EXPLORING THE LINKS BETWEEN TRADE REFORMS AND HOUSEHOLD INCOME DISTRIBUTION IN SOUTH ASIA: A GENERAL EQUILIBRIUM APPROACH

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Abstract

Trade reforms in South Asia have been often associated in the popular debate with increases in income inequality and poverty. This creates a growing interest to investigate the link between trade liberalization, poverty and income distribution. This paper provides a quantitative assessment of the likely implications of trade liberalisation in South Asian economies, and in particular the impacts on the household sector. A multi-country computable general equilibrium model (CGE) was constructed by incorporating a multiple household framework into the Global Trade Analysis Project (GTAP) model. The database consists of household survey data of the respective South Asian economies and the version seven of the GTAP database which reflects the 2004 world economy. The study examines the effects of reductions in import tariffs under the SAFTA on the welfare and the income distribution of socio-economic household groups and the implications for government revenue in the respective South Asian economies. The results indicate that although the short-run household gains are limited, in the long-run there is a reallocation of resources from manufacturing to agricultural sectors. Benefits accrue to unskilled rural household labour and to skilled labour in urban households. However, trade liberalisation would lead to reductions in government revenue in all South Asian countries, which in turn may affect the overall welfare of the citizens in those economies.

Keywords*: Multi-Country Computable General Equilibrium (CGE) model, Poverty, Trade liberalization.*

JEL Classifications: F15, F 13, F47, H31, H60.

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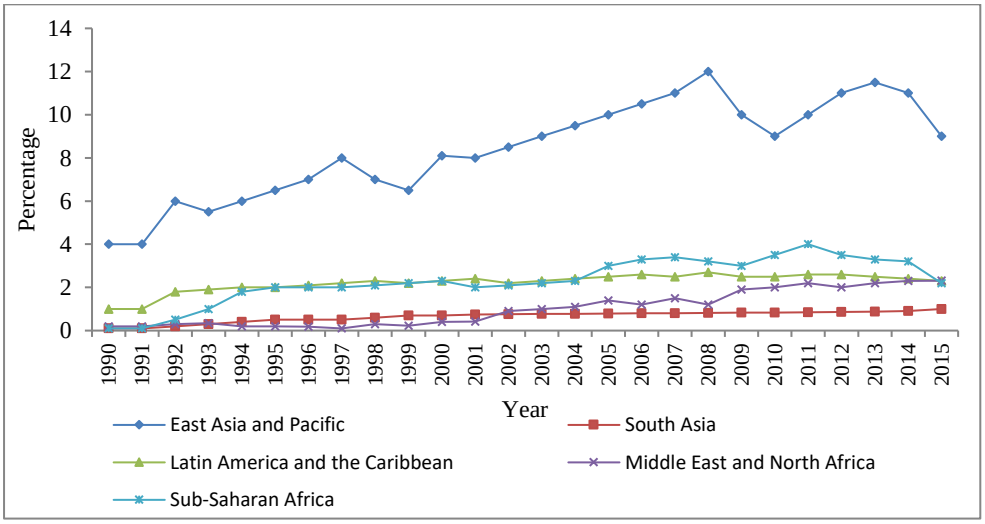
INTRODUCTION

The South Asian Association for Regional Cooperation (SAARC) was established in 1985 by seven countries, viz. Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka, Afghanistan became the eighth member in 2005. In 1993, the member countries decided to liberalise trade under successive rounds of tariff concessions with the ultimate objective of establishing a free trade agreement (FTA). The launch of South Asian Preferential Trade Agreement (SAPTA) in 1995 was the first major political breakthrough for the SAARC as it was the initial regional agreement on economic cooperation in South Asia (Sawhney & Kumar, 2008). The SAPTA was replaced by the South Asian Free Trade Agreement (SAFTA) which was signed on January 6, 2004 at the 12th SAARC Summit held in Islamabad. The treaty came into force on January 1, 2006, with expectations of be full implementation of the treaty by December 31, 2015. One of the main objectives of forming SAFTA is to strengthen intra-SAARC economic cooperation by decreasing tariff and nontariff barriers (NTBs) and structural impediments to free trade. The agreement binds all contracting states to reduce tariffs to 0-5 per cent by December 31, 2015.

However, the progress of cooperative efforts among the South Asian nations has been rather slow and South Asia's intra-regional trade as a share of regional Gross Domestic Product (GDP) has remained low in comparison with the other regions (see Figure 1 below).

Figure 1: Intra-regional Trade as a Share of Regional GDP



Source: World Bank. (2018). *A Glass Half Full: The Promise of Regional Trade in South Asia*, South Asia Development Forum.

The failure of SAFTA to date to raise the level of intra-regional trade to a satisfactory level may be attributable to numerous reasons such as; imposing restrictive rules of origin, the inclusion of long sensitive-item lists, poor trade facilitation and, political conflicts between India and Pakistan. The extensive sensitive item lists declared by the member countries raise the question as to whether countries are really concerned about free trade. Almost all of the South Asian countries (except Afghanistan and Bhutan) are members of the World Trade Organisation (WTO) which requires that preferential trading agreements free "substantially all trade" between member states where "substantially all" is interpreted as 85% (United States Agency for International Development Research Group, 2005). Therefore, it seems the South Asian countries should initiate steps to minimise their impediments to free trade.

South Asia is one of the poorest regions in the world. Hence, an important question is whether full implementation of the SAFTA would enhance the level of welfare and improve household income distribution in the region. In considering the economic impacts of the FTA, this paper examines how SAFTA may affect broader socio-economic groups in the region, particularly with regard to household income distribution in both the short run and the long run. This will provide policymakers with information on the overall costs and benefits of full SAFTA implementation and on the areas where appropriate policy interventions may be required. In recent years Computable General Equilibrium (CGE) models have been widely used to address the impacts of trade liberalisation in developing economies as they are able to incorporate various channels through which trade reforms affect different groups in society (Gilbert, 2008). In this paper a multi-country CGE model, for South Asia is formulated, based on the Global Trading Analysis Project (GTAP), which links the major South Asia trading partners with the rest of the world.

The structure of the paper is as follows. Section two reviews the existing CGE studies relating to trade liberalisation and poverty. A brief overview of the South Asian economies is presented in Section three. The structure of the model and the database development and experimental design are illustrated in Section four. Section five presents the results and the discussion. Concluding comments are provided in Section six.

TRADE LIBERALISATION AND POVERTY: A SURVEY OF LITERATURE

The correlation between trade liberalisation and poverty has received considerable attention in recent years. However, there have been difficulties in establishing precise links between trade reforms and their impacts on poverty. One reason is that trade reforms affect individuals in diverse ways including employment, redistribution of resources, change in prices of consumer goods, and changes in government revenues and expenditure (Winters, 2004). The neoclassical theoretical models on international trade support the argument that trade liberalisation stimulates long run growth and reduces income disparities across countries. There is no suggestion that trade liberalisation is harmful for growth (Fiestas, 2005). The classic link between trade and income distribution was put forward by the Heckscher-Ohlin (H-O) model in the 1930s and the

Stolper-Samuelson theorem (S-S) in the 1940s. The H-O theory predicts that trade will increase the returns to the abundant factors in an economy (Gerber, 1999). The implication of this is that for unskilled-labour-abundant countries such as South Asia, trade should raise the incomes of low-skilled workers, thus leading to poverty reduction. It is, however, argued that the benefits of trade may not be uniformly spread across different groups in the economy for a number of practical reasons.

Different empirical approaches, using single country and cross country data, have been undertaken to gain greater insights into the relationship between trade liberalisation and poverty. Reimer (2002) noted that much of the research on trade liberalisation and poverty focused on the consumption side of the trade-poverty relationship. Reimer proposed four main approaches that could be used to analyse the trade-poverty relationship namely; cross country regression, partial equilibrium or cost of living analysis, general equilibrium models based on Social Accounting Matrix (SAM) and micro-macro synthesis.

Dollar and Kraay (2004) used cross country regression analysis to determine if free trade accelerates economic growth. They were able to establish a positive link between changes in trade volume and growth rates. Partial equilibrium analysis can be used to obtain an estimate of the impact of a change in the economy and does not require the complete solution of a new equilibrium system (Whalley, 1975b). These models use household expenditure data to measure poverty and most of the studies are regarded as micro-simulation models where analysis is based on the behaviour of individual households, as opposed to representative households. The partial equilibrium approach is limited to a particular industry or to a single factor, such as labour. Hence, the approach is limited in its scope to analyse the economy wide impacts of trade liberalisation on poverty and income distribution. For this reason most economists favour general equilibrium analysis in addressing poverty issues in developing countries.

CGE models are generally based on neoclassical theories where households, firms and the other economic agents behave optimally to achieve equilibrium in the economy. For instance, the models can be built as single country or multi-country models, based on a geographical focus (global or regional), sectoral focus (single sector/multiple sectors) and can be static (counterfactual analysis) or dynamic (models that allow the determination of a time path by which a new equilibrium is reached). Models can also be built according to the level of household disaggregation required for analysis. Applications of CGE models in poverty analysis can be classified into three main categories, depending on how households are integrated into the CGE model (Sothea, 2009). They are; the standard Representative Household (RH) approach, the Extended Representative Household approach (ERH), and the Micro-Simulation (MS) approach.

CGE models with RH approach are designed by disaggregating the household sector into several groups assuming that a representative agent from a particular group will constitute the behaviour of the whole group (Naranpanawa, 2005). Accordingly, in the RH approach, poverty analysis is undertaken by using the fluctuations in expenditure or income levels of the RH, which are generated by the model in conjunction with the household survey data. Sothea (2009) pointed out that the RH approach is a traditional

method and easy to implement. However, the main limitation of this model for income distribution and poverty analysis is that there are no intra-group income distribution changes because of the single-representative household aggregation.

According to the ERH approach, distributive impacts are easily captured by extending the disaggregation of the representative households in order to identify as many household categories as possible corresponding to different socio-economic groups. For the past 20 years, MS models have been increasingly applied in qualitative and quantitative analyses of economic policies. Bourguignon and Spadaro (2006) point out that the MS technique is useful in analysing economic policies in two ways. Firstly, this method fully takes into account the heterogeneity of the economic behaviour agents (e.g. households) observed in micro data unlike RH or ERH methods which only work with typical households (actual/real households) or typical economic agents. Dixon et al. (1995) and Meagher (1996) incorporated a MS model with a partial equilibrium framework in the 1980s and others have subsequently attempted to use MS models by fully integrating households into a CGE model (Cogneau & Robilliard, 2001; Decaluwé et al., 1999; Cockburn, 2001; Savard, 2004; Bourguignon & Spadaro, 2006). The use of CGE models, complemented with household survey data, is now recognised as well-suited to identifying the mechanisms by which macro-economic shocks affect poverty and income distribution (Winters et al., 2004; Hertel & Reimer 2005). While most authors have attempted to develop static MS models, a few have developed dynamic MS models (e.g. Selim, 2010).

