Impact of Trade Liberalization on Import and Export Expansion in the Economy of Bangladesh: A computable general equilibrium (CGE)Analysis

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Abstract

This paper describes the impact of trade liberalization on the import volume andexport growth of Bangladesh using the computable general equilibrium model. Paper scrutinizes the process of trade liberalization in Bangladesh and its impact on the growth and structure of exports, imports, output and other related macroeconomic variables with particular emphasis on exports and import. It also finds the positive impact of import which increase the welfare of Bangladesh, simulation result suggest that under the complete abolition of the tariff rate, the export of all sectors increase significantly. Output of agriculture and manufacturing has been increased and output of finance, service and mineral decreased. However, the social welfare and utility consumptions have also increased significantly after abolition of tariff rate.This work uses the social accounting matrix or SAM database and Standard CGE model. It concludes with the recommended policy measures which might be catalyst topromote total welfare of the country.

Keywords: Trade Liberalization, import growth, Export Expansion, CGE model, Bangladesh, SAM.

Introduction

Trade liberalization is one of the important means to ensure economic growth and development through the proper allocation of resources; competition in broader sense; rapid flow of knowledge and investment, which will finally make sure the capital accumulation and technical improvement. The volume of export will be reduced if there is obstacle to trade exists. On the other hand controlling import subtracts efficiency significantly although balance of payment is protected by them (Thirlwall, A. P., Santos, P. & Amelia, 2004).

However, Bangladesh has been liberalizing its trade regime extensively since 1992 in order to achieve higher trade performance and GDP growth. However, despite the long period of liberalization, imports are still growing faster than exports, increasing the trade deficit. Though country have been experiencing surplus in terms of balance of pay since last couple of years (Bangladesh Bank, 2015).In addition, Liberalization interaction with price decreases imports slightly hence improves the trade balance, while interaction with income increases imports slightly hence worsens the trade balance (Yusop&Hoque, 2009). It is now widely held that Bangladesh has

successfully completed the first phase of import liberalization by eliminating the quantitative restrictions and the higher implicit tariffs (Hossain &Alauddin, 2005). But Keynesian economists believe that reduction of import duties under an import liberalization policy (easy fiscal) contributes to an excess of imports over exports hence a foreign trade deficit (Froyen, 1996).

Despite the abundance of studies in this area, but empirical studies based on the impact of liberal trade policies on economic structure like import and export of Bangladesh are quite limited. However, previous research works are mainly focused on economic growth, liberalization and impact on agriculture, poverty and so on. The purpose of this study is to establish a relationship between the impacts of liberal trade policy and its impact on import and export volume of Bangladesh using Computable general equilibrium (CGE) model in order to answer the question: is there any impact of liberal trade policy on import and export in Bangladesh.

To investigate the impacts of these policies, a CGE model is developed and observed the trade policy simulations for Bangladesh using the social accounting matrix (SAM) obtained from Global Trade Analysis Project (GTAP) database. A SAM is square matrices with the same number of rows and columns in which rows and columns correspond to the income (seller receipts) and expenditure (buyers) respectively of each of the agents of the economy. It is the circular flow of income, between firms and households, complicated by the presence of government and foreigners. The design of SAMs respects the difference between goods and factors. But SAM not a model rather it is a database. Many models can be fitted to the same database with very different inherent analysis and policy implications. It is useful for policy analysts and researchers embarking on more complex SAM-based methodologies. One such methodology is CGE modeling. Here we will construct an aggregate "macro" SAM for Bangladesh using data from the GTAP 8 database.

Moreover, in this research we observed three scenarios firstly, after the abolition of import tariff rates, secondly, 10 % import tariff and thirdly 15% import tariff rates were observed and found that liberal trade policy of import tariff cut leads to an increase in the household welfare. This section is followed by section 2, which presents the methodology and simulation scenario. Section 3 discusses the distributional impact of policy simulation result. Section 4 explains the robustness of the simulation result. Section 5 presents the conclusion of the simulation results.

Background study:

The economy of Bangladesh has undergone distinctive shifts in trade, fiscal, industrial, and financial policies over the last two decades. To date back, the 1970s was characterized by a highly regulated financial system, a narrow-base fiscal regime, an inward-looking trade and industrial policy and an overvalued exchange rate regime despite the fact that the domestic currency was depreciated by 75 per cent in 1975. The outcome was not a satisfactory macroeconomic scenario in terms of growth of Gross Domestic Product (GDP) and manufacturing output, foreign debts, fiscal and current account deficits, and the stability of the general price level (Salim, 1999). Bangladesh, in effect, launched strategies leading to a greater market- and export-orientation by initiating the structural adjustment programs in different spheres of the economy at the behest of the World Bank and the International Monetary Fund (IMF) in 1982. While the changes in the fiscal, financial, and industrial policies constitute the building blocks of a market-oriented economy, the trade policy shifts have provided the nucleus for a liberalized economic regime. Indeed, since the beginning of the 1990s, there has been a turn-around in the macroeconomic picture as the economy

witnessed a record-low rate of inflation, significant accumulation of foreign reserves and a better resource position of the government. Some view this as an evidence of successful stabilization while others interpret them as symptoms of stagnation and a low level of economic activity (Mahmud, 1995 mentioned in Hossain, M. A. &Alauddin, M., 2005). Moreover, the overall macro scenario in 2014-2015 of the country is worth satisfactory in terms of its GDP growth, stable inflation rate since couple of years, unemployment rate as well as surplus in balance of payments. Therefore it is worth to find a relationship between liberalization of trade and trade balance.

