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Is SAFTA Trade Creating or Trade Diverting?

A Computable General Equilibrium Assessment with a Focus on Sri Lanka

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ABSTRACT

The Agreement on South Asian Free Trade Area (SAFTA) entered its second phase of implementation in 2008. The creation of a free trade area is expected to affect its participants—Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka—very differently given their diversity in terms of size, income, and structure of trade and protection. Using the 2004 MAcMapHS6-v2 database on measures of applied protection at the HS6 level and MIRAGE, a computable general equilibrium global model, this study examines the effects of SAFTA on trade and net income in the region. The magnitude of the effects will depend on initial levels of protection in the region and whether the agreement is trade diverting or trade creating. An important component of the SAFTA agreement is the exemption of products (sensitive list) from the trade liberalization process. Because such exclusion can restrict significantly the benefits from the regional trade agreement, we simulate the effects of SAFTA with and without sensitive products. Our findings show that among South Asian countries, Sri Lanka gains the most from the agreement because it initially has relatively low tariffs and faces high tariffs in the region. Exempting sensitive products from the agreement limits gains from trade for the lower-middle-income members of SAFTA but may be welfare enhancing for the least developed economies.

Keywords: trade liberalization, FTA, SAFTA, CGE, Sri Lanka

1. INTRODUCTION

The Agreement on South Asian Free Trade Area (SAFTA) signed in January 2004, is the latest step in the agenda of the South Asian Association for Regional Cooperation (SAARC) to create a free trade area among South Asian countries. More ambitious than its predecessor—South Asian Preferential Trading Arrangement (SAPTA)—the agreement entered into force January 1, 2006, with the provisions of its Trade Liberalization Program scheduled to be fully implemented by January 2016. SAFTA's contracting states include three lower-middle-income countries—the Republic of India, the Islamic Republic of Pakistan, and the Democratic Socialist Republic of Sri Lanka—and four least developed countries (LDCs)—the People's Republic of Bangladesh, the Kingdom of Bhutan, the Republic of Maldives, and the Kingdom of Nepal.[1] The agreement calls for the Trade Liberalization Program to be implemented in two phases; the first phase started July 1, 2006 and called for a first reduction of tariffs over two years; the second phase started in 2008 and was to reduce tariffs further resulting in the creation of a free trade area by 2016 (SAARC 2009).

Whereas the SAFTA agreement represents an important step toward regional integration, each member country has announced a list of products that would be exempt from the tariff reductions. Government enact these lists called "negative" or "sensitive" lists as a mean to protect domestic industries from foreign competition and preserve tariff revenues given that products on the list have usually high tariffs. The lists represent between 13 and 25 percent of harmonized tariff lines across SAFTA countries, a large enough proportion of products to limit significantly the potential gains from the trade liberalization process.

Ex-ante evaluations of SAFTA have not generated much optimism in the literature. Bandara and Yu (2003) surveyed early studies of the impact of a potential SAFTA and classified them into three views: optimistic, pessimistic, and moderate. The authors describe Pigato et al. (1997) as optimistic; their results from a global computable general equilibrium (CGE) model predict that SAFTA would benefit significantly small economies in the region and have a positive effect on South Asian regional integration. Panagariya (1999), of the pessimistic view, considers SAFTA undesirable because it would be largely trade diverting and, consequently, efficiency reducing given that it is doubtful that SAFTA members are the most efficient suppliers for SAFTA countries. The pessimistic argument is developed further in a more recent study by Baysan, Panagariya, and Pitigala (2006), where the authors identify three features of SAFTA economies that make the free trade area economically unattractive: the economies are relatively small in relation to the world in terms of gross domestic product (GDP) and trade flows; the high levels of protection among SAFTA members, with the exception of Sri Lanka, mean that the countries will suffer from trade diversion given that member countries currently trade outside the SAFTA region; and, finally, excluded sectors in the sensitive lists and strict rules of origin lead to sectoral biases that could be exploited by powerful domestic lobbies to resist outside competition.

Srinivansan and Canonero (1995) hold a more moderate view; they believe that a South Asian agreement would hold potential gains for the region although less than those from unilateral liberalization. Also in this group, DeRosa and Govindan (1996), focusing on the impact of trade liberalization in South Asia on food and agriculture, use the Armington system of bilateral trade demands in a partial equilibrium framework and examine alternative approaches to trade liberalization within the SAARC region. Their results show that although SAPTA leads to expansion of intraregional food trade, broader trade liberalization with other parts of the world may increase welfare gains significantly.

Bandara and Yu's (2003) own findings differ from those of the aforementioned studies. Using trade data and a global CGE model, they find that for most of the countries the potential gains or losses under SAFTA are marginal, and the sole country to benefit significantly is the largest in the region, India.

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[1] The ongoing conflict between Pakistan and India has made the implementation of SAFTA provisions difficult. Pakistan ratified SAFTA in mid-February 2006 but continues to deny India Most Favored Nation status and has restricted imports from India to a small positive list of 773 items (Kumar 2006).

This study adds to the existing literature by modeling details of SAFTA with regard to the time line and sectoral schedule of tariffs at the HS6 (six-digit Harmonized Commodity Description and Coding System) level. Using the 2004 version of MAcMapHS6-v2, a database of bilateral protection (Bouët et al. 2008), and MIRAGE, a global CGE model with a sequential, dynamic, recursive setup (Bchir et al. 2002; Decreux and Valin 2007), we model the reduction of tariffs at a disaggregated level, taking into account the exemption of sensitive products from the tariff cuts. We simulate two versions of SAFTA: one that implements the actual SAFTA agreement including the list of sensitive products and one that does not exempt sensitive products from the liberalization process. To assess the relative magnitude of SAFTA's impact, the results are compared with those obtained from full trade liberalization at the multilateral level.

Our findings show that SAFTA members experience on average small gains from the agreement, but whereas exempting sensitive products from the agreement may limit the gains from trade for the lower-middle-income countries in SAFTA, it may be welfare enhancing for the least developed countries. Sri Lanka realizes real income gains under all scenarios; it has the most to gain from trade liberalization because of relatively low applied tariffs relative to high protection faced in the region.

Section 2 of the paper gives a brief overview of SAFTA countries. Section 3 identifies the rationale for the sectoral and geographical aggregations for this study that best capture the trade environment for South Asian countries. Section 4 characterizes the initial conditions of trade and protection for SAFTA countries with respect to the selected aggregations. Following a detailed presentation of the schedule of tariff cuts as negotiated under SAFTA, Section 5 discusses and analyzes the results obtained from simulating three trade liberalization scenarios. We conclude in Section 6.

2. BACKGROUND ON SAFTA MEMBERS

Sri Lanka

For the past decade, Sri Lanka's trade policy has focused on negotiating a number of bilateral and regional trade agreements to increase its market access to the region (Wijayasiri 2007; WTO 2004). Despite its narrow export base and its reliance on imports, Sri Lanka is expected to be one of the winners from trade liberalization because of its liberal trade environment, the relatively low protection it applies to its imports, and the high tariffs it faces on its exports (EIU 2007).

Sri Lanka is a lower-middle-income developing country according to the World Bank definition with a per capita income in 2007 estimated at US$1,617 (Sri Lanka 2008).[2] GDP per capita growth was uneven between 1990 and 2002 but leveled off at above 5 percent in the period 2003–2006. Although the country's growth rate of more than 6 percent in 2006 (Figure 1) lags behind the South Asian average of 8.7 percent, it is a notable achievement given the resurgence of the civil war that has marked the country over the past two decades and the economic impact the December 2004 tsunami had on agriculture and fisheries (ADB 2007).

In Sri Lanka's economy, as in other South Asian countries, the service sector makes up the largest component of GDP, at 56 percent (Figure 2). The manufacturing subsector dominates the industrial sector, which contributes 27 percent of GDP, and the wearing apparel subsector dominates the manufacturing sector. The share of agriculture in GDP declined from 20 percent in 2002 to 16 percent in 2006, and is among the lowest in South Asia, but the sector employs more than a third of the labor force and contributes 25 percent of merchandise exports (World Bank 2008; WTO 2007). Tea, for which Sri Lanka ranks first in world exports, is the country's main agricultural export (FAO 2009).

Figure 1. Sri Lanka's GDP per capita growth, 1990–2006
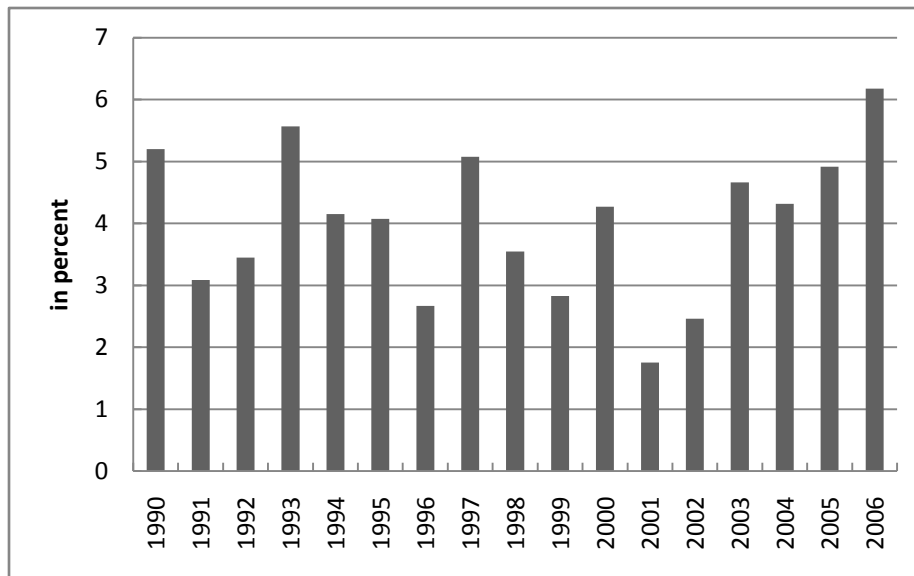
Source: World Bank (2008).

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[2] All dollars are U.S. dollars.

Figure 2. Contribution of economic sectors to GDP, 2006
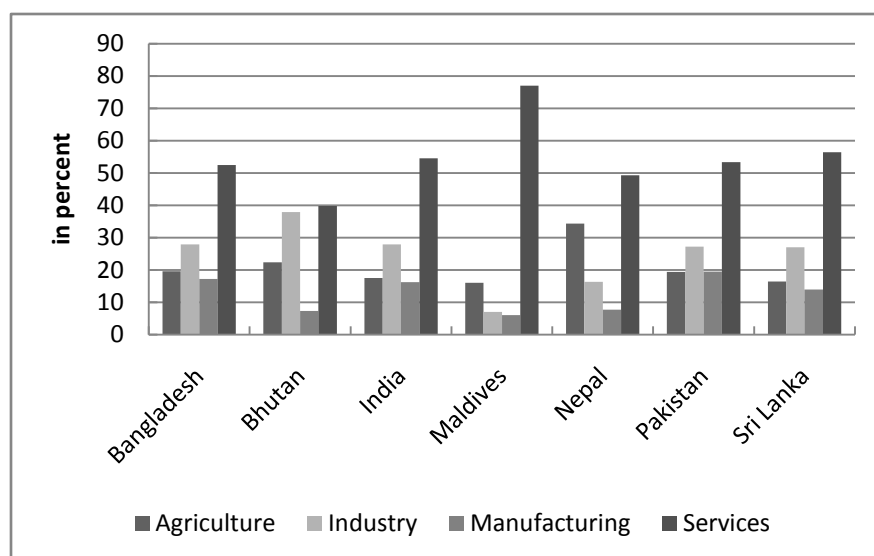
Source: World Bank (2008).

Sri Lanka's export base is narrow in terms of products and markets. Wearing apparel is the major export, constituting nearly 50 percent of total exports, followed by tea and spices, 9 percent, rubber and rubber products, 8 percent, and precious and semiprecious stones, nearly 6 percent (ITC 2008). Sri Lanka is highly dependent on the U.S. and E.U. markets, which together absorb more than two-thirds of Sri Lanka's exports.[3] Combined, textiles and wearing apparel constitute more than 80 percent of Sri Lankan exports to the United States and 52 percent of Sri Lankan exports to the E.U. (Wijayasiri 2007).