The majority of multi-country CGE models have used well known databases and modelling software for developing global multilateral general equilibrium trade models through the GTAP. However, the GTAP database is limited to one representative household and therefore its use for poverty impact analysis is crucially dependent on the quality of the database extension for such analysis (Evans, 2001). Hertel et al. (2003) used the GTAP model to analyse the impact of multilateral trade liberalisation on household earnings in developing countries by integrating household strata according to income specialisation. By stratifying households according to earnings specialisation, they were able to capture the diverse trade policy impacts while maintaining the analytical flexibility and comparability across countries.

In addition to the approaches mentioned above, multi-country models have been developed to analyse the links between trade reforms and household income distribution. One such example is the global model developed by Ezaki and Nguyen (2008) to investigate the impact of regional economic integration in East Asia on household income and poverty. The results indicate that East Asian Free Trade Agreements (FTAs) have positive effects on growth with improvements in income distribution and poverty reduction (the results for China were exceptional). Gilbert and Oladi (2010) formulated a CGE model to assess the potential impact of trade reforms under the Doha Development Agenda on the economies of South Asia, and compared the results with a potential regional trade agreement (SAFTA). The structure of the model they built is similar in many respects to the GTAP model. The results suggest that the distributional impacts of

trade reforms in South Asia are not likely to be biased against the rural poor in many of the economies.

Based on the review above it is clear that multi-country or global CGE models are the most favoured approach to analyse the issue of trade liberalisation on household income distribution and poverty. This is because these types of models offer a complete structure in which to simulate the general impact of trade liberalisation on a national economy in both short run and long run perspectives. These models are also more suitable for analysing the impacts of multilateral trade liberalisation, or the formation of custom unions etc., on a particular country as the model can link major trading partners with the rest of the world (Naranpanawa, 2005). Hence, multi-country models are able to provide a more realistic assessment of the impacts of trade liberalisation than single country models. Therefore, in this paper a multi-country CGE model for South Asia (SAMGEM) is formulated, based on the GTAP model and by disaggregating the household sector in the South Asian economies.

South Asian Output, Trade and Poverty Patterns: Key Characteristics of the South Asian Economies

The World Development Report in 2017 indicated that the region has about 23% of the world's population and 15% of the world's arable land, but only about 2.7% of global Gross Domestic Product (GDP), 1.8% of world trade, and less than 4% of world foreign investment flows. Table 1 displays the key economic indicators of the South Asian Economies. The South Asian region is tremendously diverse in terms of country size, economic and social development, geography, political systems, languages, and cultures.

The region consists of a single large country, India, surrounded by a number of medium and small nations including Pakistan, Afghanistan, Bangladesh, Nepal, Bhutan, Sri Lanka and Maldives. India's dominance is obvious, accounting for more than 79% of the region's GDP and 73%of its population in 2017. It also commands a leading position in international trade while having relatively low trade openness (35.5%) with the rest of the world. The World Bank classifies India, Sri Lanka, Maldives and Bhutan as lower middle-income countries (LMC) and the other four South Asian countries as low-income countries (LIC).

Among the member countries, Bangladesh, India, and Pakistan, which account for 95% of the region's population, the range of per capita income was narrower: US$ 585 in Afghanistan, US$ 1547 in Pakistan, US$ 4065 in Sri Lanka and US$ 1939 in India. Today, South Asia as a region is generally characterised by low per capita incomes, a high incidence of poverty and poor infrastructure.

Trends in Economic Growth and Sectoral Composition of GDP

According to the Asian Development Outlook, 2017 it is noticed that, despite the slight fall in developing Asia's growth forecast overall, the South Asia's economic growth remains impressive over the period of 2000-2017.

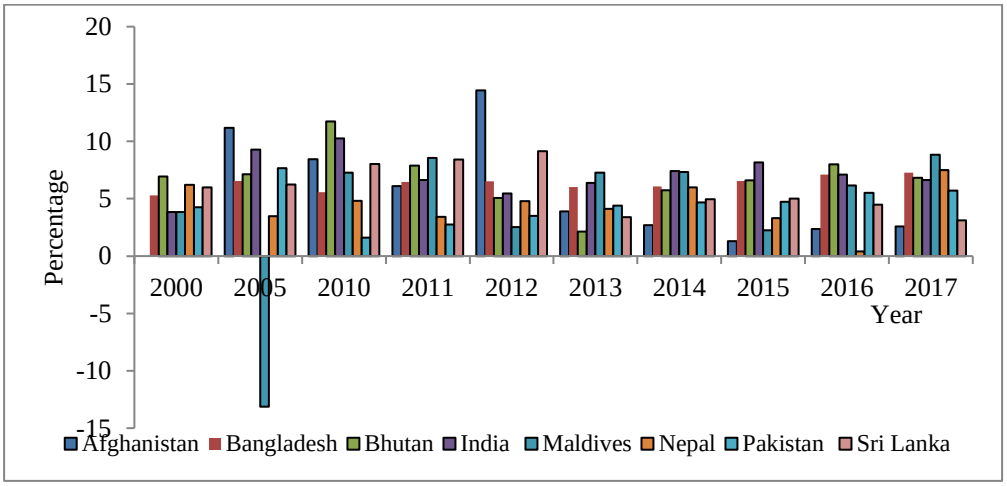
Table 1: Economic Indicators of South Asian Countries -2017

	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Land Area ('000 sq km)	652.86	130.17	38.12	2973.19	0.30	143.35	770.88	62.71
Population (million)	35.53	164.67	0.807	1339.18	0.436	29.30	197.015	21.44
Rural Population (% of total population)	74.75	64.14	59.83	66.4	60.62	80.66	63.55	81.61
Poverty headcount ratio at national poverty lines (% of population)		24.3	8.2					4.1
GDP (US$ billion)	20.81	249.72	2.51	2597.49	4.59	24.47	304.95	87.17
GDP per capita (US$)	585.85	1516.51	3110.23	1939.61	10535.79	835.07	1547.85	4065.22
Real GDP growth (%)	2.3	6.2	6.3	6.1	-3.1	5.3	2.0	6.0
Distribution of GDP (%)								
- Agriculture	20.96	13.41	15.18	15.45	5.88	27.03	22.88	7.70
- Industry	21.70	27.75	39.04	26.15	9.69	13.47	17.94	27.20
- Manufacturing	11.30	17.30	7.13	14.99	2.01	5.21	11.98	18.51
- Services	53.01	53.47	39.25	48.93	70.73	51.53	53.09	55.77
Total Exports (US$ million)	1342.63	37548.75	654.10	490079.4	3347.16	2388.02	25114.13	19116.94
Total Imports (US$ million)	9544.68	50613.76	1205.47	565594.9	3567.59	10282.29	53527.25	25402.51
Current Account Balance (US$ million)	-4683.1	-6364.81	-546.13	-39072.6	-876.4	-815.32	-15818	-2309.38
Current Account Balance (% GDP)	-22.49	-2.54	-21.74	-1.50	-19.06	-3.33	-5.18	-2.64
Merchandise Trade (% of GDP)	40.73	35.55	63.29	28.70	58.55	45.97	26.00	36.92
Foreign Direct Investment (% of GDP)	0.25	0.86	-0.65	1.53	11.25	0.80	0.92	1.57
Inflation, GDP Deflator (%)	4.87	6.27	7.54	2.99	0.03	7.58	4	8.24
Unemployment Rate (%)	8.83	4.36	2.43	3.52	4.99	2.73	4.04	4.07
Gross Savings (% of GDP)	18.09	35.23	24.88	32.09	5.28*	44.36	20.10	33.89

Source: World Bank, World Bank Statistics 2017 *Maldives (International Monetary Fund)

From 2000 to 2017, the region's GDP grew at about 6% annually – nearly twice the rate of the world economy (World Trade Organisation, 2017). Increased globalisation and the opening up of South Asian markets to the rest of the world were important features, particularly since 2000, and contributed to the higher growth rates in the region. Figure 2 illustrates the trends in economic growth rates of the South Asian countries from 2000 to 2017.

Figure 2: **GDP Growth Rates in South Asia: 2000-2017**



Source: World Bank, World Development Indicators Data Base, 2017

In 2012, GDP growth in South Asia accelerated to 8.6% per annum, higher than Southeast Asia's 5.6% and slightly below East Asia's 10.4% (World Bank Database, 2012). Although India's growth was a dominant factor in the high average GDP growth rate of South Asia, other South Asian countries, with the exception of Maldives, also experienced relatively higher GDP growth (exceeding 5.0%) in 2012. However, GDP growth has slowed down in certain countries such as Sri Lanka in 2017 due to change in the government policy in economic activities in the country.

Table 2: Trends in Sectoral Composition of Gross Domestic Product of SAARC Nations

Country	Agriculture as % of GDP			Manufacturing as % of GDP			Services as % of GDP		
	1990	2000	2016	1990	2000	2016	1990	2000	2016
Bangladesh	30	22	14	13	14	17	46	50	53
India	27	21	16	17	16	15	34	41	48
Nepal	49	38	29	6	9	5	30	34	50
Pakistan	23	24	23	15	13	12	43	47	52
Sri Lanka	26	20	7	13	15	18	46	52	57
South Asia	27	22	16	16	16	15	36	42	49

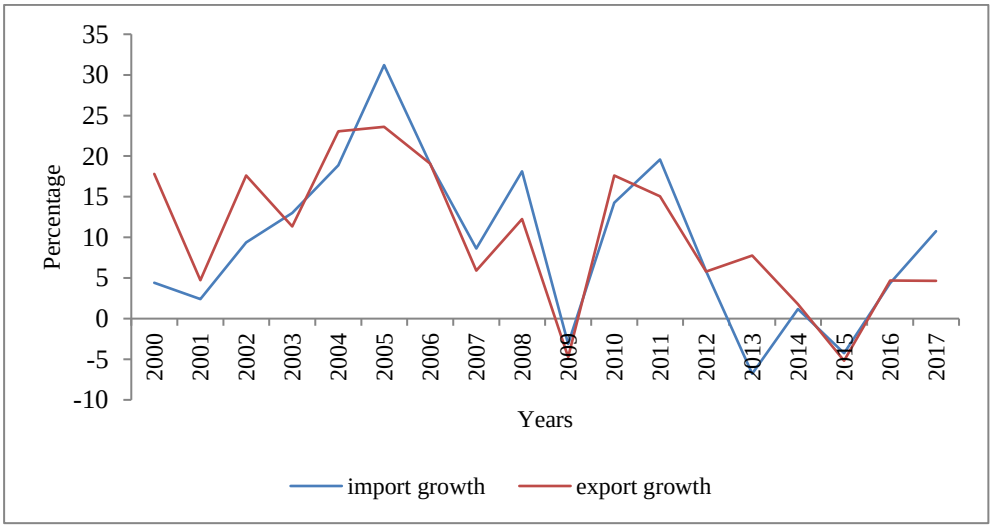
Source: World Bank, World Development Indicators Data Base, 2017

Table 2 above illustrates the trends in sectoral composition of GDP in South Asia from 1990-2016. What is immediately noticeable is the remarkable increase in the service sector in all South Asian economies over the period. Although the share of agriculture to GDP declined from 27% in 1990 to 16% in 2016, it is worth noting that the agricultural sector continues to play a very important role in South Asia as nearly 55% of the labour force is engaged in this sector in South Asia (World Bank, 2017).

