Employment Effects of FTA Agreements: The Perspectives from Bangladesh

Raihan, Selim

South Asian Network on Economic Modeling (SANEM),
Department of Economics, University of Dhaka, Bangladesh

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Selim Raihan[2]

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[2] Dr. Selim Raihan is Associate Professor, Department of Economics, University of Dhaka, Bangladesh and Executive Director, South Asian Network on Economic Modeling (SANEM)

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I. INTRODUCTION

Bangladesh has entered into several regional FTA agreements and is in the process of signing bilateral FTA agreements with a number of countries. In recent years, there has been increased interest in regional economic integration in South Asia. With the stalemate of the World Trade Organisation (WTO) negotiations, it is expected that the interest in regional trading arrangements will increase further. Regional integration in South Asia got the momentum in 1995 when the South Asian Association for Regional Cooperation (SAARC) Preferential Trading Arrangement (SAPTA) was signed. In early 2004, the SAARC member countries agreed to form a South Asian Free Trade Area (SAFTA), which has come into force since July 01, 2006. Bangladesh is also a member of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) comprising countries from South Asia and South-East Asia. Recently, Bangladesh is negotiating with India and Malaysia for bilateral FTAs.

Standard trade theories argue for trade liberalisation for the efficient allocation of resources including labour. However, theories have looked more at the import liberalisation effect and there has been less emphasis on market access effects. Empirical studies on effect of trade liberalisation on employment appear to be inconclusive. At aggregate level, trade reform has no significant effect on employment (Hoekman and Winters, 2005). Effects of trade on employment highly depend on regional and institutional factors; case-studies are needed to capture country specific peculiarities (Lee, 2005; Jansen and Lee, 2007). Also, case studies show mixed results.

Any FTA deal has two important aspects: the market access aspect (the export side) and the trade liberalisation aspect (the import side). The employment effects of these two aspects might be in different directions. While increased exports may create new employment in the export oriented sectors, increased import through liberalisation of trade may contract employment in the import competing sectors. The net effect may depend on the relative strength of the aforementioned two effects.

Against this backdrop, this paper investigates the economy-wide impacts of three different FTA agreements on the Bangladesh economy. These FTA agreements are Bangladesh-India bilateral FTA, Bangladesh-Malaysia bilateral FTA and BIMSTEC.

Bangladesh and India are now negotiating to form a bilateral Free Trade Area (FTA) which will allow tariff free trade between these two South Asian countries. Despite the fact that there is a South Asian Free Trade Area (SAFTA), the progress in SAFTA is quite slow which compelled the South Asian member countries like India and Bangladesh to negotiate for a bilateral FTA deal. This bilateral FTA deal is supposed to increase the market access of Bangladesh's export products in India, whereas, there will be increased import flow from

India to Bangladesh. Since 1996-97, Indian exports to Bangladesh have been growing at 9.1 percent annually, above the general rate of growth of its total merchandise exports (8.4 percent). However, India's imports from Bangladesh over the same period have grown on average at only 3 percent annually, compared to average growth of its total imports of 9.2 percent. Consequently Bangladesh's bilateral trade deficit with India has been increasing rapidly, on average at about 9.5 percent annually.

Malaysia is one of the most advanced developing countries having a thriving economy. It is expected that FTA agreement with Malaysia in goods, services (including manpower, mode 4 and mode 3 as well) and investment will be of immense benefit for Bangladesh. Bangladesh has trade deficit with Malaysia. Bangladesh's total exports to Malaysia – its largest investment partner among the Association of Southeast Asian Nations (ASEAN) - were worth just US$16.9 million in 2006-7, while its imports from there totalled US$384.16 million.

Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) is comprised of Bangladesh, Bhutan, Myanmar, India, Nepal, Sri Lanka and Thailand as its members. An important element of this economic cooperation is FTA deal among the member countries. For Bangladesh, the market access in India, Myanmar and Thailand is important.

The aforementioned three FTAs are likely to increase market access of Bangladesh's export products to its partner countries. Such increased markets access will allow exports to rise which will have positive implications for employment in a number of sectors. However, one important concern is that the increased imports because of FTAs may lead to contraction of the domestic import competing industries leading to loss in employment in those sectors. Increased import may, on the other hand, lead to rise in the availability of cheap raw materials for the export sectors, which may result in the rise in exports.

The objective of this paper is to investigate the links between trade liberalisation and employment in Bangladesh in the context of the aforementioned three FTA scenarios. In doing so, the paper also explores the mechanisms which influence such links. This paper also investigates the impact of such FTAs on the distribution of employment, wages and composition of skill and unskilled labour in the sectors. Finally, this paper draws the relevant policy implications.

The organisation of the paper is as follows: Section II discusses on the methodology of the research; Section III presents and analysis of the structure of the Bangladesh economy; Section IV provides the simulation results from the WITS/SMART model; Section V presents the simulation results using the multiplier model; Section VI offers an analysis using the CGE model; and Section VII suggests the policy implications and concludes.

II. METHODOLOGY

This study uses several models such as WITS/SMART global partial equilibrium model, multiplier model, CGE model and an employment satellite matrix to explore the employment effects in Bangladesh out of three different FTA scenarios. At first, the scenarios are run in the WITS/SMART partial equilibrium model. The paper models FTA agreements as a reduction of tariffs to zero on goods traded between members of the agreements. There is no consideration of sensitive products or NTBs. The changes in exports, imports and import revenues are obtained at the 6 digit HS code level from the WITS/SMART model and they are aggregated to 41 SAM sectors in Bangladesh.

The percentage changes in net exports (changes in export minus imports) are calculated from the WITS/SMART model. Also, the changes in import revenues from the WITS/SMART model are used to calculate the changes in implicit tariff rates at the sectoral level. Implicit tariff rates are defined as the ratios of import revenues to imports. In the context of the SAM based multiplier model, changes in net exports are introduced as shocks. In this way, both the changes in exports and imports can be captured in the multiplier model. In the context of the CGE model, however, changes in export demand and changes in implicit tariff rates are introduced as trade liberalisation elements of the FTA.

Through the above mentioned procedures we can establish the links between a global trade model and country model. Since there are limitations of a single country multiplier or CGE model in undertaking simulations relating regional or bilateral trade reform scenarios, establishment of such links with the global model can enable the single country model to conduct such simulations.

In the context of the multiplier model, assuming unit employment elasticity of output, the changes in output are linked to the employment satellite matrix to obtain the export-induced employment effect. However, in the context of the CGE model the employment effects of export changes and reduction in tariffs are derived in the following way: the base value addition by labour is divided by the base number of employment of labour to calculate the base ‘derived wage rate’. Now, the CGE simulation produces new vector of value addition of labour and percentage change in wage rate. The percentage change in wage rate is used to derive the ‘new derived wage rate’. Now, dividing the new value addition of labour with the ‘new derived wage rate’ produces the new number of employment. The change in the employment is the difference between the base number of employment taken from the employment satellite and the new number of employment.

2.1. Trade Shocks: The WITS/SMART Model

Milner et al. (2002) provides a simple analytical framework explaining the theory behind partial equilibrium. The World Integrated Trade Solution (WITS) brings together various databases ranging from bilateral trade, commodity trade flows and various levels and types of protection. WITS also integrate analytical tools that support simulation analysis. The SMART simulation model is one of the analytical tools in WITS for simulation purposes. SMART contains in-built analytical modules that support trade policy analysis such as effects of multilateral tariff cuts, preferential trade liberalization and ad hoc tariff changes. The underlying analytics of the theory are defined in Laird and Yeats (1986) and ECA (2000). The derivation begins with a basic trade model composed of simplified import demand and export supply functions and an equilibrating identity:

A simplified import demand function for country j from country k of commodity i:

$$M_{ijk} = f(Y_j, P_{ij}, P_{ik}) \quad (1)$$

The export supply function of commodity i of country k can be simplified as:

$$X_{ijk} = f(P_{ikj}) \quad (2)$$

The equilibrium in the trade between the countries is the standard partial equilibrium equation:

$$M_{ijk} = X_{ikj} \quad (3)$$

In a free trade environment, the domestic price of the commodity i in country j from country k would change with the change in an ad valorem tariff as follows:

$$P_{ijk} = P_{ikj}(1 + t_{ikj}) \quad (4)$$

In order to get the price equation, differentiating (4) we obtain:

$$dP_{ijk} = P_{ikj}dt_{ikj} + (1 + t_{ikj})dP_{ikj} \quad (5)$$

Equations (4) and (5) are substituted into the elasticity of import demand function:

$$\frac{\Delta M_{ijk}}{(M_{ijk})} = \alpha_i^m \frac{\Delta P_{ijk}}{(P_{ijk})} \quad (6)$$

Using this, one obtains the change in imports:

$$\frac{dM_{ijk}}{M_{ijk}} = \alpha_i^m \left(\frac{dt_{ijk}}{(1+t_{ijk})} + \frac{dP_{ijk}}{P_{ijk}} \right) \quad (7)$$

In the similar process one can obtain, with the elasticity of export supply function, the change in exports:

$$\frac{dX_{ijk}}{X_{ijk}} = \alpha_i^x (\frac{dP_{ikj}}{P_{ikj}})$$

WITS/ SMART has a very precise and elegant methodology for calculating revenue effects. The tariff revenue is the product of the tariff rate and the tariff base (value of imports). Thus, before the change in the ad valorem incidence of trade barriers, the revenue is given as:

$$R_0 = \sum_i \sum_k t_{ijk}^0 P_{ijk}^0 M_{ijk}^0 \quad (8)$$

After the change in tariff rate, the new revenue collection will be given by:

$$R_1 = \sum_i \sum_k t_{ijk}^1 P_{jk}^1 M_{ijk}^1 \quad (9)$$

The revenue loss as a result of the implementation of any RTA is the difference between R_0 and R_1.

2.2. Employment Effects

2.2.1. The Multiplier Model

The move from a SAM data framework to a SAM based multiplier framework requires decomposing the SAM accounts into “exogenous” and “endogenous” as well as to introduce

a set of assumptions pertaining to the Generalized Leontief Model (Alarcon, 2002). Generally accounts intended to be used as policy instruments (e.g. government expenditure, investment, exports) are made exogenous and accounts a priory specified as objectives or targets must be made endogenous (e.g. activity, commodity demand, factor return and household income).

For any given injection into the exogenous accounts (i.e. instruments) of the SAM, influence is transmitted through the interdependent SAM system among the endogenous accounts. The interwoven nature of the system implies that the incomes of factors, households and production are all derived from exogenous injections into the economy via a multiplier process. The multiplier process is developed here on the assumption that when an endogenous income account receives an exogenous expenditure injection, it spends it in the same proportions as shown in the matrix of average propensities to spend (APS). The elements of the APS matrix are calculated by dividing each cell by its corresponding column sum totals.

The multiplier analysis using the SAM framework helps to understand the linkages between the different sectors and the institutional agents at work within the economy. Accounting multipliers have been calculated according to the standard formula for accounting (impact) multipliers, as follows:

$$\mathbf{Y} = A\,Y + \mathbf{X} = (I - A)^{-1}\mathbf{X} = M_a\,\mathbf{X}$$

Where:

Y is a vector of incomes of endogenous variables

X is a vector of expenditures of exogenous variables

A is the matrix of average expenditure propensities for endogenous accounts

$M_a = (I - A)^{-1}$ is a matrix of aggregate accounting multipliers (generalized Leontief inverse).

Variations in any one of the exogenous account (i.e. in this case ΔX) will produce total impacts (ΔY) of endogenous entries via the multipliers. More specifically they are expressed as:

$$\Delta Y = M_a \times \Delta X.$$

The economy wide effect is thus equal to $\Delta Y = M_a \times \Delta X$. Thus ΔY captures the economy wide impacts on the four endogenous accounts namely: (i) gross output; (ii) commodity demand; (iii) factor returns and (iv) household. Table 1 provides the description of the endogenous and exogenous accounts and multiplier effects.