The product concentration in exports increases Sri Lanka's vulnerability to changes in world markets. For instance, since the 2005 expiration of the Multi Fiber Arrangement, Sri Lanka's textiles and wearing apparel sectors continue to struggle due to increased worldwide competition, especially from large suppliers like India and China (ADB 2007). Given that 15 percent of the labor force is employed in the garment industry, the negative effects on the sector may have welfare consequences for the whole country (Noble 2004).

Sri Lanka is an original member of the World Trade Organization (WTO) and benefits from special and differential treatment due to its classification as a net food-importing developing country (WTO 2001). In the late 1970s, it engaged in trade reforms as part of an extensive economic reform program, making it relatively more open today than its South Asian partners. Nevertheless, its liberalization efforts have slowed or been uneven as the country has had to change focus toward ending the civil war, making trade and other policies unpredictable and less transparent (WTO 2004). Sri Lanka bounds 37.8 percent of tariff lines, resulting in a final bound tariff of 30.3 percent on average. The country's most-favored-nation (MFN) tariff has increased on average from 9.8 percent in 2003 to 11 percent in 2006 (WTO 2007).

In addition, Sri Lanka has signed a number of regional trade agreements. The oldest, known as the Bangkok Agreement, was signed in 1975 by Bangladesh, India, the Lao People's Democratic Republic, Korea, and Sri Lanka (Table 1).[4] Historically, its preferential trade concessions have led to a limited increase in intraregional trade given the few numbers of products included in the agreement and

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[3] Unless otherwise noted, E.U. refers to the 25 members of the European Union included in the 2004 MAcMapHS6-v2 database (Bulgaria and Romania did not become members until 2007).

[4] The agreement is the only preferential trade agreement with membership open to all developing countries in the Asia and Pacific regions (Iyer 2003).

their relevance to actual trade in the region. In addition, the preferences offered by the agreement have been eroded because of tariff reduction at the multilateral level without corresponding adjustment at the regional level (Iyer 2003). With China joining in 2001 and the adoption in 2005 of the Asia-Pacific Trade Agreement (APTA), the revised Bangkok Agreement has the potential to become a major preferential trade agreement joining South and East Asia and the two most populous countries in the world, China and India, but the emergence of other regional and bilateral preferential trade agreements in the region promises to be more effective in promoting greater trade integration (ESCAP 2006).

One such promising regional agreement is the Agreement on South Asian Free Trade Area (SAFTA), which entered into force January 1, 2006, replacing the Agreement on SAARC Preferential Trading Arrangement (SAPTA). Tariff reductions under SAFTA began in July 2006 and are to be completed in 2016. Sri Lanka, a member of SAARC since its inception in 1985, has signed the agreement and, like other non-LDC members, has committed to reduce tariffs to 20 percent by January 2008 during the first phase of SAFTA's Trade Liberalization Program. The program's second phase calls for Sri Lanka to eliminate tariffs through a 10 percent annual reduction by 2013 (for India and Pakistan, the final year is 2012) for non-LDC SAFTA partners and by 2009 for LDCs. In addition, each country has submitted a list of "sensitive products." Those products are exempt from tariff cuts, and although Sri Lanka's list amounts to the lowest share of tariff lines among non-LDC members, it still exempts 17 percent of total tariff lines. (Please see section 5.2 for a more detailed discussion of the Trade Liberalization Program and sensitive products.)

Under a similar framework named the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMST-EC), Bangladesh, India, Myanmar, Sri Lanka, and Thailand have agreed to negotiate a free trade agreement that will progressively eliminate tariffs and nontariff barriers in goods and services. As under SAFTA, members are allowed to exempt a list of sensitive products and LDC members benefit from special and differential treatment (BIMST-EC 2004). SAFTA and BIMST-EC share three member countries and have similar time frames for the reduction of tariffs on goods. Under the BIMST-EC free trade agreement, the reduction of tariffs takes place in two phases depending on whether products are considered fast track (2006–2009) or normal (2007–2012).[5]

Currently Sri Lanka has implemented several bilateral free trade agreements: the India–Sri Lanka Free Trade Agreement since 2001, the Pakistan–Sri Lanka Free Trade Agreement since 2005, and the Iran–Sri Lanka Free Trade Agreement since 2004. Sri Lanka also grants preferential tariffs under the Agreement on the Global System of Trade Preferences, which was established in 1988 to encourage the exchange of trade preferences among developing countries (the Group of 77) to promote trade among such countries (UNCTAD XI 2004).[6]

Sri Lanka benefits from preferential tariffs with the United States and the E.U. under the Generalized System of Preferences (GSP) but both coverage and use rates have been historically low (Wijayasiri 2007). Still, 25 percent of Sri Lanka's exports to the E.U. are duty free either under MFN status or GSP, and 60 percent benefit from preferences under GSP. Sri Lanka is the only South Asian country to be eligible for trade preferences under GSP+, an E.U. program that offers additional tariff-free benefits to GSP countries that implement 27 international conventions in the fields of human and labor rights, sustainable development and good governance (Wijayasiri 2007).

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[5] LDCs have a longer time frame within which to eliminate tariffs (BIMST-EC 2004).

[6] The Agreement on the Global System of Trade Preferences arose out of the United Nations Group of 77. That group of countries showed interest in 1976 in developing a global system of trade for developing countries, but the agreement did not come into force until 1988. To date, 43 countries have ratified/acceded to the agreement: Algeria, Argentina, Bangladesh, Benin, Bolivia, Brazil, Cameroon, Chile, Colombia, Cuba, Democratic People's Republic of Korea, Ecuador, Egypt, Ghana, Guinea, Guyana, India, Indonesia, Iran, Iraq, Libya, Malaysia, Mexico, Morocco, Mozambique, Myanmar, Nicaragua, Nigeria, Pakistan, Peru, Philippines, Republic of Korea, Romania, Singapore, Sri Lanka, Sudan, Thailand, Trinidad and Tobago, Tunisia, Tanzania, Venezuela, Vietnam, and Zimbabwe.

Table 1. Multilateral and preferential trading arrangements of SAFTA countries

Country	WTO	Regional Agreement	Bilateral Agreements
SAFTA non-LDC			
India	Member	Bangkok Agreement APTA (1976) BIMST-EC (1997) SAFTA (2006)	Bhutan (2006) Nepal (1991) Sri Lanka (2001) MERCOSUR (2005)
Pakistan	Member	ECOTA (2003) SAFTA (2006)	Sri Lanka (2005)
Sri Lanka	Member	Bangkok Agreement APTA (1976) BIMST-EC (1997) SAFTA (2006)	India (2001) Pakistan (2005) Iran (2004)
SAFTA LDC			
Bangladesh	Member	Bangkok Agreement APTA (1976) BIMST-EC (1997) SAFTA (2006)	
Bhutan	Observer	BIMST-EC (1997) SAFTA (2006)	India (2006)
Maldives	Member	SAFTA (2006)	
Nepal	Member (2004)	BIMST-EC (1997) SAFTA (2006)	India (1991)

Source: Adapted from Samaratunga and Thibbotuwawa (2006).
Notes: SAFTA = Agreement on South Asian Free Trade Area; APTA = Asia-Pacific Trade Agreement; BIMST-EC = Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation; MERCOSUR = Southern Cone Common Market; ECOTA = Economic Cooperation Organization Trade Agreement.

Other SAFTA Countries

SAFTA countries represent 22 percent of the world's population but only 1.3 percent of world merchandise exports, of which only 5.5 percent is intraregional. In spite of the emergence of regional and bilateral trade agreements in the region, intraregional trade has remained marginal. In comparison, the Association of Southeast Asian Nations (ASEAN) contributes 6.1 percent to world merchandise exports, and intraregional exports constitute 23 percent of ASEAN total merchandise exports to the world (World Bank 2008).

The SAFTA region is dominated by India, which accounts for more than two-thirds of the region's GDP, population, and land area. Pakistan and Bangladesh follow far behind, contributing 11.1 and 5.4 percent, respectively, to the region's GDP (Figure 3).

Although South Asia is still the poorest region in Asia, SAFTA countries are not homogeneous when it comes to poverty and food security. Among the SAFTA LDCs, Bangladesh and Nepal are classified as the most food insecure according to a study by Diaz-Bonilla et al. (2000).[7] Those countries

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[7] Diaz-Bonilla et al. (2000) use cluster analysis to classify 163 countries based on five measures of food security: food production per capita, the ratio of food imports to total exports, calories and proteins consumed per capita, and the share of nonagricultural population in total population.

have among the highest share of the population living under \$1.25 a day (WDI 2008): 49.6 percent for Bangladesh and 55.1 percent for Nepal. Bhutan, one of the poorest countries in Asia, has a poverty incidence of 26.2 percent (WDI 2008). Although the Maldives is an LDC, it is considered a food-neutral country by the same study, but it is vulnerable because of the high incidence of food imports in its total exports.

India, Pakistan, and Sri Lanka are also classified as food-insecure countries because of relatively low consumption indicators (Diaz-Bonilla et al. 2000). Among those three countries, the incidence of poverty is highest in India and Pakistan, 41.6 and 35.9 percent respectively. Sri Lanka has the lowest incidence of poverty at 14 percent (WDI 2008).[8]

Most countries in the region have experienced solid GDP per capita growth during the 2004–2006 period ranging between 5 and 8 percent, with the exception of Nepal, which was hit with a slowdown, the result of a combination of poor weather and continued conflict in the country. In the Maldives, GDP per capita contracted by 7.8 percent due to the December 2004 tsunami but rebounded in 2006 with a growth of 21 percent (Figure 4).

The countries share a strong dominance of the service sector in GDP as well as a reliance on the manufacturing sector (Figure 2). Agriculture's contribution to GDP ranges from 16 percent in the Maldives to 38 percent in Nepal. But for the majority of the SAFTA countries—India, Bhutan, Bangladesh, and Nepal—more than 60 percent (76 percent in Nepal) of the labor force is employed in agriculture, followed by Pakistan, at 42 percent. For five of the seven SAFTA countries, textiles and wearing apparel, both labor-intensive sectors, are the main exports. For the two remaining countries, Bhutan and the Maldives, electricity (to India) and fish account for the main exports, respectively.

