.69	-18.32	12.10		11.13
	D SR	-0.61	1.01	-1.54	-0.15	-0.20	-1.35	1.91	3.71	5.88	-5.26	-2.75	-36.72	-6.62	0.33	-0.85
	LR	0.69	2.90	-0.54	0.29	1.23	-1.39	8.31	15.66	22.73	-8.81	-9.27	-59.38	-9.49	1.27	0.23
	XS SR	-0.61	1.65	-0.16	-0.15	-0.20	-1.11	7.85	4.66	17.04	-3.63	-2.71	-35.02	-5.01	0.33	-0.51
	LR	0.69	3.43	0.48	0.29	1.23	-1.21	19.38	16.48	53.77	-7.77	-9.25	-58.76	-8.53	1.27	0.46
Full-Lib	M SR	10.64	-14.67	30.69	32.73	-23.62	0.13	72.89	19.37	-8.17	14.76	7.83	58.52	28.45		-4.25
	LR	21.98	-13.70	41.31	45.35	-16.65	5.37	64.48	32.00	-19.31	32.42	20.70	111.54	50.83		3.43
	EX SR		33.18	25.38			9.64	15.11	19.90	17.81	28.91	36.76	75.70	33.67		14.76
	LR		37.42	20.96			6.58	25.42	29.81	56.59	10.92	14.40	-19.53	15.31		10.65
	D SR	-0.44	2.76	-1.13	-0.14	-0.20	-1.04	0.95	3.25	4.84	-6.03	-3.33	-37.16	-7.06	0.31	-0.94
	LR	1.06	5.82	0.08	0.36	1.36	-0.63	5.03	15.26	21.66	-9.82	-10.54	-59.66	-9.85	1.25	0.17
	XS SR	-0.44	3.97	0.22	-0.14	-0.20	-0.88	5.59	4.12	16.65	-4.43	-3.30	-35.49	-5.26	0.31	-0.61
	LR	1.06	7.11	1.15	0.36	1.36	-0.53	12.10	16.03	53.35	-8.85	-10.52	-59.06	-8.72	1.25	0.39
Remit	M SR	1.81	1.16	1.73	2.44	1.60	1.16	2.41	1.16	1.56	1.24	1.64	1.52	1.55		1.16
	LR	1.63	1.19	1.48	1.85	1.48	1.21	2.38	1.08	2.06	1.40	1.66	1.70	1.55		1.36
	EX SR		-0.76	-0.84			-0.52	-1.47	-1.24	-1.71	-1.18	-1.12	-1.94	-1.00		-0.65
	LR		-0.33	-0.25			-0.10	-0.99	-0.93	-2.08	-0.72	-0.47	-1.41	-0.43		-0.38
	D SR	0.39	0.01	0.23	0.72	0.39	0.18	0.07	-0.36	-0.52	-0.27	-0.03	-0.72	0.01	0.87	0.09
	LR	0.74	0.34	0.55	1.10	0.68	0.53	0.42	-0.17	-0.56	0.16	0.47	-0.23	0.44	1.27	0.39
	XS SR	0.39	-0.02	0.18	0.72	0.39	0.17	-0.43	-0.41	-1.60	-0.31	-0.03	-0.73	-0.03	0.87	0.07
	LR	0.74	0.32	0.51	1.10	0.68	0.52	-0.06	-0.21	-1.94	0.12	0.47	-0.24	0.41	1.27	0.38

Source: Simulations results.

Notes: SR refers to the year 2005 and LR refers to the last year 2020. M, EX, XS and D represent, respectively, the volumes of imports, exports, production and local sales of domestic output.

CROP: Cereal Crop, COMC: Commercial Crop, LIVS: Livestock-Poultry, FORS: Forestry, RATM: Rice-Ata Milling, FOOD: Other Food, LEAT: Leather, TEXT: Textiles, GARM: Ready-made Garment, CHEM: Chemical-Fertiliser, MACH: Machinery, PETR: Petroleum, OIND: Other Industries, CNST: Construction, SERV: Services

Table 15.7: Sectoral volume changes, percentage change from BaU path (cont.)