Trends in External Trade and Average Tariff in South Asia

South Asia was a relatively protected region in the 1950s, with countries imposing high tariff barriers to foster industrial development through import-substitution policies. By the early 1990s, however, all of the countries within the region had begun implementing liberalisation policies, and six of the South Asian countries namely; Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka remain committed to freer multilateral trade as World Trade Organisation (WTO) members. Consequently, South Asian international trade has grown rapidly since the 1990s. The growth rates in exports and imports dropped sharply in 2009 due to world economic crisis started in USA. Figure 3 illustrates the growth in exports and imports in South Asia over the period 2000-2017.

Figure 3: Exports and Imports Growth in South Asia: 2000-2017

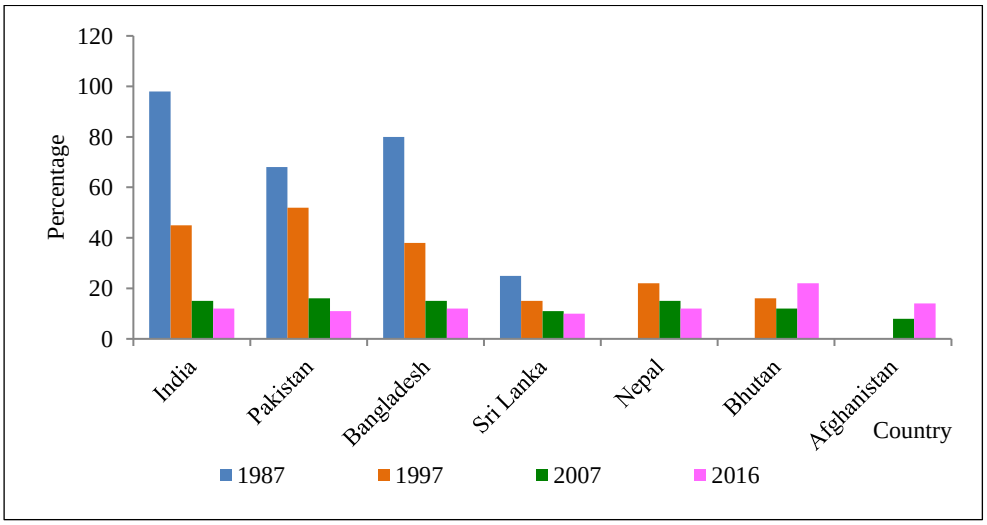


Source: World Bank, Database (2017)

After a long period of experiencing import substitution industrialisation, most South Asian economies started to dismantle their protective tariffs in late 1980s. Sri Lanka was the pioneer in the South Asian trade liberalization in the late 1970s. Figure 4 illustrates a sharp decline in tariffs that took place in the region between 1987 and 2016 and most of the tariff reduction took place around 2007. Tariffs in the largest economies in the region averaged 98.8% (India), 81.8% (Bangladesh) and 68.9% (Pakistan) in 1987. It is noticed that simple average tariff in Sri Lanka had been reduced close to 10% by 2016. The World

Bank (2018) pointed out that trade liberalisation in South Asia has not been smooth. Several countries in South Asia have implemented trade reforms over the last two decades; Bangladesh in the late 1990s and Pakistan and Sri Lanka after the global financial crisis in the late 2000s. The World Bank (2018) indicates that, despite the trade reforms, tariffs in South Asian economies are still higher compared with those in other regions. In 2016, the simple average tariffs in South Asia was 13.6%, which is more than double the world average (6.3%) and the highest among major regions in the world. For instance, the simple average tariffs in North America is 2.7%; Europe and Central Asia, 4.3%; East Asia and Pacific, 7.3%; Latin America and Caribbean, 7.4% and Sub-Saharan Africa, 11.4%. This clearly demonstrates that, it is important for South Asian economies to initiate steps to further liberalise their economies.

Figure 4: Simple Average Tariffs in South Asia: 1987-2016



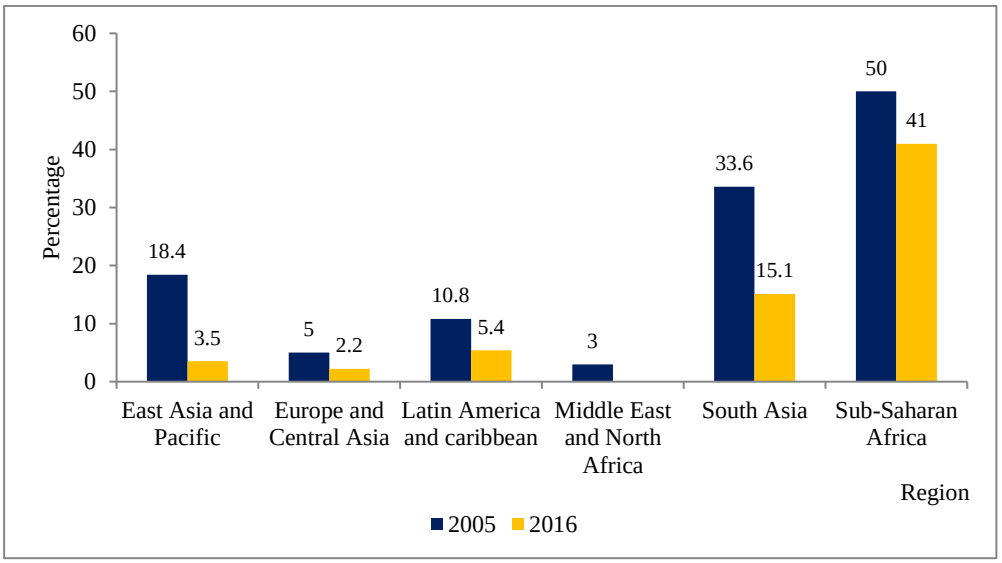
Source: World Trade Organisation (WTO), United Nation Conference on Trade and Development (UNCTAD) database (2017).

Poverty and Income Distribution in South Asia

South Asia is one of the poorest regions in the world and, after Sub-Saharan Africa, is home to the largest concentration of the world population living in poverty. Despite more rapid economic growth in South Asia in the recent years, the region is still home to about 596 million of the 912 million poor living in the Asia and Pacific region (The World Bank, 2010). Figure 5 illustrates that South Asia has experienced a substantial reduction in both the incidence of poverty and the absolute number of poor over the period 2005 to 2016**.**

Poverty in the South Asian region has fallen from 33.6% in 2005 to about 15.1% in 2016. Most countries have made progress in poverty reduction following trade liberalisation in the region in the 1990s.

Figure 5: The Share of Working Poor Living on less than US$ 1.90 per Day by Region



Source: World Bank, World Development Indicators Data Base, 2017

Figure 6 (a) and 6(b) below depict the patterns of income distribution in South Asia. Figures 6(a) demonstrates the income share held by the richest 20% and the poorest 20% of the total working population while Figure 6(b) illustrates the income share held by the richest 10% and the poorest 10% of the total working population in the South Asian countries.

Figure 6 (a): Income Share held by Poorest and the Richest 20% of the total Population

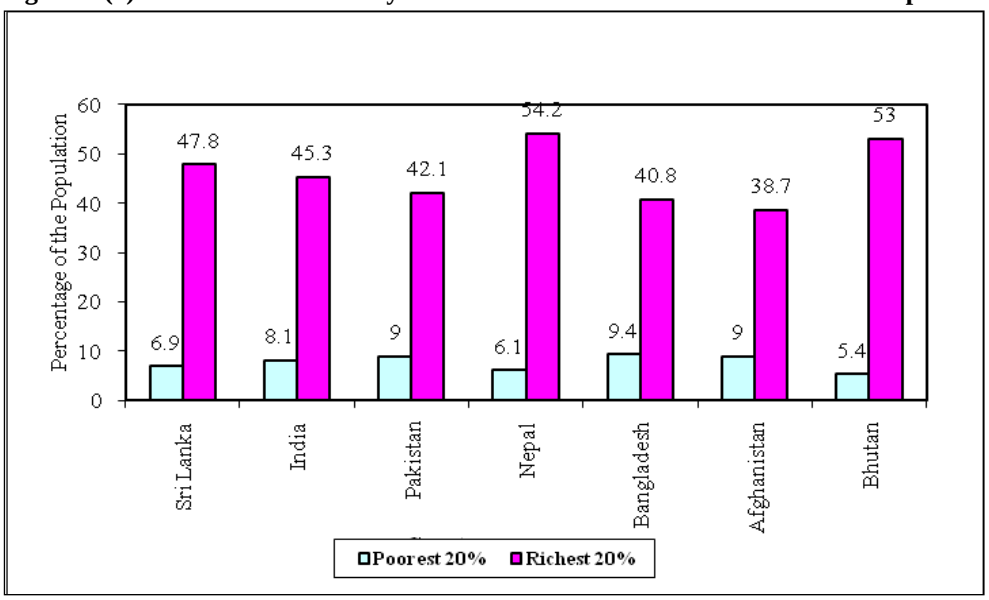
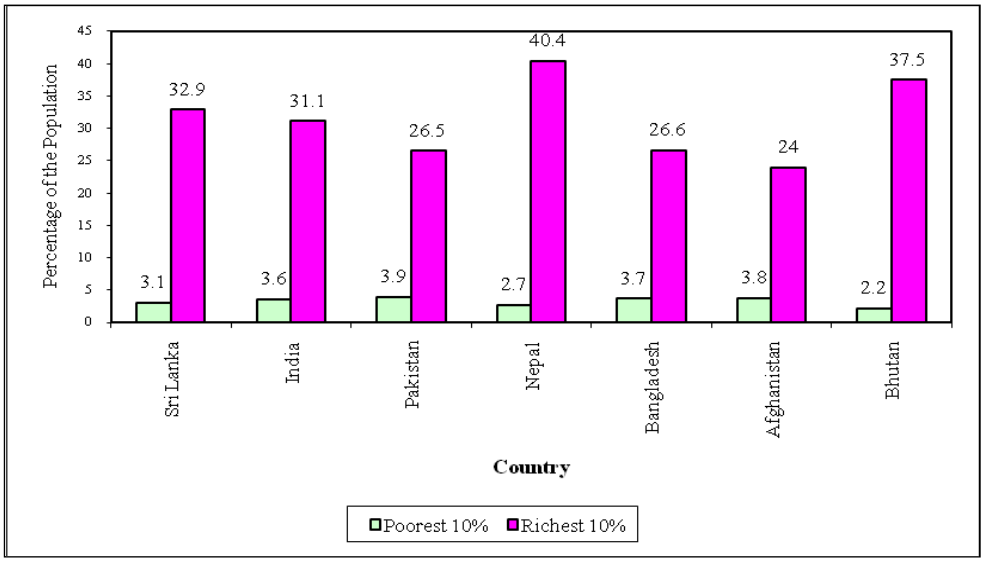