Bangladesh in economic reform mode: Policy changes

Bangladesh took a gradualist approach to the consolidation of her economic policy regime. The promulgation of the New Industrial Policy (NIP) in 1982 marked the beginning of Bangladesh's transition to a liberalized regime. The NIP provisions were further streamlined by the Revised Industrial Policy (RIP) of 1985-86 followed by a third round of reforms in 1991. One can, however, identify two discernible phases: pre-liberalization era (1972-1982) and post-liberalization era (1982 onwards) of which 1983 through 1991 can be described as the transition period (Hossain, &Alauddin, 2005). The first two phases of the trade policy reforms coincided with the two industrial policy packages, NIP and RIP. The third and final phase, regarded as the most intensive and pro-active phase of trade liberalization, was taken up in 1991-92. All three basic elements of the trade policy regime namely, the export policy, the import policy, and the exchange rate policy have been subjected to thorough reshuffles.

Export Policy Changes

Although, export-promoting incentives have been in place since the late 1970s, a structured and concerted effort has been underway only since 1986. Major policy interventions include:
- ➢ reduction in tariff levels across the board;
- ➢ provision for duty-free access to imported inputs, and duty drawbacks on inputs;
- ➢ provision for financial assistance mainly to non-traditional exports through the Export Performance Benefit Scheme (XPB);
- ➢ tax rebates on export income and concessionary duties on imported capital;
- ➢ elimination of dual exchange rates and convertibility of taka on current account;

Thus, the domain of the export assistance spread to value added, intermediate inputs as well as gross output. Until 1986, the XPB coverage was mostly limited to non-tradition all exports especially the readymade garments (RMG). In 1986, the XPB coverage was extended to include all exports excepting raw jute and unprocessed leather, and in 1987, the scope was further extended to accord incentives to indirect exports with a view to promoting backward linkages. Bayes et al. (1995) show that most of these incentives had positive impacts on various categories of assistance. Rab (1989), claims that these incentives also helped reduce the anti-export bias during the 1980s. However, as Salim (1999) points out, with the narrowing down of the official and the Wage Earners Scheme (WES) exchange rates, the benefits from the XPBs over time disappeared. The two rates were finally unified in 1992. An econometric investigation based on the ARDL and the ARDL integration techniques indicate that trade liberalization has had a positive impact on the growth of exports (Hossain&Alauddin, 2005). As a consequence, perhaps, real GDP registered a steady growth during the post-liberalization period, particularly during the 1990s. In the process of transition, the structure of exports and GDP also changed, the former being in favor of non-traditional exports and latter in favor of services and to an extent, industrial output.

Apart from concessionary duties and rebates on income taxes, the fiscal incentives include accelerated depreciation allowances and excise tax refunds on domestic raw materials and inputs. The Industrial Policy of 1991 allows proportional income tax rebates of at least 30% on export earnings. The Export Processing Zone (EPZ) industries enjoy a wide range of other incentives such as the total exemption of income taxes for the first ten years, a three-year tax exemption on the salaries of foreign recruits, interest on foreign loans, royalties and other fees and profits on account of transfer of shares by the foreign companies (Hossain, M. A. &Alauddin, M., 2005). Fig 1 shows growth trend of export in Bangladesh both pre-liberalization era and post-liberalization era.

Fig 1: Export growth in Bangladesh
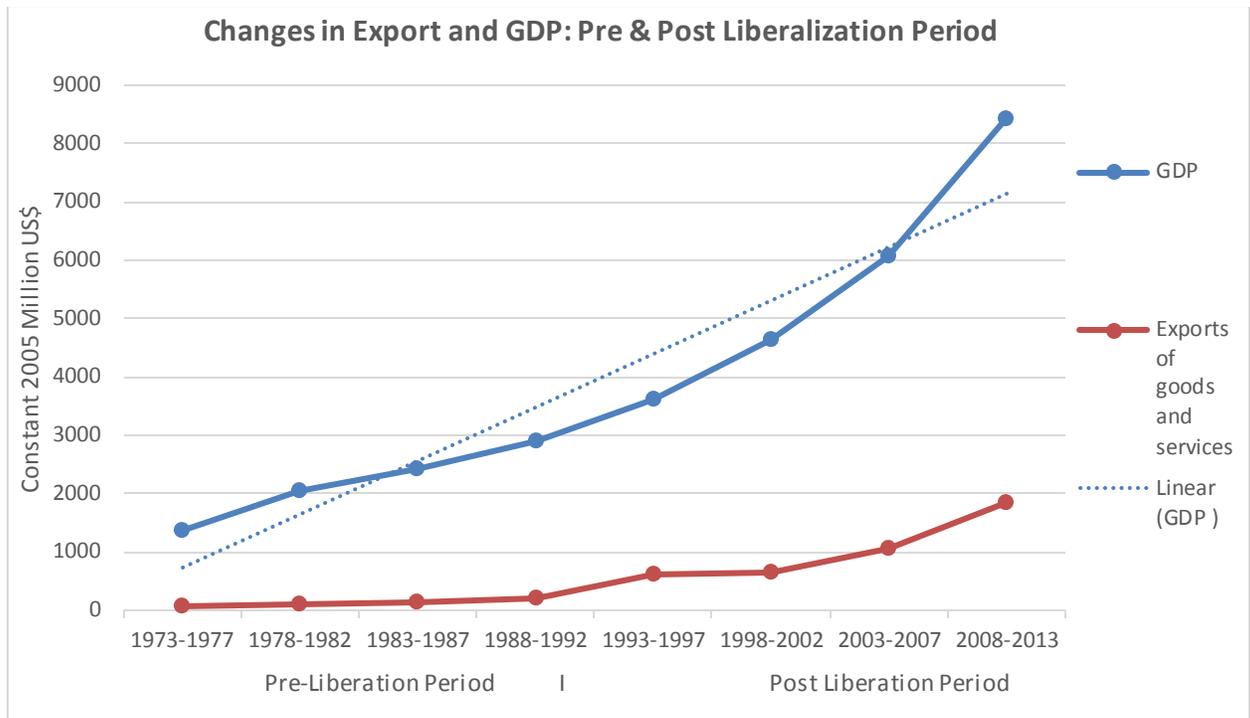
(Source:WDI, 2014)