Figure 3. Relative size indicators of SAFTA countries, 2006
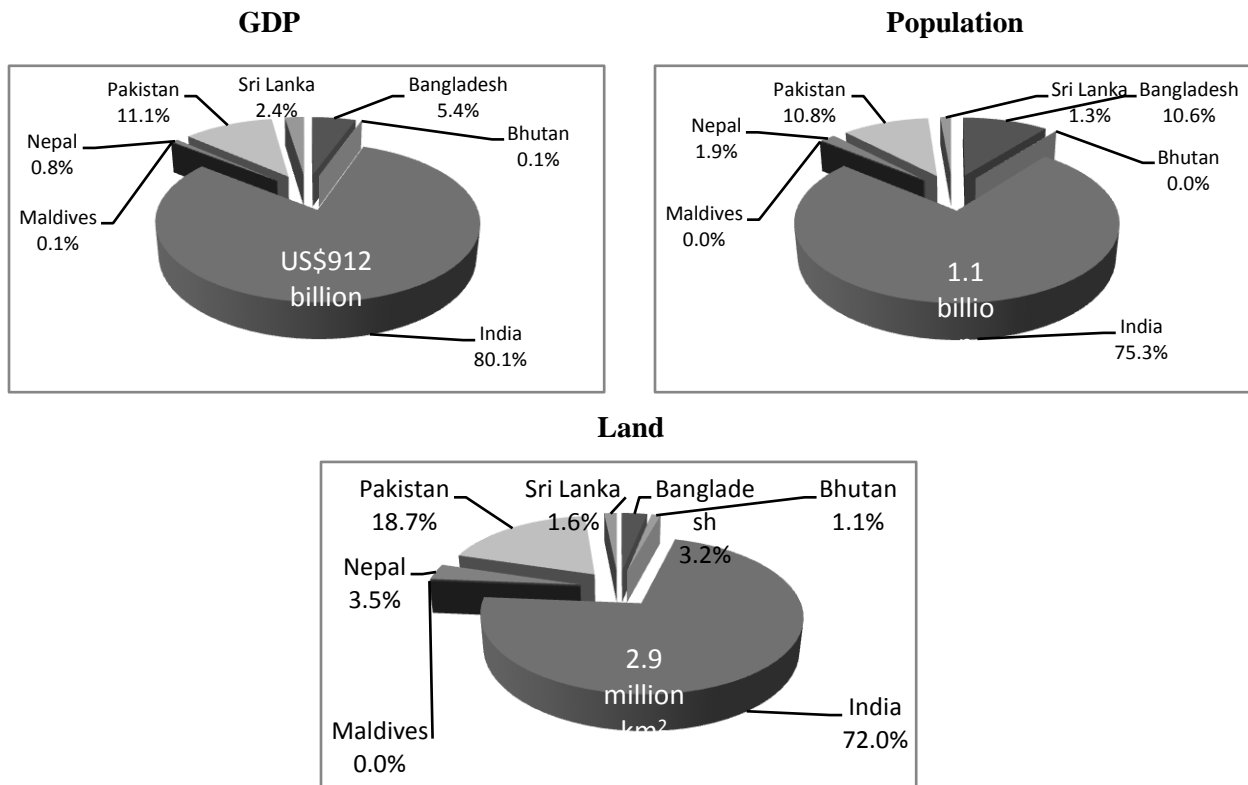
Source: World Bank (2008).

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[8] The poverty data represents the most recent available year: 2005 for Bangladesh, India, and Pakistan; 2004 for Nepal; 2003 for Bhutan; and 2002 for Sri Lanka (no data is available for the Maldives.

The importance of trade in the South Asian economies is assessed by the tradability index, which measures the merchandise trade–to–GDP ratio. The smaller countries, the Maldives and Bhutan, display a higher dependency on trade with merchandise trade–to–GDP ratios of 178 and 77 percent, respectively, followed closely by Sri Lanka at 75 percent. The other four countries have much lower ratios, below 49 percent (Figure 5).

Figure 4. GDP per capita growth, 2004–2006
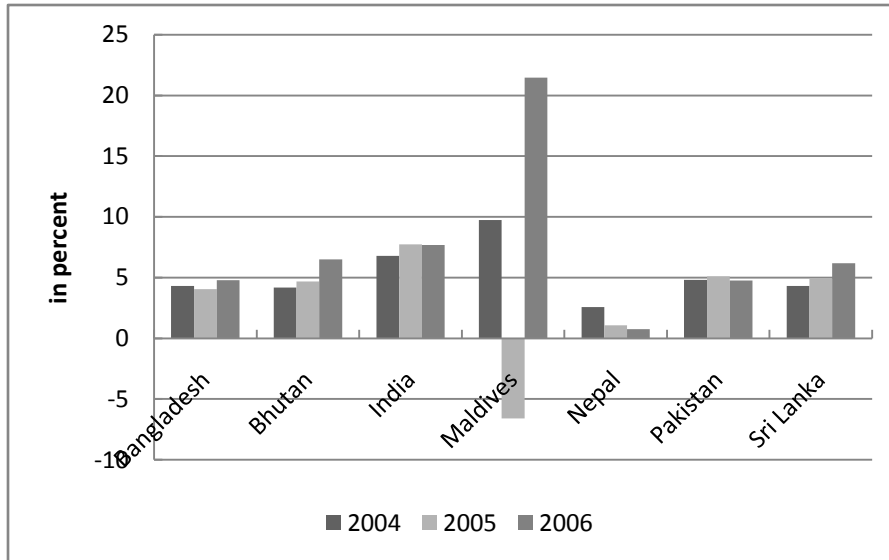
Source: World Bank (2008).

Figure 5. Merchandise trade–to–GDP ratio in SAFTA countries, 2006
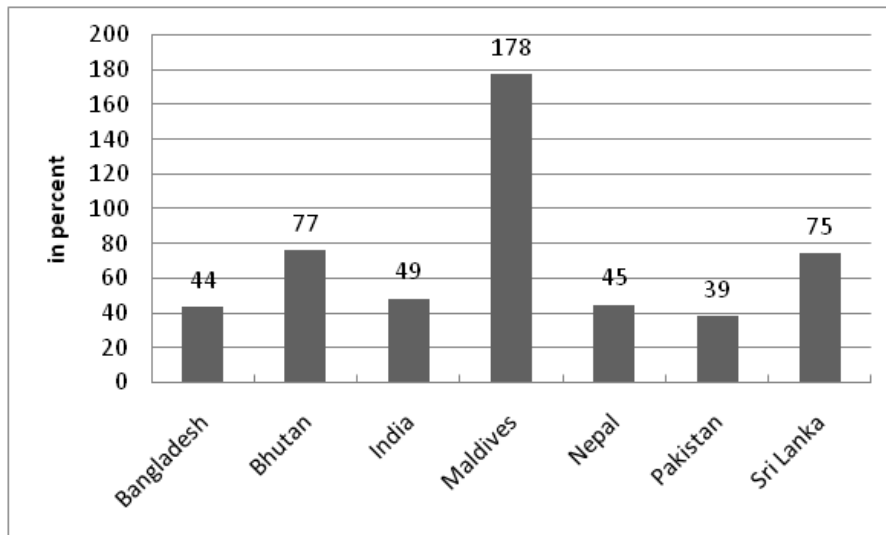
Source: World Bank (2008).

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The countries also differ in their market and product concentration. Table 2 reports indexes of market and product diversification calculated as the inverse of the Herfindahl index for SAFTA countries. Non-LDC SAFTA countries have a greater concentration in markets than middle-income countries on average but show more diversification in products: Sri Lanka is the most concentrated in markets, and India shows the least diversification in products. SAFTA LDCs are more concentrated in markets but more diverse in products than LDCs on average, but in the region they are more concentrated in both markets and products compared with their partners (Table 2).

Table 2. Market and product diversification in trade for SAFTA countries

	Market diversification index	Product diversification index
	(in percent)	
SAFTA non-LDC		
India	10.5	41.6
Pakistan	6.6	92.3
Sri Lanka	4.6	82.7
SAFTA LDC		
Bangladesh	2.7	27.2
Bhutan	1.5	15.5
Maldives	6.2	11.5
Nepal	3.2	46.0
Rest of the World		
Middle-income countries' average	9.6	38.9
Least developed countries' average	6.2	12.0

Source: Authors' calculations.
Note: The figures represent the inverse of the Herfindahl index, so lower values indicate higher concentration.

Although Sri Lanka undertook reforms toward trade liberalization as early as the 1970s, antitrade policies in the rest of South Asia remained the legacy of import-substitution policies until the 1990s, when unilateral trade liberalization policies were introduced (Baysan, Panagariya, and Pitigala 2006). With the exception of Bhutan, SAFTA countries are members of the WTO but continue to maintain high levels of tariffs. India and Sri Lanka conform to the pattern of most countries, where MFN tariffs in agriculture are much higher than in industry, but for other SAFTA countries protection of agriculture is not much higher than protection of industry—and for the Maldives, it is lower. All WTO members of SAFTA have bound tariffs that largely exceed their MFN rates. This is the case in agriculture, especially for Bangladesh, India, and Pakistan (Figure 6).

Figure 6. Bound and MFN tariff rates for SAFTA countries

Agriculture

Non-agriculture
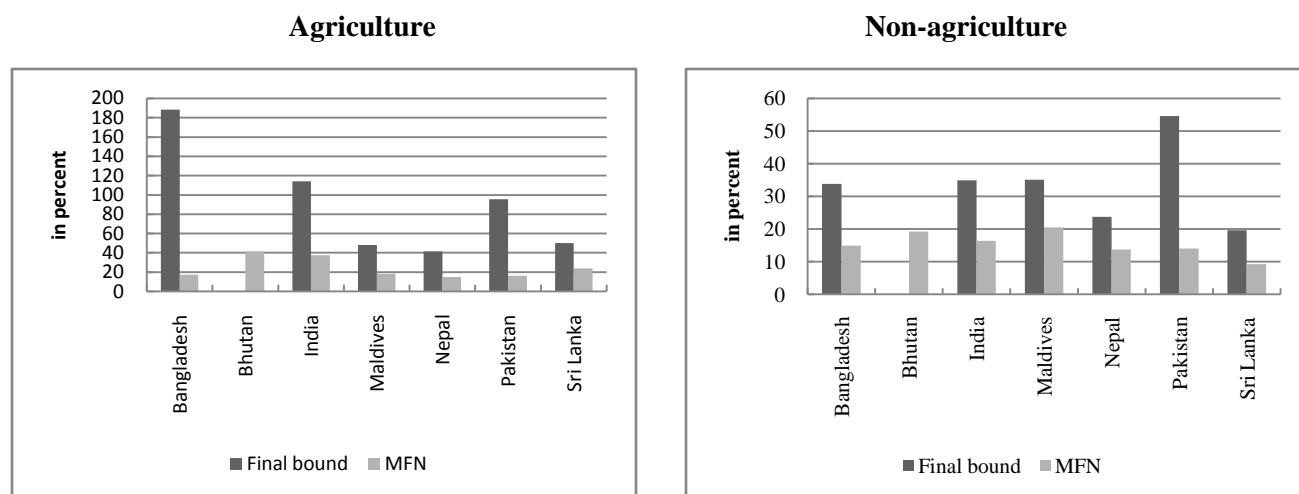
Source: WTO (2007).
Note: MFN = most-favored nation.

The SAFTA countries have entered into regional and bilateral agreements with each other and countries outside the region, some of them overlapping (Table 1). But those agreements are characterized by the exclusion of sensitive products from tariff cuts, the imposition of tariff-rate quotas, and strict rules of origin. For example, under the India–Sri Lanka Free Trade Agreement, 15 of the top 20 Sri Lankan exports are subject to a quota or included in India's negative list (Baysan, Panagariya, and Pitigala 2006). In addition, agricultural products are classified as sensitive products in most of the agreements, and the ones benefiting from the preferential treatment have little significance for the contracting countries (Samaratunga and Thibbotuwawa 2006).

3. SECTORAL AND GEOGRAPHICAL AGGREGATION

Sectoral Aggregation

Table 3 illustrates Sri Lanka's tariff structure in relation to the world and its SAFTA partners at the most detailed level of sectoral decomposition available in Global Trade Analysis Project (GTAP) sectoral nomenclature.

At the global level, Sri Lanka faces on average higher protection (9.8 percent) than it applies (7.4 percent). That pattern is accentuated in certain products known to be subject to high protection globally such as sugar (raw and processed), dairy products, paddy and processed rice, wheat, and cereals. On the other hand, on beverages and tobacco products, forestry, mineral products, animal products, other crops (which include Sri Lanka's main agricultural exports, tea and spices), and vegetables, fruits, and nuts, Sri Lanka applies higher protection than it faces.

Across its SAFTA partners, Sri Lanka on average applies lower tariffs (less than 9 percent with the exception of Nepal) than it faces (greater than 15 percent with the exception of Nepal). But it is not uniform across sectors and across countries: Sri Lanka applies a high tariff of 35 percent to imports of paddy and processed rice but faces higher protection globally (119 and 98 percent, respectively) and with respect to India (80 percent). So although Sri Lanka is expected to benefit more than its SAFTA partners from the implementation of the agreement, the effects on specific commodities will vary according to their initial structure of protection and whether they are included in the sensitive list. The number of duty-free imports in Sri Lanka from SAFTA partners Bangladesh, Bhutan, the Maldives, and Nepal attests to Sri Lanka's special and differential treatment toward its SAFTA LDC partners. The average tariff rate faced by Sri Lankan exports to India is also interesting. In spite of the India–Sri Lanka Free Trade Agreement, in force since 2001, it is more than three times higher than tariff rates faced by India's exports to Sri Lanka. The same pattern follows between Sri Lanka and Pakistan, although not much can be inferred yet because the rates in Table 3 do not reflect the Pakistan–Sri Lanka Free Trade Agreement that came into force in 2005.