Figure 6(b): Income Share held by Poorest and the Richest 10% of the Population



Source: World Bank, World Development Indicators Data Base, 2010
Survey Years: Sri Lanka 2007, Pakistan 2006, India 2005, Nepal 2004 and Bangladesh 2005, Bhutan 2003 and Afghanistan 2008.

Under both circumstances, the gap is the largest in Nepal followed by Bhutan, Sri Lanka and India. In examining Figures 6(a) and 6(b) it is evident that even though there has been a decline in overall poverty in the South Asian region, income inequality between the rich and poor has widened among the countries in the region.

The Model and Data

To analyse the effects of trade liberalisation in South Asia, a static multi-country CGE model for South Asia (SAMGEM) is formulated which links country or regional models all over the world through trade and investment. Its framework and database are basically the same as the GTAP (Global Trading Analysis Project) model. An important feature of the SAMGEM, which makes it different from the 'standard' GTAP model is that it attempts to incorporate a multi-household[11] dimension into the model. Accordingly, the household sector is disaggregated based on different income groups in different geographical regions of four countries in South Asia (India, Sri Lanka, Bangladesh and Pakistan). The equations in SAMGEM are written using the TABLO language in the GEMPACK (General Equilibrium Modelling Package) software. The principal programming language for GTAP data and modelling work is based on the GEMPACK software which is capable of handling complex linear, nonlinear and mixed integer optimization problems (Harrison & Pearson, 1996).

[11] In the standard GTAP model each region has a single representative household (Hertel & Tsigas, 1997).

Database

The data for SAMGEM are mainly taken from the GTAP database version 7, which reflects the world economy in 2004 (Narayanan & Walmsley, 2008). The data are aggregated into sixteen regions, thirty sectors and three primary factors. The GTAP version 7 contains 113 countries/regions and in designing the model 113 countries/regions have been aggregated into 16 countries/regions (Appendix A.1). In formulating the model, 57 GTAP sectors have been aggregated into 30 sectors (Appendix A.2). The five factors in the GTAP model have been aggregated into the three factors, namely; skilled labour, unskilled labour and capital (including land and natural resources) with each group assumed to be homogeneous. The factor aggregation of the model is presented in Appendix A.3. In SAMGEM one representative household is specified for the rest of the world other than the above mentioned four South Asian countries. For these four South Asian countries, the household sector is disaggregated according to different income classes based on different geographical classifications. For instance, in the case of Sri Lanka the household sector is disaggregated into 30 household groups according to income deciles and geographical regions consisting of 10 rural groups, 10 urban groups and 10 estate sector[12] groups. In India, the household sector is disaggregated into 24 household groups according to monthly per capita consumer expenditure (MPCE) classes consisting of 12 rural groups and 12 urban groups. In Pakistan, the household sector is disaggregated into 10 household groups according to income quintiles consisting of 5 rural groups and 5 urban groups. In the case of Bangladesh, the household sector is disaggregated based on MPCE. Accordingly, the household sector includes a total of 38 groups, consisting of 19 rural and 19 urban groups.

To evaluate the economic impacts of trade liberalisation in South Asia on household income distribution, additional data on household income and expenditure are used for the four South Asian countries. These data are compiled by the Central Bank of Sri Lanka (which conducted the Consumer Finances and Socio Economic Survey in 2003/2004), the National Sample Survey Organisation (NSSO) of India (which conducted the Household Expenditure Survey in 2004), the Federal Bureau of Statistics of Pakistan (which conducted the Household Income and Expenditure Survey in 2004/2005) and Bangladesh Bureau of Statistics (which conducted the Household Income and Expenditure Survey in 2004/2005). The household data for 2003/2004 and 2004/2005 for the South Asian countries are used as it is consistent with the 2004 base year in version 7 of the GTAP database. The commodity groups in the household survey data of each of the South Asian countries are matched and categorised under the 30 industries aggregated from the GTAP database. Further, the household income is proportionally allocated among different factors of the GTAP based on the proportions calculated from the household survey data

[12] The estate sector is considered to be part of the rural sector. Large plantations growing tea, rubber and coconut were introduced in Sri Lanka during the British colonial period and labour was imported from South India to work on these plantations. These are included in the estate sector which comprises 5 per cent of the total population in Sri Lanka (World Bank, 2009).

of the respective South Asian economies depending on the sources of income received by the households.

In modelling the government sectors the data for government budget deficits/surpluses and net foreign transfers were obtained from the International Financial Statistics Year Book (2004), for all the countries presented in Appendix A.1. In addition, it should be noted that the choice of elasticity values critically affects the results of policy simulations generated by the model and hence, it is important to select appropriate values for these parameters. Most of the elasticity values applied in the model were directly taken from version 7 of the GTAP database. Moreover, the income or expenditure elasticity values for different household groups have been obtained from previous studies undertaken for South Asian countries (Rajapakse, 2011; Majumder, 1986; Yen & Roe, 1986; Burney & Khan, 1991).

Construction of the Model

The modelling of each region in the standard GTAP is based on the ORANI model (Dixon et al., 1982) and imposes the assumptions of constant returns to scale in production and perfect competition in commodity and factor markets.

In SAMGEM each regional household (private household and the government) owns the factors of production. Private household income consists of labour and capital income, and income is allocated to savings and consumption using exogenous shares. Households of the four South Asian countries receive fixed proportions of sectoral capital income based on their initial supplies of capital services. Labour income is defined as wages and salaries, whereas capital income is profit from household investment and income from land and natural resources. Labour income is determined by the household supply of labour in each industry and the corresponding wage rates. The household composition of sectoral labour income would change as labour moves between industries during the trade liberalisation.

Household disposable income is total income less income taxes and private household savings. The household consumption demand is determined using the Linear Expenditure System (LES) function. This is one of the key differences between GTAP and SAMGEM, as in the GTAP model household consumption is determined using a Constant Difference Elasticity (CDE) function. In modelling the household consumption equations, the ORANI-G multi-household framework has been followed (Centre of Policy Studies, of the Monash University, 2004). The LES function is used in the SAMGEM because it can measure the effect of a change in income on the structure of the consumption. In the model, households make the optimal allocation between consumption of commodities by maximisation of the Stone Geary Utility function or LES function subject to its budget constraint, which is the disposable income spent on consumption.

The government in each region is an institutional sector and acts as a consumer. It receives revenue from taxes and tariffs. Eight kinds of taxes and subsidies were specified in each country model consisting of tariffs, export duties, production taxes and output subsidies, taxes on intermediate inputs, sales taxes imposed on consumer goods and public goods,

factor taxes and income taxes. Government revenue consists of revenues from all taxes, foreign grants and transfers from households, and is allocated among consumption and government savings. All the equations relating to production, investment, transportation and trade in SAMGEM are based on the standard GTAP model.

Policy Experiment and Model Closure

The policy simulation mentioned below is analysed in both short run and long run frameworks. In the short run real wages are held fixed, with employment adjusting in each industry. In the capital market the capital stock in each sector is held fixed, with rates of return to capital adjusting endogenously. Further, the trade balance is fixed, with real consumption, investment and government spending moving together to accommodate it (Horridge, 2000).

However, if the time frame under consideration is deemed to be long run in nature, capital stock is allowed to vary while labour supply is assumed to be fixed. This reflects that capital can adjust over time with the natural rate of unemployment. Under this scenario the price of labour is allowed to vary while the price of capital remains fixed. In addition, the trade balance, real consumption, government consumption and investments become endogenous in the model. Since the model can only be solved for (n-1) prices, one price is set exogenously, and all other prices are evaluated relative to this numéraire (Brockmeier, 2001). Accordingly, as in the standard GTAP the global average return to primary factors is used as the numéraire in the model.

South Asia Free Trade Area (SAFTA)

Since, all South Asian economies are committed to reduce all tariff barriers by at the implementation of SAFTA, this simulation considers full implementation of the SAFTA in its originally proposed form where all SAARC countries reduce their existing tariff rates to 0% among all members in South Asia while maintaining the existing tariffs barriers with the rest of the world.

Furthermore, in undertaking the above mentioned simulations it is assumed that non-tariff barriers are absent. This is a realistic assumption as the WTO notified that all the developing countries are required to eliminate their non-tariff barriers post 2005.

Simulation Results

Trade policy analysts are concerned with the overall economic benefits that the country will receive in the event that free trade treaties are successfully negotiated (Siriwardana & Yang, 2007). On the basis of model simulation this section reports the results of the estimated short run and long run impacts of trade liberalisation on the important macroeconomic variables, trade, household income, government revenue and the economic welfare of the South Asian economies. The level of welfare is determined based on the equivalent variation (EV) that arises under the policy simulation.

Impact of Trade Liberalisation on Macroeconomic Variables

The macroeconomic effects of trade liberalisation in South Asia are illustrated in the Table 3 below. The table compares both short run and long run macroeconomic implications of the implementing SAFTA. Several important points emerged from these projections. The results indicate that under the SAFTA there are positive impacts on real GDP in all South Asian economies in the short run as well as in the long run. Another point to be noted is that the gains in GDP are higher in the long run for each South Asian economy, except in the Rest of South Asia and Bangladesh, as a result of better utilisation of capital. Further, the results illustrate that there is higher increase in employment in labour (especially unskilled labour) with the implementation of the SAFTA. Hence, liberalisation labour intensive industries such as agriculture is important for South Asia as the agricultural sector continues to play a significant role in terms of employment to a vast majority of the labour force in the region.

