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Implications of WTO Agreements and Unilateral Trade Policy Reforms for Poverty in Bangladesh:

Short versus Long-Run Impacts

by

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Abstract

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 the 2000 SAM of Bangladesh including 15 production sectors, four factors of production (skilled and unskilled labor, 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 liberalization induces an expansion of agricultural and light manufacturing sectors, favorable 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 households the biggest winners in terms of welfare and poverty reduction; **(4)** Domestic liberalization effects far outweigh those of free world trade when these scenarios are combined; and **(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 1, 2 and 3 present the issues and the methodology of this study. In Section 4 we analyze the implications for production and poverty in Bangladesh of the Doha agreement, world and domestic trade liberalization and increased remittances. Conclusions are in Section 5.

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 liberalization, the further liberalization of textile and garment trade, and freer international movement of workers. Furthermore, the Doha Round will require reforms by Bangladesh, notably in the area of trade liberalization. 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 Liberalization 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 about the implications of the removal of quotas under the Uruguay Round Agreement on Textiles and

Clothing (ATC) 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). In addition, the Doha Round is likely to reduce tariffs on textiles and clothing and reduce or eliminate subsidies on cotton production. These will also impinge heavily on Bangladesh.

1.3 Free Movement of Natural Persons

It has been argued that liberalizing the movement of natural persons, i.e. even by a small relaxation of restrictions on labor mobility would produce huge gains in terms of efficiency and poverty reduction in the world (Winters and Walmsley 2002, Rodrik 2004). However, regarding the liberalization 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 liberalization, play a major role in poverty reduction in Pakistan.

1.4 Unilateral Trade Liberalization

The standard arguments in favor of trade liberalization are that it expands the small domestic market, provides access to foreign direct investment, creates greater competition, 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 liberalization programs and associated economic reforms during the 1980s and the 1990s significantly liberalized 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 unweighted average tariff rate declined from 88.6 percent in 1991 to 22.2 percent in 1999 while the import-weighted average tariff rate declined from 42.1 percent to 14.7 percent over the same period (World Bank, 1999; WTO, 2000). It is, however, important to note the presence of a number of para-tariffs – infrastructure development surcharge, supplementary duties, regulatory duties, VAT exemptions for specified domestic products, and license fees – which can substantially increase the level of protection. For example, including these para-tariffs raised the average tariff rate from 22.2 percent to 32 percent in 1999.

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 Order (IPO) of 1997-2002 of which only 28 were trade related. In IPO 2003-06, trade-related QRs have all been abolished (barring 3 for which WTO waivers exist). In addition, there have also been moves towards a more market-determined exchange rate regime. The Taka (the domestic currency) has

been floated as of May 2003. 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 Income and Expenditure Survey (HIES) 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 optimization by economic agents. Instead, these agents have myopic behavior. 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

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(and total labor 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 available from the authors upon request.

Static Module. In each sector there is a representative firm, which earns capital income, transfers a share of profits 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 labor. The latter is also represented by a CES function of two labor categories: skilled labor and unskilled labor. Both labor 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 labor, 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 maximization 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

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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 of export demand that expresses the limited power of the local producers on the world market. In order to increase their exports, local producers will, *ceteris paribus*, have to 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 labor 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 Income and Expenditure Survey 2000 by Bangladesh

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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 and four factors of production: skilled and unskilled labor, agricultural and non-agricultural capital. An important feature of the SAM is the decomposition of households into nine groups based on location – urban and rural – and assets – land or education. In the case of rural households, 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 -- while for urban households there are four -- Illiterates (no education); Low Education (class I to class IX); Medium Education (class X to class XII); High Education (graduate and above).

Table 1 summarizes the basic structure of the 2000 Bangladesh SAM. Import duty rates ranges from as low as 1 percent (ready-made garments) to as high as 55.2 percent (petroleum). The sectoral import penetration ratio (ratio of imports to domestic demand) is highest for Ready-made Garment (44 percent), followed by Petroleum (43 percent), while the highest shares in total imports are for Machinery (32.8 percent), and 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), and 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 contributions 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).[4]

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Table 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 labor income and non-agricultural capital income each represent 35 percent of total household income, while skilled labor income and agricultural capital income come next with shares in households' income of 16.06 percent and 10.32 percent. Unskilled labor 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 most of their income from non-agricultural capital, although the latter two categories also receive a significant share of skilled labor income, whereas low education households are heavily dependent on unskilled labor 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 liberalization 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. The survey includes 7439 households of which almost 80 percent live in rural areas. 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 analyze their implications for welfare and poverty in Bangladesh. Note first that the "pre-simulation", which adjusts the 2001 base-line for liberalizations that have occurred or will occur independently of the Doha Round (the 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 combining the ATC-quota removal with domestic tariff cuts show that losses at the sectoral and household levels are reduced by the latter liberalization.