Table 1: Description of the Endogenous and Exogenous Accounts and Multiplier Affects

Endogenous (y)	Exogenous (x)
The activity (gross output multipliers), indicates the total effect on the sectoral gross output of a unit-income increase in a given account *i* in the SAM, and is obtained via the association with the commodity production activity account *i*.	
The consumption commodity multipliers, which indicates the total effect on the sectoral commodity output of a unit-income increase in a given account *i* in the SAM, is obtained by adding the associated commodity elements in the matrix along the column for account *i*.	Intervention into through activities (x = i + g + e), where i= GFCF + ST Exports (e) Government Expenditure (g) Investment Demand (i) Inventory Demand (i) Gross Fixed Capital Formation (GFCF) Stock (ST)
The value added or GDP multiplier, giving the total increase in GDP resulting from the same unit-income injection, is derived by summing up the factor-payment elements along account *i*'s column.	
Household income multiplier shows the total effect on household and enterprise income, and is obtained by adding the elements for the household groups along the account i column.	Intervention via households (x = r + gt + ct), where Remittance (r) Government Transfers (gt) Corporation Transfers (ct)

The economy-wide impacts of the rise in exports are examined by changing the total exogenous injection vector. More specifically, the total exogenous account is manipulated to estimate their effects on output (through an output multiplier), value-added or GDP (through the GDP multiplier), and household income (through household income multiplier) and commodity demand (via commodity multipliers). The calculated multipliers are provided in Annex 1.

2.2.2. The CGE Model

All three FTA scenarios are run in a Computable General Equilibrium (CGE) framework, whose advantage is that it traces the price effects of the exogenous shock. In an increasingly market oriented economy, the variations in prices may be the most important sources of re-allocation of resources among competing activities which then may alter the factorial income and hence personal income distribution. A SAM prepared for the year 2006-07 serves as the consistent and comprehensive database for the above-mentioned exercises.

The Bangladesh CGE model is built using the PEP standard static model.[3] In the Bangladesh CGE model representative firm in each industry maximizes profits subject to its production technology. The sectoral output follows a Leontief production function. Each industry's value added consists of composite labour and composite capital, following a constant elasticity of substitution (CES) specification. Different categories of labour are combined following a constant elasticity of substitution (CES) technology with imperfect substitutability between different types of labour. Composite capital is a CES combination of the different categories of capital. It is assumed that intermediate inputs are perfectly complementary, and are combined following a Leontief production function.

Household incomes come from labour income, capital income, and transfers received from other agents. Subtracting direct taxes yields household's disposable income. Household savings are a linear function of disposable income, which allows for the marginal propensity to save being different from the average propensity.

Corporation income consists of its share of capital income and of transfers received from other agents. Deducting business income taxes from total income yields the disposable income of each type of business. Likewise, business savings are the residual that remains after subtracting transfers to other agents from disposable income.

The government draws its income from household and business income taxes, taxes on products and on imports, and other taxes on production. Income taxes are described as a linear function of total income, whether it be for households or for businesses. The current government budget surplus or deficit (positive or negative savings) is the difference between its revenue and its expenditures. The latter consist of transfers to agents and current expenditures on goods and services.

The rest of the world receives payments for the value of imports, part of the income of capital, and transfers from domestic agents. Foreign spending in the domestic economy consists of the value of exports, and transfers to domestic agents. The difference between foreign receipts and spending is the amount of rest-of-the-world savings, which are equal in absolute value to the current account balance, but of opposite sign.

The demand for goods and services, whether domestically produced or imported, consists of household consumption demand, investment demand, demand by government, and demand as transport or trade margins. It is assumed that households have Stone-Geary utility functions (from which derives the Linear Expenditure System). Investment demand includes both gross fixed capital formation (GFCF) and changes in inventories. .

[3] See www.pep-net.org

Producers' supply behaviour is represented by nested CET functions: on the upper level, aggregate output is allocated to individual products; on the lower level, the supply of each product is distributed between the domestic market and exports. The model departs from the 'pure' form of the small-country hypothesis. A local producer can increase his share of the world market only by offering a price that is advantageous relative to the (exogenous) world price. The ease with which his share can be increased depends on the degree of substitutability of the proposed product to competing products; in other words, it depends on the price-elasticity of export demand. Commodities demanded on the domestic market are composite goods, combinations of locally produced goods and imports. The imperfect substitutability between the two is represented by a constant elasticity of substitution (CES) aggregator function. Naturally, for goods with no competition from imports, the demand for the composite commodity is the demand for the domestically produced good.

The system requires that there is equilibrium between the supply and demand of each commodity on the domestic market. Also there are equilibriums in the factor markets. Total investment expenditure must be equal to the sum of agents' savings. The sum of supplies of every commodity by local producers must be equal to domestic demand for that commodity produced locally. And finally, supply to the export market of each good must be matched by demand.

III. STRUCTURE OF THE BANGLADESH ECONOMY

The structure of the Bangladesh economy in 2007, as derived from the SAM, is briefly presented in Table 2. Colum 1 shows the shares of sectoral value-added in total value added. The share of agriculture in total valued added is 19.88 percent with cereal crop and commercial crop sectors as the leading sectors. The share of industry is 18 percent and the sectors with high shares are rice milling, woven readymade garments (woven RMG) and knit readymade garments (knit RMG). The share of services sector (including construction) is 62.12 percent and the leading services sectors are wholesale and retail trade, construction and other services.

Column 2 of Table 2 shows the sectoral export orientation. The woven and knit RMG sectors are more than 80 percent export oriented. The other major export oriented sectors are jute, leather, Information technology, public administration and defence, fishing, furniture industry and fertiliser industry.

Bangladesh's export basket is highly concentrated as is evident from the fact that around 74 percent of the total export comes from woven and knit RMG (Column 3 of Table 2). The share of fishing is 5.3 percent. Jute, leather and miscellanies industries constitute 3.3, 1.8 and 4 percent of the total exports respectively. In the services sectors, public administration

and defence constitute 5 percent of the total export[4] and the IT sector has a very low share, only 0.16 percent.

Column 4 of Table 2 suggests that the major import-oriented sectors are chemical industry, petroleum, fertilizer industry, paper, printing and publishing industry, miscellaneous industry, toiletries and yarn. According to Column 5, the sectors with high import shares are miscellaneous industry, petroleum, food process and commercial crops. Finally, Column 6 presents the sectors with respective tariff rates. The leading protected sectors (the sectors with high tariff rates) are toiletries, cigarette industry, furniture industry, paper, printing and publishing industry, jute and yarn, cloth milling, woven RMG, poultry rearing, fishing and grain milling.

Table 2: Structure of the Bangladesh Economy in 2007 as derived from the SAM

	1	2	3	4	5	6
Sectors	**Vi/TV**	**Ei/Oi**	**Ei/TE**	**Mi/Oi**	**Mi/TM**	**TAR**
Cereal Crop sectors	7.44	0.00	0.00	4.72	2.42	6.33
Commercial crops	4.53	2.24	1.16	20.59	7.50	5.53
Livestock Rearing	1.45	0.01	0.00	0.01	0.00	6.78
Poultry Rearing	0.90	0.00	0.00	0.58	0.06	15.09
Fishing	4.03	10.30	5.31	0.07	0.03	33.35
Forestry	1.54	0.00	0.00	0.00	0.00	0.00
Agriculture	**19.88**		**6.47**		**10.00**	
Rice Milling	3.09	0.03	0.02	1.21	0.69	6.23
Grain Milling	0.36	0.08	0.01	0.11	0.01	24.28
Food Process	1.24	0.72	0.37	22.11	8.00	12.07
Leather Industry	0.39	23.10	1.77	4.25	0.23	11.74
Jute and Yarn	0.20	35.91	3.33	48.49	3.16	18.23
Cloth milling	1.72	0.01	0.01	14.62	3.76	27.43
Woven RMG	2.39	80.93	37.40	10.27	3.34	21.27
Knitting	3.26	90.42	36.26	1.28	0.36	1.17
Toiletries	0.00	1.60	0.02	45.14	0.32	31.97
Cigarette Industry	0.09	1.02	0.11	1.40	0.10	30.40
Furniture Industry	0.21	20.80	1.11	22.83	0.86	16.31
Paper, printing and publishing Industry	0.06	1.38	0.05	57.80	1.50	20.76
Pharmaceuticals	0.34	1.72	0.15	15.55	0.95	2.05
Fertilizer Industry	0.05	9.52	0.31	74.34	1.69	4.04
Petroleum	0.05	1.51	0.42	69.94	13.80	16.63
Chemical Industry	0.11	2.17	0.28	71.14	6.44	14.62
Glass Industry	0.04	4.07	0.05	23.58	0.20	21.03
Earth-ware and clay industry	0.19	0.05	0.00	12.01	0.30	7.22
Cement	0.16	0.26	0.02	6.09	0.39	11.07
Metal	0.96	2.84	0.75	13.53	2.51	14.12
Miscellaneous Industry	1.91	5.77	3.99	56.89	27.67	14.40
Mining and Quarrying	1.19	0.05	0.01	0.52	0.05	20.12
Industry	**18.00**		**86.43**		**76.32**	
Construction	8.42	0.05	0.05	0.53	0.38	21.15
Electricity and Water Generation	0.89	0.35	0.03	7.46	0.41	6.77

[4] The export of public administration and defence refers to the foreign exchange earnings thorough the UN peace commission.

Sectors	1 Vi/TV	2 Ei/Oi	3 Ei/TE	4 Mi/Oi	5 Mi/TM	6 TAR
Gas Extraction and Distribution	0.28	0.00	0.00	0.00	0.00	0.00
Wholesale and retail trade	14.63	0.00	0.00	0.00	0.00	0.00
Transport	9.44	1.11	0.82	15.58	8.13	0.00
Health Service	2.30	0.00	0.00	0.00	0.00	0.00
Education Service	2.63	0.00	0.00	0.00	0.00	0.00
Public Administration and Defense	2.84	18.83	5.03	11.72	2.20	0.00
Bank Insurance and Real estate	1.63	1.08	0.16	12.90	1.34	0.00
Hotel and Restaurant	0.70	0.00	0.00	0.00	0.00	0.00
Communication	1.32	2.75	0.32	1.89	0.15	0.00
Information Technology and E-Commerce	0.07	27.56	0.16	7.04	0.03	0.00
Other Services	16.98	0.48	0.54	1.30	1.03	0.00
Services	**62.12**		**7.11**		**13.68**	
Total	**100.00**		**100.00**		**100.00**	

Note: Vi = sectoral value added, TV = total value added, Ei = sectoral export, Oi = sectoral output, TE = total export, Mi = sectoral import, TM = total import, TAR = tariff rate. All figures are expressed in percentage
Source: Social Accounting Matrix of Bangladesh for 2007

Table 3 presents the structure of employment in the economy of Bangladesh. Despite the fact that agricultural sector contributes less than 20 percent of the value-addition (Table 1), it constitutes nearly 47 percent of the total employed labour force of the country. The shares of industry and services sectors are 11.1 percent and 41.9 percent respectively.