			CROP	COMC	LIVS	FORS	RATM	FOOD	LEAT	TEXT	GARM	CHEM	MACH	PETR	OIND	CNST	SERV
Doha	Ind	SR	0.44	4.51	1.69	0.00	-0.01	1.02	-5.82	-0.10	1.04	-1.36	-1.14	-2.31	-1.01	0.05	-0.08
		LR	0.11	1.17	0.26	-0.03	0.02	0.30	-2.29	0.21	0.82	-0.36	-0.58	-0.74	-0.27	-0.05	-0.04
	KD*	SR	0.03	0.31	0.12	0.00	0.00	0.07	-0.45	-0.01	0.05	-0.10	-0.08	-0.19	-0.07	0.00	-0.01
		LR	0.12	1.14	0.28	-0.02	0.03	0.30	-2.02	0.14	0.56	-0.33	-0.48	-0.68	-0.24	-0.03	-0.03
	LQ	SR	0.24	1.85	0.74	0.06	0.06	0.47	-2.32	0.02	0.48	-0.51	-0.39	-0.90	-0.34	0.08	0.02
		LR	0.17	1.21	0.33	0.03	0.08	0.35	-2.08	0.22	0.72	-0.31	-0.47	-0.67	-0.20	0.02	0.01
	LNQ	SR	0.09	1.69	0.59	-0.10	-0.09	0.32	-2.47	-0.13	0.33	-0.66	-0.54	-1.05	-0.49	-0.07	-0.13
		LR	0.07	1.10	0.23	-0.08	-0.02	0.25	-2.18	0.11	0.61	-0.41	-0.57	-0.78	-0.30	-0.08	-0.09
Full-Lib-Row	Ind	SR	1.39	14.11	3.10	0.32	0.45	1.89	-13.52	-2.63	-1.57	-4.53	-3.47	-2.77	-1.33	0.29	-0.19
		LR	0.40	3.60	0.64	0.08	0.18	0.75	-4.97	-0.32	-0.38	-0.98	-1.44	-0.58	-0.15	0.00	-0.02
	KD	SR	0.09	0.98	0.21	0.02	0.03	0.13	-1.04	-0.17	-0.08	-0.34	-0.26	-0.22	-0.10	0.02	-0.01
		LR	0.38	3.46	0.64	0.08	0.17	0.70	-4.51	-0.37	-0.41	-1.00	-1.29	-0.62	-0.18	0.02	-0.02
	LQ	SR	0.72	5.60	1.40	0.26	0.34	0.91	-5.52	-0.90	-0.47	-1.74	-1.24	-1.03	-0.38	0.27	0.05
		LR	0.48	3.61	0.73	0.15	0.26	0.80	-4.64	-0.27	-0.31	-0.95	-1.26	-0.56	-0.09	0.10	0.04
	LNQ	SR	0.36	5.22	1.04	-0.10	-0.02	0.55	-5.86	-1.26	-0.83	-2.09	-1.60	-1.39	-0.74	-0.09	-0.31
		LR	0.26	3.38	0.51	-0.07	0.04	0.58	-4.84	-0.49	-0.53	-1.16	-1.48	-0.78	-0.31	-0.12	-0.18
Full-Lib-Own	Ind	SR	2.62	16.82	5.07	3.95	4.73	-0.95	78.04	38.84	146.12	-17.01	-11.55	-94.49	-22.52	8.14	2.83
		LR	3.35	6.35	2.25	1.89	3.72	0.88	21.82	23.31	72.43	-6.87	-9.73	-71.58	-7.18	3.49	3.48
	KD	SR	0.17	1.17	0.35	0.27	0.31	-0.07	6.02	2.45	7.51	-1.27	-0.86	-7.59	-1.62	0.55	0.19
		LR	2.24	5.05	1.66	1.34	2.66	0.29	20.77	17.44	53.24	-6.51	-7.55	-55.71	-7.05	2.79	2.38