However, since the aim of this study is to isolate the effects of the Doha agreements, we embed these elements 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 liberalization with no domestic tariff cuts

- Full-Lib-Own: Full domestic trade liberalization with no ROW trade liberalization

- Full-Lib: ROW and full domestic trade liberalization

- 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.

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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.

The results of all the simulations are described in tables 3-10: Table 3 presents macroeconomic effects, 4 to 7 the sectoral results, 8 the income consequences and 10 the poverty consequences for all five.

3.1   The Doha Scenario

Overview of shocks (Table 4). The Doha simulation involves the removal of all export subsidies, plus cuts in domestic support and tariffs in the rest of the world. We have also assumed that the Doha scenario is implemented after the removal of all textile quotas in the context of the separate Multi-Fibre Agreement. 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.[5] These increases are particularly strong in the agricultural, food processing and textile/garment sectors.

Macro Effects (Table 3). At the aggregate level, real GDP is hardly affected in either the short or the long run.[6] The results indicate a small decrease in aggregate welfare measured by equivalent variations and a short-run increase in the poverty headcount, although these effects

diminish in the long run. In addition, we observe a decline in the domestic terms of trade (the ratio of export to import prices on the domestic market) 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 increases 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. Real GDP remains unchanged in the short run and increases slightly in the long run. The small positive impact in the long run is essentially due to capital accumulation. However, the current simulation affects households negatively. This apparently surprising result is due to the fact that the increased income is not sufficient to counterbalance the increase in prices under the Doha scenario. Thus, real consumption decreases and welfare change is negative.

Sectoral Effects (Tables 4-7). Simulations run with the GTAP world model show that the Doha scenario implies strong relative increases in the world prices and demand for agricultural goods, particularly for Commercial Crop and Livestock-Poultry sectors (Table 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, 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. In the industrial sectors import volumes tend to expand as import prices stagnate, leading to a decrease in local demand for competing domestic output. In both the short and long runs, rising world export prices and demand lead to export growth in the commercial crop and

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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 4). Note that, as initial import penetration ratios and export orientation ratios are generally fairly small (Table 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 5). Value added prices increase, in the short run, most strongly 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. These variations in value added prices influence the capital rental rate and labor wage rates and lead to a reallocation of resources (Table 5), such that output expands in these sectors and contracts in heavy manufacturing sectors such as leather, petroleum, chemical products, machinery and other industries (Table 6), for which the Doha shocks to world prices and demand are relatively weaker.

To understand the impacts on factor remunerations, it is important to recall that labor 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.[7] 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 3). Both skilled and unskilled labor factors move from contracting to expanding

sectors. As the expanding sectors are relatively more intensive in unskilled labor, unskilled wage rates increase more than skilled wage rates.

In the long run, resource allocation effects are similar, although the output effects, driven increasingly by the reallocation of capital investments rather than labor mobility, are much stronger (Table 6). Initial increases in capital rental rates in the expanding sectors lead to a long-term reallocation of investment from industrial to the 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 scenario benefits unskilled labor-intensive agriculture (particularly commercial crops) and light manufacturing (other food processing and textiles/ready-made garments). 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, to long-term increases in unskilled wage rates.

Welfare Effects (Table 8). In order to explore the welfare impacts of Doha as measured by equivalent variations (EV), we examine effects on household nominal incomes 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 9). Factor remunerations represent the vast majority of household income in Bangladesh (Table 2), and since the rates of remuneration of all factors increase (Table 3), nominal income increases for all household groups. The accumulation of agricultural capital, 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-

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agricultural capital and skilled labor income. The 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, cutting real consumption. 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, 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 9). In the long run real consumption and welfare changes are smaller with respect to the baseline scenario, although they follow the same pattern.[8]

Poverty Effects (Tables 9-10). 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).[9] 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.[10] 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. The first block of the table 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 in the long run. The large farmer category registers the greatest decrease in poverty, driven by their high agricultural capital income shares.