Table 3: Sectoral Employment Numbers and Shares from the Employment Satellite Matrix

Sectors	Number		% Share in Total		% Share in Total (UL+SL)
	UL	SL	UL	SL	
Cereal Crop sectors	13165730	9270	29.91	0.28	27.83
Commercial crops	3239420	1580	7.36	0.05	6.85
Livestock Rearing	2077557	356443	4.72	10.70	5.14
Poultry Rearing	1562291	238709	3.55	7.17	3.80
Fishing	943285	151715	2.14	4.56	2.31
Forestry	423142	76858	0.96	2.31	1.06
Agriculture	**21411425**	**834575**	**48.65**	**25.06**	**46.99**
Rice Milling	248550	450	0.56	0.01	0.53
Grain Milling	10590	3910	0.02	0.12	0.03
Food Process	245770	21130	0.56	0.63	0.56
Leather Industry	91960	7040	0.21	0.21	0.21
Jute and Yarn	183590	17410	0.42	0.52	0.42
Cloth milling	650190	23810	1.48	0.72	1.42
Woven RMG	1008370	103630	2.29	3.11	2.35
Knitting	93170	4830	0.21	0.15	0.21
Toiletries	14990	2010	0.03	0.06	0.04
Cigarette Industry	121660	7340	0.28	0.22	0.27
Furniture Industry	946720	19280	2.15	0.58	2.04
Paper, printing and publishing Industry	89640	28360	0.20	0.85	0.25
Pharmaceuticals	54700	9300	0.12	0.28	0.14
Fertilizer Industry	38540	10460	0.09	0.31	0.10
Petroleum	7460	2540	0.02	0.08	0.02
Chemical Industry	113060	13940	0.26	0.42	0.27
Glass Industry	5700	2800	0.01	0.08	0.02
Earth-ware and clay industry	243920	3000	0.55	0.09	0.52
Cement	37100	2900	0.08	0.09	0.08
Metal	190540	29460	0.43	0.88	0.46

Sectors	Number		% Share in Total		% Share in Total (UL+SL)
	UL	SL	UL	SL	
Miscellaneous Industry	493290	61710	1.12	1.85	1.17
Mining and Quarrying	2700	500	0.01	0.02	0.01
Industry	**4892210**	**375810**	**11.12**	**11.29**	**11.13**
Construction	1453000	71000	3.30	2.13	3.22
Electricity and Water Generation	48510	11490	0.11	0.35	0.13
Gas Extraction and Distribution	4770	3230	0.01	0.10	0.02
Wholesale and retail trade	7035780	72220	15.99	2.17	15.01
Transport	3316660	29540	7.54	0.89	7.07
Health Service	61920	272080	0.14	8.17	0.71
Education Service	247020	1058980	0.56	31.80	2.76
Public Administration and Defense	784890	96110	1.78	2.89	1.86
Bank Insurance and Real estate	291529	216471	0.66	6.50	1.07
Hotel and Restaurant	695680	16320	1.58	0.49	1.50
Communication	136380	1620	0.31	0.05	0.29
Information Technology and E-Commerce	4250	4750	0.01	0.14	0.02
Other Services	3626440	265560	8.24	7.98	8.22
Services	**17706829**	**2119371**	**40.23**	**63.65**	**41.88**
Total	**44010464**	**3329756**	**100.00**	**100.00**	**100.00**

Note: UL = unskilled labour; SL = skilled labour

Source: Employment Satellite Matrix (data from Labour Force Survey 2005-06)

IV. RESULTS FROM THE WITS/SMART MODEL

4.1. Changes in Net Exports

In the WITS/SMART model, three FTA scenarios are run which assume full elimination of bilateral tariff between Bangladesh and India (under Bangladesh-India bilateral FTA), full elimination of bilateral tariff between Bangladesh and Malaysia (under Bangladesh-Malaysia bilateral FTA) and full elimination of tariff on trade among the BIMSTEC member countries (under BIMSTEC). The resultant changes in net exports are reported in Table 4. The percentage changes in sectoral net exports appear to be most prominent under BIMSTEC and least impact is observed under Bangladesh-Malaysia FTA. The reason behind minimal impact under the Bangladesh-Malaysia FTA is that Bangladesh's base trade (both exports and imports) with Malaysia is much lower than its trade with India or BIMSTEC region. Therefore, based on the pattern of existing trade, though an FTA with Malaysia will increase Bangladesh's trade with Malaysia significantly it is unlikely to increase Bangladesh's total trade by large margin. WITS/SMART model predicts that Bangladesh's net exports under this FTA deal would decline by 0.03 percent. This suggests that though the imports from Malaysia would rise more than the exports to Malaysia, net exports would decline only by little margin. Under the Bangladesh-India FTA, there is a small positive impact on the net exports, indicating that under this scenario, the rise in exports to India would be higher than the rise in imports from India. Under BIMSTEC, there would be the largest impact on net exports among all three scenarios and the impact will be negative suggesting that the rise in imports from BIMSTEC region would be larger than the rise in exports to the BIMSTEC region. The major reason behind smaller impact on net exports is that that none of India,

Malaysia or other BIMSTEC regions is a major export destination of Bangladesh. Another important observation is that under all of these scenarios there is very little impact in the net exports of Bangladesh's major export items, namely woven and knit RMG, since more than 90 percent of the exports of these two items are destined to the EU and North America.

Table 4: Percent Changes in Net Exports from Base from the WITS/SMART Simulations

Sectors	Bangladesh-India FTA	Bangladesh-Malaysia FTA	BIMSTEC
Cereal Crop sectors	-453045.90	-4.91	-453131.65
Commercial crops	-4.08	-0.03	-4.95
Livestock Rearing	0.00	-3.05	-0.02
Poultry Rearing	-631.41	-1725.13	-1164.49
Fishing	14.30	0.00	14.38
Forestry	0.00	0.00	0.00
Rice Milling	-59.40	0.00	-74.27
Grain Milling	0.11	-0.06	0.08
Food Process	108.99	-26.27	113.82
Leather Industry	2.61	0.00	2.58
Jute and Yarn	3.00	0.72	2.14
Cloth milling	-7832.69	-850.44	-12880.20
Woven RMG	-0.03	0.05	-0.05
Knitting	0.01	0.02	0.01
Toiletries	-4.67	-3.60	-44.69
Cigarette Industry	3.51	0.00	3.51
Furniture Industry	-43.40	-1.61	-52.55
Paper, printing and publishing Industry	-87.58	-6.78	1.46
Pharmaceuticals	1.74	-0.09	1.62
Fertilizer Industry	33.90	0.00	33.90
Petroleum	-84.52	-1.62	-84.53
Chemical Industry	-9.14	-10.98	-25.75
Glass Industry	60.49	8.23	1.28
Earth-ware and clay industry	-326.70	-25.00	-395.65
Cement	278.31	-65.72	234.05
Metal	-0.53	10.57	-0.95
Miscellaneous Industry	-8.30	0.48	-12.20
Total	0.08	-0.03	-0.33

Source: Calculated from WITS/SMART simulation

4.2. Changes in 'Implicit Tariff Rates"

WITS/SMART simulation also provides results for changes in import and import revenues based on which it is possible to calculate the changes in implicit tariff rates. As expected, the BIMSTEC scenario would result in the largest reduction in overall tariff rate and under this scenario overall tariff rate is reduced by 39.5 percent (Table 5). Under the Bangladesh-India FTA scenario the overall tariff rate is reduced by 33.6 percent. However, under the Bangladesh-Malaysia FTA scenario the overall tariff rate is reduced only by 28.6 percent.

Table 5: Percent Change in "implicit Tariff Rates" from Base

Sectors	Bangladesh-India FTA	Bangladesh-Malaysia FTA	BIMSTEC
Cereal Crop sectors	-59.20	-26.27	-59.22
Commercial crops	-61.46	-40.58	-62.56
Livestock Rearing	-80.94	-96.91	-81.05
Poultry Rearing	-27.32	-29.10	-28.08
Fishing	-37.69	-26.27	-47.93
Rice Milling	-90.68	-26.27	-99.73
Grain Milling	-26.28	-26.37	-26.44
Food Process	-30.93	-37.80	-33.46
Leather Industry	-36.89	-26.38	-42.31
Jute and Yarn	-53.57	-29.42	-57.79
Cloth milling	-33.99	-25.28	-37.38
Woven RMG	-30.21	-26.52	-32.36
Knit RMG	-36.25	-26.34	-36.78
Toiletries	-49.42	-27.25	-58.90
Cigarette Industry	-38.44	-26.28	-38.44
Furniture Industry	-60.00	-35.08	-71.86
Paper, printing and publishing Industry	-42.35	-27.33	-45.54
Pharmaceuticals	-33.29	-26.83	-34.55
Fertilizer Industry	-26.42	-26.27	-26.42
Petroleum	-34.24	-24.23	-34.25
Chemical Industry	-21.03	-32.59	-22.14
Glass Industry	-37.26	-28.83	-38.00
Earth-ware and clay industry	-34.98	-29.51	-59.63
Cement	-49.74	-34.57	-72.03
Metal	-44.62	-28.35	-46.51
Miscellaneous Industry	-37.82	-28.23	-40.10

Source: Calculated from WITS/SMART simulation

V. RESULTS FROM THE MULTIPLIER MODEL

5.1. The Bangladesh Social Accounting Matrix

This study uses the latest available Social Accounting Matrix (SAM) of Bangladesh for the year 2007. The 2007 SAM identifies the economic relations through *four types of accounts*: (i) production activity and commodity accounts for 41 sectors; (ii) 4 factors of productions with 2 different types of labour and 2 types of capital; (iii) current account transactions between 4 main institutional agents; household-members and unincorporated capital, corporation, government and the rest of the world; and (iv) two consolidated capital accounts distinguished by public and private origins to capture the flows of savings and investment. The 2007 SAM has 86 sectors which have been aggregated to 41 sectors. The mapping is provided in Annex 2. The disaggregation of activities, commodities, factors and institutions in the 41-sector SAM is given in Table 6.

Table 6: Disaggregation and Description of Bangladesh SAM Accounts

Set	Description of Elements
Commodities (41)	
Agriculture (6)	Cereal crop; commercial crop; Livestock Rearing; Poultry Rearing; Fishing; and Forestry
Manufacturing (22)	Rice Milling; Grain Milling; Food products; Leather Industry; Jute and Yarn Industry; Cloth Industry; Woven RMG; Knit RMG; Toiletries; Cigarette and Bidi Industry; Furniture Industry; Paper, Printing and Publishing industry; Pharmaceuticals; Fertiliser Industry; Petroleum; Chemical Industry; Glass Industry; Earth-ware Industry; Cement; Metal Industry; Miscellaneous Industry; Mining and Quarrying
Services (13)	Construction; Electricity and Water Generation; Gas Extraction and Distribution; Wholesale and Retail Trade; Transport; Health Service; Education Service; Public Administration and Defence; Bank Insurance and Real estate; Hotel and Restaurant; Communication; Information Technology and E-Communication; and Other Services
Factors of Production (4)	
Labour (2)	Labour Unskilled, and Labour Skilled
Capital (2)	Capital and Land
Current Institutions (11)	
Households (7)	Rural: landless, Agricultural marginal, Agricultural small, Agricultural large, Non-farm Urban: Households with low educated heads, and households with high educated heads
Others (3)	Government, Corporation and Rest of the World
Capital Institution (1)	
Consolidated Capital Account	

Source: The Bangladesh SAM

5.2. Changes in Endogenous Accounts due to Exogenous Shock

Table 7 reports the changes in endogenous accounts in the SAM under three different FTA scenarios as a result of export shock. The impacts on gross output, commodity demand, value-added and household consumption appear to be minimal under all three scenarios. The maximum impact would however be observed under the Bangladesh-India FTA scenario where the gross output, commodity demand, value added and household consumption would rise by 0.29 percent, 0.30 percent, 0.32 percent and 0.28 percent respectively. The impacts under the BIMSTEC scenario would be negative. However, the Bangladesh-Malaysia FTA scenario would generate the least impacts.

There are also some differences among these three scenarios as far as the sectoral level impacts are concerned. Under the Bangladesh-India FTA, some sectors would expand and among them fishing, jute and yarn, fertiliser would have larger expansions. In contrast, some sectors, cloth milling, paper and printing industry, chemical industry, glass industry, would experience contraction. The Bangladesh-Malaysia FTA would generate the least impacts among the three scenarios for all sectors. Under the BIMSTEC scenario, most of the sectors would experience contraction.