	LQ	SR	0.71	6.06	1.67	1.01	1.47	-0.78	25.20	13.57	42.87	-7.90	-5.14	-68.90	-10.08	2.77	0.53
		LR	0.71	3.53	-0.05	-0.60	1.04	-1.49	18.54	17.36	57.52	-8.84	-10.23	-63.81	-8.97	1.02	0.58
	LNQ	SR	-1.60	3.64	-0.65	-1.30	-0.85	-3.05	22.33	10.97	39.60	-10.00	-7.31	-69.61	-12.13	0.42	-1.77
		LR	-1.54	1.22	-2.29	-2.82	-1.22	-3.69	15.89	14.74	54.00	-10.88	-12.24	-64.62	-11.00	-1.24	-1.66
Full-Lib	Ind	SR	3.93	33.47	8.65	4.15	4.98	0.62	53.32	34.91	142.41	-21.19	-14.82	-94.74	-23.60	8.29	2.46
		LR	3.81	10.31	2.97	1.99	3.92	1.68	13.78	23.01	72.34	-7.97	-11.15	-72.02	-7.32	3.51	3.46
	KD	SR	0.26	2.33	0.59	0.28	0.32	0.04	4.11	2.20	7.32	-1.58	-1.10	-7.61	-1.70	0.56	0.16
		LR	2.66	8.82	2.38	1.43	2.83	1.02	13.54	17.02	52.86	-7.58	-8.78	-55.97	-7.21	2.82	2.35
	LQ	SR	1.46	12.14	3.29	1.30	1.80	0.07	18.16	12.52	42.34	-9.63	-6.35	-69.43	-10.38	3.06	0.58
		LR	1.24	7.41	0.75	-0.43	1.31	-0.65	11.23	17.10	57.41	-9.85	-11.42	-64.15	-9.03	1.14	0.63
	LNQ	SR	-1.24	9.16	0.55	-1.40	-0.91	-2.59	15.02	9.53	38.56	-12.03	-8.83	-70.24	-12.76	0.32	-2.09
		LR	-1.27	4.76	-1.74	-2.89	-1.19	-3.11	8.48	14.21	53.52	-12.08	-13.61	-65.04	-11.28	-1.36	-1.85
Remit	Ind	SR	1.59	0.93	1.09	2.06	1.47	1.24	0.09	0.11	-2.50	0.51	0.94	-0.23	1.02	2.55	1.24
		LR	1.66	1.24	1.21	1.81	1.53	1.40	0.81	0.65	-1.27	1.07	1.38	0.65	1.32	2.14	1.57
	KD	SR	0.62	0.24	0.38	0.90	0.62	0.42	-0.15	-0.09	-1.01	-0.03	0.20	-0.47	0.22	1.05	0.41
		LR	1.22	0.81	0.86	1.47	1.15	0.99	0.36	0.28	-1.35	0.59	0.89	0.15	0.87	1.75	1.07
	LQ	SR	0.07	-0.40	-0.26	0.42	0.03	-0.18	-0.94	-0.90	-2.43	-0.70	-0.42	-1.24	-0.38	0.69	-0.17
		LR	-0.04	-0.45	-0.43	0.18	-0.13	-0.28	-0.87	-0.99	-2.72	-0.62	-0.35	-1.04	-0.38	0.47	-0.15
	LNQ	SR	0.18	-0.29	-0.15	0.53	0.14	-0.07	-0.83	-0.79	-2.32	-0.59	-0.31	-1.13	-0.27	0.80	-0.06
		LR	0.11	-0.30	-0.28	0.33	0.02	-0.12	-0.72	-0.84	-2.57	-0.47	-0.20	-0.89	-0.23	0.62	0.00