This structure of tariffs across commodities and countries makes Sri Lanka a good candidate for trade liberalization at the multilateral level and at the regional level within SAFTA since in both cases the elimination of tariffs will increase its market access to trade partners. The sector that stands to gain the most from trade liberalization would be Sri Lanka's largest exports, wearing apparel, given that it is subject to high protection in SAFTA countries and on average in the world (Table 3). In agriculture, dairy products would benefit from trade liberalization, but because that category is on the sensitive list, gains will be limited under SAFTA.

Manufactures and agriculture are Sri Lanka's main commodity exports, representing 69 and 35 percent, respectively, of total merchandise exports. Manufactures also represent the main component of commodity imports, with agriculture coming third after fuels and mining products (WTO 2007).

Table 4 summarizes the selected aggregation for this study. Fourteen of the sectors are in agrifood, for which Sri Lanka's exports face higher trade protection than other sectors. The sectoral aggregation also includes 11 primary and manufacturing sectors that constitute Sri Lanka's main exports and source of employment and two service sectors.

Table 3. Sri Lanka's average applied and faced protection, 2004

	Average applied protection on Sri Lanka's imports							Average protection faced by Sri Lanka's exports						
	World	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	World	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan
								(in percent)						
Beverages and tobacco products	66.0	89.8	5.3	84.4	133.2	125.6	114.4	30.0	32.5	98.9	98.2	31.4	54.3	70.0
Sugar cane, sugar beet	25.0	0.0	0.0	0.0	0.0	0.0	25.0	153.5	0.0	0.0	0.0	15.0	0.0	0.0
Meat: cattle, sheep, goats, horses	23.9	25.0	0.0	24.8	0.0	25.0	25.0	42.7	20.3	0.0	30.0	15.0	10.0	10.0
Coal	5.0	0.0	5.0	4.8	0.0	0.0	5.0	6.1	2.7	0.0	6.5	25.0	5.0	18.5
Chemical, rubber, plastic prods	6.6	3.3	9.7	3.1	5.3	17.0	6.9	4.6	19.1	14.7	16.0	26.4	12.9	14.0
Cattle, sheep, goats, horses	17.2	0.0	0.0	2.5	0.0	0.0	2.1	17.7	0.0	0.0	0.0	25.0	0.0	0.0
Electronic equipment	5.4	3.6	9.9	3.1	5.4	5.0	8.3	3.1	13.5	17.6	6.8	22.4	6.5	17.9
Electricity	10.0	0.0	0.0	4.8	0.0	0.0	0.0	9.4	22.5	0.0	10.0	25.0	15.0	25.0
Metal products	7.6	6.5	22.6	3.5	9.4	17.9	6.1	9.4	13.5	19.4	15.0	24.6	6.3	8.4
Forestry	15.8	25.0	0.0	8.4	0.0	22.9	5.8	8.9	16.8	2.9	24.6	24.5	9.7	103.0
Fishing	9.1	5.6	0.0	8.8	8.0	3.1	8.9	6.9	22.9	10.0	29.5	20.0	5.2	10.0
Gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Gas manufacture, distribution	5.0	0.0	0.0	4.8	0.0	0.0	0.0	1.5	15.0	10.0	15.0	25.0	5.0	10.0
Cereal grains nec	6.3	0.0	0.0	7.6	6.0	25.0	5.7	27.3	0.0	0.0	60.0	15.0	10.0	9.0
Ferrous metals	5.4	11.0	5.2	3.1	5.5	9.0	5.4	1.3	12.7	25.2	18.4	24.5	8.4	8.1
Leather products	11.8	6.4	21.6	8.3	10.4	6.0	10.3	9.0	8.5	29.2	11.3	21.0	13.9	9.9
Wood products	4.4	5.5	6.5	6.6	1.1	9.9	11.9	6.2	27.3	16.1	14.1	17.0	13.2	23.1
Dairy products	14.3	14.5	24.0	12.4	10.0	13.1	11.1	36.4	32.5	30.0	33.1	10.5	15.0	24.6
Motor vehicles and parts	7.7	7.4	18.1	4.7	5.1	5.2	14.0	8.5	30.4	20.0	14.7	25.6	14.9	23.3
Metals nec	7.3	9.3	10.0	6.2	8.6	9.6	8.6	8.9	10.8	20.0	15.0	24.5	6.0	6.7
Mineral products nec	16.1	24.2	24.9	14.7	6.1	14.1	22.3	8.1	29.9	28.3	13.6	18.8	33.4	22.2
Animal products nec	11.4	13.6	6.4	13.8	23.6	13.8	20.7	3.5	19.6	25.8	15.5	21.8	11.8	23.1

Table 3. Continued

	Average applied protection on Sri Lanka's imports								Average protection faced by Sri Lanka's exports						
	World	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	In percent	World	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan
Crops nec	40.6	44.7	24.9	39.0	0.0	12.9	48.9		13.7	30.0	56.9	53.0	15.2	11.8	19.3
Food products nec	15.2	11.1	17.8	13.9	8.2	24.0	10.4		15.1	26.1	22.1	69.0	15.1	19.6	19.0
Oil	8.4	0.0	10.0	4.8	0.0	0.0	0.0		6.6	0.0	0.0	0.0	25.0	0.0	0.0
Machinery and equipment nec	4.9	6.1	6.0	3.3	5.2	7.3	3.8		2.3	10.7	10.7	12.1	17.7	8.3	17.1
Manufactures nec	8.6	11.3	7.0	4.7	8.0	8.4	8.3		4.7	24.1	27.5	18.1	20.7	17.0	22.5
Minerals nec	5.5	6.0	0.0	5.1	0.0	12.5	6.8		1.6	6.1	10.0	9.6	24.8	10.6	6.7
Meat products nec	23.9	0.0	25.0	22.6	0.0	25.0	23.9		36.9	24.2	10.0	66.1	22.5	14.6	24.5
Oilseeds	24.3	25.0	0.0	24.7	0.0	0.0	24.4		13.9	18.8	0.0	17.5	15.0	10.0	9.0
Transport equipment nec	8.9	6.2	5.7	10.8	9.6	13.9	5.4		5.2	13.4	10.0	7.5	62.2	7.8	13.2
Petroleum, coal products	12.7	15.8	10.0	6.3	5.0	0.0	15.8		1.5	28.2	0.0	15.0	24.3	15.9	22.1
Processed rice	35.0	35.0	0.0	35.0	0.0	35.0	35.0		119.2	0.0	0.0	0.0	0.2	0.0	0.0
Paddy rice	35.0	35.0	0.0	35.0	0.0	35.0	35.0		98.2	0.0	0.0	80.0	15.0	10.0	10.0
Plant-based fibers	0.0	0.0	0.0	0.0	0.0	0.0	0.0		15.0	32.5	20.0	15.0	15.5	4.5	25.0
Paper products, publishing	7.9	18.2	12.9	8.3	10.4	11.2	11.5		7.4	14.3	9.1	14.9	16.7	12.4	16.6
Sugar	22.5	0.0	0.0	23.6	25.0	13.1	25.0		83.5	32.5	0.0	15.0	1.0	25.0	10.0
Textiles	1.5	3.0	7.2	1.0	4.8	13.0	0.6		9.9	28.0	16.1	15.0	18.9	9.5	21.8
Vegetables, fruit, nuts	22.7	25.1	25.0	26.4	21.3	20.0	20.0		13.2	16.1	19.2	57.4	15.0	9.8	18.6
Vegetable oils and fats	18.9	19.6	0.0	12.2	20.2	14.3	14.5		32.1	17.6	0.4	50.7	22.0	12.8	27.8
Wearing apparel	9.5	10.2	12.5	9.6	9.9	9.3	5.9		11.3	32.3	28.1	15.0	24.8	18.8	25.0
Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0		34.2	0.0	0.0	0.0	15.0	0.0	0.0
Wool, silkworm cocoons	0.0	2.7	0.0	0.0	0.0	0.0	0.0		8.2	24.5	10.0	15.0	25.0	6.0	10.0
Average over all commodities	7.4	5.7	8.8	5.9	8.0	16.0	5.8		9.8	17.8	20.6	22.0	18.2	10.4	15.5

Source: Authors' calculations based on the 2004 MAcMapHS6-v2 database and GTAP 6.2 nomenclature.
Note: nec = Not elsewhere classified.

Table 4. Sectoral aggregation

#	Sector
Agrifood	
1	Wheat
2	Paddy rice
3	Vegetables, fruit, nuts
4	Oilseeds
5	Other crops
6	Plant-based fibers
7	Wool, silkworm cocoons
8	Animals and animal products
9	Bovine meat and meat products
10	Processed rice
11	Raw milk and dairy products
12	Sugar
13	Beverages and tobacco products
14	Other food products
Primary and manufacturing	
15	Fishing
16	Primary products
17	Paper products, publishing
18	Textiles
19	Wearing apparel
20	Petroleum and coal products
21	Metal products
22	Mineral products
23	Chemical, rubber, plastic products
24	Minerals nec
25	Other manufactured products
Services	
26	Transport and trade
27	Other services

Source: Based on GTAP 6.2 nomenclature.
Note: nec = Not elsewhere classified.

Geographical Aggregation

As the indexes in Table 2 show, Sri Lanka has a narrow base with respect to markets. That is also evidenced by the direction-of-trade statistics, which indicate that 60 percent of Sri Lanka's exports are directed to the United States and the E.U., although the trend decreased over the period 2002–2008 (Table 5). The remainder is directed to emerging and developing countries in Asia and the Middle East. In Asia, the share of Sri Lanka's exports to SAFTA has increased since 2002, dominated by Sri Lanka's trade with India. The Middle East is also an important region for Sri Lankan trade. The United Arab Emirates is the second largest single-country developing trade partner after India for Sri Lankan exports (3 percent of total exports).

Sri Lanka's imports, on the other hand, are more diversified and are sourced predominantly from developing countries. India leads, providing more than 21 percent of Sri Lanka's imports followed by China, which is replacing the E.U. as the second largest supplier of Sri Lanka's imports. Whereas the remaining SAFTA countries contribute only marginally to Sri Lanka's trade, other Asian countries of Indonesia, Korea, Malaysia, Singapore, and Thailand contribute together 17 percent of Sri Lanka's imports. Iran and the United Arab Emirates are the main sources of Sri Lanka's imports (consisting almost entirely of crude oil) from the Middle East (Table 5).

In addition to the contribution of developing countries, Japan is an important trading partner of Sri Lanka in Asia, absorbing more than 2 percent of its exports and supplying 3 percent of its imports, but the trend is decreasing.

The geographical aggregation shown in Table 6 reflects the structure of markets described previously and corresponds to the GTAP 6.2 nomenclature. It includes four developed countries/regions and 17 developing countries/regions, mostly in Asia. Among SAFTA members, the GTAP 6.2 database singles out Bangladesh, India, Pakistan, and Sri Lanka but groups Bhutan, the Maldives, and Nepal in the Rest of South Asia.