Table 7: Changes in Endogenous Accounts of SAM due to Net Export Shock (Percent change over base)

Endogenous accounts	Bangladesh-India FTA	Bangladesh-Malaysia FTA	BIMSTEC
Activity			
Cereal Crop sectors	0.15	0.00	-0.24
Commercial crops	0.29	0.00	-0.12
Livestock Rearing	0.39	-0.01	-0.06
Poultry Rearing	0.27	0.00	-0.11
Fishing	2.53	-0.01	-0.06
Forestry	0.11	-0.01	-0.35
Agriculture	**0.73**	**0.00**	**-0.16**
Rice Milling	0.27	0.00	-0.13
Grain Milling	0.17	0.00	-0.11
Food Process	1.36	-0.21	0.82
Leather Industry	0.48	0.00	0.75
Jute and Yarn	2.28	0.26	0.63
Cloth milling	-0.30	-0.01	-0.48
Woven RMG	-0.04	0.04	-0.06
Knitting	-0.04	0.02	0.00
Toiletries	1.45	-0.06	-0.83
Cigarette Industry	0.20	0.00	-0.09
Furniture Industry	0.38	-0.41	-13.31
Paper, printing and publishing Industry	-12.76	-0.10	-0.21
Pharmaceuticals	-0.19	0.00	-0.07
Fertilizer Industry	3.33	0.00	2.90
Petroleum	0.28	-0.03	-1.39
Chemical Industry	-2.16	-0.25	-0.71
Glass Industry	-4.02	0.32	-0.14
Earth-ware and clay industry	0.00	-0.01	-0.26
Cement	1.04	-0.18	0.65
Metal	0.32	0.30	-0.12
Miscellaneous Industry	0.10	0.03	-0.74
Mining and Quarrying	0.17	0.05	-0.04
Industry	**0.16**	**-0.01**	**-0.29**
Construction	0.00	0.00	0.00
Electricity and Water Generation	0.23	0.00	-0.12
Gas Extraction and Distribution	0.24	0.00	-0.10
Wholesale and retail trade	0.32	-0.01	-0.11
Transport	0.30	-0.01	-0.13
Health Service	0.25	0.00	-0.09
Education Service	0.14	0.00	-0.06
Public Administration and Defence	0.03	0.00	-0.01
Bank Insurance and Real estate	0.29	0.00	-0.09
Hotel and Restaurant	0.26	0.00	-0.10
Communication	0.13	0.01	-0.13
Information Technology and E-Commerce	0.16	0.00	-0.08
Other Services	0.22	0.00	-0.12
Services	**0.20**	**0.00**	**-0.09**
TOTAL GROSS OUTPUT	**0.29**	**0.00**	**-0.18**
Commodity			
Cereal Crop sectors	0.16	0.00	-0.25
Commercial crops	0.30	0.00	-0.13
Livestock Rearing	0.41	-0.01	-0.06
Poultry Rearing	0.28	0.00	-0.12

Endogenous accounts	Bangladesh-India FTA	Bangladesh-Malaysia FTA	BIMSTEC
Fishing	2.66	-0.01	-0.06
Forestry	0.12	-0.01	-0.37
Agriculture	**0.77**	**0.00**	**-0.17**
Rice Milling	0.28	0.00	-0.14
Grain Milling	0.18	0.00	-0.12
Food Process	1.43	-0.22	0.86
Leather Industry	0.51	0.00	0.79
Jute and Yarn	2.40	0.27	0.66
Cloth milling	-0.32	-0.01	-0.50
Woven RMG	-0.04	0.04	-0.06
Knitting	-0.04	0.02	0.00
Toiletries	1.53	-0.06	-0.87
Cigarette Industry	0.21	0.00	-0.09
Furniture Industry	0.40	-0.43	-14.01
Paper, printing and publishing Industry	-13.43	-0.10	-0.22
Pharmaceuticals	-0.20	0.00	-0.07
Fertilizer Industry	3.51	0.00	3.05
Petroleum	0.29	-0.03	-1.46
Chemical Industry	-2.27	-0.26	-0.75
Glass Industry	-4.23	0.34	-0.15
Earth-ware and clay industry	0.00	-0.01	-0.27
Cement	1.09	-0.19	0.68
Metal	0.34	0.32	-0.13
Miscellaneous Industry	0.10	0.03	-0.78
Mining and Quarrying	0.18	0.05	-0.04
Industry	**0.17**	**-0.01**	**-0.30**
Construction	0.00	0.00	0.00
Electricity and Water Generation	0.24	0.00	-0.13
Gas Extraction and Distribution	0.25	0.00	-0.11
Wholesale and retail trade	0.34	-0.01	-0.12
Transport	0.32	-0.01	-0.14
Health Service	0.26	0.00	-0.09
Education Service	0.15	0.00	-0.06
Public Administration and Defence	0.03	0.00	-0.01
Bank Insurance and Real estate	0.30	0.00	-0.09
Hotel and Restaurant	0.27	0.00	-0.11
Communication	0.14	0.01	-0.14
Information Technology and E-Commerce	0.17	0.00	-0.08
Other Services	0.23	0.00	-0.13
Services	**0.21**	**0.00**	**-0.09**
TOTAL COMMODITY DEMAND	**0.30**	**0.00**	**-0.19**
Value-Added			
VA Labour Unskilled	0.28	0.00	-0.15
VA Labour Skilled	0.33	0.00	-0.12
VA Capital	0.36	0.00	-0.14
VA Land	0.23	0.00	-0.20
TOTAL VALUE-ADDED	**0.32**	**0.00**	**-0.14**
Households			
Rural Landless	0.29	0.00	-0.12
Rural Marginal Farmers	0.28	0.00	-0.12
Rural Small Farmers	0.26	0.00	-0.12
Rural Large Farmers	0.26	0.00	-0.14

Endogenous accounts	Bangladesh-India FTA	Bangladesh-Malaysia FTA	BIMSTEC
Rural Non Farm	0.30	0.00	-0.13
Urban Low Education	0.26	0.00	-0.12
Urban High Education	0.29	0.00	-0.11
TOTAL HOUSEHOLD CONSUMPTION	**0.28**	**0.00**	**-0.12**

Source: The Multiplier Model

5.3. Employment Effects of Multiplier Simulations: Link with Employment Satellite Matrix

The output effects of the multiplier model are linked to the employment satellite matrix with the assumption of 'unit employment elasticity of output' and the results are shown in Table 8. Under the Bangladesh-India FTA scenario, as far as the total employment is concerned, there would be 115776 additional number of employment of unskilled labour (0.26 percent rise over base) and 7316 additional number of skilled labour (0.22 percent rise over base). The total employment effects of BIMSTEC would be negative and 200423 number of unskilled labour (0.46 percent of base) and 5518 number of skilled labour (0.17 percent of base) would lose their jobs. The Bangladesh-Malaysia FTA would lead to loss in employment of 4319 number of unskilled labour (0.01 percent over base) and loss of only 41 number of employment of skilled labour (close to zero percent over base).

Table 8: Changes in Number of Employment out of Net Export Shock

Sectors	Bangladesh-India FTA		Bangladesh-Malaysia FTA		BIMSTEC	
	UL	SL	UL	SL	UL	SL
Cereal Crop sectors	21544	15	187	0	-33560	-24
Commercial crops	9825	5	13	0	-4318	-2
Livestock Rearing	8493	1457	-135	-23	-1242	-213
Poultry Rearing	4304	658	-22	-3	-1894	-289
Fishing	25102	4037	-69	-11	-597	-96
Forestry	521	95	-38	-7	-1586	-288
Agriculture: Number	**69789**	**6267**	**-65**	**-44**	**-43197**	**-912**
Percent change over base	**0.33**	**0.75**	**0.00**	**-0.01**	**-0.20**	**-0.11**
Rice Milling	708	1	5	0	-359	-1
Grain Milling	19	7	0	0	-12	-5
Food Process	3518	302	-548	-47	2103	181
Leather Industry	473	36	3	0	726	56
Jute and Yarn	4414	419	495	47	1216	115
Cloth milling	-2077	-76	-64	-2	-3248	-119
Woven RMG	-445	-46	399	41	-637	-65
Knitting	-37	-2	17	1	-3	0
Toiletries	230	31	-9	-1	-130	-17
Cigarette Industry	257	16	3	0	-105	-6
Furniture Industry	3771	77	-4082	-83	-132623	-2701
Paper, printing and publishing Industry	-12042	-3810	-90	-29	-196	-62
Pharmaceuticals	-111	-19	-2	0	-40	-7
Fertilizer Industry	1352	367	0	0	1177	319
Petroleum	22	7	-2	-1	-109	-37
Chemical Industry	-2570	-317	-291	-36	-847	-104
Glass Industry	-241	-119	20	10	-9	-4
Earth-ware and clay industry	4	0	-31	0	-668	-8
Cement	403	32	-71	-6	252	20
Metal	639	99	603	93	-248	-38

Sectors		Bangladesh-India FTA		Bangladesh-Malaysia FTA		BIMSTEC	
		UL	SL	UL	SL	UL	SL
Miscellaneous Industry		496	62	137	17	-3830	-479
Mining and Quarrying		5	1	1	0	-1	0
Industry:	**Number**	**-1213**	**-2932**	**-3509**	**4**	**-137591**	**-2964**
	Percent change over base	**-0.02**	**-0.78**	**-0.07**	**0.00**	**-2.81**	**-0.79**
Construction		50	2	-1	0	-23	-1
Electricity and Water Generation		115	27	1	0	-61	-15
Gas Extraction and Distribution		12	8	0	0	-5	-4
Wholesale and retail trade		24166	248	-626	-6	-8562	-88
Transport		10672	95	-203	-2	-4556	-41
Health Service		159	701	0	-1	-57	-248
Education Service		361	1546	3	11	-156	-667
Public Administration and Defence		274	34	-1	0	-116	-14
Bank Insurance and Real estate		868	645	-12	-9	-248	-184
Hotel and Restaurant		1858	44	8	0	-798	-19
Communication		185	2	11	0	-191	-2
Information Technology and E-Comm		7	8	0	0	-3	-4
Other Services		8474	621	77	6	-4860	-356
Services:	**Number**	**47201**	**3981**	**-745**	**-1**	**-19635**	**-1642**
	Percent change over base	**0.27**	**0.19**	**0.00**	**0.00**	**-0.11**	**-0.08**
Total:	**Number**	**115776**	**7316**	**-4319**	**-41**	**-200423**	**-5518**
	Percent change over base	**0.26**	**0.22**	**-0.01**	**0.00**	**-0.46**	**-0.17**

Note: UL = unskilled labour; SL = skilled labour

Source: Employment Satellite Matrix

VI. RESULTS FROM THE CGE MODEL

In the Bangladesh CGE model three FTA scenarios are run considering changes in export demand and tariff rates calculated from the WITS/SMART model. The CGE model is able to capture both the export side (through the change in export demand) and import side (through the change in implicit tariff rates).

6.1. Macro Results

The macroeconomic impacts of the three FTA scenarios are reported in Table 9. Consumer price index would fall, both exports and imports would rise and wage rates of unskilled and skilled labour would fall under all three scenarios. However, the largest impacts are observed under the BIMSTEC scenario while lowest impacts are witnessed under the Bangladesh-Malaysia FTA scenario. The impacts of the Bangladesh-India FTA scenario are closer to those of the BIMSTEC scenario. Since the fall in the consumer price index is higher than the falls in the wage rates, real wage would rise.

It is interesting to observe that though WITS/SMART model predicts only 0.85 percent rise in exports under the Bangladesh-India FTA scenario (see Table 3) because of the increased market access in India, the CGE model foresees a much larger rise in exports (7.03 percent). This additional rise in exports comes from own trade liberalisation, as a result of which the

export sectors can enjoy access to raw materials at cheaper prices. The Bangladesh-Malaysia FTA and BIMSTEC scenario also generate much larger rise in exports under the CGE framework than those under the WITS/SMART model.

The FTAs also lead to rise in imports because of own trade liberalisation. Since under BIMSTEC, Bangladesh would have to liberalise its imports for a number of countries of South Asia and South-east Asia, the rise in imports under this scenario would be larger than those under other two bilateral FTA scenarios.