Source: Simulations results.

Notes: SR refers to the year 2005 and LR refers to the last year 2020. Ind, Kd, LQ and LNQ represent, respectively, investment demand, capital stock, skilled labour and unskilled labour.

* For capital stock the SR refers to the first year after the shock, i.e. 2006.

CROP: Cereal Crop, COMC: Commercial Crop, LIVS: Livestock-Poultry, FORS: Forestry, RATM: Rice-Ata Milling, FOOD: Other Food, LEAT: Leather, TEXT: Textiles, GARM: Ready-made Garment, CHEM: Chemical-Fertiliser, MACH: Machinery, PETR: Petroleum, OIND: Other Industries, CNST: Construction, SERV: Services

Table 15..8: Income and Welfare effects, percentage change from BaU path

			Rural					Urban			
			Marg-Landless	Small Farmer	Large Farmer	Non-Ag.	Low-Illiterate	Med-Educ.	High-Educ.	High-Educ.	
Doha	Income	SR	0.52	0.48	0.58	0.84	0.47	0.46	0.48	0.42	0.49
		LR	0.50	0.47	0.51	0.64	0.46	0.46	0.47	0.43	0.46
	CPI	SR	0.62	0.62	0.61	0.60	0.60	0.59	0.57	0.54	0.52
		LR	0.54	0.54	0.53	0.53	0.53	0.52	0.51	0.50	0.49
	Real Consumption	SR	-0.10	-0.14	-0.04	0.26	-0.13	-0.13	-0.09	-0.12	-0.03
		LR	-0.04	-0.07	-0.02	0.12	-0.07	-0.06	-0.05	-0.07	-0.03
	Welfare (EV)	SR	-0.10	-0.14	-0.03	0.15	-0.11	-0.12	-0.08	-0.09	-0.01
		LR	-0.04	-0.06	-0.02	0.07	-0.06	-0.06	-0.04	-0.06	-0.01
Full-Lib-Row	Income	SR	1.01	0.89	1.18	1.94	0.88	0.83	0.89	0.74	0.93
		LR	0.81	0.74	0.88	1.25	0.73	0.71	0.73	0.64	0.74
	CPI	SR	1.25	1.24	1.23	1.19	1.19	1.17	1.11	1.04	1.01
		LR	0.90	0.89	0.89	0.87	0.87	0.86	0.84	0.81	0.79
	Real Consumption	SR	-0.24	-0.35	-0.05	0.80	-0.31	-0.34	-0.22	-0.31	-0.08
		LR	-0.08	-0.15	-0.01	0.41	-0.14	-0.15	-0.11	-0.17	-0.06
	Welfare (EV)	SR	-0.24	-0.34	-0.04	0.46	-0.28	-0.32	-0.20	-0.24	-0.03
		LR	-0.08	-0.15	-0.01	0.23	-0.13	-0.14	-0.10	-0.13	-0.02
Full-Lib-Own	Income	SR	-9.38	-9.62	-9.76	-9.64	-9.91	-9.57	-9.76	-10.32	-10.15
		LR	-5.23	-5.77	-6.13	-6.72	-6.06	-5.58	-6.04	-6.73	-6.77
	CPI	SR	-9.16	-9.11	-9.12	-9.10	-9.30	-9.49	-9.58	-9.69	-9.88
		LR	-6.92	-6.87	-6.88	-6.86	-7.02	-7.13	-7.19	-7.24	-7.34
	Real Consumption	SR	-0.23	-0.55	-0.70	-0.57	-0.67	-0.09	-0.20	-0.71	-0.31
		LR	1.83	1.20	0.82	0.21	1.08	1.69	1.25	0.58	0.66
	Welfare (EV)	SR	-0.22	-0.52	-0.59	-0.32	-0.59	-0.07	-0.17	-0.53	-0.11
		LR	1.83	1.15	0.71	0.13	0.98	1.60	1.13	0.46	0.26
Full-Lib	Income	SR	-8.45	-8.81	-8.67	-7.80	-9.11	-8.82	-8.95	-9.66	-9.30
		LR	-4.48	-5.10	-5.32	-5.54	-5.40	-4.93	-5.38	-6.16	-6.11
	CPI	SR	-8.01	-7.96	-7.99	-8.00	-8.21	-8.42	-8.56	-8.74	-8.96
		LR	-6.11	-6.05	-6.07	-6.07	-6.23	-6.35	-6.43	-6.51	-6.63
	Real Consumption	SR	-0.48	-0.92	-0.73	0.31	-0.99	-0.44	-0.43	-1.03	-0.38
		LR	1.75	1.04	0.82	0.65	0.93	1.54	1.14	0.40	0.60
	Welfare (EV)	SR	-0.46	-0.87	-0.62	0.18	-0.88	-0.40	-0.37	-0.78	-0.14
		LR	1.75	1.00	0.71	0.37	0.85	1.46	1.03	0.32	0.23
Remit	Income	SR	0.95	0.94	0.99	0.77	0.96	0.86	0.86	0.70	0.71
		LR	1.20	1.14	1.17	0.86	1.17	1.08	1.04	0.86	0.84
	CPI	SR	0.41	0.41	0.42	0.42	0.42	0.42	0.43	0.44	0.44
		LR	0.30	0.30	0.30	0.31	0.31	0.32	0.33	0.34	0.35
	Real Consumption	SR	0.54	0.53	0.58	0.36	0.56	0.44	0.43	0.26	0.28
		LR	0.91	0.84	0.88	0.58	0.89	0.77	0.72	0.53	0.51
	Welfare (EV)	SR	0.54	0.51	0.50	0.21	0.50	0.41	0.39	0.20	0.10
		LR	0.90	0.81	0.75	0.33	0.79	0.72	0.64	0.41	0.19

Source: Simulations results.