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 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 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.

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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 liberalization

Overview of shocks (Table 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 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 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 4-7). 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

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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 8). Regarding income 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 9-10). 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 similar, but stronger, effects than the Doha agreement. The agricultural and garment sector expands leading to higher returns to agricultural capital and unskilled labor 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.

These losses from world free trade may seem surprising at first sight, but are easily comprehensible in terms of Bangladesh's heavy dependence on food and textile imports. The

prices of both increases with world free trade, thus increasing both the cost of living and the price of inputs to Bangladesh's principal export industry.

3.3   Unilateral trade liberalization with no free world trade

Overview of shocks (Table 4). In this scenario, nicknamed Full-Lib Own, we focus solely on the impact of domestic trade liberalization 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 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 3). The impacts on GDP and welfare illustrate the importance of analyzing trade liberalization 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 liberalization 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 the domestic terms of trade (the ratio of export to import prices on domestic markets) 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 labor-intensive textile-garment sectors. The user cost of capital also declines both in the short and the long run.

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Sectoral Effects (Tables 4-7)**.** Tariff elimination leads to an immediate reduction in the domestic price of imports that is proportional to the initial sectoral tariff rates (Table 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 5). Greatly increased import competition for textiles is offset by increased input demand from the ready-made garment sector. In contrast,

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production contracts in the heavier manufacturing sectors for which export demand stagnates or declines. As a result, non-agricultural capital and labor 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 labor. There are also moderate capital stock increases in the agricultural and service sectors.

In the short run, nominal factor returns fall by roughly 10 percent as a result of declining domestic prices (Table 3). Overall investment falls in response to the average reduction in capital returns relative 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 fall slightly more in the non-agricultural sector (Table 3), although these rates converge after long-term adjustment in sectoral investment rates (Table 7). Returns to capital fall relative to wage rates.

Welfare Effects (Table 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 labor. 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 real consumption growth with the poorest household categories emerging as the biggest winners.

Poverty Effects (Tables 9-10). 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 liberalization leads to strong expansion of agricultural and textile/garment sectors, as a result of their lower initial tariffs (and thus smaller increases in 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 4). This simulation, Full-Lib, simply combines the shocks of the preceding two simulations involving simultaneous world and domestic free trade.

Macro Effects (Table 3). At the macro level, the effects are quite similar to those under domestic liberalization. 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 the domestic terms of trade, import and exports are reduced. Furthermore, the reductions in both the urban and rural CPIs and in both the skilled and unskilled wage rates are less than those under domestic liberalization.

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Sectoral Effects (Tables 4-7)**.** The sectoral effects also closely follow those of domestic liberalization. However, free world trade-induced changes in import/export prices and export demand in favor of agricultural sectors do introduce some changes with respect to domestic liberalization alone. In particular, free world trade accentuates the long-run expansion of agricultural sectors (particularly commercial crops), dampens the expansion of textile/garments, and reinforces the contraction of the heavy industrial sectors.

Welfare Effects (Table 8)*.* The pattern of changes in welfare largely resembles those of the domestic liberalization scenario. However, short-term welfare losses tend to be greater and long-term welfare gains smaller, with the exception of large farmers who experience welfare gains in the short- and long-terms.

Poverty Effects (Tables 9 and 10)*.* The similarity to the unilateral trade liberalization scenario also 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: Overall, this simulation illustrates the much more substantial and favorable impacts of domestic liberalization relative to free world trade. Indeed, because free world trade increases poverty for all but large farmers, it counteracts the positive effects of domestic liberalization, but only to a very limited degree. Large farmers emerge as the principal beneficiaries of global free trade.

3.5 Increase in remittances (Remit)

Overview of shocks (Table 4). This simulation takes a completely different view of trade liberalization and assumes increased international mobility of natural persons. We introduce a fifty percent increase in remittances (from 0.43 percent to 0.64 percent of GDP) 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 labor supply, namely a decrease in skilled and unskilled labor 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 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 4-7)**.** 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

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primarily on the garment sector, which provides two-thirds of Bangladeshi exports. As the construction sector employs 60 percent of workers and is very labor intensive, its expansion translates into a substantial increase in wage rates relative to capital returns.