Table 9: Impacts on Macro Variables (Percent change from base)

	Bangladesh-India FTA	Bangladesh-Malaysia FTA	BIMSTEC
Consumer Price Index	-1.96	-1.33	-2.04
Total Export	7.03	4.41	7.41
Total Import	3.50	2.05	3.68
Wage rate of unskilled labour	-1.05	-0.75	-1.10
Wage rate of skilled labour	-0.44	-0.39	-0.47

Source: CGE Simulations

6.2. Sectoral Results

The sectoral impacts of the CGE simulations of three FTA scenarios are reported in Table 10. Under all three scenarios domestic production would fall by small margin. This is a result of the rise in imports which replaces domestic production. Under Bangladesh-India FTA and BIMSTEC, production in the aggregate agricultural and aggregate industrial sectors would rise and that of aggregate services sector would fall. However, under Bangladesh-Malaysia FTA scenario production in both aggregate agriculture and aggregate services sectors would fall and that of aggregate industrial sector would rise. There are significant differences among the sectors in terms of rise or fall in production. In the case of agricultural sectors, under all three scenarios, there is a reduction in the production in the forestry sector. Though Bangladesh-Malaysia FTA would lead to a small rise in production of cereal crops, the other two scenarios would result in reduction in production in this sector by small margins. In the case of industrial sectors, all three scenarios predict robust rises in production and exports of woven and knit RMGs. Other sectors, such as jute and yarn and fertiliser industry would experience notable rises in production under the Bangladesh-India FTA and BIMSTEC. The furniture industry would experience rise in production only under the Bangladesh-Malaysia FTA scenario and its production would fall under other two scenarios. Major sectors, which will experience fall in production because of increased imports, under all three scenarios, are toiletries, paper-printing and publishing, chemical, glass, earth-ware, cement, metal and miscellaneous industries. In the case of services sectors, production in construction, communication and other services would fall and those of remaining services sectors would rise. The magnitudes of the impacts are, in general, most pronounced under the BIMSTEC scenario and least observed under Bangladesh-Malaysia FTA scenario.

Table 10: Impacts on Sectoral Production, Export and Import (Percent change from base)

Sectors	Bangladesh-India FTA			Bangladesh-Malaysia FTA			BIMSTEC		
	O	E	M	O	E	M	O	E	M
Cereal Crop sectors	-0.14	1.42	6.39	0.05	1.10	2.15	-0.14	1.47	6.28
Commercial crops	0.42	2.34	5.95	0.10	1.19	3.52	0.44	2.24	6.02
Livestock Rearing	0.39	2.15	10.89	0.17	1.47	14.67	0.39	2.24	10.75
Poultry Rearing	0.47	2.74	5.60	0.24	1.70	7.58	0.48	2.84	5.73
Fishing	1.59	7.22	23.80	0.40	1.71	15.79	1.61	7.38	32.76
Forestry	-2.72			-1.63			-2.85		
Agriculture	**0.18**	**6.34**	**6.10**	**-0.02**	**1.62**	**3.25**	**0.18**	**6.46**	**6.16**
Rice Milling	0.27	1.92	11.57	0.18	1.31	2.04	0.26	1.98	13.02
Grain Milling	0.40	2.07	11.12	0.21	1.36	12.00	0.41	2.14	11.09
Food Process	0.22	28.01	4.04	-1.22	0.98	6.15	0.10	27.43	4.48
Leather Industry	1.80	4.39	6.04	0.91	2.26	4.27	1.80	4.52	7.33
Jute and Yarn	8.35	10.29	5.85	3.70	4.57	3.60	8.06	10.10	6.19
Cloth milling	-0.09	3.20	14.93	-0.30	119.28	10.88	-0.27	3.56	16.64
RMG	7.15	7.68	2.57	4.86	5.29	2.47	7.61	8.18	2.78
Knitting	7.89	8.33	-5.43	5.04	5.32	-3.58	8.32	8.79	-5.75
Toiletries	-10.06	15.03	8.81	-6.08	-1.18	4.55	-13.13	12.58	11.00
Cigarette Industry	0.42	4.57	21.36	0.23	1.91	13.82	0.47	4.72	21.16
Furniture Industry	-2.24	2.41	9.14	0.65	5.37	4.60	-3.08	2.27	11.54
Paper, printing and publishing Industry	-7.60	-0.79	4.69	-4.79	-1.24	2.90	-8.25	-1.02	5.06
Pharmaceuticals	1.56	4.99	-2.25	1.12	3.16	-1.69	1.61	5.31	-2.33
Fertilizer Industry	12.43	20.32	-0.92	1.21	2.15	-0.01	12.61	20.54	-0.94
Petroleum	-0.86	4.26	1.52	-0.69	2.84	1.01	-0.80	4.34	1.51
Chemical Industry	-5.07	4.91	0.07	-5.37	-1.84	0.35	-5.26	4.79	0.01
Glass Industry	-2.76	3.15	8.24	-2.17	2.97	7.46	-3.06	3.00	9.21
Earth-ware and clay industry	-3.09	16.11	3.62	-1.71	0.17	0.71	-3.18	15.73	3.44
Cement	-7.32	52.97	1.18	-4.79	-2.13	1.50	-8.17	50.46	6.00
Metal	-7.05	0.23	4.15	-3.90	1.90	1.68	-7.24	0.23	4.09
Miscellaneous Industry	-7.43	-2.82	5.16	-3.35	-0.50	1.73	-7.50	-2.63	5.14
Mining and Quarrying	-4.88	-1.79	19.05	-2.92	-0.85	6.33	-5.06	-1.85	19.84
Industry	**0.57**	**7.47**	**4.16**	**0.34**	**4.83**	**2.50**	**0.58**	**7.88**	**4.39**
Construction	-5.14	17.12	4.87	-3.18	18.14	7.71	-5.35	17.07	8.42
Electricity and Water Generation	0.61	3.16	0.46	0.33	2.11	1.30	0.62	3.25	0.54
Gas Extraction and Distribution	0.40			0.26			0.41		
Wholesale and retail trade	0.45			0.21			0.45		
Transport	0.81	2.45	-2.45	0.52	1.70	-1.79	0.84	2.55	-2.54
Health Service	0.52			0.33			0.54		
Education Service	0.66			0.45			0.69		
Public Administration and Defence	1.45	2.43	-1.57	1.06	1.78	-1.15	1.52	2.56	-1.64
Bank Insurance and Real estate	-0.41	1.04	-2.74	-0.24	0.81	-1.98	-0.43	1.09	-2.87
Hotel and Restaurant	0.59			0.39			0.61		
Communication	-0.19	1.38	-2.91	-0.05	1.07	-2.04	-0.21	1.44	-3.05
Information Technology and ECom	1.19	2.40	-2.59	0.85	1.71	-1.87	1.25	2.52	-2.71
Other Services	-0.04	1.74	-3.07	-0.02	1.23	-2.18	-0.04	1.83	-3.23
Services	**-0.77**	**2.40**	**-2.10**	**-0.47**	**1.78**	**-1.38**	**-0.80**	**2.51**	**-2.09**
Total	**-0.12**	**7.04**	**3.50**	**-0.10**	**4.41**	**2.05**	**-0.13**	**7.41**	**3.68**

Note: O = production, E = export, M = import

Source: CGE simulation

The impacts on sectoral value-added by unskilled labour, skilled labour and composite capital are reported in Table 11. These impacts are, in general, in line with the impacts on sectoral production as reported in Table 10.

Table 11: Impacts on Sectoral Value-added by Unskilled labour, Skilled Labour and Composite Capital (Percent change from base)

Sectors	Bangladesh-India FTA			Bangladesh-Malaysia FTA			BIMSTEC		
	VUL	**VSL**	**VK**	**VUL**	**VSL**	**VK**	**VUL**	**VSL**	**VK**
Cereal Crop sectors	0.08	-0.41	-0.27	0.18	-0.11	-0.04	0.09	-0.42	-0.04
Commercial crops	0.68	0.19	0.33	0.26	-0.03	0.04	0.71	0.20	0.04
Livestock Rearing	0.20	-0.28	0.54	0.04	-0.25	0.28	0.20	-0.31	0.28
Poultry Rearing	0.27	-0.22	0.60	0.09	-0.20	0.33	0.27	-0.23	0.33
Fishing	1.43	0.94	1.95	0.29	0.00	0.64	1.45	0.93	0.64
Forestry	-2.99	-3.46	-2.65	-1.82	-2.11	-1.59	-3.13	-3.62	-1.59
Agriculture	**0.29**	**0.18**	**0.17**	**0.14**	**-0.10**	**-0.01**	**0.30**	**0.18**	**-0.01**
Rice Milling	0.16	-0.33	0.58	0.10	-0.19	0.38	0.14	-0.37	0.38
Grain Milling	0.32	-0.17	0.78	0.15	-0.15	0.46	0.32	-0.19	0.46
Food Process	0.10	-0.39	0.56	-1.31	-1.60	-1.00	-0.03	-0.53	-1.00
Leather Industry	1.70	1.20	2.11	0.83	0.54	1.11	1.69	1.17	1.11
Jute and Yarn	8.48	7.95	8.97	3.77	3.46	4.08	8.20	7.65	4.08
Cloth milling	-0.06	-0.54	0.40	-0.28	-0.58	0.02	-0.23	-0.74	0.02
RMG	7.11	6.59	7.59	4.82	4.51	5.14	7.57	7.02	5.14
Knitting	7.85	7.33	8.35	5.00	4.69	5.33	8.29	7.74	5.33
Toiletries	-10.27	-10.71	-9.83	-6.23	-6.51	-5.92	-13.35	-13.79	-5.92
Cigarette Industry	0.20	-0.29	0.68	0.07	-0.22	0.39	0.23	-0.28	0.39
Furniture Industry	-2.43	-2.90	-1.97	0.52	0.23	0.83	-3.27	-3.76	0.83
Paper, printing and publishing Industry	-7.75	-8.20	-7.32	-4.89	-5.17	-4.60	-8.41	-8.87	-4.60
Pharmaceuticals	1.33	0.84	1.81	0.96	0.66	1.28	1.37	0.86	1.28
Fertilizer Industry	12.08	11.54	12.60	0.99	0.69	1.30	12.24	11.68	1.30
Petroleum	-1.46	-1.94	-0.80	-1.08	-1.37	-0.65	-1.43	-1.93	-0.65
Chemical Industry	-5.28	-5.74	-4.84	-5.52	-5.80	-5.22	-5.48	-5.96	-5.22
Glass Industry	-2.92	-3.39	-2.46	-2.28	-2.57	-1.97	-3.23	-3.72	-1.97
Earth-ware and clay industry	-3.30	-3.77	-2.85	-1.86	-2.15	-1.55	-3.39	-3.88	-1.55
Cement	-7.60	-8.05	-7.16	-4.98	-5.26	-4.68	-8.45	-8.92	-4.68
Metal	-7.17	-7.62	-6.74	-3.99	-4.28	-3.70	-7.38	-7.85	-3.70
Miscellaneous Industry	-7.52	-7.97	-7.09	-3.43	-3.71	-3.13	-7.60	-8.07	-3.13
Mining and Quarrying	-5.22	-5.68	-4.64	-3.15	-3.44	-2.77	-5.42	-5.90	-2.77
Industry	**1.75**	**0.99**	**0.58**	**1.18**	**0.72**	**0.47**	**1.84**	**1.06**	**0.47**
Construction	-5.29	-5.75	-4.92	-3.28	-3.56	-3.03	-5.50	-5.98	-3.03
Electricity and Water Generation	0.17	-0.32	0.77	0.03	-0.26	0.43	0.15	-0.36	0.43
Gas Extraction and Distribution	-0.07	-0.56	0.53	-0.05	-0.35	0.34	-0.08	-0.59	0.34
Wholesale and retail trade	0.48	-0.01	1.03	0.22	-0.07	0.59	0.49	-0.02	0.59
Transport	0.71	0.22	1.14	0.45	0.15	0.74	0.73	0.22	0.74
Health Service	0.42	-0.07	1.08	0.26	-0.04	0.68	0.44	-0.07	0.68
Education Service	0.94	0.45	1.60	0.62	0.32	1.04	0.98	0.47	1.04
Public Administration and Defence	1.69	1.20	2.34	1.20	0.90	1.62	1.77	1.26	1.62
Bank Insurance and Real estate	-0.39	-0.88	0.24	-0.24	-0.53	0.17	-0.41	-0.91	0.17
Hotel and Restaurant	0.57	0.08	1.05	0.36	0.07	0.68	0.59	0.08	0.68
Communication	-0.29	-0.78	0.30	-0.12	-0.42	0.27	-0.32	-0.82	0.27
Information Technology and ECom	1.09	0.60	1.69	0.77	0.48	1.16	1.14	0.63	1.16
Other Services	-0.16	-0.65	0.18	-0.11	-0.40	0.13	-0.17	-0.68	0.13
Services	**-0.66**	**-0.27**	**-0.24**	**-0.42**	**-0.16**	**-0.14**	**-0.69**	**-0.29**	**-0.14**

Note: VUL = value-added by unskilled labour, VSL = value-added by skilled labour and VK= value added by composite capital

Source: CGE simulation

6.3. Employment Effects of CGE Simulations: Link with Employment Satellite Matrix

The CGE simulation results are linked to the employment satellite matrix and the resultant employment effects are reported in Table 12.