Table 5. Geographical composition of Sri Lanka's trade, 2002–2008

	Destination of exports						
	2002	2003	2004	2005	2006	2007	2008
	(US$ million)						
	4,678	*5,133*	*5,757*	*6,384*	*6,883*	*7,740*	*8,688*
	(in percent)						
Developed Countries	**74.8**	**70.1**	**71.0**	**68.0**	**68.8**	**67.7**	**65.1**
United States	37.7	34.6	32.5	31.1	29.1	25.5	21.7
European Union*	30.1	28.5	32.4	30.9	33.6	37.0	37.8
Japan	3.0	3.1	2.7	2.3	2.4	2.1	2.1
Rest of Developed Countries	4.0	3.8	3.3	3.7	3.6	3.2	3.5
Emerging and Developing Countries	**23.8**	**25.7**	**28.1**	**29.6**	**26.7**	**27.4**	**29.9**
Africa	0.8	0.9	0.8	0.7	0.7	0.7	0.7
Asia	10.3	11.5	13.2	14.7	13.4	13.0	13.1
SAFTA	*5.5*	*6.8*	*8.8*	*10.2*	*8.7*	*8.3*	*8.4*
Bangladesh	0.2	0.2	0.2	0.2	0.3	0.3	0.2
Bhutan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
India	3.6	4.8	6.8	8.9	7.1	6.7	6.8
Maldives	1.0	1.1	1.1	0.4	0.4	0.7	0.7
Nepal	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Pakistan	0.6	0.7	0.7	0.7	0.8	0.7	0.7
Rest of Emerging and Developing Asia	4.8	4.7	4.4	4.4	4.7	4.6	4.7
China**	1.5	1.8	1.6	1.5	1.4	1.3	1.4
Indonesia	0.2	0.2	0.2	0.4	0.7	0.6	0.7
Korea	0.7	0.6	0.3	0.4	0.4	0.4	0.4
Malaysia	0.2	0.2	0.2	0.2	0.4	0.5	0.5

Table 5. Continued

	Destination of exports						
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Singapore	1.5	1.3	1.5	1.2	1.1	1.0	0.7
Thailand	0.3	0.2	0.3	0.4	0.6	0.6	0.7
Vietnam	0.2	0.2	0.1	0.2	0.1	0.2	0.2
Other Developing Asia	0.2	0.2	0.3	0.2	0.1	0.1	0.2
Middle East	7.3	7.8	7.0	7.3	7.0	7.7	8.4
Iran	0.7	0.7	1.0	1.2	1.2	1.5	1.7
Saudi Arabia	0.6	0.6	0.5	0.6	0.4	0.7	0.7
United Arab Emirates	2.8	3.2	2.4	2.7	2.5	2.7	3.0
Other Middle East	3.1	3.3	3.1	2.9	2.8	2.8	2.9
Central and South America	1.4	1.4	1.8	3.1	1.5	1.8	1.8
Rest of Emerging and Developing Countries	4.0	4.2	5.3	3.8	4.1	4.3	5.8
Rest of the World	**1.5**	**4.2**	**0.9**	**2.3**	**4.5**	**4.9**	**5.0**
	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5. Continued

	2002	2003	2004	2005	2006	2007	2008
				Provenance of imports			
	(US$ million)						
	6,022	*6,672*	*8,000*	*8,863*	*10,253*	*11,301*	*14051*
	(in percent)						
Developed Countries	**35.8**	**35.8**	**33.0**	**29.1**	**28.7**	**26.8**	**28.4**
United States	3.6	3.0	3.0	2.3	2.0	3.6	2.2
European Union*	15.1	16.6	15.7	14.6	13.7	12.3	13.6
Japan	5.9	6.7	5.1	4.3	4.4	3.7	2.9
Rest of Developed countries	11.2	9.5	9.2	7.9	8.6	7.2	9.7
Emerging and Developing Countries	**64.0**	**61.7**	**66.9**	**70.8**	**70.7**	**72.6**	**70.9**
Africa	0.6	0.4	0.8	0.8	0.3	0.3	0.3
Asia	48.6	51.9	53.3	56.5	57.2	58.1	54.7
SAFTA	*15.5*	*17.6*	*19.7*	*22.4*	*22.9*	*24.9*	*22.9*
Bangladesh	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bhutan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
India	13.8	16.1	18.0	20.7	21.2	23.1	21.2
Maldives	0.5	0.3	0.2	0.2	0.2	0.1	0.1
Nepal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pakistan	1.1	1.1	1.3	1.3	1.4	1.6	1.4
Rest of Emerging and Developing Asia	33.1	34.3	33.7	34.2	34.3	33.1	31.9
China**	12.4	13.3	13.4	14.4	14.0	14.6	15.0
Indonesia	2.4	2.4	2.2	2.5	2.2	2.2	2.3
Korea	5.0	4.2	3.1	2.4	1.8	1.6	1.5
Malaysia	3.4	4.1	4.1	4.4	4.3	2.5	2.4
Singapore	7.2	7.8	8.7	8.3	9.7	9.9	7.7

Table 5. Continued

	2002	2003	2004	2005	2006	2007	2008
				Provenance of imports			
Thailand	2.4	2.2	1.9	1.9	2.0	2.0	2.7
Vietnam	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Other Developing Asia	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Middle East	13.8	8.3	11.0	11.5	11.8	13.0	13.7
Iran	3.0	3.7	5.2	5.9	7.4	7.5	7.9
Saudi Arabia	2.6	1.1	2.2	1.7	1.4	1.3	1.4
United Arab Emirates	4.5	2.7	2.5	3.3	2.1	2.9	3.1
Other Middle East	3.7	0.7	1.0	0.6	0.8	1.3	1.3
Central and South America	0.7	0.4	1.3	1.2	0.6	0.4	0.3
Rest of Emerging and Developing Countries	0.4	0.6	0.4	0.8	0.8	0.8	1.9
Rest of the World	**0.2**	**2.5**	**0.1**	**0.1**	**0.6**	**0.7**	**0.6**
	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: IMF (2009).
Notes: * = The data for the European Union (EU) for all periods cover Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, and the United Kingdom. This definition applies to any mention of the term in the remaining tables; ** = China includes Hong Kong and Macau.

Table 6. Geographical aggregation

#	Regions	North/South	Scarcity of land
1	United States	North	No
2	European Union	North	Yes
3	Japan	North	Yes
4	Rest of Developed Countries	North	No
5	Bangladesh	South	Yes
6	India	South	Yes
7	Pakistan	South	Yes
8	Sri Lanka	South	Yes
9	Rest of South Asia	South	Yes
10	China	South	Yes
11	Indonesia	South	Yes
12	Korea	North	Yes
13	Malaysia	South	Yes
14	Singapore	South	Yes
15	Taiwan	North	Yes
16	Thailand	South	Yes
17	Vietnam	South	Yes
18	Rest of Developing Asia	South	Yes
19	Iran	South	Yes
20	Rest of Middle East	South	Yes
21	Rest of the World	South	Yes

Source: Based on GTAP 6.2 nomenclature.
Note: "Scarcity of land" reflects low values of land area per capita.

Table 6 also identifies the regions with respect to two geographical indicators that are linked to assumptions made in the MIRAGE model. The first indicator, "North/South," reflects the difference in quality of products coming from developed countries (North) and those coming from developing countries (South). It implies that substitutability is higher among products belonging to the same quality range than among products from different quality ranges. The last column identifies countries or regions that are land scarce and where, therefore, land exhibits low supply elasticity (Bouët 2008).

4. INITIAL STRUCTURES OF PROTECTION, TRADE, AND PRODUCTION

The MIRAGE model relies on the GTAP 6.2 database for multisectoral, multiregion data and the 2004 MAcMapHS6-v2 database for the applied protection on goods. The GTAP 6.2 database is built from a combination of regional input–output tables adjusted to match international datasets on macroeconomic aggregates, bilateral merchandise and services trade, protection, and energy. The GTAP 6.2 database provides detailed economic information for 96 regions and 57 sectors, representing global economic activity for a particular reference year—2001 (Dimaranan 2006).

The 2004 MAcMapHS6-v2 database computes the equivalent measure of applied protection at the six-digit level of the Harmonized Commodity Description and Coding System (HS) for 5,111 products, 166 reporting countries, and 208 partners. The equivalent measure combines ad valorem tariffs and the ad valorem equivalent of specific tariffs, tariff quotas, prohibitions, and antidumping duties, at the bilateral level, taking into account all preferential agreements across the world up to 2004. The bilateral measures of protection in MAcMapHS6-v2 are aggregated across regions and products using a weighting methodology originated by Centre D'Etudes Prospectives et d'Informations Internationales (CEPII) and based on reference groups of countries instead of the standard import-weighted average protection (Bouët et al. 2008).[9]

Based on these two databases, the structures of protection and trade are presented in this section according to the sectoral and regional classifications described in tables 4 and 6.

Protection and Trade

Table 7 illustrates the structure of applied protection worldwide. Overall, developed countries have significantly less protection than developing countries, averaging below the world average of 4.4 percent. Among developing countries, Asian countries appear to be the most protectionist. Confirming Baysan, Panagariya, and Pitigala's (2006) observation of high levels of protection in the SAFTA region, Table 7 shows that SAFTA countries apply the highest tariff rates, ranging between 15 and 23 percent, with the exception of Sri Lanka, which applies an average rate of 7 percent. So within SAFTA, Sri Lanka is relatively an open economy overall. Outside SAFTA, protection is highest in Malaysia, Thailand, and Vietnam. In the Middle East, Iran has an applied tariff rate of 17 percent, more than twice the region average of 7 percent.

Across sectors, agriculture is the most protected sector at the world and country levels, but within SAFTA industrial protection is relatively high by world standards, and for the Maldives, it surpasses even agricultural protection. The higher level of protection in agriculture is not surprising given that agriculture was left out of multilateral trade negotiations until 1995, when the WTO was formed. The Agreement on Agriculture (WTO 2007) went a long way to lower protection in developed and developing countries but has met with strong resistance, and agriculture continues to be the main hurdle in completing the ongoing round of multilateral negotiations and seems to be left out of most bilateral and regional trade agreements.

This trend is especially true for Sri Lanka, whose tariff rate on agriculture exceeds 20 percent compared with 6 percent on industry. The Maldives, on the other hand, has a small agriculture sector constrained by limited availability of cultivable land and must import most of its staple foods, so the incentive to protect domestic production is low. In Asia and among SAFTA countries in particular, the high protection rates in industry are driven by high tariffs in the textiles and wearing apparel subsectors. Iran, not a WTO member, has particularly high rates of 43.5 and 82 percent for textiles and wearing apparel, respectively.

At the global level, LDCs seem to face the same level of protection as non-LDCs and developed countries. But with respect to developed countries, LDCs face lower tariff rates suggesting that LDCs may benefit from preferences from developed countries. SAFTA countries face higher protection than

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[9] In particular, this reference-group weighting scheme reduces the endogeneity bias in measuring protection and usually provides higher assessments of average protection.

other developing exporters overall and with respect to developed countries. Although the region benefits from preferential treatment by developed-country partners, it may underuse such preferences because of the product mix of SAFTA exports or because of the restrictions imposed on the products' eligibility for preferential treatment. For example, textiles and wearing apparel, among the most important exports for many SAFTA countries, are excluded from the preferential agreement with the United States. Interestingly, SAFTA countries face tariffs as high as other countries with respect to other SAFTA partners (Table 7).

Tables 8 and 9 illustrate the structure of protection and trade for Sri Lanka's exports. Sri Lanka faces very high protection on paddy rice, processed rice, and sugar and high protection on milk and dairy products, bovine meat and meat products, and wheat (Table 8). The largest share of paddy rice (37 percent) is exported to the E.U., where it faces a tariff rate of 82 percent, which although high is less than the rates Japan, Korea, and Taiwan apply to paddy rice from Sri Lanka (554, 450, and 497 percent, respectively), but they are still the destination for 8 percent of total paddy rice exports. On the other hand, Sri Lanka directs 11 percent of its paddy rice exports to the Rest of the Middle East, which has a very low average tariff of 1.7 percent. Processed rice follows a similar pattern, where the E.U. receives 34 percent of Sri Lanka's exports in spite of applying a tariff rate of 152 percent. Again, Japan, Korea, and Taiwan are the highest protectors of processed rice (580, 450, and 521 percent, respectively), but they absorb only 4 percent of exports. A large share of processed rice, 15 percent, is exported to the Rest of the Middle East, which applies one of the lowest tariff rates on this sector. Milk and dairy products have two main destinations: the Rest of South Asia, 77 percent, and the Rest of the Middle East, 12 percent. Relative to the world average, these two regions have among the lowest tariff rates, 12 and 15 percent, respectively. Developed countries, with the exception of the United States, apply very high tariff rates on dairy products ranging from 96 to 125 percent, yet they are still the destination for 6 percent of Sri Lanka's exports. More than three-fourths of Sri Lanka's exports of sugar has for its destination the Rest of South Asia, but 17 percent still finds its way to the largest protectors of sugar, the E.U., Japan, and the Rest of Developed Countries, with tariff rates of 237, 406, and 93 percent, respectively.