There is an improvement in the terms of trade in all countries, except in Bangladesh and the Rest of South Asia in the short run. However, Sri Lanka's terms of trade deteriorates in the long run under the SAFTA as result of a decrease in export prices relative to import prices. It seems that in the long run trade liberalisation would result in Sri Lanka losing export competitiveness in the international market, as Sri Lanka competes with larger economies in the region such India and Pakistan. Since, all South Asian economies export and import similar products, for example textiles and wearing apparel, larger economies gain greater competitive power than the smaller economies in the region.

Impact of Trade Liberalisation on Sectoral Trade

Table A.4 in the appendix illustrates the percentage changes in total sectoral exports and imports of the South Asian countries under the SAFTA. Under the SAFTA when all tariffs have been eliminated, exports and imports of agricultural products increase more than manufacturing goods in all South Asian countries both in the short run and in the long run.

The results suggest that under this policy option there is an increase in the exports of textiles from all South Asian countries in the short run and the long run. This is because South Asia has a natural advantage in the production of textile yarn and fabric, producing the bulk of the world's cotton which is the most important raw material for the industry. Since, the region also has an abundance of cheap labour to work in this industry, it is advantageous for textile entrepreneurs in South Asia to modernise their plants to be competitive with the other textile manufacturers in the world. It seems that in most of the South Asian economies the wearing apparel sector is not benefiting from the phasing out of the quota regime in 2005. Yet, the results suggest that in Bangladesh there is a rise in exports of wearing apparel (9.42% in the short run 8.23% in the long run) and being a least developed country in the region Bangladesh still continues to enjoy tariff preferences in major markets (United States Agency for International Development Research Group, 2005).

Table 3: Macroeconomic Performance under the SAFTA

Region	India (IND)		Pakistan (PAK)		Sri Lanka (LKA)		Bangladesh (BGD)		Rest of South Asia (XSA)	
	SAFTA -full Trade Liberalisation									
	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
Change in real GDP (%)	0.128	0.176	0.193	0.293	0.758	1.582	0.861	0.713	2.932	2.459
Change in Terms of Trade (%)	0.260	0.283	0.184	0.195	0.062	-0.213	-1.100	-0.913	-0.702	-0.944
Change in volume of Exports (%)	1.040	0.951	1.709	1.676	6.417	8.009	8.069	6.853	10.846	13.716
Change in volume of Imports (%)	1.066	1.182	1.158	1.452	4.972	6.702	5.683	5.563	5.178	3.743
Change in per capita Utility (%)	0.195	0.229	0.261	0.348	0.854	1.389	0.679	0.476	3.031	2.052
Change in Employment (%) - Unskilled	0.220	0.000	0.297	0.000	1.120	0.000	1.200	0.000	5.027	0.000
- Skilled	0.168	0.000	0.203	0.000	1.176	0.000	1.081	0.000	3.884	0.000
Change in Capital (%)	0.000	0.257	0.000	0.407	0.000	2.152	0.000	0.870	0.000	4.120

Source: Author's own simulation results

Note: SR- Short run LR- Long run

It is noticed that the member countries of the SAFTA agreement retain Most Favoured Nation (MFN) tariff rates for the items included in their sensitive lists which mostly contain agricultural goods.

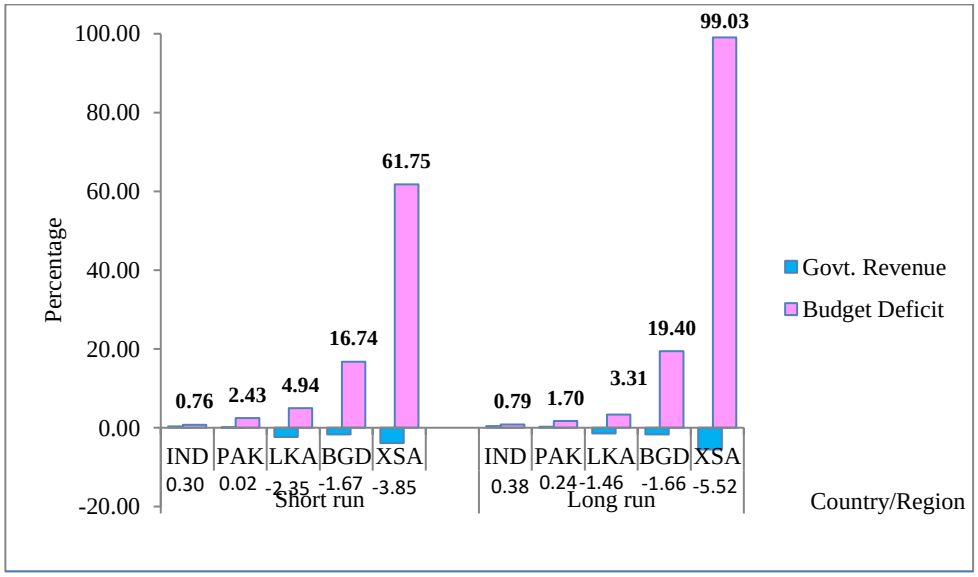
Since agricultural goods dominate intra-regional trade in South Asia, the members should imitate steps to remove such products from the sensitive list as higher tariffs on agricultural products might seriously inhibit intra-regional trade in the region.

Impact on Household Income

The percentage changes in unskilled labour income, skilled labour income, capital income (including income on land and natural resources) and government transfers that accrue to households located in different geographical areas in the respective South Asian countries are presented in figures A.5 to A.8 in the appendix under the SAFTA. It is noticed that household income increases in all South Asian countries in the short run as well as in the long run. However, it should be noted that the long run gains are higher than those of the short run due to efficient allocation of resources and the creation of more investment opportunities in the long run.

Under the SAFTA, unskilled labour income in rural households increases proportionately in all South Asian countries whereas income of skilled labour and capital increase more in urban households as predicted by the Heckscher-Ohlin (H-O) model. On the other hand transfers from government to households decline in smaller economies, except in India and Pakistan, under the SAFTA with zero tariff agreement. In overall it is interesting to notice that in the long run trade liberalisation would result in a larger narrowing of income disparities in all South Asian economies than in the short run.

Figure 7: Percentage Change in Government Revenue and Budget Deficit: SAFTA



Source: Author's own simulation results

Impact on Government Revenue

The percentage change in total government revenues in the South Asian economies under the SAFTA is illustrated in Figure 7. The results suggest that elimination of import tariffs would result in reductions in government revenue in all South Asian economies, except in India and Pakistan, both in the short run and the long run. There is marginal increase in total government revenue in India (0.30% in short run and 0.38% in the long run) and in Pakistan (0.02% in short run and 0.24% in long run). Table A.9 in the appendix explains in detail the composition of the sources of government revenue and their change (in US$ million) due to trade liberalisation. From the table it is evident that India's total government revenue increases as a result of an increase in both indirect taxes as well as direct taxes. It is interesting to note that under the SAFTA zero tariff agreement there is still an increase in the revenue from import tariffs in India, as India trades heavily with other countries outside the region.

Table 4: Equivalent Variation under the SAFTA

	SAFTA: full Trade Liberalisation	
Region	Short Run (US$ Million)	Long Run (US$ Million)
1 IND	1146.579	1344.943
2 PAK	226.940	302.786
3 LKA	152.438	247.888
4 BGD	344.994	241.720
5 XSA	386.156	261.350
6 USA	-95.656	-25.371
7 CAN	-5.868	-3.294
8 EU	-175.055	-43.706
9 ASE	-80.309	-39.184
10 HIA	-74.300	-36.695
11 JPN	-111.382	-28.494
12 CHN	-108.980	-60.864
13 XME	-75.717	-33.670
14 AUS_NZL	-29.773	-11.209
15 RUS_XSU	-7.186	-6.521
16 ROW	-128.952	-21.140
Total	1363.928	2088.539

Source: Author's own simulation results

Welfare impacts of Trade Liberalisation

Equivalent variation (EV) is used to determine the overall level of welfare under each policy option (Table 4). EV is an absolute monetary measure of welfare improvement in terms of income that results from the fall in import prices when tariffs are reduced or eliminated.

The welfare projections indicate that in both the short run and the long run all economies gain under the SAFTA. Further, it is important to note that although welfare improves in India, Pakistan, and Sri Lanka in the long run, Bangladesh and Rest of South Asia gain more in the short run under both policy options. Hence, the long run welfare gains are lower for least developed economies in the region under the SAFTA.

CONCLUDING REMARKS

This paper analysed the impact of the SAFTA with full trade liberalisation using a multi-country CGE model formulated for South Asia based on the GTAP model. It is noticed that the real GDP improves in all South Asian economies under the SAFTA zero tariff agreement. It is apparent that the gains in real GDP are proportionately higher in the long run than in the short run in all South Asian economies with the exception of Bangladesh and Rest of South Asia which are the least developed economies in the region. Although, it seems that welfare gains for India, Pakistan, and Sri Lanka are likely to increase in the long run, there are less welfare gains for Bangladesh and the Rest of South Asia in the long run under the SAFTA.

Industry level results indicate that South Asian countries can encourage trade among SAFTA members by eliminating barriers, particularly eliminating the products included in the sensitive lists. The results suggest that there are substantial increases in exports of agricultural products such as wheat, grains, vegetables and oil seeds, especially in Bangladesh and Rest of South Asia both in the short run and in the long run. This implies the member countries should remove both tariff and non-tariff barriers especially in the agricultural sector by revising their sensitive product lists, as substantial development of agricultural trade in the region cannot be otherwise envisaged. The World Bank (2018) noted that in 2015, nine years after implementation of SAFTA had come into force in 2006, about 43.7% of intra-SAARC imports were still restricted under the sensitive list, which becomes a barrier to boost the intra regional trade in South Asia. The model results support the view that the trade liberalisation would enhance economic growth which is the most powerful instrument for reducing poverty and improving the quality of life in South Asian economies.

Two general qualifications need to be kept in mind when interpreting the results presented from this analysis. Firstly, the multi-country CGE model used to undertake the simulations is a static model and hence the dynamic effects of the trade liberalisation are not captured. Secondly, issues such as bilateral investments and service trade liberalisation are not considered under the present analysis which can be important areas for future research concern.