Table 12: Employments effects of CGE Simulation

Sectors	Bangladesh-India FTA				Bangladesh-Malaysia FTA				BIMSTEC			
	Change in no. of employment		% change in no. of employment		Change in no. of employment		% change in no. of employment		Change in no. of employment		% change in no. of employment	
	UL	SL	UL	SL	UL	SL	UL	SL	UL	SL	UL	SL
Cereal Crop sectors	149993	3	1.14	0.03	124015	26	0.94	0.28	158404	5	1.20	0.05
Commercial crops	56687	10	1.75	0.64	33217	6	1.03	0.36	59404	11	1.83	0.68
Livestock Rearing	26334	572	1.27	0.16	16622	483	0.80	0.14	27301	582	1.31	0.16
Poultry Rearing	20852	542	1.33	0.23	13369	455	0.86	0.19	21704	567	1.39	0.24
Fishing	23637	2102	2.51	1.39	9960	591	1.06	0.39	24301	2141	2.58	1.41
Forestry	-8281	-2328	-1.96	-3.03	-4547	-1327	-1.07	-1.73	-8682	-2432	-2.05	-3.16
Agriculture	**269221**	**901**	**1.26**	**0.11**	**192636**	**234**	**0.90**	**0.03**	**282431**	**873**	**1.32**	**0.10**
Rice Milling	3028	1	1.22	0.11	2140	1	0.86	0.20	3117	0	1.25	0.10
Grain Milling	147	11	1.39	0.28	96	10	0.91	0.25	152	11	1.44	0.28
Food Process	2849	11	1.16	0.05	-1377	-257	-0.56	-1.22	2669	-13	1.09	-0.06
Leather Industry	2554	116	2.78	1.65	1471	65	1.60	0.93	2593	116	2.82	1.65
Jute and Yarn	17685	1468	9.63	8.43	8369	674	4.56	3.87	17269	1421	9.41	8.16
Cloth milling	6529	-24	1.00	-0.10	3084	-45	0.47	-0.19	5710	-64	0.88	-0.27
RMG	83147	7319	8.25	7.06	56657	5101	5.62	4.92	88352	7800	8.76	7.53
Knitting	8382	377	9.00	7.81	5405	247	5.80	5.10	8843	398	9.49	8.25
Toiletries	-1397	-207	-9.32	-10.31	-828	-123	-5.52	-6.14	-1856	-269	-12.38	-13.38
Cigarette Industry	1532	11	1.26	0.15	1012	12	0.83	0.17	1630	14	1.34	0.19
Furniture Industry	-13158	-476	-1.39	-2.47	12164	119	1.28	0.62	-20760	-637	-2.19	-3.30
Paper, printing & publishing	-6068	-2209	-6.77	-7.79	-3736	-1361	-4.17	-4.80	-6622	-2393	-7.39	-8.44
Pharmaceuticals	1317	120	2.41	1.29	945	98	1.73	1.06	1366	124	2.50	1.33
Fertilizer Industry	5115	1259	13.27	12.03	677	114	1.76	1.09	5200	1276	13.49	12.20
Petroleum	-31	-38	-0.41	-1.50	-24	-25	-0.33	-0.98	-25	-37	-0.33	-1.47
Chemical Industry	-4837	-742	-4.28	-5.32	-5429	-757	-4.80	-5.43	-5012	-769	-4.43	-5.52
Glass Industry	-108	-83	-1.89	-2.96	-88	-61	-1.54	-2.19	-123	-91	-2.15	-3.26
Earth-ware and clay industry	-5538	-100	-2.27	-3.34	-2708	-53	-1.11	-1.76	-5658	-103	-2.32	-3.43
Cement	-2455	-221	-6.62	-7.64	-1579	-142	-4.26	-4.89	-2758	-246	-7.43	-8.48
Metal	-11788	-2125	-6.19	-7.21	-6218	-1149	-3.26	-3.90	-12093	-2183	-6.35	-7.41
Miscellaneous Industry	-32255	-4666	-6.54	-7.56	-13284	-2058	-2.69	-3.33	-32419	-4711	-6.57	-7.63
Mining and Quarrying	-114	-26	-4.21	-5.26	-65	-15	-2.42	-3.06	-118	-27	-4.37	-5.46
Industry	**54537**	**-224**	**1.11**	**-0.06**	**56685**	**394**	**1.16**	**0.10**	**49458**	**-383**	**1.01**	**-0.10**
Construction	-62209	-3783	-4.28	-5.33	-36978	-2263	-2.54	-3.19	-64693	-3932	-4.45	-5.54
Electricity and Water	596	14	1.23	0.12	386	15	0.79	0.13	614	13	1.27	0.11
Gas Extraction & Distribution	47	-4	0.99	-0.12	34	1	0.71	0.04	49	-4	1.03	-0.12
Wholesale and retail trade	108901	316	1.55	0.44	69294	230	0.98	0.32	113162	328	1.61	0.45
Transport	58867	196	1.77	0.66	40151	161	1.21	0.54	61330	204	1.85	0.69
Health Service	922	1034	1.49	0.38	632	966	1.02	0.36	962	1088	1.55	0.40
Education Service	4970	9498	2.01	0.90	3423	7598	1.39	0.72	5205	10033	2.11	0.95
Public Administration & Def.	21759	1585	2.77	1.65	15471	1248	1.97	1.30	22805	1669	2.91	1.74
Bank Insurance and Real est.	1941	-941	0.67	-0.43	1508	-314	0.52	-0.15	2039	-962	0.70	-0.44
Hotel and Restaurant	11414	86	1.64	0.53	7844	75	1.13	0.46	11904	91	1.71	0.56
Communication	1045	-5	0.77	-0.34	868	0	0.64	-0.03	1082	-6	0.79	-0.35
IT and ECom	92	50	2.17	1.05	65	41	1.54	0.87	96	53	2.27	1.11
Other Services	32619	-541	0.90	-0.20	23645	-31	0.65	-0.01	34059	-551	0.94	-0.21
Service	**180963**	**7506**	**1.02**	**0.35**	**126341**	**7727**	**0.71**	**0.36**	**188614**	**8024**	**1.07**	**0.38**
Total	**504721**	**8182**	**1.15**	**0.25**	**375663**	**8355**	**0.85**	**0.26**	**520503**	**8514**	**1.18**	**0.26**

Note: UL = unskilled labour, SL = skilled labour

Source: Employment Satellite Matrix

Table 12 suggests that total employment of unskilled and skilled labour would rise under all three scenarios and the magnitudes of the rise in employments are much higher under the CGE simulations than those under the multiplier model. The largest impact on total employment would be under the BIMSTEC scenario, where there would be additional employment of 520503 unskilled and 8514 skilled labours. Which means, under this scenario, the employment of unskilled and skilled labour would rise by 1.18 percent and 0.26 percent respectively over their base numbers. The major rise in employment would come from agriculture and services sectors. The impacts on employment under the Bangladesh-India FTA scenario would be similar but relatively smaller in magnitude compared to those under the BIMSTEC scenario. The Bangladesh-Malaysia FTA would generate the lowest impact on employment.

It is also interesting to observe that under all three simulations, the rises in employment of the unskilled labour are much higher than those of the skilled labour. This reason behind such impact is that the fall in the wage rate of unskilled labour would larger than the fall in wage rate of skilled labour under all three scenarios. This would lead to some substitution of skilled labour by unskilled labour in the production sectors. This suggests that the production method will be more unskilled labour intensive because of these FTA scenarios.

VII. POLICY IMPLICATIONS AND CONCLUSION

The analysis of the macro impacts of the FTA scenarios suggest that such bilateral and regional FTAs would be beneficial for Bangladesh in terms of impact on consumer prices, exports, real wages and employment. At the sectoral level, a number of export oriented sectors would gain from such FTAs. However, the sectoral level impacts also suggest that a large number of sectors would experience fall in production because of large inflow of imports, which will result in loss in employment in these sectors. Therefore, these FTAs have important sectoral implications in terms of production, exports, import and employment. It however appears that at the aggregate level employment would rise which would mean that the loss in employment in some sectors will be more than compensated by rise in employment in other sectors. Therefore, the net effect on employment is likely to be positive. It should however be mentioned that there might be some important costs for such adjustments of employment at the sectoral level. Our CGE analysis could not capture such adjustment costs. But, in reality, such adjustments costs could be big. Therefore, the policy makers should be aware of such adjustment costs and find ways to mitigate them.

It is important to note that in the WITS/SMART simulation, in the multiplier simulation or in the CGE simulation there has been no consideration of sensitive lists of the FTA scenarios. The sensitive list in the FTAs covers the list of the products which will be out of tariff liberalisation. All three FTA scenarios are likely to have important sensitive lists. For

example, currently India holds a sensitive list of 480 products for the imports from LDCs and Bangladesh's sensitive list in the SAFTA includes 1254 products for non-LDCs and 1249 products for LDCs.[5] No final negotiation has been taken place with respect to the size of sensitive lists under Bangladesh-India FTA, Bangladesh-Malaysia FTA and BIMSTEC; but it is clear that existence of such sensitive lists would hold back much of the prospects of the rise in market access Bangladesh's products in its partner countries. Raihan (2011) shows that at the 6 digit HS code level Bangladesh exports 403 products to India. Under an FTA agreement with India, Bangladesh's exports to India would rise by around 45 percent from the base and top 50 products would comprise around 92 percent of the rise in exports. Under India's new sensitive list for LDCs 10 products of Bangladesh out of these 50 top products would not receive any tariff preferences. This suggests that India's sensitive list would not restrict much of the potential of the rise in export from Bangladesh to India under such an FTA as far as the current pattern of trade is concerned. However, there are views from the garments manufactures in Bangladesh that, despite the fact that the current volume of export of garments from Bangladesh to India is very low and therefore they are not in the top 50 export items, there are much prospects of rise in exports in this category in the future if several non-tariff barriers are removed in India. Most of the garments and textile items (under HS codes 61 and 62) for which Bangladesh has comparative advantage are still in India's new sensitive list.

Also, if Bangladesh maintains a long sensitive list that would contain much of the prospects for the export sectors to access cheaper imported raw materials. On the other hand it is true that sensitive list would also help some sectors to enjoy protection, and, therefore, there would no loss in production and employment after forming an FTA. On the basis of this argument the case for maintaining a sensitive list in the FTA could be justified. However, it should be considered that prolonged protection may work against raising efficiency in the protected sectors and as a result consumers are likely to suffer because of high prices. It is therefore imperative for the policy makers to devise the sensitive list in such a way so that it remains a small list of products and it is time bounded.