Notes: SR: 2005; LR: 2020. Marg: Marginal; Non-Ag: Non-agriculture; Educ.: Education; Med.: Medium

Table 15.9: BaU Poverty level

		Rural					Urban					All	
		Landless	Marg. Farmer	Small Farmer	Large Farmer	Non-Ag.	Rural	Illiterate	Low-Educ.	Med-Educ.	High-Educ.		
Proportion (percent)		17.08	7.44	16.12	8.15	30.86	79.65	7.79	6.88	4.66	1.01	20.34	100
Headcount	2000	73.6	64.2	47.9	23.0	45.5	51.5	70.7	30.5	7.7	0.0	39.1	49.0
	2005	69.3	55.3	41.8	18.2	41.1	46.3	65.5	26.6	6.0	0.0	35.5	44.1
	2020	39.8	28.6	15.8	6.0	19.0	22.4	38.7	11.3	1.4	0.0	19.0	21.7
Poverty Gap	2000	23.0	17.2	11.3	4.8	12.3	14.1	22.3	7.5	1.5	0.0	11.4	13.6
	2005	19.9	14.4	9.0	3.8	10.3	11.8	19.4	6.1	1.2	0.0	9.8	11.4
	2020	8.1	4.9	2.6	0.7	3.5	4.2	8.5	1.7	0.4	0.0	3.9	4.1
Squared Poverty Gap	2000	9.2	6.3	3.7	1.4	4.5	5.2	9.3	2.5	0.5	0.0	4.5	5.1
	2005	7.5	5.0	2.9	1.0	3.6	4.2	7.7	1.9	0.4	0.0	3.7	4.1
	2020	2.5	1.3	0.7	0.1	1.0	1.2	2.8	0.4	0.1	0.0	1.3	1.2

Source: Household survey of 2000 and simulations results (BaU).

Notes: The BaU path takes into account the shocks of the ATC removal since 2005. Marg: Marginal; Non-Ag: Non-agriculture; Educ.: Education; Med.: Medium