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Appendix

Table A.1: Regional Aggregation of the GTAP Database

No	GTAP Code	Aggregated Region	Member Regions
1	IND	India	India (IND)
2	LKA	Sri Lanka	Sri Lanka (LKA)
3	PAK	Pakistan	Pakistan (PAK)
4	BGD	Bangladesh	Bangladesh (BGD)
5	XSA	Rest of South Asia	Bhutan, Maldives ,Nepal and Afghanistan (XSA)
6	USA	United States of America	United States of America (USA)
7	CAN	Canada	Canada (CAN)
8	EU	European Union	Austria (AUT) ,Belgium (BEL) ,Denmark (DNK) , Finland (FIN) ,France (FRA) ,Germany (DEU) ,United Kingdom (GBR) ,Greece (GRC) ,Ireland (IRL) ,Italy (ITA) ,Luxembourg (LUX) ,Netherlands (NLD) , Hungary (HUN), Portugal (PRT) ,Spain (ESP) ,Sweden (SWE), Cyprus(CYP), Czech Republic (CZE), Estonia(EST), Latvia (LVA), Lithuania (LTU), Malta (MLT), Poland (POL), Slovakia (SVK) and Slovenia (SVN).
9	ASE	ASEAN	Indonesia(IDN),Malaysia (MYS) ,Philippines (PHL) , Singapore (SGP) ,Thailand (THA), Vietnam (VNM), Cambodia (KHM), Lao People's Democratic Republic (LAO), Myanmar (MMR), Rest of Southeast Asia (XSE).
10	HIA	High Income Asia	Hong Kong (HKG) ,Korea (KOR) and Taiwan (TWN)
11	JPN	Japan	Japan(JPN)
12	CHN	China	China (CHN)
13	XME	Rest of Middle East	Bahrain ,Iran (IRN), Islamic Republic of Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates and Yemen
14	AUS_ NZL	Australia & New Zealand	Australia(AUS) and New Zealand (NZL)

Table A.1 (Continued….)

No	GTAP Code	Aggregated Region	Member Regions
15	RUS_ XSU	Russian Federation and Rest of Soviet Union	Russian Federation (RUS) and Rest of Former Soviet Union(XSU)
16	ROW	Rest of the World	Rest of Oceania(XOC) , Rest of East Asia (XEA), Mexico (MEX), Rest of North America (XNA), Argentina (ARG), Bolivia (BOL), Brazil (BRA), Chile (CHL), Colombia (COL), Ecuador (ECU), Paraguay (PRY), Peru (PER), Uruguay (URY), Venezuela (VEN), Rest of South America (XSM), Costa Rica (CRI), Guatemala (GTM), Nicaragua (NIC), Panama (PAN), Rest of Central America (XCA), Caribbean (XCB), Switzerland(CHE), Norway (NOR), Albania (ALB), Bulgaria (BGR), Rest of EFTA (XEF), Belarus (BLR), Croatia (HRV), Romania (ROU), Ukraine (UKR), Rest of Eastern Europe (XEE), Rest of Europe (XER), Kazakhstan (KAZ), Kyrgyzstan (KGZ), Armenia (ARM), Azerbaijan (AZE), Georgia (GEO), Turkey (TUR), Rest of Western Asia (XWE), Egypt (EGY), Morocco (MAR), Tunisia (TUN), Rest of North Africa (XNF), Nigeria (NGA), Senegal (SEN), Rest of Western Africa (XWF), Rest of Central Africa (XCF), Rest of South Central Africa (XAC), Ethiopia (ETH), Madagascar (MDG), Malawi (MWI), Mauritius (MUS), Mozambique (MOZ), Tanzania (TZA), Uganda (UGA), Zambia (ZMB), Zimbabwe (ZWE), Rest of Eastern Africa (XEC), Botswana (BWA), South Africa (ZAF) and Rest of South African Customs Union (XSC).

Table A.2: Commodity Aggregation of the GTAP database

No.	GTAP Code	Aggregated Sector	Commodity/Service Category
1	PDR_ PCR	Rice; Paddy and Processed	Paddy rice (PDR) **,**Processed rice (PCR)
2	WHT_GRO	Wheat, Cereal Grains	Wheat (WHT), Cereal Grains nec (GRO)
3	V_F	Vegetables and fruits	Vegetables, fruit, nuts (V_F)
4	OSD_VOL	Oil seeds and vegetable oil	Oil seeds (OSD) **,**Vegetable oils and fats (VOL)
5	PFB_OCR	Plant based fibers and crops	Plant-based fibers (PFB) **,**Crops nec (OCR)

Table A.2 (Continued…..)

No.	GTAP Code	Aggregated Sector	Commodity/Service Category
6	C_B_SGR	Sugar	Sugar cane (C_B) ,sugar beet (SGR)
7	RMK_MIL	Dairy Products and milk	Dairy products (MIL) ,Raw milk (RMK)
8	FSH	Fishing	Fishing (FSH)
9	CMT_OAP	Meat	Bovine mea (CMT)t, Meat products nec (OMT) ,Animal products nec (OAP) ,Cattle, Sheep Goats, Horse (CTL)
10	OFD	Food Products nec	Food Products nec (OFD)
11	B_T	Beverages and tobacco products	Beverages and tobacco products (B_T)
12	TEX	Textiles	Textiles (TEX)
13	WAP	Wearing apparel	Wearing apparel (WAP)
14	LEA_LUM	Leather, wood products	Leather products (LEA) ,Wood products (LUM)
15	PPP	Paper Products	Paper Products and Publishing (PPP)
16	CRP	Chemical, rubber, plastic products	Chemical, rubber, plastic products (CRP)
17	I_S_NFM_FMP	Metal Products	Basic metal products (FMP), Metals nec. (NFM), Ferrous metals (I_S)
18	ELE	Electronic Equipment	Electronic Equipment (ELE)
19	OME	Machinery	Machinery and Equipment nec. (OMF)
20	OMF	Other Manufacturing	Manufactures nec.(OMF)
21	MVH_OTP	Motor Vehicle & Transports	Motor vehicles and parts (MVH) , Transport equipment nec (OTN), Transport necessaries (OTP)
22	P_C_COA	Petroleum & Coal	Petroleum (P_C) & Coal Products (COA)
23	GAS_GDT	Gas	Gas (GAS), Gas Manufacturers & Distributors (GDT)
24	CMN_ROS	Tradeable Services	Construction (CNS) ,Financial services nec (OFI) ,Insurance (ISR) , Business services nec (OBS) , Communication (CMN), Recreational and other services (ROS)

Table A.2 (Continued…..)

No.	GTAP Code	Aggregated Sector	Commodity/Service Category
25	OSG_DWE	Non Tradeable Services	Public Administration, Defense, Education, Health (OSG) and Dwellings (DWE)
26	WOL_ NMM	Other Primary products	Wool, Silk worm, cocoons (WOL), Minerals nec. (OMN), Mineral product necessaries
27	TRD_CNS	Trade & Construction	Trade (TRD) & Construction
28	ELY_WTR	Electricity, water and air transport	Electricity (ELY), Water (WTR), Water transport (WTP), and Air transport (ATP)
29	OIL	Oil	Oil (OIL)
30	FRS	Natural Resources and Extracts	**Forestry (**FRS)

Table A.3: Factor Aggregation

No	GTAP Code	Description	Aggregated Factors
1	UnSkLab	Unskilled Labour	Unskilled Labour (UnSkLab)
2	SkLab	Skilled Labour	Skilled Labour (SkLab)
3	Capital	Capital	Capital (Capital), Land (Land), and Natural Resources (NatlRes)