Import growth in Bangladesh

Abolishing quantitative restrictions as well as implicit tariffs were the two most important tools to liberalize import growth in Bangladesh. Government has taken major reform initiatives in order for liberalizing its import regime.

- ✓ Trade procedure simplification
- ✓ Tariff rates reduction as well as reduction of range of protection among products
- ✓ Tariff level reduction and so on

In 1986 government introduced letter of credit system in alternate of import licensing for making the import process as simple as possible. They also decide that positive list of product need not to have license for importing goods on the other hand negative list of good require official approval. Within 1994, only 109 items were subject to any restriction and only 40 of them were due to trade reasons (Yilmaz and Varma, 1994).

Moreover, National Board of Revenue shows that In 1980s, customs duty rates for raw materials were 0-20%, for intermediate goods 50%, for consumer goods 100%, for luxury goods between 150 to 200 %. But in 1995 the rate became only 15% for raw materials, 7.5% for machinery goods, 45% for final goods, 3o % for intermediate products. So these are chronological improvement in terms of import liberalization in Bangladesh (Hossain, &Alauddin, 2005).

These are the important reason for increasing the amount of import in Bangladesh. We can see form the figure-2 the volume of import has been increased due to liberalizing the import policy in the country.

Table 1: *Changes in GDP and Import after Liberalization*

Economic Indicators (In million US$)	Pre Liberalization Period			Post Liberalization Period			
	1976-80	**1981-85**	**1986-90**	**1991-95**	**1996-00**	**2001-05**	**2006-10**
GDP per capita	154.2	196.8	230	271.8	324	354.6	504
GDP at constant price	19,164	22,789	27,321	33472	42,515	55,054	71,837
Total Import	2,191	3,321	3,845	4,783	8,166	10,383	17,435

(Source: WDI, 2014)

Figure 2. Import growth in Bangladesh
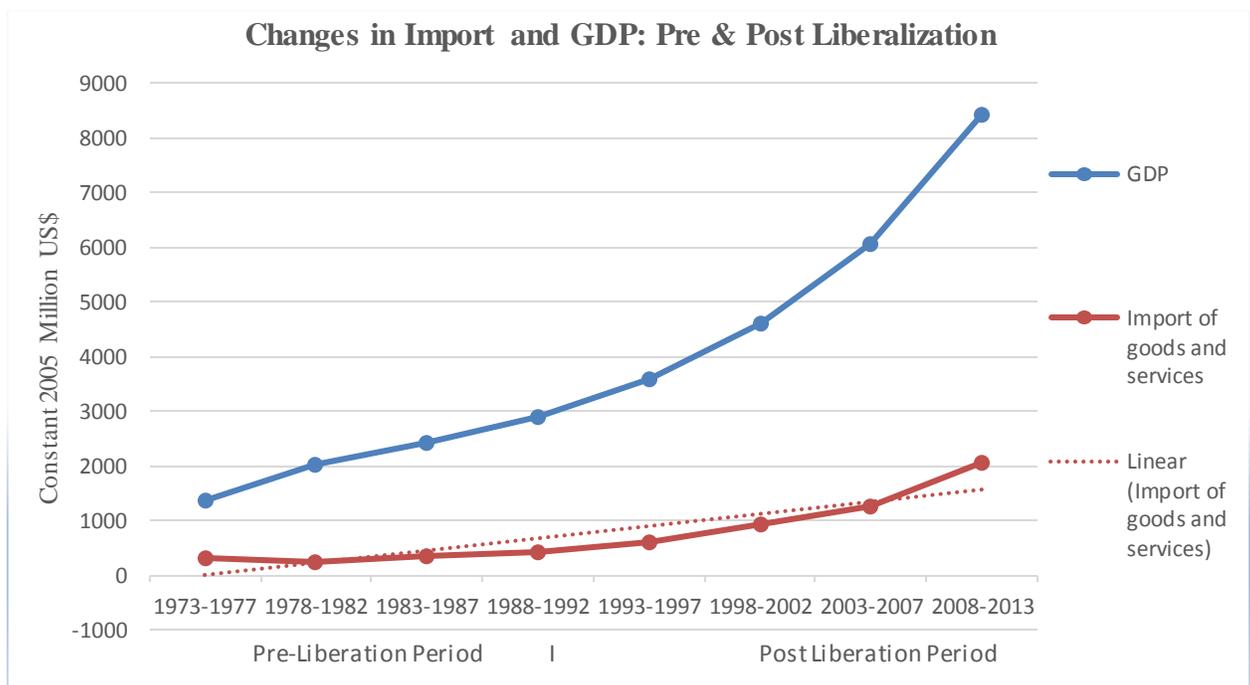
(Source: WDI, 2014)