Sri Lanka's main exports in industry are wearing apparel (32 percent) and other manufactured products, whereas in agriculture, other crops, which include tea, constitute 14 percent of Sri Lanka's total exports. Three regions absorb nearly three-fourths of Sri Lanka's other crops exports: the E.U., the Rest of the Middle East, and the Rest of the World. Those regions apply varying tariffs to this sector ranging from 4.1 percent (E.U.) to 14.2 percent (Rest of the World). The United States and the E.U. together import 90 percent of Sri Lanka's wearing apparel and apply tariff rates of 12 and 11 percent, respectively, which is relatively low compared with other countries (Table 8), but high when we consider that the E.U.'s average tariff with regard to the world on wearing apparel is much lower, 5.3 percent (Table 7). Finally, other manufactured products face some of the lowest tariffs, particularly in the United States and the E.U., which together absorb 68 percent of Sri Lanka's exports.

Sri Lanka's main exports to SAFTA countries rank very low in the export structure of the country. Among the most important are oilseeds to Pakistan and animals and animal products to Bangladesh, India, and the Rest of South Asia. Those sectors face tariffs worldwide of 14 and 13 percent, respectively, but within SAFTA partners, they face slightly lower rates, 9 percent for oilseeds and ranging between 5 and 11 percent for animals and animal products (tables 8 and 9).

Table 7. Protection applied by country, 2004

	Total	By sector					By exporter			
		Total agriculture	Industry				Dvped	Dvping	LDC	SAFTA
			Total	Textile	Wearing apparel					
					(in percent)					
World	4.4	14.7	3.4	7.9	9.0		4.1	4.9	4.7	7.1
United States	2.5	8.1	2.0	6.9	11.4		2.2	2.0	2.0	4.8
European Union–25	2.0	9.7	1.3	2.8	5.3		1.5	2.9	1.0	4.1
Japan	3.4	25.9	1.3	4.5	10.5		3.7	3.0	2.2	7.7
Rest of Developed Countries	4.1	26.2	2.2	5.9	12.2		4.7	3.7	1.3	6.3
Bangladesh	16.9	21.9	16.4	21.8	30.5		14.0	20.7	16.4	19.6
Bhutan	15.2	21.2	13.9	17.7	29.3		14.4	15.6	16.7	13.3
India	19.1	62.0	14.6	14.5	14.9		18.3	19.6	19.5	17.6
Maldives	23.4	17.6	23.9	18.1	23.8		24.4	22.0	23.8	21.5
Nepal	13.4	15.8	13.1	9.2	19.1		13.8	13.4	10.6	13.9
Pakistan	15.9	24.3	15.0	18.0	25.0		16.4	16.1	12.0	18.1
Sri Lanka	7.2	20.5	6.0	1.4	9.5		7.2	7.8	5.7	5.9
China	4.9	6.9	4.7	9.3	5.8		5.5	5.2	3.5	6.2
Indonesia	5.5	8.8	5.2	8.0	12.1		6.2	4.3	1.5	5.5
Korea	7.9	33.9	5.6	8.8	12.2		9.4	8.2	8.8	14.2
Malaysia	14.4	29.8	12.8	14.5	17.8		15.2	12.6	18.5	14.0
Singapore	0.1	1.3	0.0	0.0	0.0		0.1	0.1	0.0	0.0
Taiwan	9.9	24.4	8.6	7.8	11.1		10.7	7.7	8.6	11.5
Thailand	13.6	42.8	11.0	19.8	30.7		14.1	12.0	3.4	14.4
Vietnam	11.6	23.1	10.3	22.8	41.3		10.8	12.6	11.6	17.7
Rest of Developing Asia	6.0	11.3	5.5	6.9	11.6		6.2	5.7	5.0	7.3
Iran	17.4	28.2	16.4	43.5	81.8		17.8	16.1	6.9	21.1
Rest of Middle East	6.8	18.5	5.7	8.0	12.1		6.6	6.9	7.0	8.1
Rest of World	9.9	19.0	9.0	13.6	20.5		9.1	11.1	11.0	14.2

Source: Authors' calculations based on the 2004 MAcMapHS6-v2 database.

Sri Lanka is one of the less protectionist economies in South Asia and is the most open among SAFTA countries. Sri Lanka's average applied protection to SAFTA countries is 6 percent, a rate lower than that applied to other groups, with the exception of LDCs (Table 7). India, Bangladesh, and Pakistan benefit from this lower rate but not the Rest of South Asia, which faces a tariff rate of 11 percent on its exports to Sri Lanka, as high as the country's MFN tariff rate (Table 10).[10] The lowest tariff applied by Sri Lanka is with regard to Iran, 3.3 percent. It is the result of duty-free imports of primary products (oil), which constitutes the largest import from Iran by Sri Lanka. In contrast, Sri Lanka does not seem to benefit from preferential tariff rates from India and Iran, where it faces high tariffs of 22 and 34.1 percent, respectively, in spite of signed free trade agreements with those two countries. Those rates are higher than the average tariff rates the world faces in those countries (tables 7 and 8). The high tariffs faced by Sri Lanka with respect to India supports Baysan, Panagariya, and Pitigala's (2006) judgment that the provisions of the India–Sri Lanka Free Trade Agreement, although generous on the surface, exclude through the negative list or constrain by quotas most of the products Sri Lanka is capable of exporting.

Sri Lanka's protection of agriculture is comparable on average to that of other South Asian countries. Sri Lanka's main agricultural imports are wheat; vegetables, fruits, and nuts; other crops; milk and milk products; and other food products. Together they account for 10 percent of total imports. Imports of wheat are duty free and are imported mainly from developed countries, with the United States supplying more than two-thirds. Vegetables, fruits, and nuts are imported from developed countries (nearly 30 percent), India and Pakistan (48 percent combined), and the Middle East (12 percent). Sri Lanka's tariff on this sector is consistent across countries ranging from 19 percent (E.U.) to 26 percent (India). Milk and milk products are subject to tariffs that are relatively modest relative to other agricultural imports, averaging across countries just under 15 percent. Ninety-nine percent of imports come from developed countries, 5 percent of which come from the E.U. Finally, other food products are subjected to tariffs ranging from 11 to 18 percent and are imported from a variety of sources, the main ones being the E.U., India, Thailand, and the Rest of the World. Beverages and tobacco products constitute by far the most protected sector; the average tariff is 66 percent but ranges across countries from 50 to 153 percent. The E.U. supplies nearly half of that sector's imports to Sri Lanka (tables 10 and 11).

Industrial products constitute the largest share of total imports for Sri Lanka, 74 percent. The three leading sectors—textiles (vital as the main input to the wearing apparel sector); chemical, rubber, and plastic products; and other manufactured products—account for 18, 11, and 24 percent, respectively, of total imports (Table 11).

The structure of tariffs and trade flows just presented accentuates the importance of the list of commodities Sri Lanka and other SAFTA members choose to exempt from the free trade agreement. Because Sri Lanka faces higher protection than it applies overall and in South Asia in particular, it is expected to benefit from trade liberalization, but with such a narrow base with respect to sectors and partners, the gains may be limited when the trade agreements are restricted by long lists of exempted sensitive products.

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[10] The Pakistan–Sri Lanka trade agreement was not implemented until 2005 so would not be reflected in the 2004 MAcMapHS6-v2 database.

Table 8. Average tariffs faced by Sri Lanka's exports, 2004

Sectors	United States	European Union	Japan	Rest of Developed Countries	Bangladesh	India	Pakistan	Rest of South Asia	China	Indonesia	Korea
					(in percent)						
Wheat	2.9	35.8	208.6	28.1	0.0	0.0	0.0	15.0	65.6	1.7	2.2
Paddy rice	5.7	81.6	553.9	6.6	0.0	80.0	10.0	4.0	0.0	18.8	450.0
Vegetables, fruit, nuts	1.2	2.5	1.9	14.9	16.1	57.4	18.6	10.7	9.0	5.0	38.8
Oilseeds	0.0	0.0	0.4	6.6	18.8	17.5	9.0	10.0	7.0	5.0	590.8
Other crops	2.7	4.1	4.2	43.3	30.0	53.0	19.3	13.3	13.0	5.0	19.0
Plant-based fibers	0.0	0.0	0.0	0.0	21.0	14.7	5.0	8.2	2.6	5.0	1.0
Wool, silkworm cocoons	0.1	0.0	0.0	0.0	13.5	15.0	5.0	0.0	0.0	0.0	1.0
Animals and animal products	0.0	1.6	1.3	15.7	4.8	11.0	6.7	7.0	16.9	3.3	13.5
Bovine meat and meat products	0.7	34.7	71.3	120.0	24.2	65.9	24.4	16.1	15.9	5.0	21.6
Processed rice	2.7	151.8	580.2	10.7	0.0	0.0	0.0	0.2	0.0	19.7	450.0
Raw milk and dairy products	9.3	95.8	101.1	125.3	32.5	33.1	24.6	12.2	16.8	4.9	156.9
Sugar	36.4	236.6	406.2	93.1	32.5	15.0	10.0	16.6	54.6	38.8	34.4
Beverages and tobacco products	4.9	42.6	10.5	22.6	32.5	98.2	70.0	67.6	12.1	23.5	27.3
Other food products	0.3	12.2	11.9	42.7	19.7	55.4	25.5	14.8	13.0	5.1	20.3
Fishing	0.0	9.8	3.4	0.6	22.9	29.5	10.0	6.0	1.3	4.8	18.3
Primary products	0.0	0.2	0.3	9.0	14.9	22.4	92.0	8.7	3.1	5.8	4.8
Paper products, publishing	0.0	0.0	0.0	0.7	14.4	15.0	16.6	12.3	5.8	6.0	2.2
Textiles	11.0	10.4	8.0	12.8	28.5	15.0	22.5	12.9	6.8	9.0	11.9
Wearing apparel	11.9	11.1	8.9	14.8	32.3	15.0	24.9	23.3	1.2	14.7	11.2
Petroleum and coal products	1.6	0.0	4.2	0.3	28.2	15.0	22.1	18.5	1.7	2.7	5.1
Metal products	0.1	0.4	0.0	1.7	11.8	15.4	7.5	6.4	5.0	10.5	6.1
Mineral products	0.0	0.0	0.0	0.0	7.3	13.8	5.5	11.0	0.4	4.6	1.3
Chemical, rubber, plastic products	0.7	0.3	0.0	2.9	19.0	15.9	14.2	13.5	6.0	9.2	6.6
Minerals nec	4.5	8.4	0.0	1.7	30.9	13.4	23.1	35.1	4.7	6.0	6.8
Other manufactured products	1.1	0.9	1.1	1.1	18.8	13.1	19.2	12.2	3.2	6.2	5.5
Average by country	*7.4*	*8.0*	*6.5*	*14.5*	*17.9*	*22.0*	*15.6*	*11.4*	*6.5*	*6.7*	*11.2*