There are also concerns about the Rules of Origin (RoO). In order to have a meaningful market access in India, other BIMSTEC region and Malaysia the RoO of the FTA agreements should be very liberal, simple, transparent, and remain the same for all products. Bangladesh, as a least developed country, will be unable to meet stringent RoO criteria. Therefore, in the FTA negotiation Bangladesh should pursue for liberal and simplified RoO for its export products.

There are also problems of non-tariff barriers (NTBs) for Bangladesh's export products as far as their market accesses in India, other BIMSTEC region and Malaysia are concerned. NTBs refer to the wide and heterogeneous range of policy interventions other than border tariffs

[5] These are at 6 digit HS code level.

that affect and distort trade of goods, services, and factors of production. For Bangladesh, NTBs are crucial in the context of intensifying its trade with partner countries under the said FTA agreements. One of the main reasons of SAFTA not being able to enhance intra-regional trade at the desired level is the presence of NTBs as SAFTA is yet to address the NTB issues directly. The NTBs, distorting exports from Bangladesh to her neighbouring countries, mostly have to do with standards, testing and certification procedures in food processing, textiles and other such areas. Other major NTBs faced by Bangladeshi exporters include licensing, classification of goods, custom valuation, countervailing duties. Besides the lack of trade facilitation is also acting as a NTB. Therefore, in order to make Bangladesh-India bilateral FTA, Bangladesh-Malaysia bilateral FTA and BIMSTEC effective the policy makers and negotiators of Bangladesh should negotiate hard with the partner countries with a view to minimising the presence of NTBs. To do away with the trade-impeding effects of NTBs, there should be mutual recognition agreements among respective organizations of Bangladesh and its trading partners. There is also a need for harmonization of TBT and SPS measures. It can further be argued that the accreditation bodies or agencies of partner countries may set up accreditation centres in Dhaka in collaboration with designated national Agency of Bangladesh to facilitate mutual cooperation with necessary capacity building under technical and financial assistance. Non-acceptability of conformity assessment certificates of any particular product, if and when arise, should be resolved by mutual cooperation programmes without restricting its trade. It is also important to note that non tariff measures (NTMs) and para-tariff measures (PTMs) not notified in WTO should be prohibited.

It should also be mentioned that the current status of inland transportation and road infrastructure is inefficient corrupt. Inland transportation suffers from such problems as illegal toll collection, bad road communication, congestion at river-ports, and frequent disruption in transportation due to political programmes and labour unrest. Inefficient and corrupt ports and inland transportation increase the cost of production substantially. Under this circumstance, many exporters find it extremely difficult to compete in the global market. The state of physical infrastructure is weak in Bangladesh. Poor infrastructure requires firms to devote more resources to such tasks as procuring inputs and getting their products to market. All this can undermine the competitiveness of exporting enterprises. There are two dimensions of poor infrastructure – one is the unavailability of a certain service or utility (such as telephone, water, electricity, roads and highways, etc.) and the other is the unreliability of the services provided. In Bangladesh there are problems on both fronts. Therefore, in order to reap the maximum benefit out the bilateral and regional FTA agreements, there is a need to improve the supply side capacity of the Bangladesh economy, which will require significant improvement of the physical infrastructure, reduction in cost of doing business, rise in labour productivity and improvement in economic governance.

REFERENCES

Alarcon, J.V. (2002), “Social Accounting Matrix-Based Modelling: Extension to Wellbeing and Environment and Computable General Equilibrium Models: Applications using the 1975 and 1980 Ecuador and Bolivian 1989 and 1997 SAMs”, Institute of Social Studies, The Hague, The Netherlands

ECA (2000), Economic Commission for Africa, “The Economic and Welfare Impacts of the EU-Africa Economic Partnership Agreements: The Analytical Methodology - the GTAP and SMART Models and related Databases,” 2000.

Hoekman, B. and Winters, L. A. (2005), "Trade and employment : stylized facts and research findings," Policy Research Working Paper Series 3676, The World Bank.

Jansen, M. and Lee, E. (2007), “Trade and employment: Challenges for Policy Research”. A joint ILO-WTO Study, Geneva, ILO/WTO.

Laird, S. and Yeats, A. (1986), “The UNCTAD Trade Policy Simulation Model: A Note on Methodology, Data and Uses,” UNCTAD Discussion Paper No. 19, Geneva, 1986.

Lee, E. (2005), “Trade Liberalization and Employment”, DESA Working Paper No. 5

Milner, C., Morrissey, O. and McKay, A. (2002), “Some Simple Analytics of the Trade and Welfare Effects of Economic Partnership Agreements: The Case of the EU-EAC”, mimeo, CREDIT, University of Nottingham.

Raihan, S. (2011), “Economic Corridors in South Asia: Exploring the Benefits of Market Access and Trade Facilitation”, Paper prepared for RIS, New Delhi under the Asian Development Bank RETA 6472

Annex 1: SAM based Multiplier Modules

The shift from a 'data' SAM structure to a SAM based Multiplier Module requires the introduction of assumptions and the separation of the SAM accounts into 'exogenous' and 'endogenous' components.

Table A1: General SAM Modular Structure

		1a-PA	**1b-CM**	**2-FP**	**3a-HH-OI**	**4-KHH-OI**	**5-ROW**	**TDD**
1a	PA		$T_{1a, 1b}$		0			$\mathbf{Y_{1a}}$
1b	CM	$T_{1b, 1a}$			$T_{1b, 3}$	$T_{1b, 4}$	$T_{1b, 5}$	$\mathbf{Y_{1b}}$
2	FP	$T_{2, 1a}$					$T_{2, 5}$	$\mathbf{Y_2}$
3	HH-IO	$T_{3, 1a}$	$T_{3, 1b}$	$T_{3, 2}$	$T_{3, 3}$		$T_{3, 5}$	$\mathbf{Y_3}$
4	KHH-OI	$T_{4, 1a}$			$T_{4, 3a}$		$T_{4, 5}$	$\mathbf{Y_4}$
5	ROW		$T_{5, 1b}$	$T_{5\,2}$	$T_{5, 3}$	0	0	$\mathbf{Y_5}$
	TSS	$\mathbf{E_{1a}}$	$\mathbf{E_{1b}}$	$\mathbf{E_2}$	$\mathbf{E_3}$	$\mathbf{E_4}$	$\mathbf{E_5}$	

Where: by definition $Y_i = E_j$ and **1 Production (1a PA** = Production Activities and **1b CM** = Commodities); **2 FP** = Factors of Production; **3 HH-IO** = Households and Other Institutions (incl. Government); **4 KHH-OI** = Capital Account Households and Other Institutions (incl. government); **5 ROW** = Rest of the World (Current and capital account). **Blank entries** indicate that there are no transactions by definition.

The separation is needed to gain entry into the system, allowing some variables within the SAM structure to be manipulated exogenously (via injection instruments) to assess the subsequent impacts on the endogenous accounts as well as on the exogenous accounts.

Generally, accounts intended to be used as policy instruments are classified as exogenous and accounts specified *a priory* as objectives (or targets) are classified as endogenous.

Three accounts are designated as endogenous accounts: *(1) Production (Production Activities and Commodities) account, (2) Factors of Production account, (3a) Households and Other Institutions (excl. the Government)*.

The exogenous accounts comprises *3a Government (expenditure, transfer, remittances); 4 Capital account of institutions (savings and demand for houses, investment demand, infrastructure and machinery and equipment); and* 5 ROW *transfers, remittances, export demand and capital.* The SAM Flows and the categorization into endogenous and exogenous accounts are shown below.

Table A2: Endogenous and Exogenous Accounts

		1a-PA	1b-CM	2-FP	3a-HH-OI	3b-Gov	4-KHH-OI	5-ROW	TDD
1a	PA		$T_{1a, 1b}$		0				$\mathbf{Y_{1a}}$
1b	CM	$T_{1b, 1a}$			$T_{1b, 3a}$	$T_{1b, 3b}$	$T_{1b, 4}$	$T_{1b,5}$	$\mathbf{Y_{1b}}$
2	FP	$T_{2, 1a}$						$T_{2, 5}$	$\mathbf{Y_2}$
3a	HH-OI			$T_{3a, 2}$	$T_{3a, 3a}$	$T_{3a, 3b}$		$T_{2, 5}$	$\mathbf{Y_3}$
3b	Gov	$T_{3b, 1a}$	$T_{3b, 1b}$		$T_{3b, 3a}$	$T_{3b, 3b}$		$T_{3a, 5}$	
4	KHH-OI	$T_{4, 1a}$			$T_{4, 3}$			$T_{4, 5}$	$\mathbf{Y_4}$
5	ROW		$T_{5, 1b}$	$T_{5, 2}$	$T_{5, 3a}$	$T_{5, 3b}$	$T_{5, 4}$	0	$\mathbf{Y_5}$
	TSS	$\mathbf{E_{1a}}$	$\mathbf{E_{1b}}$	$\mathbf{E_2}$	$\mathbf{E_{3a}}$	$\mathbf{E_{3b}}$	$\mathbf{E_4}$	$\mathbf{E_5}$	

Where Endogenous: **1 Production (1a PA** = Production Activities and **1b CM** = Commodities); **2 FP** = Factors of Production; **3a HH** = Households and Other Institutions (excl. Government); Where Exogenous: **3b** Government; **4 KHH-OI** = Capital Account of Households and of Other Institutions (incl. government); **5 ROW** = Rest of the World (Current and capital account). **Blank** entries indicate that there are no transactions by definition.

Table A3: Endogenous and Components of Exogenous Accounts

	PA	CM	FP	3a HH&OI	EXO	INCOME	Exogenous Accounts (EXO) used as injections Column Vectors
1a PA		$T_{1a\ 1b}$		0	X_{1a}	$\mathbf{Y_{1a}}$	$X_{1a} = 0$
1b CM	$T_{1b\ 1a}$			$T_{1b\ 3a}$	X_{1b}	$\mathbf{Y_{1b}}$	X_{1b} = Government Consumption Subsidies -Taxes + Exports + Gov. Investment (capital formation in infrastructure and machinery and equipment) + Gross Capital Stock formation
2 FP	$T_{2\ 1a}$				X_2	$\mathbf{Y_2}$	X_2 =Factor Remittances from ROW
3a HH&OI			$T_{3a\ 2}$	$T_{3a\ 3a}$	X_{3a}	$\mathbf{Y_{3a}}$	X_{3a} = Factor Remittances from ROW
3b-5 Leaks	L_{1a}	L_{1b}	L_2	L_{3a}	$L_{3b\text{-}5} = X_{3b\text{-}5}$	$Y_{3b\text{-}5}$	3b =Aid to Government from ROW
EXPN	$\mathbf{E_{1a}}$	$\mathbf{E_{1b}}$	$\mathbf{E_2}$	$\mathbf{E_{3a}}$	$\mathbf{E_{3b\text{-}5}}$		Where $\mathbf{E_i = Y_j}$
L_{1a} = Activity Tax					L_{3a} = Income Tax + Household Savings + Corporate Savings		
L_{1b} = Commodity Tax + Import Duty + Imports					$L_{3b\text{-}5}$ $X_{3b\text{-}5}$ and $Y_{3b\text{-}5}$ falls out of the model		
L_2 = Factor Remittances to ROW					Blank entries indicate that there are no transactions by definition.		

<u>Note on Injection</u>: For any given injection into the exogenous accounts X_i (i.e. instruments) of the SAM, influence is transmitted through the interdependent SAM system among the endogenous accounts. The interwoven nature of the system implies that the incomes of factors, institutions and production are all derived from exogenous injections into the economy via a multiplier process. Multiplier models may also be built on the input-output frameworks. The main shortcoming of the IO model is that the feedback between factor income generation (value added) and demand by private institutions (households) does not exist. In this case the circular economic flow is truncated. The problem can be partly tackled by endogenising household consumption within the I-O framework; this is typically referred to as a 'closed I-O model'. In this case, the circular economic flow is only partially truncated. A better solution is to extend the I-O to a SAM framework which captures the full circular economic flow.