Volume of Export and Import in Bangladesh

The volume of import and export has increased after the trade liberalization in Bangladesh. In the following figure shows that both the import and export are going simultaneously upward since

Fig 3: Volume of Export and Import in Bangladesh

Volume of Export and Import in Bangladesh
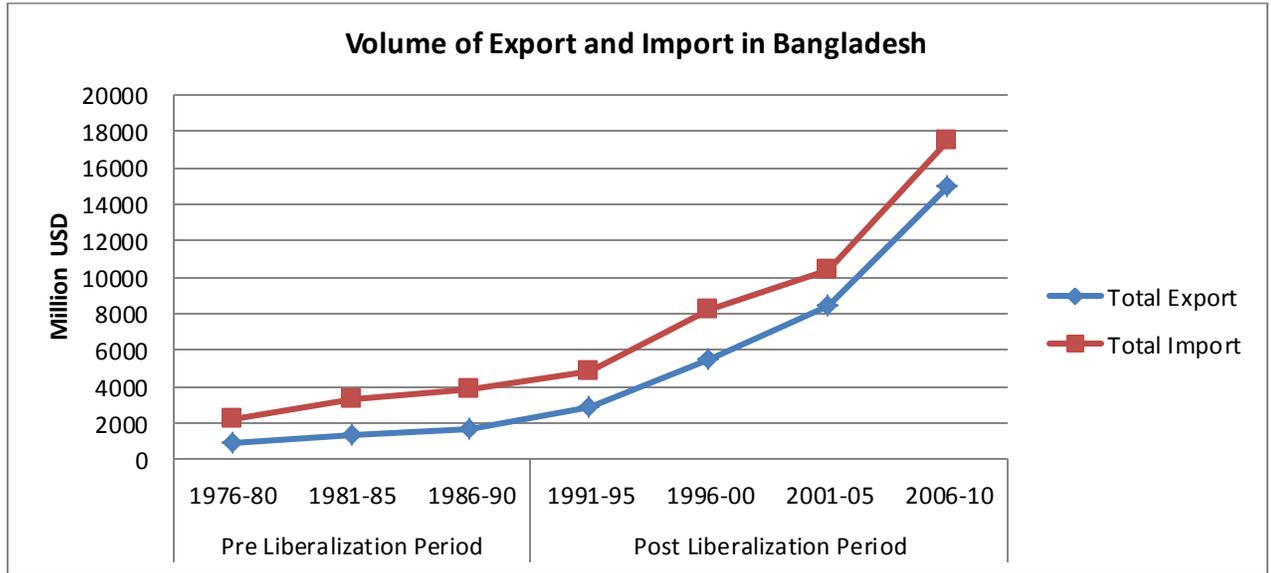
1991. But volume of import is more than the amount of export. So liberalization policy is creating a negative impact on the trade balance of Bangladesh.

Section 2: Model and Simulation Scenario

The CGE model consist of 279 single equation and equal number of endogenous single variable that divided into prices, sectors of production, factors of production and utility function. CGE model is used to assess the impact of economic shocks that reverberate across sectors and representing cumulative shocks across country. CGE model is calibrated to a Social Accounting Matrix (SAM) obtained from GTAB 8 data base after integrating 57 sectors into 11 sectors, which is consistent, complete and disaggregated data system.

This model consists of 11 goods and 4 factors of production with the assumption that all factors (land, unskilled labor, skilled labor and capital) available are completely used by 11 sectors. Hicksian Equivalent Variation (EV) is computed which measures the changes in the utility level in monetary term of the total households of Bangladesh in 2008. All other 146 member countries of WTO are considered as rest of the world and assuming that import tariff rate of these countries are set according to WTO norms and other guidelines.

The following systems of simultaneous equations of different blocks for the standard CGE model (Hosoe, Gasawa, & Hashimoto, 2010) were solved using GAMS and optimal as well as equilibrium solutions were analyzed.