Table 8. Continued

Sectors	Malaysia	Singapore	Taiwan	Thailand	Vietnam	Rest of Developing Asia	Iran	Rest of Middle East	Rest of the World	*Average by sector*
					(in percent)					
Wheat	0.0	0.0	7.0	27.0	0.0	4.6	5.0	3.0	16.3	34.0
Paddy rice	0.0	0.0	497.2	52.0	20.0	43.7	50.0	1.7	22.7	98.1
Vegetables, fruit, nuts	15.9	0.0	34.5	26.9	39.4	10.5	35.1	12.9	20.0	13.2
Oilseeds	0.0	0.0	11.3	35.2	10.0	18.5	11.6	2.5	8.8	13.9
Other crops	20.5	0.0	17.1	30.3	29.4	6.3	24.6	7.4	14.2	13.6
Plant-based fibers	0.0	0.0	0.0	5.0	9.4	3.4	4.0	3.9	6.6	1.6
Wool, silkworm cocoons	0.0	0.0	0.0	0.0	0.0	9.7	0.0	3.2	9.0	0.6
Animals and animal products	2.8	0.0	7.2	17.0	1.3	11.3	54.0	12.1	19.3	12.7
Bovine meat and meat products	0.0	0.0	32.0	51.5	46.8	29.0	42.9	20.9	47.0	37.4
Processed rice	0.0	0.0	520.8	52.0	0.0	46.1	50.0	2.5	27.7	118.6
Raw milk and dairy products	1.6	0.0	11.3	14.2	27.8	4.4	42.7	14.9	29.0	36.3
Sugar	0.0	0.0	138.1	64.9	10.0	39.2	72.2	3.3	24.0	83.0
Beverages and tobacco products	315.0	2.4	13.8	35.3	78.1	18.9	36.3	66.9	53.4	30.0
Other food products	23.8	0.0	20.2	30.8	36.9	5.7	34.3	6.4	18.5	15.9
Fishing	0.8	0.0	18.1	59.4	6.2	11.0	28.7	10.7	16.5	6.9
Primary products	0.3	0.0	11.6	32.9	4.5	16.4	30.5	62.2	10.6	8.7
Paper products, publishing	18.7	0.0	2.6	24.7	12.5	14.5	29.7	8.0	12.6	6.3
Textiles	15.8	0.0	10.4	22.3	33.9	8.1	52.1	11.6	18.4	11.1
Wearing apparel	19.3	0.0	11.9	36.2	49.8	14.0	90.0	14.7	25.3	11.2
Petroleum and coal products	12.7	0.0	6.6	1.0	14.7	4.4	5.0	4.5	18.6	1.5
Metal products	11.9	0.0	4.6	15.4	2.0	9.9	27.9	7.4	7.9	8.6
Mineral products	0.0	0.0	0.0	2.0	1.4	14.3	5.7	2.8	8.9	1.2
Chemical, rubber, plastic products	17.4	0.0	6.8	14.2	9.7	8.8	30.3	6.8	13.4	4.1
Minerals nec	29.0	0.0	10.8	24.6	34.4	9.8	57.3	8.1	19.5	8.7
Other manufactured products	10.5	0.0	2.4	12.1	10.2	10.7	17.5	5.5	11.9	3.0
Average by country	20.2	0.0	10.6	25.2	12.9	8.7	34.1	10.4	15.5	

Source: Authors' calculations based on the 2004 MAcMapHS6-v2 database.
Note: nec = Not elsewhere classified.

Table 9. Sri Lanka export shares by sector and destination, 2004

Sectors	United States	European Union	Japan	Rest of Developed Countries	Bangladesh	India	Pakistan	Rest of South Asia	China	Indonesia	Korea
					(in percent)						
Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	14.5	37.2	4.7	9.6	0.0	0.6	0.2	1.0	6.3	0.6	2.2
Vegetables, fruit, nuts	2.4	32.2	0.6	3.1	0.0	2.4	4.9	14.1	0.5	0.1	0.2
Oilseeds	0.0	0.5	0.0	0.1	0.0	0.0	98.4	0.0	0.0	0.0	0.0
Other crops	2.9	18.1	4.4	8.3	0.1	2.9	1.6	0.1	1.3	0.1	0.1
Plant-based fibers	8.8	35.9	15.0	4.6	0.0	0.3	2.7	0.2	6.7	0.0	14.6
Wool, silkworm cocoons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Animals and animal products	1.0	0.8	0.3	0.0	33.4	21.8	1.5	35.5	0.4	0.0	0.3
Bovine meat and meat products	10.6	24.4	3.8	7.2	0.2	1.6	0.3	32.2	3.6	0.4	1.2
Processed rice	9.6	33.9	2.7	20.0	0.0	0.3	0.2	7.3	2.3	0.3	1.1
Raw milk and dairy products	1.0	2.9	0.3	2.8	0.0	0.0	0.0	76.7	0.2	0.9	0.1
Sugar	1.9	9.5	0.5	7.0	0.0	0.0	0.0	76.1	0.0	0.0	0.1
Beverages and tobacco products	4.7	13.5	0.7	2.4	0.0	0.1	0.0	30.0	0.1	0.0	0.0
Other food products	9.7	28.2	34.4	3.9	1.9	0.6	0.4	2.5	2.6	0.0	3.8
Fishing	5.2	13.4	74.9	4.6	0.0	0.0	0.0	0.1	0.3	0.0	0.0
Primary products	5.2	68.1	4.2	2.2	0.0	8.4	0.0	0.6	1.3	0.2	0.6
Paper products, publishing	2.9	49.7	0.4	3.3	0.9	24.9	0.9	2.3	0.3	0.4	0.4

Importers

Table 9. Continued

Sectors	Importers										
	United States	European Union	Japan	Rest of Developed Countries	Bangladesh	India	Pakistan	Rest of South Asia	China	Indonesia	Korea
Textiles	45.8	25.3	2.4	2.7	0.2	0.5	0.2	8.3	2.8	0.7	6.3
Wearing apparel	66.4	23.5	1.2	3.9	0.0	0.0	0.0	0.8	0.3	0.0	0.1
Petroleum and coal products	6.2	16.5	1.5	4.3	0.0	0.6	0.0	42.2	1.5	0.2	1.2
Metal products	2.6	30.9	5.5	6.0	2.9	33.4	0.5	3.2	0.6	0.2	0.2
Mineral products	0.3	24.6	33.9	1.3	0.0	4.2	1.7	0.6	2.1	0.2	0.4
Chemical, rubber, plastic products	35.0	35.8	5.4	5.7	0.8	3.7	2.3	0.7	0.8	0.1	0.5
Minerals nec	42.9	25.3	6.2	8.6	0.8	2.2	1.1	0.6	0.6	0.1	0.7
Other manufactured products	28.9	39.1	7.3	4.7	0.4	0.6	0.1	0.4	1.5	0.5	0.4
Transport and trade	19.8	38.5	7.6	7.8	0.1	1.3	0.3	0.1	4.0	0.8	3.9
Other services	12.7	36.9	6.0	8.0	0.1	1.2	0.1	0.1	6.4	0.9	1.3
Export shares by country	*35.7*	*28.6*	*5.3*	*5.4*	*0.2*	*1.4*	*0.7*	*1.6*	*1.8*	*0.3*	*1.4*

Table 9. Continued

Sectors	Malaysia	Singapore	Taiwan	Thailand	Vietnam	Rest of Developing Asia	Iran	Rest of Middle East	Rest of the World	Total	*Export shares by sectors*
							(in percent)				
Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0	*0.0*
Paddy rice	0.5	1.0	1.2	0.5	0.7	0.4	0.1	10.9	7.7	100.0	*0.1*
Vegetables, fruit, nuts	0.1	0.1	0.1	0.1	0.1	0.0	0.8	26.6	11.5	100.0	*1.2*
Oilseeds	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.5	0.1	100.0	*0.1*
Other crops	0.1	0.4	0.7	0.0	0.2	0.1	4.4	26.7	27.4	100.0	*13.9*
Plant-based fibers	1.0	0.0	0.1	0.3	0.0	0.0	0.1	4.2	5.5	100.0	*0.6*
Wool, silkworm cocoons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.0*
Animals and animal products	0.1	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.2	100.0	*0.0*
Bovine meat and meat products	0.4	0.7	0.7	0.4	0.4	0.3	0.1	4.2	7.3	100.0	*0.1*
Processed rice	0.3	0.5	0.6	0.3	0.3	0.2	0.1	14.8	5.2	100.0	*0.0*
Raw milk and dairy products	0.0	1.7	0.0	0.0	0.0	0.0	0.0	11.8	1.4	100.0	*0.0*
Sugar	0.0	0.0	0.0	0.0	0.0	0.1	0.0	4.5	0.3	100.0	*0.0*
Beverages and tobacco products	1.1	6.7	0.3	0.0	0.0	0.0	0.0	40.0	0.4	100.0	*0.1*
Other food products	0.2	2.0	2.0	1.2	0.0	0.0	0.0	5.3	1.2	100.0	*2.0*
Fishing	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.5	100.0	*0.8*
Primary products	0.2	0.4	0.3	0.2	0.2	1.1	0.0	0.7	6.0	100.0	*0.1*

Table 9. Continued

Sectors	Malaysia	Singapore	Taiwan	Thailand	Vietnam	Rest of Developing Asia	Iran	Rest of Middle East	Rest of the World	Total	Export shares by sectors
						Importers					
Paper products, publishing	1.9	0.5	0.2	0.1	0.1	0.7	0.0	6.3	3.8	100.0	*0.4*
Textiles	0.3	0.2	0.2	0.2	0.0	0.1	0.0	1.3	2.4	100.0	*9.4*
Wearing apparel	0.0	0.1	0.1	0.0	0.0	0.0	0.0	1.8	1.9	100.0	*31.9*
Petroleum and coal products	0.1	0.4	1.3	0.0	1.6	17.4	0.4	0.9	3.6	100.0	*0.2*
Metal products	0.8	1.9	0.1	0.2	0.0	0.4	0.0	8.0	2.3	100.0	*0.6*
Mineral products	4.5	0.0	1.2	4.7	0.0	0.7	0.0	16.4	3.2	100.0	*0.1*
Chemical, rubber, plastic products	0.2	0.9	0.4	0.1	0.3	0.4	0.2	1.9	5.0	100.0	*6.1*
Minerals nec	0.5	1.4	0.5	0.1	0.0	0.1	0.3	1.2	6.8	100.0	*1.4*
Other manufactured products	0.3	3.0	0.1	5.2	0.7	0.2	0.1	3.6	2.9	100.0	*13.4*
Transport and trade	0.6	1.4	0.6	0.6	0.7	0.4	0.0	2.3	9.4	100.0	*8.4*
Other services	1.0	1.5	0.6	1.3	1.2	0.5	0.4	3.2	16.7	100.0	*8.9*
Export shares by country	*0.3*	*0.9*	*0.3*	*0.9*	*0.3*	*0.2*	*0.7*	*6.1*	*8.0*	*100.0*	*100.0*

Source: Authors' calculations based on the 2004 MAcMapHS6-v2 database.
Note: nec = Not elsewhere classified.