Table A.4: Change in Sectoral Exports and Imports under the SAFTA

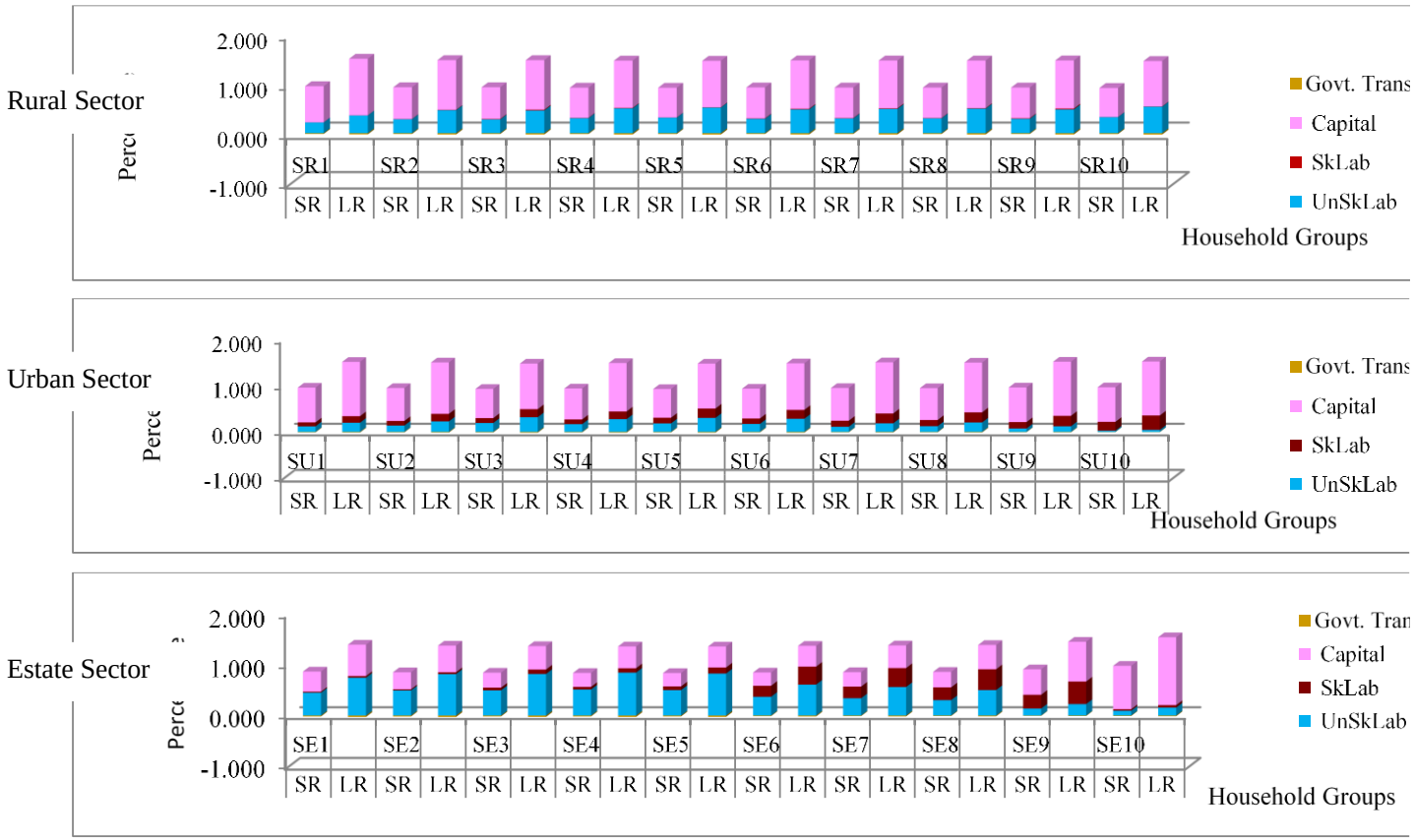
	Exports (% Change)										Imports (% Change)									
	Short Run (% Change)					Long Run (% Change)					Short Run (% Change)					Long Run (% Change)				
Sector	IND	PAK	LKA	BGD	XSA	IND	PAK	LKA	BGD	XSA	IND	PAK	LKA	BGD	XSA	IND	PAK	LKA	BGD	XSA
1 pdr_pcr	11.79	1.51	-1.50	3.44	1.19	11.47	1.59	0.60	3.55	4.73	1.62	21.52	72.99	56.73	0.13	11.47	1.59	0.60	3.55	4.73
2 wht_gro	1.95	9.41	-0.92	116.35	7.27	2.11	9.30	1.00	116.04	8.27	1.12	0.94	3.55	3.49	3.26	2.11	9.30	1.00	116.04	8.27
3 v_f	5.21	18.27	20.49	5.54	68.15	5.15	18.12	21.55	5.40	68.92	4.26	3.82	17.37	11.74	1.99	5.15	18.12	21.55	5.40	68.92
4 osd_vol	2.63	-0.20	117.30	120.17	100.36	2.58	-0.58	120.43	119.87	102.63	2.68	2.21	7.39	4.04	4.43	2.58	-0.58	120.43	119.87	102.63
5 pfb_ocr	6.17	4.37	6.33	27.31	44.17	5.99	4.13	8.05	27.01	45.22	8.27	4.51	18.30	4.45	5.38	5.99	4.13	8.05	27.01	45.22
6 c_b_sgr	25.23	11.36	1.59	4.97	15.71	25.30	11.38	3.17	3.55	14.07	7.93	2.76	0.74	0.08	-0.04	25.30	11.38	3.17	3.55	14.07
7 rmk_mil	24.25	35.38	23.10	33.80	9.34	23.98	34.40	26.15	32.59	11.08	1.58	2.27	1.02	14.70	5.25	23.98	34.40	26.15	32.59	11.08
8 fsh	0.16	-0.49	-0.49	1.10	-0.01	0.17	-0.37	1.28	1.41	2.76	2.14	1.11	2.03	22.28	1.88	0.17	-0.37	1.28	1.41	2.76
9 cmt_oap	-1.57	5.73	39.85	10.28	9.33	-1.68	5.50	43.79	10.02	11.41	1.60	1.15	0.42	-0.72	3.26	-1.68	5.50	43.79	10.02	11.41
10 ofd	-0.08	8.67	1.03	3.12	17.08	-0.23	8.47	2.98	3.28	19.95	4.49	4.36	1.37	4.60	3.57	-0.23	8.47	2.98	3.28	19.95
11 b_t	7.69	-2.53	3.15	3.62	57.55	7.65	-2.56	5.17	3.65	59.24	3.99	0.71	1.71	6.09	-2.94	7.65	-2.56	5.17	3.65	59.24
12 tex	1.31	2.59	6.61	7.58	12.55	0.89	2.69	9.22	5.99	11.28	2.58	1.87	-0.06	10.75	6.62	0.89	2.69	9.22	5.99	11.28
13 wap	-1.12	-1.31	-1.18	9.42	12.56	-1.69	-1.18	0.70	8.23	12.31	5.01	0.95	6.13	16.79	-0.23	-1.69	-1.18	0.70	8.23	12.31
14 lea_lum	-1.55	1.15	25.19	6.03	23.82	-1.92	1.04	27.48	4.32	23.08	2.92	2.18	4.64	3.20	4.78	-1.92	1.04	27.48	4.32	23.08
15 ppp	11.10	5.39	33.40	6.19	10.36	11.01	4.95	33.67	5.36	11.02	1.86	0.86	4.78	4.04	7.20	11.01	4.95	33.67	5.36	11.02
16 crp	2.41	6.45	10.15	20.40	34.56	2.48	5.69	12.69	20.10	36.77	1.18	2.04	1.81	3.78	6.64	2.48	5.69	12.69	20.10	36.77
17 i_s_nfm_fmp	1.42	0.34	87.16	31.70	49.18	1.46	-0.57	88.10	30.15	49.22	0.91	1.00	13.75	4.19	11.07	1.46	-0.57	88.10	30.15	49.22
18 ele	1.87	-0.63	7.56	6.04	10.41	1.84	-0.67	8.84	5.96	14.24	0.99	0.61	1.66	3.84	5.92	1.84	-0.67	8.84	5.96	14.24
19 ome	2.12	9.38	27.43	14.13	11.09	2.19	9.06	28.06	13.59	14.90	0.67	1.02	1.46	1.27	6.72	2.19	9.06	28.06	13.59	14.90

Table A.4: (Continued….)

	Exports (% Change)										Imports (% Change)									
	Short Run (% Change)					Long Run (% Change)					Short Run (% Change)					Long Run (% Change)				
Sector	IND	PAK	LKA	BGD	XSA	IND	PAK	LKA	BGD	XSA	IND	PAK	LKA	BGD	XSA	IND	PAK	LKA	BGD	XSA
20 omf	-1.27	1.06	4.52	8.06	20.07	-1.43	0.84	5.70	6.95	21.45	0.79	2.00	3.80	5.03	8.01	-1.43	0.84	5.70	6.95	21.45
21 mvh_otn_otp	3.64	-0.12	0.50	4.62	6.62	3.37	-0.14	2.14	1.83	2.17	0.67	0.16	3.46	0.94	6.22	3.37	-0.14	2.14	1.83	2.17
22 p_c_coa	7.76	-2.20	1.90	29.58	2.84	8.84	-2.44	2.59	31.91	5.80	0.77	1.03	24.25	5.38	2.16	8.84	-2.44	2.59	31.91	5.80
23 gas_gdt	7.04	-7.27	-19.93	13.47	5.75	8.40	-17.99	6.51	14.76	2.39	4.86	2.18	5.63	-4.48	18.36	8.40	-17.99	6.51	14.76	2.39
24 cmn_ros	-1.23	-1.26	-0.37	2.82	2.77	-1.26	-0.93	-1.86	0.64	-0.40	0.53	0.60	0.28	-0.67	0.49	-1.26	-0.93	-1.86	0.64	-0.40
25 osg_dwe	-1.29	-0.91	0.72	1.75	0.52	-1.51	-1.53	-3.38	1.52	1.85	0.34	0.56	-0.24	-0.38	-0.89	-1.51	-1.53	-3.38	1.52	1.85
26 wol_omn_nmm	0.32	7.84	3.60	2.97	5.96	0.30	7.35	5.57	2.98	9.04	0.49	1.26	4.91	4.16	14.27	0.30	7.35	5.57	2.98	9.04
27 trd_cns	-1.18	-0.81	-1.32	2.28	2.46	-1.31	-1.48	-0.47	1.67	3.15	0.67	0.65	0.65	0.14	0.53	-1.31	-1.48	-0.47	1.67	3.15
28 ely_wtr	-0.38	-0.80	-0.47	2.17	2.35	-0.40	-0.85	0.84	1.25	2.74	0.61	0.46	0.30	-1.21	1.10	-0.40	-0.85	0.84	1.25	2.74
29 oil	-2.26	-3.53	41.14	6.71	-17.31	-1.16	-2.07	41.57	5.00	12.47	1.22	0.06	0.71	1.85	7.35	-1.16	-2.07	41.57	5.00	12.47
30 frs	4.05	-0.21	37.29	58.11	35.98	3.83	0.30	38.31	58.37	42.81	1.70	17.99	17.45	0.73	4.58	3.83	0.30	38.31	58.37	42.81