Domestic Production Block:

$$Y_j = b_j \prod_h F_{h,j}^{\beta h,j} \ \forall j \ \text{------------------ (1)}$$

$$F_{h,j} = \frac{\beta h,j \, Pj^y}{P_h^f} Y_j \quad \forall h,j \ \text{-------------- (2)}$$

$$X_{i,j} = ax_{i,j} Z_j \forall i,j \ \text{---------------- (3)}$$

$$Y_j = ay_i Z_j \forall j \quad \text{----------------------(4)}$$

$$p_j^z = ay_j p_j^y + \sum_i ax_{i,j} p_i^q \forall j \quad \text{-------(5)}$$

Government Block:

$$T^d = \tau^d + \sum_h P_h^f FF_h \quad \text{-------------------------------- (6)}$$

$$T_j^z = \tau_j^z \, p_j^z Z_j \forall j \quad \text{----------------------------------(7)}$$

$$T_i^m = \tau_i^m p_i^m M_i \forall i \quad \text{------------------------------------- (8)}$$

$$X_i^g = \frac{\mu i}{P_i^q}\left(T^d + \sum_j T_j^z + \sum_j T_j^m - S^g \right) \quad \forall j \quad \text{--------(9)}$$

Investment and Saving Block:

$$X_i^v = \frac{\lambda i}{P_i^q}\left(S^p + S^g + \in S^f \forall i \right. \quad \text{-------------------------------- (10)}$$

$$S^p = ss^p\left(\sum_h P_h^f FF_h \right) \quad \text{-- (11)}$$

$$S^g = ss^g\left(T^d + \sum_j T_j^z + \sum_j T_j^m \right) \quad \text{-----------------------------(12)}$$

Household Block:

$$X_i^p = \frac{\propto i}{P_i^q}\left(\sum_h P_h^f FF_h \right) - S^p - T^d \right) \quad \forall i \quad \text{------------------------------ (13)}$$

Export and Import Prices and Balance of Payments (BOP) Block:

$$P_i^e = \in P_i^{We} \forall i \quad \text{------------------------------ (14)}$$

$$P_i^m = \in P_i^{Wm} \forall i \quad \text{------------------------------ (15)}$$

$$\sum_j P_i^{We} E_i + S^f = \sum_j P_i^{Wm} M_i \quad \text{----------(16)}$$

Armington Composite (Substitution between imports and domestic goods) Block:

$$Q_i = \gamma_i \left(\delta m i \, M_i^{\eta i} + \delta d i \, D_i^{\eta i} \right)^{\frac{1}{\eta i}} \forall i \quad \text{------------------------------ (17)}$$

$$M_i = \left[\frac{\gamma_i^{\eta i} \delta m i \, p_i^q}{(1+\tau_i^m)\, p_i^m} \right]^{\frac{1}{1-\eta i}} Q_i \quad \forall i \quad \text{------------------------------ (18)}$$

$$D_i = \left[\frac{\gamma_i^{\eta i} \delta d i \, p_i^q}{p_i^d} \right]^{\frac{1}{1-\eta i}} Q_i \quad \forall i \quad \text{------------------------------ (19)}$$

Transformation between exports and domestic goods block:

$$Z_i = \theta_i \left(\xi e i \, E_i^{\phi i} + \xi d i \, D_i^{\phi i} \right)^{\frac{1}{\phi i}} \forall i \quad \text{------------------------------ (20)}$$

$$E_i = \left[\frac{\theta_i^{\phi i} \xi e i \,(1+\tau_i^z p_i^z)}{p_i^e} \right]^{\frac{1}{1-\phi i}} Z_i \quad \forall i \quad \text{------------------------------ (21)}$$

$$D_i = \left[\frac{\theta_i^{\phi i} \xi d i \,(1+\tau_i^z p_i^z)}{p_i^d} \right]^{\frac{1}{1-\phi i}} Z_i \quad \forall i \quad \text{------------------------------ (22)}$$

Market Clearing Conditions:

$$Q_i = X_i^p + X_i^g + X_i^v + \sum_j X_{i,j} \forall i \quad \text{------------------------------ (23)}$$

$$\sum_j F_{h,j} = FF_h \forall h \quad \text{------------------------------ (24)}$$

The endogenous variables in this model are: $Y_j, F_{h,j}, X_{i,j} Z_j, X_i^p, X_i^g, X_i^v, E_i, M_i, Q_i, D_i, P_h^f, P_j^y P_j^z, P_i^q, P_i^e, P_i^m, P_i^d, \varepsilon, S^p, S^g, T^d, T_j^z$ and T_i^m

The exogenous variables are: $FF_h, S^f, P_i^{We}, P_i^{Wm}, \tau^d, \tau_j^z, \tau_i^m$

Where, Y_j = Composite factor produced.

$F_{h,j}$ = The h-th factor used by the j-th firm,

$X_{i,j}$ = Intermediate input of the i-th good used by j-th firm,

Z_j = Gross domestic output of the i-th good used by the j-th firm,

$X_i{}^p$ = Household consumption of the i-th good,

$X_i{}^g$ = Government consumption of the i-th good,

$X_i{}^v$ = demand for the i-th investment good,

E_i = Exports of the i-th good,

M_i = Imports of the i-th good,

Q_i = The i-th Armington composite good,

D_i = The i-th domestic good,

$P_h{}^f$ = Price of the h-th factor,

$P_j{}^y$ = Price of the j-th composite factor

$P_j{}^Z$ = Price of the j-th gross domestic output.

$P_i{}^q$ = Price of the i-th composite good.