Welfare Effects (Table 8). Rural households, with the exception of large farmers, benefit most given the higher share of remittances and wages in their total income (Table 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, 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 9 and 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 are shown to be a powerful tool to combat poverty, as poorer households are more dependent on this income source. It is probably too late for the Doha Round, but these results reinforce the view that liberalizing the mobility of labor should be a key objective for developing country negotiators in future trade talks.

4.   Conclusions

This study examines the impact of WTO agreements and unilateral 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 minor negative implications for the overall macro economy, household welfare and poverty in Bangladesh, as the 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 labor. 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 important, 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 beneficiaries of the Doha agreement appear to be rural large farmers who capitalize 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 to the Doha agreement, although the effects are much stronger. In particular, overall poverty increases by nearly 1 percent in the short term and 0.5 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 liberalization 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, once 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. Unilateral liberalization 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.

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Figure 1: Aggregate welfare effects
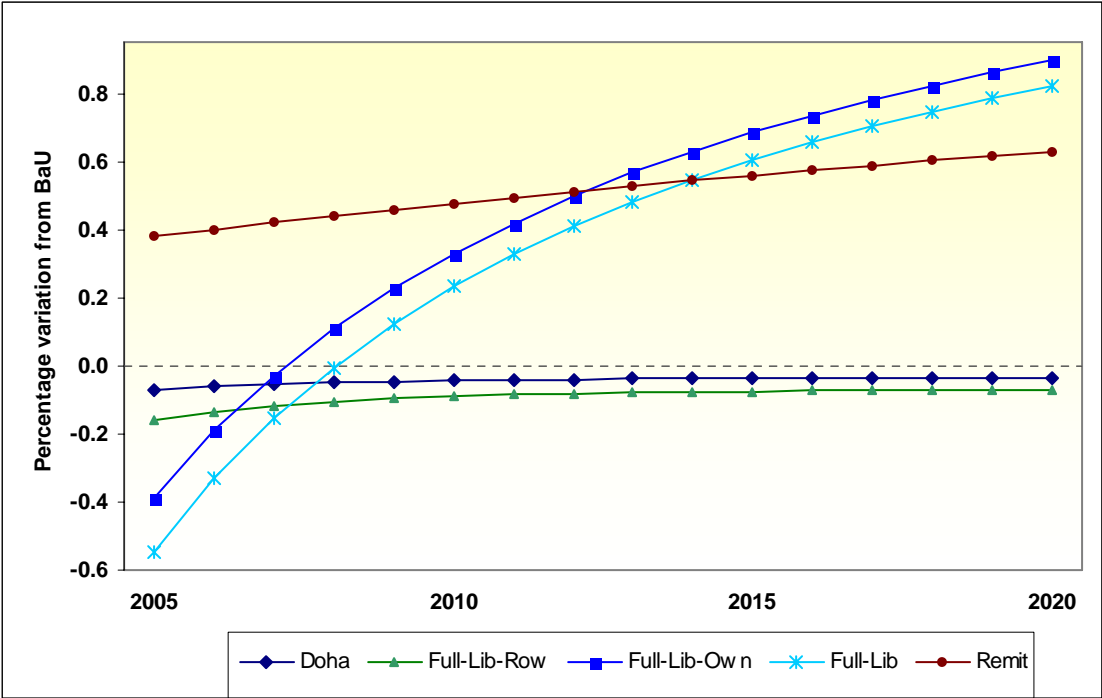
Table 1: Base run statistics

	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 2: Household income composition

	Skilled labour	Unskilled labour	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 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 4: Sectoral trade and consumer price effects and export demand shocks

(percentage change from BaU path)