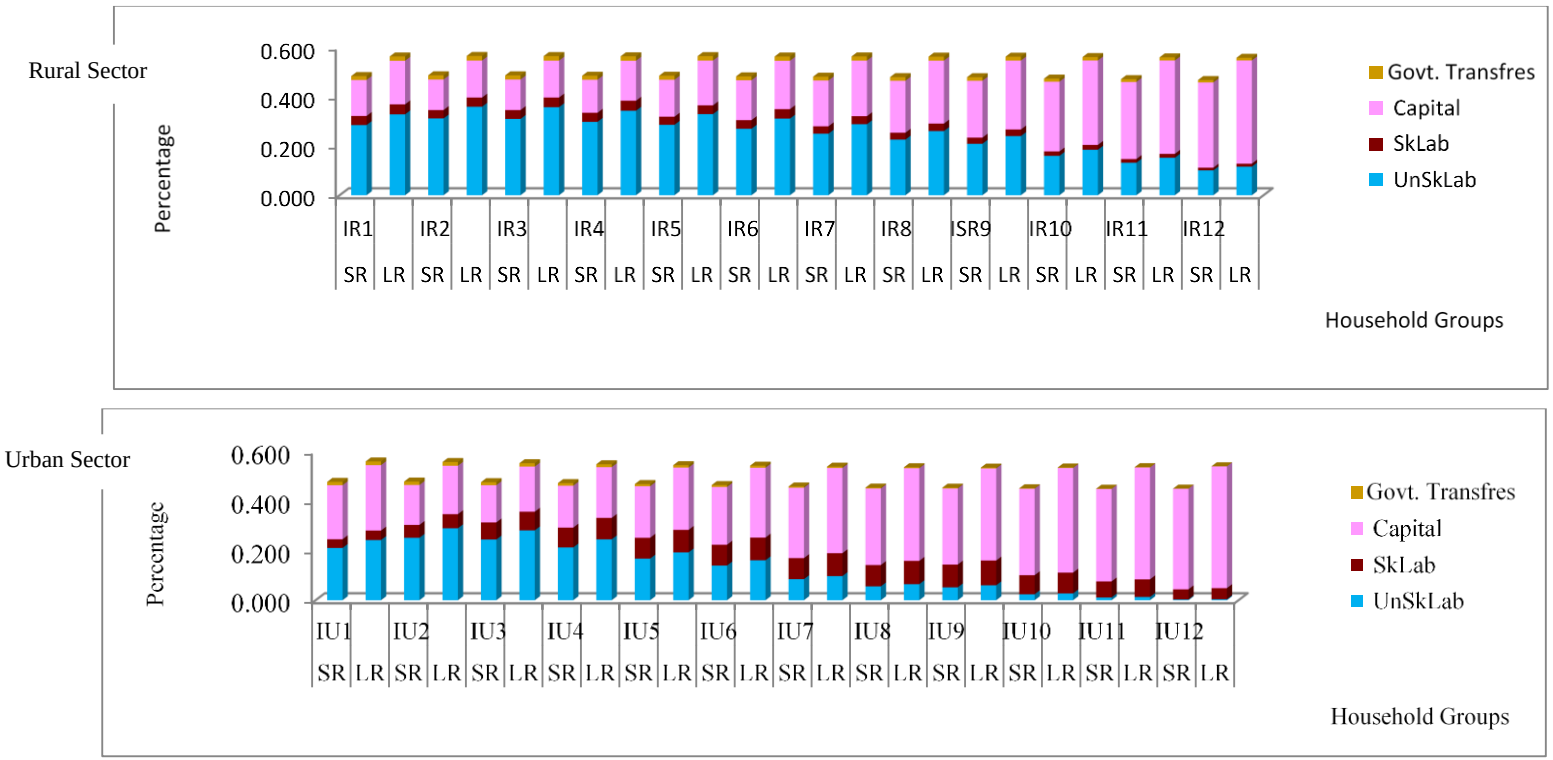
Source: Author's own Simulation Results

Appendix A.5: Impact on Household Income under the SAFTA: Sri Lanka



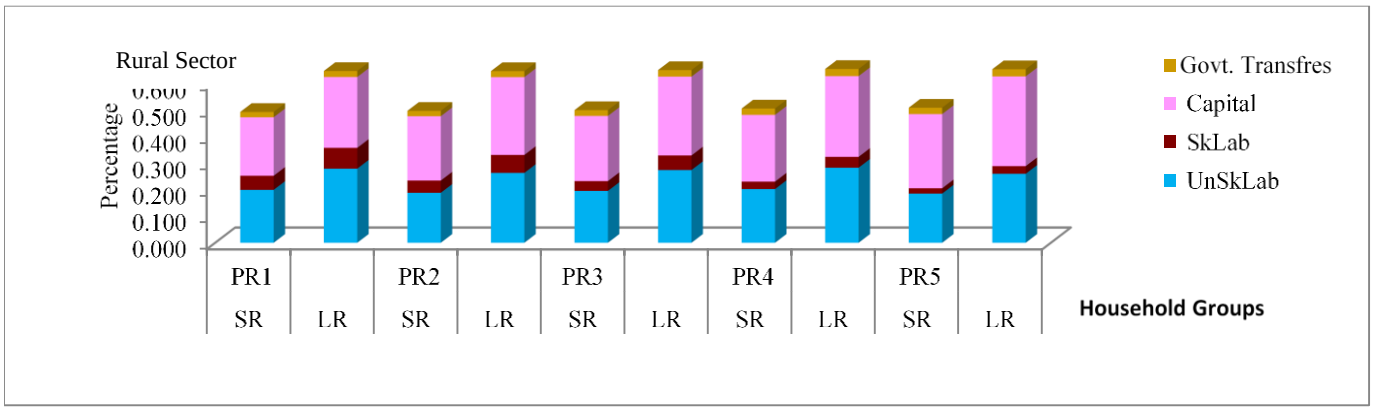
Source: Author's own simulation results

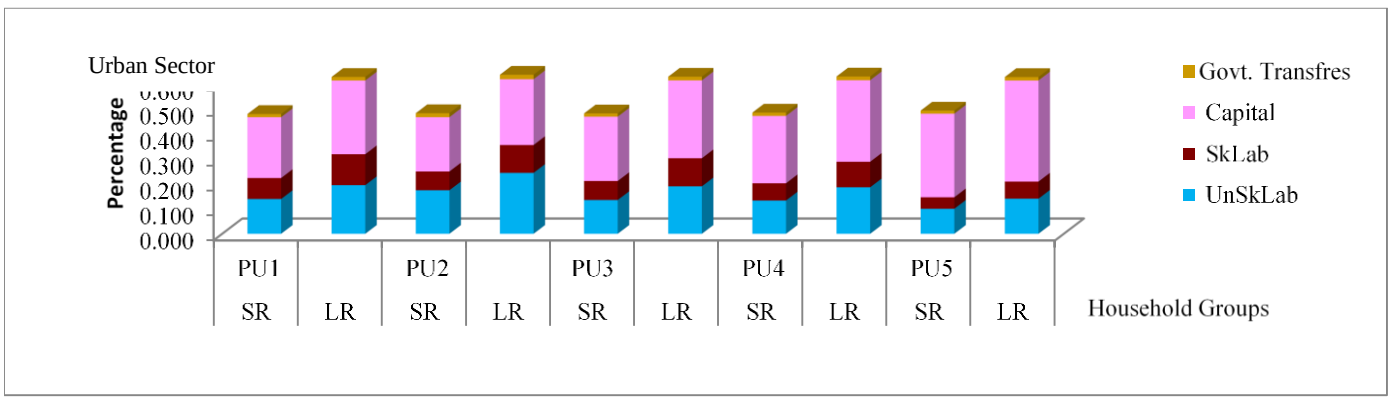
Appendix A.6: Impact on Household Income under the SAFTA: India



Source: Author's own simulation results
Note: SR- Short run LR- Long run

Appendix A.7: Impact on Household Income under the SAFTA: Pakistan

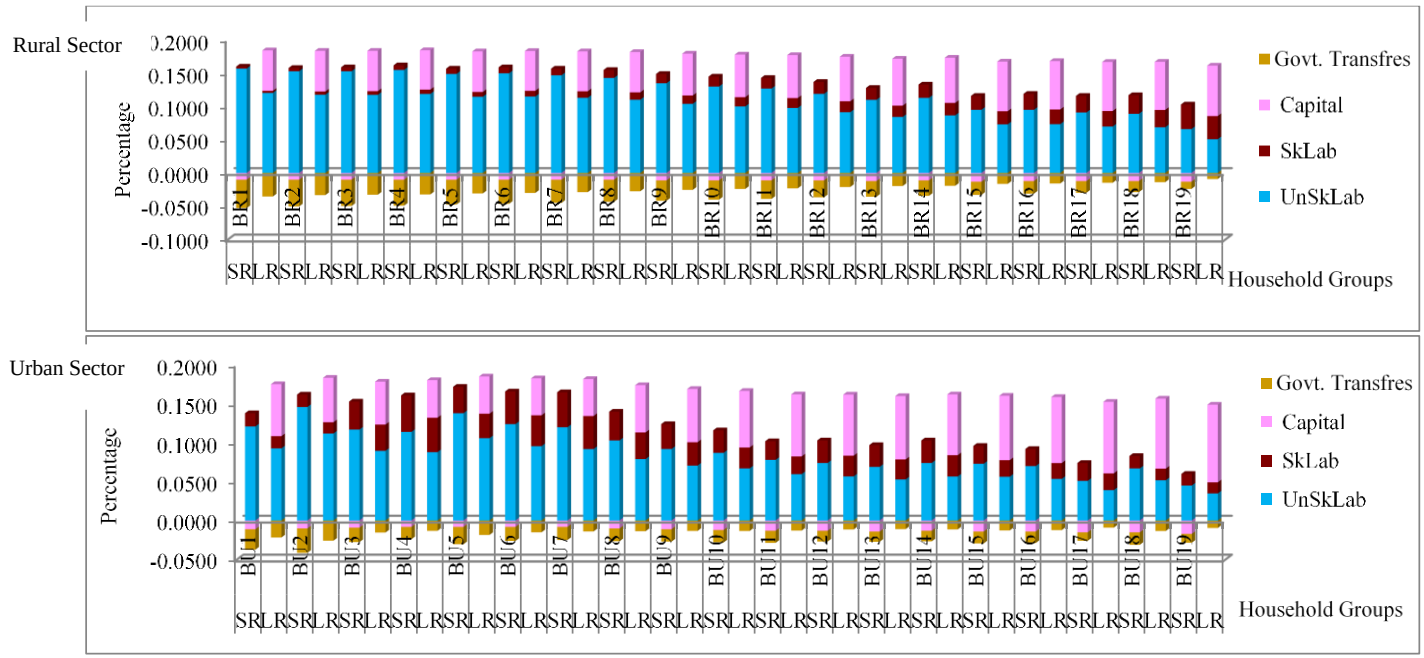




Source: Author's own simulation results

Note: SR- Short run LR- Long run

Appendix A.8: Impact on Household Income under the SAFTA: Bangladesh



Source: Author's own simulation results

Note: SR- Short run LR- Long run

Table A.9 Change in Tax Revenue from different Sources under the SAFTA

	Short Run (US$ millions)					Long Run (US$ millions)				
	IND	PAK	LKA	BGD	XSA	IND	PAK	LKA	BGD	XSA
TPC	6871.45	1742.77	-0.01	1716.09	2012.81	8056.22	2420.57	12.74	1599.79	1896.28
TGC	0.00	0.02	-0.03	0.00	-4.49	0.00	0.02	-0.05	0.00	-4.37
TIU	6524.41	64.80	-49.34	-107.51	695.58	7194.82	515.47	-38.00	23.38	-45.95
TFU	154.11	28.13	161.66	150.59	873.18	181.38	36.65	257.45	203.71	597.56
TOUT	4137.67	7.65	574.71	-1444.29	1623.14	5743.88	8.63	1708.37	-1149.83	1221.31
TEX	-782.94	794.86	518.55	0.61	251.12	-1000.73	756.93	666.10	0.48	158.14
TIM	161.41	-4120.06	-8451.04	-19139.24	-17680.26	1894.15	-2899.09	-7524.26	-19433.06	-19202.36
TDTX	17066.11	-1481.83	-7245.50	-18823.76	-12228.92	22069.72	839.19	-4917.66	-18755.53	-15379.38
INCT	8804.63	1675.37	435.48	1295.58	2919.89	10369.90	2072.71	693.25	1244.58	2050.23
TOTAL	25870.74	193.54	-6810.02	-17528.19	-9309.03	32439.62	2911.90	-4224.41	-17510.96	-13329.15

Note: TPC – Consumer tax
TGC – Tax on Public Goods
TIU – Tax on Intermediate Inputs
TFU – Factor Tax
TOUT- Output Taxes
TEX – Export Taxes
TIM- Import Taxes
INCT-Income Tax
IDTX- Total Indirect Taxes

Source: Author's own simulation results