$P_i{}^e$ = Export price in terms of domestic currency,

$P_i{}^m$ = Import price in terms of domestic currency,

$P_i{}^d$ = Price of the i-th domestic good,

ε = Foreign exchange rate(domestic currency/ foreign currency)

S^p = Household saving,

S^g = Government saving

T^d = Direct tax,

$T_j{}^z$ = Production tax on the j-th good,

$T_i{}^m$ = Import tariff on the i-th good,

FF_h = Endowments of the h-th factor for the household,

S^f = Foreign saving,

$P_i{}^{We}$ = Export price in terms of foreign currency,

$P_i{}^{Wm}$ = Import price in terms of domestic currency,

τ^d = Direct tax rate,

$\tau_j{}^z$ = Production tax rate on the j-th good,

$\tau_i{}^m$ = Import tariff rate on the i-th good,

$\propto_I$ = Share parameter of the utility function,

$\beta_{h,j}$ = Share coefficient in the composite factor production function,

b_j = scaling coefficient in the composite in the composite factor production function,

$ax_{i,j}$ = input requirement coefficient of the i-th intermediate input for a unit output of the j-th good,

a_{yj} = input requirement coefficient fo the j-th composite good for a unit output of the j-th good,

λi = Expenditure share of the i-th good in total investment ($\sum \lambda i = 1$),

μi = Share of i-th good in government expenditure ($\sum \mu i = 1$),

γi = Scaling coefficient in the Armington composite good production function,

σi = Elasticity of substitution in the Armington composite good production function,

ηi = Parameter defined by the elasticity of substitution, $(\eta i = (\sigma i - 1)/ \sigma i), (\eta i \geq 1)$,

θi = Scaling coefficient of the i-th transformation,

$\xi ei, \xi di$ = Share coefficient of the i-th good transformation, $(\xi ei + \xi di) = 1$,

ψi = Elasticity of transformation of the i-th good transformation,

ϕi = Parameter defined by the elasticity of transformation $(\phi i = (\psi i + 1)/ \psi i, \psi i \geq 1$,

Section 3: Distributional Impact of Policy Simulation

The SAM entries obtained from GTAP 8 database for Bangladesh on the macroeconomic situation of 2013. The SAM table indicates that the base run import tariff rates are 6.3% for AGR,

14.3% for MIN, and 11.7% for MNF even after the implementation of liberal trade policies. Hence, the impacts of liberal trade policies are analyzed using two counterfactual equilibrium solutions obtained by imposing import tariff abolition scenario, and by imposing 10% and 15% flat tariff rate for all sectors.

The simulation is carried out in four scenarios:

1. With the abolition of import and export tariff rate;
2. By imposing 10% tariff rate for all the imported and exported goods
3. By imposing 15% tariff rate for all the imported and exported goods
4. By imposing 20% tariff rate for all the imported and exported goods

The sensitivity analysis is done by changing the sectors elasticity of substitution and transformation in low elasticity case (decrease by 25% of baseline values of the elasticity) and high elasticity case (increase by 25% of the baseline values of the elasticity). Sectorial elasticity is taken from GTAB database.

Table 2: Simulation results for output by % change in tariff rate from the base run rate

Output					
	Finance	Agriculture	Mineral	Manufacturing	Service
Baseline(AGR=6.3%, MIN=14.3, and MNF=11.)	32790.238	23700.042	3935.652	43937.877	34354.466
Abolition of Tariff rate	32362.802	24061.738	3677.339	45887.955	34057.757
Based on 10% tariff rate	32757.057	23877.905	3841.868	43841.499	34354.322
Based on 15% tariff rate	32912.232	23806.028	3917.617	43027.06	34467.468
Based on 20% tariff rate	33045.418	23744.961	3989.588	42321.426	34562.455

After abolition of import tariff (zero tariff rates), the output of financial, mineral, and service sector has decreased; but the output of agriculture and manufacturing sector has increased (See the table 1). When the import tariff is increased 10%, 15% and 20% as flat rate the output of finance, mineral and service sector has also increased but both the rates output of agriculture and manufacturing sector has decreased. So, the higher tariff rate makes the domestic finance, mineral and service sector strong because of higher demand for domestic goods and reduced demand for imported goods. But in the case of agriculture and manufacturing Bangladesh is highly dependent for imported inputs particularly for heavy industrial equipment. So the higher tariff rate with higher dependency for imported inputs reduces the output in agriculture and manufacturing sectors. In case of Bangladesh the manufacturing and agriculture sector is very important for the higher growth of the economy. So the agriculture and manufacturing sector should have less import tariff rate than the finance, mineral and service sectors thereby applying flat tariff rate for all the sectors are not wise policy decision.