Table 15.10: Poverty effects, percentage change from BaU path

		Rural					Urban				All		
		Landless	Marg. Farmer	Small Farmer	Large Farmer	Non-Ag.	Rural	Illiterate	Low-Educ.	Med-Educ.		High-Educ.	
Doha	P0 SR	0.00	0.31	0.09	-1.65	0.12	0.03	0.08	0.00	0.00	0.00	0.06	0.03
	LR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	P1 SR	0.21	0.36	0.11	-0.98	0.40	0.24	0.24	0.27	0.59	0.00	0.26	0.24
	LR	0.13	0.29	0.10	-0.93	0.30	0.18	0.16	0.24	0.23	0.00	0.18	0.18
	P2 SR	0.28	0.48	0.13	-1.40	0.50	0.31	0.30	0.35	0.59	0.00	0.32	0.31
	LR	0.15	0.33	0.10	-1.05	0.33	0.21	0.19	0.27	0.26	0.00	0.20	0.21
Full-Lib-Row	P0 SR	0.30	0.61	0.09	-3.09	0.47	0.22	0.15	0.00	0.00	0.00	0.11	0.20
	LR	0.00	0.00	0.00	0.00	0.98	0.32	0.76	0.00	0.00	0.00	0.60	0.37
	P1 SR	0.49	0.91	0.11	-2.95	0.98	0.54	0.64	0.69	1.51	0.00	0.67	0.56
	LR	0.26	0.68	0.01	-3.22	0.65	0.35	0.42	0.56	0.54	0.00	0.44	0.37
	P2 SR	0.65	1.21	0.13	-4.23	1.23	0.71	0.81	0.90	1.52	0.00	0.84	0.74
	LR	0.30	0.77	0.01	-3.60	0.72	0.41	0.48	0.62	0.61	0.00	0.50	0.43
Full-Lib-Own	P0 SR	0.21	0.77	1.83	2.95	0.91	0.92	0.00	0.00	1.43	0.00	0.06	0.78
	LR	-6.30	-3.12	-3.88	0.00	-4.56	-4.83	-4.28	-6.75	0.00	0.00	-4.71	-4.81
	P1 SR	0.43	1.25	2.17	1.74	2.31	1.47	-0.11	0.54	3.30	0.00	0.12	1.23
	LR	-7.02	-6.13	-4.45	-2.52	-4.30	-5.62	-6.06	-6.58	-1.51	0.00	-6.04	-5.70
	P2 SR	0.57	1.67	2.59	2.46	2.90	1.80	-0.14	0.71	3.36	0.00	0.09	1.48
	LR	-8.07	-6.76	-4.82	-2.83	-4.73	-6.40	-6.83	-7.47	-1.68	0.00	-6.77	-6.47
Full-Lib	P0 SR	0.59	2.98	1.83	-1.65	1.30	1.24	0.15	0.26	1.43	0.00	0.23	1.07
	LR	-6.03	-2.65	-4.50	0.00	-3.99	-4.57	-4.10	-6.37	0.00	0.00	-4.49	-4.55
	P1 SR	0.94	2.20	2.23	-1.57	3.33	2.01	0.56	1.26	4.89	0.00	0.82	1.80
	LR	-6.78	-5.45	-4.46	-5.98	-3.65	-5.29	-5.65	-6.04	-0.93	0.00	-5.61	-5.36
	P2 SR	1.24	2.94	2.67	-2.25	4.18	2.53	0.70	1.64	5.00	0.00	0.97	2.24
	LR	-7.80	-6.02	-4.83	-6.59	-4.02	-6.00	-6.38	-6.87	-1.04	0.00	-6.30	-6.06
Remit	P0 SR	-0.17	-0.76	-2.66	-1.65	-0.72	-0.94	-0.04	-0.04	0.00	0.00	-0.04	-0.79
	LR	-4.18	-2.05	-3.88	0.00	-4.37	-3.83	-3.06	-6.37	0.00	0.00	-3.68	-3.80
	P1 SR	-1.33	-1.49	-2.07	-1.38	-1.66	-1.58	-1.02	-1.44	-1.12	0.00	-1.11	-1.49
	LR	-3.44	-4.00	-4.30	-4.64	-3.80	-3.75	-2.62	-3.74	-1.52	0.00	-2.76	-3.56
	P2 SR	-1.74	-1.98	-2.46	-1.98	-2.06	-1.98	-1.28	-1.84	-1.11	0.00	-1.38	-1.87
	LR	-3.97	-4.43	-4.66	-5.15	-4.18	-4.18	-2.97	-4.28	-1.70	0.00	-3.08	-3.95

Source: Simulations results

Notes: SR: 2005; LR: 2020. Marg: Marginal; Non-Ag: Non-agriculture; Educ.: Education; Med.: Medium

P0 is the Head-count ratio (percentage of poor), P1 is the poverty gap (depth) and P2 is the squared poverty gap (severity).

Notes

1. The transitional WTO Agreement on Textiles and Clothing (ATC) replaced the Multifibre Arrangement (MFA) in 1995.
2. Abbink et al. (1995) use a sequential dynamic CGE model for Indonesia where total investment is distributed as a function of base year sectoral shares in total capital remuneration and sectoral profit rates.
3. The model is formulated as a system of non linear equations solved simultaneously as a constrained non-linear system (CNS) with GAMS/Conopt3 solver.
4. This figure is greater than 100 because of the negative stock variation in this sector.
5. All results are interpreted with respect to the base run simulation (BaU path).
6. The FGT indices allow 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 is first defined. The poverty line is the minimum income that is required to maintain a subsistence level of consumption. The first indicator, the head-count 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, measures the depth of poverty as the average distance separating the income of poor households from the poverty line. The final indicator, the squared poverty gap index, measures the severity of poverty, taking account of the inequality of income distribution among the poor.
7. Poverty analysis is performed with DAD software, which is freely distributed at:
<http://www.pep-net.org/>