SAM coefficient (Aij) are derived from payments flows by endogenous accounts to themselves (Tij) and other endogenous accounts as to the corresponding outlays (Ei = Yj); similarly, the leak coefficients (Bij) derived from flows reflecting payments from endogenous accounts to exogenous accounts. They are derived below.

Table A4: Coefficient Matrices and Vectors of the SAM Model

Account	1a - PA	1b – CM	2 – FP	3a - HH&OI	3b … 5 EXO	Income
1a – PA		$A_{1a,1b} = T_{1a,1b} / \mathbf{Y_{1b}}$			X_{1a}	$\mathbf{Y_{1a}}$
1b – CM	$A_{1b,1a} = T_{1b,1a} / \mathbf{Y_{1a}}$			$A_{1b,3a} = T_{1b,3a} / \mathbf{Y_{3a}}$	X_{1b}	$\mathbf{Y_{1b}}$
2 – FP	$A_{2,1a} = T_{2,1a} / \mathbf{Y_{1a}}$				X_2	$\mathbf{Y_2}$
3a - HH&OI			$A_{3a,2} = T_{3a,2} / \mathbf{Y_2}$	$A_{3a,3a} = T_{3a,3a} / \mathbf{Y_{3a}}$	X_{3a}	$\mathbf{Y_{3a}}$
3b … 5 Leaks	$B_{1a} = L_{1a} / \mathbf{Y_{1a}}$	$B_{1b} = L_{1b} / \mathbf{Y_{1b}}$	$B_2 = L_2 / \mathbf{Y_2}$	$B_{3a} = L_{3a} / \mathbf{Y_{3a}}$		
Expenditure	$\mathbf{E_{1a} = Y_{1a}}$	$\mathbf{E_{1b} = Y_{1b}}$	$\mathbf{E_2 = Y_2}$	$\mathbf{E_3 = Y_{3a}}$		

The multiplier analysis using the SAM framework helps to understand the linkages between the different sectors and the institutional agents at work within the economy. Accounting multipliers have been calculated according to the standard formula for accounting (impact) multipliers, as follows:

$\mathbf{Y} = A\,Y + \mathbf{X} = (I - A)^{-1}\,\mathbf{X} = M_a\,\mathbf{X}$

Where:

Y is a vector of incomes of endogenous variables

X is a vector of expenditures of exogenous variables

A is the matrix of average expenditure propensities for endogenous accounts

$M_a = (I - A)^{-1}$ is a matrix of aggregate accounting multipliers (generalized Leontief inverse).

Variations in any one of the exogenous account (i.e. in this case ΔX) will produce total impacts (ΔY) of endogenous entries via the multipliers.

The representation of economic structure of an economy as contained in a SAM is best understood by assessing the backward and forward linkage. To proceed with the analysis of multipliers and linkages it is necessary to calculate the matrix of technology coefficients (e.g. Leontief I-O technology coefficients). The inverse of the coefficient matrix after deducting for the identity matrix represents the so-called matrix of production multipliers.

Each of the columns of the matrix of accounting multipliers, as indicated before show the effects of each corresponding exogenous injection on the incomes of endogenous accounts. Analogously to the I-O model the sum total of a column or a row can be calculated and they will be equivalent to the backward and forward income or expenditure linkages. In SAM models within account sums of columns or rows is calculated for each of the four endogenous accounts as well as the total column and row sums of all the endogenous accounts taken together. The former can be called “partial backward or forward linkages” or within account backward or forward linkages and the latter “total backward or forward linkages". Partial backward linkages can also be named after their corresponding account multipliers such as backward and forward linkages for production, factors, and households[5.] Therefore in conclusion we can say that the basic idea of backward linkages is to trace the output increases which occur in supplying sectors or accounts when there is a change in the sector or account using their outputs as inputs, just as with forward linkages we trace the output increases which occur or might occur in using industries or accounts when there is a change in the sector or account supplying inputs[6.]

Calculated Backward and Forward Linkages from SAM based Multiplier Model

	Backward Linkage	**Forward Linkage**
Activity		
Cereal Crop sectors	11.3306441	25.5147105
Commercial crops	10.8513271	12.9238707
Livestock Rearing	11.516938	8.02960553
Poultry Rearing	12.0829671	8.58354803
Fishing	12.1329319	15.5638405
Forestry	11.6593762	6.26193988
Rice Milling	12.1273663	24.7054133
Grain Milling	11.9476909	5.26577117
Food Process	10.7673644	13.8284524
Leather Industry	11.8095484	4.05543968
Jute and Yarn	10.8493113	1.81586976
Cloth milling	10.7465313	7.8569688
Woven RMG	11.0978693	3.86750627
Knitting	10.6146316	3.00768112
Toiletries	6.14298765	1.57993207
Cigarette Industry	6.56284304	4.79017583
Furniture Industry	10.6891436	3.03811148
Paper, printing and publishing Industry	9.16467155	1.68760391
Pharmaceuticals	8.68398188	3.92194101

[5] The interpretation of partial (within account) backward and forward linkages within a SAM framework is also similar to that of I-O models. Although the sum of all the elements, in any column (row) of the accounting multipliers matrix, could be read as the backward (forward) linkages of the expenditure-injection multipliers, the interpretation in SAM is not so straight forward because the linkages are composites of the effects of several kinds of accounts.

[6] Bulmer–Thomas, V, (1982),“Input–Output Analysis in Developing Countries”, John Wiley & Sons Ltd., New York.

Fertilizer Industry	10.9976198	1.46608237
Petroleum	4.16184768	2.72052968
Chemical Industry	9.59976244	2.00441609
Glass Industry	10.3575646	1.9631831
Earth-ware and clay industry	11.0349898	2.36201403
Cement	11.6256462	2.91022483
Metal	11.3306136	5.98376065
Miscellaneous Industry	10.6537913	4.90937229
Construction	11.2768427	2.41381409
Electricity and Water Generation	8.87917562	3.98948534
Gas Extraction and Distribution	10.350345	2.44266977
Mining and Quarrying	11.2942285	4.55251641
Wholesale and retail trade	10.2662112	32.4088886
Transport	10.4682307	20.1949517
Health Service	10.659773	7.66138776
Education Service	10.5952403	4.67990272
Public Administration and Defense	10.9803236	2.80961952
Bank Insurance and Real estate	10.7278002	5.09276837
Hotel and Restaurant	12.1286086	5.08480482
Communication	9.37055653	5.66473337
Information Technology and E-Commerce	10.7858089	2.06377363
Other Services	10.6569633	33.1398236
Commodity		
Cereal Crop sectors	11.7577797	25.8201476
Commercial crops	9.50178471	15.2191365
Livestock Rearing	12.5156209	7.03040955
Poultry Rearing	13.0022033	7.63457837
Fishing	13.1213379	14.5777709
Forestry	12.6593762	5.26193988
Rice Milling	12.9708495	24.0153574
Grain Milling	12.9319487	4.27139914
Food Process	9.16694413	16.9131342
Leather Industry	12.2306304	3.21294189
Jute and Yarn	5.56503583	1.9390045
Cloth milling	9.53407738	8.63463341
Woven RMG	10.7162847	3.2752447
Knitting	11.4768703	2.03408029
Toiletries	3.48376421	1.43432115
Cigarette Industry	7.44342535	3.86042015
Furniture Industry	8.88534977	2.76280278
Paper, printing and publishing Industry	3.76777346	2.27679905
Pharmaceuticals	8.3057027	3.47318853
Fertilizer Industry	3.4919221	2.05696506
Petroleum	1.76682719	9.33793501
Chemical Industry	2.77156811	5.44272376
Glass Industry	8.40115618	1.34792875
Earth-ware and clay industry	10.5565787	1.5727188
Cement	11.9738209	2.02368877
Metal	10.8920337	5.70853962
Miscellaneous Industry	4.71951584	11.1975962
Construction	12.2039859	1.42300779
Electricity and Water Generation	9.17212501	3.24813501
Gas Extraction and Distribution	11.350345	1.44266977
Mining and Quarrying	12.2237341	3.57482918

Wholesale and retail trade	11.2662112	31.4088886
Transport	9.8374879	22.7369116
Health Service	11.659773	6.66138776
Education Service	11.5952403	3.67990272
Public Administration and Defense	10.6939481	2.04975389
Bank Insurance and Real estate	10.3437442	4.69901575
Hotel and Restaurant	13.1286086	4.08480482
Communication	10.1935661	4.75453675
Information Technology and E-Commerce	11.0264985	1.14433359
Other Services	11.5189259	32.5615869
Value-Added		
VA Labour Unskilled	10.4843233	36.2124331
VA Labour Skilled	9.68835773	37.9873437
VA Capital	9.25140458	66.4384532
VA Land	9.13266641	12.1476471
Households		
Rural Landless	11.4175525	10.1380701
Rural Marginal Farmers	10.3427284	9.70752861
Rural Small Farmers	10.1421592	17.5736425
Rural Large Farmers	5.79657962	16.2937773
Rural Non Farm	10.2832112	51.0081576
Urban Low Education	9.34924372	16.2617778
Urban High Education	7.40113968	29.702705

Source: Multiplier Model

Annex 2: Mapping and Classification Scheme

Activity-Commodity 41	Activity-Commodity 86
Cereal Crop sectors	Paddy Cultivation, wheat Cultivation, Other Grain Cultivation
Commercial crops	Jute Cultivation, Sugarcane Cultivation, Potato Cultivation, Vegetable Cultivation, Pulses Cultivation, Oilseed Cultivation, Fruit Cultivation, Cotton Cultivation, Tobacco Cultivation, Tea Cultivation, Spice Cultivation, Other Crop Cultivation
Livestock Rearing	Livestock Rearing
Poultry Rearing	Poultry Rearing
Fishing	Shrimp Farming, Fishing
Forestry	Forestry
Rice Milling	Rice Milling
Grain Milling	Grain Milling
Food Process	Fish Process, Oil Industry, Sweetener Industry, Tea Product, Salt Refining, Food Process
Leather Industry	Tanning and Finishing, Leather Industry
Jute and Yarn	Baling, Jute Fabrication, Yarn Industry
Cloth milling	Cloth Milling, Handloom Cloth, Dyeing and Bleaching
RMG	RMG
Knitting	Knitting
Toiletries	Toiletries
Cigarette Industry	Cigarette Industry, Bidi Industry
Furniture Industry	Saw and Plane, Furniture Industry
Paper, printing & publishing	Paper Industry, Printing and Publishing
Pharmaceuticals	Pharmaceuticals
Fertilizer Industry	Fertilizer Industry
Petroleum	Petroleum
Chemical Industry	Basic Chemical, Chemical Industry
Glass Industry	Glass Industry
Earth-ware and clay industry	Earthware Industry, Clay Industry
Cement	Cement
Metal	Basic Metal, Metal Manufacturers
Miscellaneous Industry	Machinery and Equipments, Transport Equipments, Miscellaneous Industry
Construction	Urban Building, Rural Building, Power Plant Building, Rural Road Building, Port Road Railway Building, Canal Dyke Other Buildings
Electricity and Water	Electricity and Water
Gas Extraction & Distribution	Gas Extraction & Distribution
Mining and Quarrying	Mining and Quarrying
Wholesale and retail trade	Wholesale trade, retail trade
Transport	Air Transport, Water Transport, Land Transport, Railway Transport, Other Transport
Health Service	Health Service
Education Service	Education Service
Public Administration & Def.	Public Administration & Def.
Bank Insurance and Real est.	Bank Insurance and Real est.
Hotel and Restaurant	Hotel and Restaurant
Communication	Communication
IT and ECom	IT and ECom
Other Services	Housing Service, Professional Service, Entertainment, Other Services