Table 3: Simulation results for export by % change in tariff rate from the base run rate

Export

	Finance	Agriculture	Mineral	Manufacturing	Service
Baseline(AGR=6.3%, MIN=14.3%, and MNF=11.7%.)	474.282	326.032	84.546	11705.786	1360.293
Abolition of Tariff rate	497.868	349.785	85.885	13364.645	1430.742
Based on 10% tariff rate	477.171	329.029	83.748	11756.501	1372.448
Based on 15% tariff rate	466.649	319.366	82.581	11089.76	1342.991
Based on 20% tariff rate	456.173	310.161	81.375	10495.379	1313.727

Fig 4: Reducing trend in export with the increase in tariff rate
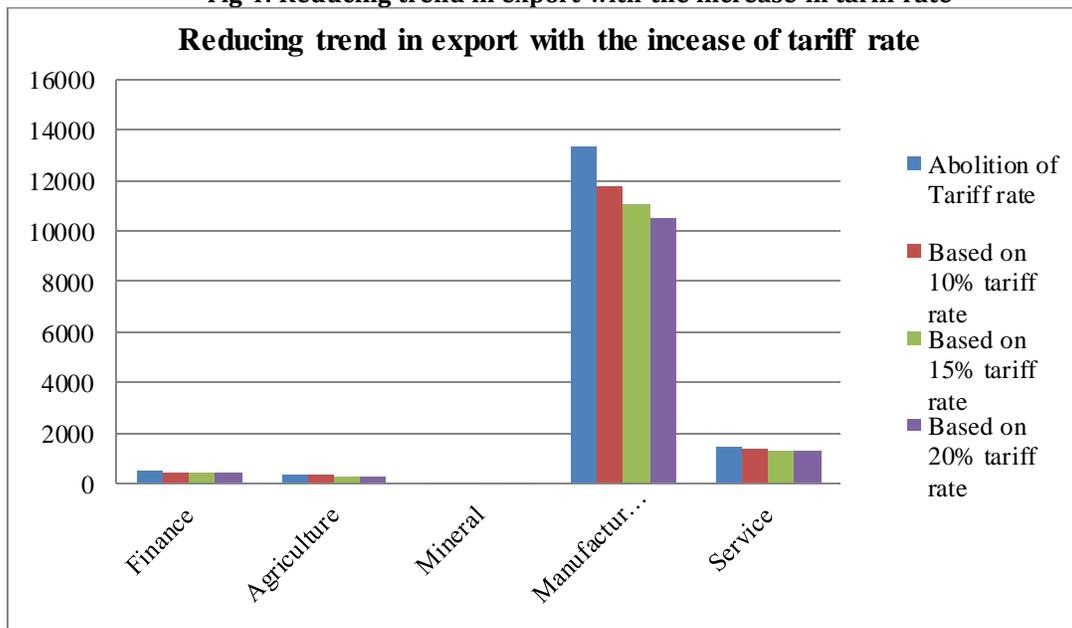
We see in the above table 2 and fig 2 that after abolition of import tariff (zero tariff rate) the export volume for all sectors has increased significantly. When the tariff rate is 10% the export volume decreases and it further decreases when the tariff rate increases 10% to 15% and then up to 20%. Unlike to the output volume, the increased tariff rate has similar impact for the all sectors. So there is a negative relationship between tariff rate and export volume. But the intensity of impacts varies from sector to sector. It has a higher level impact on the manufacturing sector than the finance sector. Higher level of export of minerals and manufacturing sectors are supported by the significant increase in the output of these sectors. The increase in consumption of manufacturing sector under the decline in output is compensated by increased import. Moreover, increase in export indicated that consumers switch their consumption behavior to the foreign goods and the decrease in domestic demand is fulfilled by the increase export.

Table 4: Simulation results for import by % change in tariff rate from the base run rate

Import

	Finance	Agriculture	Mineral	Manufacturing	Service
Baseline(AGR=6.3%, MIN=14.3%,and MNF=11.7%)	516.451	3637.112	2724.943	11199.494	711.112
Abolition of Tariff rate	478.334	3938.89	3051.744	12436.942	661.189
Based on 10% tariff rate	512.179	3412.979	2830.381	11397.229	704.304
Based on 15% tariff rate	529.115	3200.024	2733.983	10950.459	725.94
Based on 20 % tariff rate	546.064	3012.626	2645.435	10543.243	747.62

In above the table 3, we see after abolition of import tariff (zero tariff rate) the Import size of agriculture, mineral, and service sector has increased. In these sectors when the tariff rate increases gradually the import volume decreases because of higher demand for domestic goods and reduced demand for imported goods. It is worthy to mention here that in baseline there was no import tariff in finance and service sector. But after abolition of tariff of other sector the Import size of finance and service sector has decreased. On the other hand, when the import tariff increases 0% to 10% to 15% to 20% as flat rate the import of finance and service sector has also increased but import of agriculture, mineral and manufacturing sector has decreased. This is because of substitution effects of different sectors. So in this case the import tariff rate could be set differently for different sector for policy decisions.

Table 5:Simulation results for welfare by % change in tariff rate from the base run rate

Welfare

Baseline (AGR=6.3%, MIN=14.3%, and MNF=11.7%)	-51736.6
Abolition of Tariff rate	1599.448
Based on 10% tariff rate	122.746
Based on 15% tariff rate	-524.468
Based on 20 % tariff rate	-1120.96

The social welfare as measured by Hicksian equivalent variation is higher with the complete abolition of the import tariff rate that is 1599.448 (see table 4). Complete abolition of tariff rate is not possible and also not rational for all the sectors although social welfare decreases with the increased rate of tariff as flat rate. Even social welfare is negative when tariff rate is increased from 10% to 15% to 20%. So to increase total welfare different rate of tariff for different sectors should be applied. If the finance, mineral and service sector are imposed higher tariff and the agriculture and manufacturing sectors are imposed lower tariff, the total welfare increases. As with the increase of tariff rate the output for finance, mineral and service sector increases. On the other hand, with the decrease of tariff rate for the agriculture and manufacturing sectors the output for these two sectors increases. Therefore the total welfare also increases with this policy simulation.