Scenario	Measure		CROP	COMC	LIVS	FORS	RATM	FOOD	LEAT	TEXT	GARM	CHEM	MACH	PETR	OIND	CNST	SERV
Doha	Import price		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
	World export demand			6.5	0.92			-4.04	-5.16	0.27	1.66	-0.77	-0.71	0.27	0.54		0.06
	World export price			0.73	0.14			0.23	0.13	0.42	0.38	0.00	-0.01	0.04	-0.03		-0.03
	FOB export price	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
	Domestic good price	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
	Consumer price	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	Import price		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
	World export demand			43.91	5.06			-8.94	-13.48	-1.57	0.79	1.88	0.45	1.63	15.78		2.16
	World export price			2.03	0.43			0.36	0.20	0.74	0.58	-0.29	-0.26	0.08	-0.21		-0.22
	FOB export price	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
	Domestic good price	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
	Consumer price	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	Import price		-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
	World export demand		0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	World export price			0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	FOB export price	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
	Domestic good price	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
	Consumer price	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	Import price		-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
	World export demand			43.91	5.06			-8.94	-13.48	-1.57	0.79	1.88	0.45	1.63	15.78		2.16
	World export price			2.03	0.43			0.36	0.20	0.74	0.58	-0.29	-0.26	0.08	-0.21		-0.22
	FOB export price	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
	Domestic good price	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
	Consumer price	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	Import price		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
	World export demand		0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	World export price			0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	FOB export price	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
	Domestic good price	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
	Consumer price	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.

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 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	Producer price	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
	Value added price	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
	Rate of return to capital	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
	Wage rate	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	Producer price	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
	Value added price	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
	Rate of return to capital	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
	Wage rate	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	Producer price	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
	Value added price	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
	Rate of return to capital	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
	Wage rate	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	Producer price	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
	Value added price	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
	Rate of return to capital	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
	Wage rate	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	Producer price	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
	Value added price	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
	Rate of return to capital	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
	Wage rate	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.

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 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	Imports	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
	Exports	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
	Sales of domestic good	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
	Production	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	Imports	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
	Exports	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
	Sales of domestic good	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
	Production	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	Imports	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
	Exports	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
	Sales of domestic good	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
	Production	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	Imports	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
	Exports	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
	Sales of domestic good	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
	Production	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	Imports	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
	Exports	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
	Sales of domestic good	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
	Production	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.

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 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	Investment*	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
	Capital stock**	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
	Skilled labour	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
	Unskilled labour	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	Investment	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
	Capital stock	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
	Skilled labour	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
	Unskilled labour	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	Investment	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
	Capital stock	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
	Skilled labour	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
	Unskilled labour	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	Investment	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
	Capital stock	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
	Skilled labour	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
	Unskilled labour	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	Investment	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
	Capital stock	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
	Skilled labour	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
	Unskilled labour	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.
* refers to investment by sector of destination.
** 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 8: Income and Welfare effects, percentage change from BaU path

			Rural					Urban			
			Landless	Marg. Farmer	Small Farmer	Large Farmer	Non-Ag.	Illiterate	Low-Educ.	Med-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 9: BaU Poverty level

| | | Rural | | | | | | | Urban | | | | |
		Landless	Marg. Farmer	Small Farmer	Large Farmer	Non-Ag.	Rural	Illiterate	Low-Educ.	Med-Educ	High-Educ	Urban	All
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 10: Poverty effects, percentage change from BaU path

| | | | Rural | | | | | | Urban | | | | | |
		Landless	Marg. Farmer	Small Farmer	Large Farmer	Non-Ag.	**Rural**	Illiterate	Low-Educ.	Med-Educ.	High-Educ.	**Urban**	**All**
	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**
Doha	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**
	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**
Full-Lib-Row	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**
	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**
Full-Lib-Own	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**
	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**
Full-Lib	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**
	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**
Remit	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. These price changes are reported relative to the numeraire of constant world factor prices. In general equilibrium analysis, only relative price changes matter, the 'average' price level effects being absorbed by the exchange rate.

6. All results are interpreted with respect to the base run simulation (BaU path).

7. The nested production structure is as follows. At the first stage value added is represented by a CES function of capital and a composite labour. The latter is also represented by a CES function of skilled and unskilled. Labour differentiated by skills is fully mobile across sectors leading to a uniform wage rates. But the composite is sector specific and reflects the sectoral labour force composition. For the latter there is no sectoral equalization of wages. Table 15.5 reports the results for this composite labour factor.

8. These results are consistent with Ravallion's (1990) analysis of rural Bangladesh which showed how rice price rises translate only slowly into wage increases.

9. 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 indictor, the squared poverty gap index, measures the severity of poverty, taking account of the inequality of income distribution among the poor.

10. Poverty analysis is performed with DAD software, which is freely distributed at: http://www.pep-net.org/