Table 6: Simulation Results for Household Consumption by % Change in Tariff Rate from the Base Run Rate

Household Consumption

	Finance	Agriculture(6)	Mineral 14	Manufacturing11	Service
Baseline	2286.911	11082.375	1289.491	17450.112	19627.71
Abolition of Tariff rate	2318.784	11255.205	1372.367	18513.442	19889
Based on 10% tariff rate	2291.088	11020.498	1312.947	17552.281	19683.16
Based on 15% tariff rate	2278.623	10915.93	1287.144	17140.724	19591.13

In above the table 4 describes that after abolition of import tariff as zero the household consumption of all sector has increased because the price of imported goods is lower so consumer switch their consumption behavior to foreign goods from domestic goods causing sharp increase in import. In contrary, the consumption decreased when the tariff rate is increased from zero to ten or fifteen.

Table 7: Simulation Results for Utility by % Change in Tariff Rate from the Base Line Rate

Utility

Baseline	0
Abolition of Tariff rate	14620.165
Based on 10% Tariff rate	14215.38
Based on 15% tariff rate	14037.969

Utilities in the baseline scenario is zero when tariff rate is abolish then utility grows up. In addition when tariff rate is increased then utility declined. There are significant changes in the economy of Bangladesh after the trade liberalization policy. The following graph shows that before the trade liberalization policy the import volume of Bangladesh was low. But after the adoption of the policy in 1992 the import is in upward trend and increased significantly.

Robustness of the simulated results:

The robustness of the simulated results are evaluated under the criteria that how sensitive the estimated results are with the change in sectorial elasticity to maintain the sign and order of the change of export and output change under base line low (25% decreased) and high (25% increased) elasticity cases. Here we have done robustness test or sensitivity analysis on the 10% change flat tariff rate simulation. The simulation results are robust to the changes in the elasticity. Her we see that changing pattern in each case follows the normal direction and maintains the sign. For example, in the case of export in Mineral (MIN) sectors, it maintains minus sign in all the three case of lower, base and higher elasticity and the changing pattern of volume follows the normal trend. These same scenarios are also visible in all other sectors and elasticity. So this model is robust and simulation based on this model is rational.

Table 8: *Robustness test or sensitivity analysis*

Changing export			FIN	AGR	MIN	MNF	SRV
	Sigma & psi 1.5	Lower elasticity case change (25%)	0.405	0.738	0.651	.403	0.637
	Sigma & psi 2.0	Baselinecase change	0.609	0.919	0.944	.433	0.894
	Sigma & psi 2.5	Higherelasticity case change (25%)	0.828	1.065	1.218	.469	1.170

Table 9: Robustness test or sensitivity analysis

Changing domestic output			FIN	AGR	MIN	MNF	SRV
	Sigma&psi 1.5	Lower elasticity case change (25%)	-0.107	.560	1.713	0.084	-0.007
	Sigma & psi 2.0	Baseline case change	-0.101	.750	2.383	0.219	-4.20516E-4
	Sigma & psi 2.5	Higher elasticity case change (25%)	-0.095	0.934	3.046	0.352	0.007

On the other hand, If the robustness of the simulated results are evaluated under the criteria that how sensitive the estimated results are with the change in sectorial elasticity to maintain the sign and order of the change of sectorial output change under base line low (12.5% decreased) and high (12.5% increased) elasticity cases. The simulation results are robust to the changes in the elasticity.

Table 10: Robustness Test or Sensitivity Analysis

Changingin Import			FIN	AGR	MIN	MNF	SRV
	Sigma&psi 1.75	Lowerelasticitycasechange (12.5%)	0.728	-5.442	.434	.586	0.825
	Sigma & psi 2.0	Baseline case change	0.827	-6.162	.869	.766	0.957
	Sigma&psi 2.25	Higherelasticitycasechange (12.5%)	0.930	-6.872	.303	.944	1.094

Here robustness test has been done on the 10% change in tariff rate. Observing different simulation scenarios, it is found that by the increasing of the value of sigma and psi we found the increasing value of finance, agriculture, mineral, manufacture and service so the simulation result is robust.

Conclusion:

Bangladesh, like many low-income countries, uses its export earnings to pay for imported goods. Our calculations show that the majority of imports and exports are manufactured goods. After the trade liberalization in 1990, with the accession of the international trading treaty organization like WTO and SAFTA and with the reduction of import tariff rates the overall volume of trade increase dramatically in Bangladesh. The simulated results indicate also this that with the reduction of import tariff rate the export volume increases and vice versa. As to the real achievements, led by manufacturing exports especially textiles and readymade garments, total

exports consistently grew over the post-liberalization period. However, exports are still highly concentrated in a few commodities, more precisely in one commodity, textiles and readymade garments. The lack of product diversification together with the present state of low export market diversification may, however, render the Bangladesh external sector vulnerable to serious external shocks (Hossain &Alauddin, 2005). However, Bangladesh should not impose flat tariff rate rather fix it based on sectorial circumstances. It also should not abolish tariff fully to ensure government earning sufficient and more importantly to protect domestic and infant industries.

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