Table 10. Average tariffs applied on imports by Sri Lanka, 2004

Sectors	United States	European Union	Japan	Rest of Developed Countries	Bangladesh	India	Pakistan	Rest of South Asia	China	Indonesia	Korea
					(in percent)						
Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Vegetables, fruit, nuts	24.4	18.8	24.7	21.3	25.1	26.4	20.0	22.0	22.1	25.4	24.6
Oilseeds	24.9	20.1	22.2	16.8	25.0	24.7	24.4	24.9	24.1	24.8	20.6
Other crops	14.1	22.4	5.1	24.8	44.7	33.5	48.4	14.7	19.3	31.6	34.8
Plant-based fibers	0.0	0.1	0.1	0.0	0.5	0.2	0.0	0.0	0.0	2.9	0.0
Wool, silkworm cocoons	0.0	0.0	1.6	0.0	0.9	0.0	0.0	0.0	1.3	0.2	3.0
Animals and animal products	10.8	13.7	10.5	12.5	8.9	16.8	6.0	8.2	17.0	19.4	10.2
Bovine meat and meat products	22.9	24.7	22.9	21.8	25.0	24.7	24.6	25.0	24.9	22.2	23.6
Processed rice	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Raw milk and dairy products	12.4	15.3	14.1	14.1	14.5	12.7	11.1	12.5	11.7	13.4	16.1
Sugar	15.3	24.0	24.6	17.0	0.0	23.6	25.0	17.9	23.0	25.0	25.0
Beverages and tobacco products	75.7	50.3	89.3	67.9	89.8	84.4	114.4	153.3	82.4	96.3	91.9
Other food products	14.6	16.7	14.1	15.0	11.1	12.9	10.9	10.7	17.8	18.6	14.2
Fishing	9.2	6.0	7.7	9.8	5.6	8.7	8.9	8.0	4.6	8.4	9.6
Primary products	3.7	1.7	1.5	2.3	5.4	4.5	0.2	0.3	2.0	1.5	0.5
Paper products, publishing	5.0	8.9	7.2	5.1	10.7	8.1	10.9	10.2	9.3	6.3	10.4
Textiles	2.2	2.0	0.9	2.6	3.8	1.1	0.7	10.1	1.9	0.9	1.4
Wearing apparel	9.6	9.1	4.7	10.8	10.0	9.7	14.9	10.1	10.2	9.7	9.5
Petroleum and coal products	14.8	14.3	14.7	9.6	15.8	6.3	15.7	15.4	13.0	12.2	15.2
Metal products	7.4	8.5	6.9	4.7	10.8	3.9	6.3	8.6	7.2	7.2	6.2
Mineral products	5.5	3.3	5.9	5.4	6.0	5.1	6.7	5.2	5.3	5.1	6.0
Chemical, rubber, plastic products	6.1	6.8	7.6	5.3	3.4	3.1	6.0	9.8	7.7	7.7	6.5
Minerals nec	14.0	17.1	12.1	15.4	24.2	11.5	23.4	11.5	18.0	15.6	13.0
Other manufactured products	5.2	6.8	6.0	6.2	6.4	5.0	8.0	6.5	7.3	7.5	5.4
Average by country	*7.3*	*8.0*	*6.4*	*7.0*	*5.7*	*5.9*	*5.9*	*11.1*	*8.0*	*8.3*	*6.4*

Table 10. Continued

Sectors	Malaysia	Singapore	Taiwan	Thailand	Vietnam	Rest of Developing Asia	Iran	Rest of Middle East	Rest of the World	*Average by sector*
					(in percent)					
Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.0*
Paddy rice	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	*35.0*
Vegetables, fruit, nuts	26.5	24.4	23.2	25.0	25.2	25.5	23.8	23.0	24.2	*22.7*
Oilseeds	24.0	24.3	23.1	20.7	25.0	23.0	22.8	23.9	24.3	*24.2*
Other crops	31.0	24.1	14.5	36.6	28.0	23.9	42.3	12.8	28.2	*22.7*
Plant-based fibers	1.5	0.0	0.0	15.8	19.3	4.1	0.0	0.0	0.0	*0.0*
Wool, silkworm cocoons	0.0	0.0	0.2	3.8	0.0	0.4	0.0	0.0	0.1	*0.0*
Animals and animal products	15.8	13.4	10.5	16.7	11.3	16.1	11.3	11.7	15.6	*13.5*
Bovine meat and meat products	23.0	23.8	22.3	24.8	14.9	24.7	24.3	24.9	24.5	*23.9*
Processed rice	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	*35.0*
Raw milk and dairy products	12.7	12.4	16.1	17.2	10.2	11.9	18.7	15.9	15.3	*14.7*
Sugar	24.5	23.9	17.1	23.2	21.5	21.7	22.6	22.0	21.9	*22.5*
Beverages and tobacco products	57.7	65.1	72.3	44.1	145.3	105.8	44.8	90.7	77.5	*66.1*
Other food products	19.4	14.3	11.4	13.5	16.5	15.4	18.4	17.4	17.4	*16.6*
Fishing	8.7	7.5	7.9	8.7	8.0	9.9	10.0	9.6	8.2	*8.7*
Primary products	0.0	2.0	1.8	0.1	0.6	2.3	0.0	0.0	1.3	*0.9*
Paper products, publishing	12.7	7.6	11.1	9.5	15.2	9.7	14.0	12.0	7.2	*7.7*
Textiles	0.9	1.9	1.4	1.6	3.7	1.1	10.4	2.9	2.6	*1.8*
Wearing apparel	9.4	9.1	6.5	10.0	10.9	9.8	10.3	9.1	10.6	*9.7*
Petroleum and coal products	12.2	15.5	14.2	11.2	15.8	14.6	11.3	12.5	13.8	*13.6*
Metal products	8.0	7.5	7.2	7.9	12.5	5.4	6.1	7.5	6.7	*7.0*
Mineral products	5.6	5.8	6.4	5.1	5.4	5.1	6.3	3.0	5.0	*4.8*
Chemical, rubber, plastic products	7.3	6.7	7.0	8.5	10.7	7.9	6.9	5.5	6.7	*6.7*
Minerals nec	12.6	12.5	9.4	12.6	21.5	12.5	19.1	15.3	16.2	*15.4*
Other manufactured products	4.8	4.6	5.3	6.3	10.3	4.8	9.9	6.3	7.1	*6.2*
Average by country	*7.2*	*8.7*	*5.8*	*9.2*	*9.5*	*5.9*	*3.3*	*5.7*	*8.9*	

Source: Authors' calculations based on the 2004 MAcMapHS6-v2 database.
Note: nec = Not elsewhere classified.

Table 11. Sri Lanka import shares by sector and provenance, 2004

Sectors	United States	European Union	Japan	Rest of Developed Countries	Bangladesh	India	Pakistan	Rest of South Asia	China	Indonesia	Korea
							Exporters				
					(in percent)						
Wheat	69.7	0.0	0.0	26.3	0.0	3.4	0.0	0.0	0.0	0.0	0.0
Paddy rice	0.0	0.0	0.0	0.4	0.0	97.1	1.3	0.0	0.1	0.0	0.0
Vegetables, fruit, nuts	1.4	4.2	0.0	23.8	0.0	33.5	15.0	0.0	5.5	0.0	0.0
Oilseeds	0.7	0.5	0.0	10.0	0.0	74.4	0.3	0.0	0.0	2.7	0.0
Other crops	7.8	7.3	0.9	3.3	0.3	26.9	1.3	0.0	19.5	12.9	0.3
Plant-based fibers	5.8	1.6	0.0	54.9	0.1	0.6	12.9	0.0	2.9	0.6	18.0
Wool, silkworm cocoons	0.0	88.4	0.1	0.0	0.0	2.5	0.0	0.1	0.0	0.0	1.3
Animals and animal products	4.0	9.9	2.5	36.7	0.0	6.9	0.2	0.0	7.4	3.1	3.1
Bovine meat and meat products	1.5	6.9	0.5	24.0	0.0	3.5	0.0	0.1	4.5	0.9	0.1
Processed rice	0.0	5.6	0.0	0.4	0.0	36.2	55.5	0.0	0.6	0.1	0.1
Raw milk and dairy products	0.2	4.7	0.0	93.7	0.0	0.6	0.0	0.0	0.0	0.3	0.0
Sugar	0.1	1.9	0.0	0.5	0.0	45.0	0.1	0.0	0.0	0.2	0.0
Beverages and tobacco products	3.3	47.0	0.1	3.5	0.0	1.7	0.0	0.0	1.0	0.1	1.1
Other food products	0.9	9.9	0.1	5.2	0.0	13.2	8.3	7.6	1.0	6.0	0.1
Fishing	0.0	16.5	0.1	0.9	0.0	5.0	0.2	34.9	4.1	2.9	0.2

Table 11. Continued

Sectors	United States	European Union	Japan	Rest of Developed Countries	Bangladesh	India	Pakistan	Rest of South Asia	China	Indonesia	Korea
					Exporters						
Primary products	0.0	1.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Paper products, publishing	2.3	25.1	2.0	6.3	0.0	19.9	0.1	0.0	5.1	13.0	5.8
Textiles	5.0	9.8	2.7	1.4	0.2	9.4	3.5	0.5	14.8	5.1	17.3
Wearing apparel	2.3	7.4	0.6	0.3	0.1	14.1	0.8	20.1	6.3	9.6	3.0
Petroleum and coal products	1.4	2.8	0.6	0.7	0.0	0.5	0.0	0.0	1.3	0.0	0.2
Metal products	1.1	16.2	3.3	16.3	0.0	21.0	0.5	0.0	4.5	0.8	5.7
Mineral products	8.3	14.8	0.4	19.9	0.0	13.6	0.4	0.0	4.8	0.4	0.9
Chemical, rubber, plastic products	5.5	14.7	5.2	2.6	0.1	13.5	1.4	0.0	7.1	3.0	9.9
Minerals nec	3.3	10.6	1.8	2.7	0.1	34.9	0.1	0.0	5.3	7.2	1.4
Other manufactured products	3.5	30.7	12.6	4.0	0.1	9.0	0.6	0.0	8.4	1.3	4.4
Transport and trade	13.8	34.9	3.8	7.2	0.0	0.8	0.2	0.1	23.4	0.3	1.4
Other services	22.7	43.9	2.2	7.3	0.1	1.5	0.0	0.1	3.4	0.3	1.5
Import shares by country	*6.9*	*18.8*	*4.8*	*6.8*	*0.1*	*10.1*	*1.6*	*0.6*	*8.4*	*2.7*	*6.1*

Table 11. Continued

Sectors	Malaysia	Singapore	Taiwan	Thailand	Vietnam	Rest of Developing Asia	Iran	Rest of Middle East	Rest of the World	Total	Import shares by sectors
						(in percent)					
Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	100.0	*2.5*
Paddy rice	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.2	100.0	*0.0*
Vegetables, fruit, nuts	0.1	0.4	0.1	1.0	0.0	0.8	0.0	12.2	2.0	100.0	*1.6*
Oilseeds	0.1	5.4	0.0	0.0	0.0	0.0	0.0	4.7	1.2	100.0	*0.1*
Other crops	0.9	2.1	0.0	1.2	0.0	0.6	0.0	3.0	11.4	100.0	*1.4*
Plant-based fibers	0.0	1.8	0.0	0.2	0.0	0.0	0.0	0.3	0.3	100.0	*0.2*
Wool, silkworm cocoons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	1.7	100.0	*0.0*
Animals and animal products	10.4	0.4	5.8	2.4	5.2	0.1	0.0	0.5	1.5	100.0	*0.1*
Bovine meat and meat products	45.1	6.4	0.1	1.5	0.0	0.1	0.0	0.5	4.3	100.0	*0.1*
Processed rice	0.0	0.1	0.0	0.7	0.1	0.3	0.0	0.3	0.2	100.0	*0.2*
Raw milk and dairy products	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.1	100.0	*1.7*
Sugar	2.5	0.4	0.0	47.1	0.0	0.0	0.0	0.5	1.7	100.0	*0.4*
Beverages and tobacco products	1.1	33.9	0.1	0.2	0.0	0.1	0.0	2.4	4.6	100.0	*0.3*
Other food products	7.3	6.2	3.2	10.0	0.6	0.2	0.0	2.7	17.4	100.0	*2.8*
Fishing	1.4	1.8	0.3	0.6	0.2	0.6	0.0	28.7	1.6	100.0	*0.0*
Primary products	7.7	0.0	0.0	0.0	0.0	0.0	82.4	8.4	0.2	100.0	*4.4*

Table 11. Continued

Sectors	Malaysia	Singapore	Taiwan	Thailand	Vietnam	Rest of Developing Asia	Iran	Rest of Middle East	Rest of the World	Total	*Import shares by sectors*
										Exporters	
Paper products, publishing	1.7	6.7	1.1	1.8	0.0	0.1	0.0	1.4	7.5	100.0	*2.9*
Textiles	2.4	2.9	19.1	3.6	0.1	0.4	0.0	1.1	0.6	100.0	*18.1*
Wearing apparel	0.5	1.0	8.1	3.2	3.7	0.0	0.0	18.3	0.6	100.0	*1.5*
Petroleum and coal products	8.5	74.8	0.4	0.9	0.0	0.3	1.0	2.5	4.2	100.0	*5.4*
Metal products	3.4	6.8	2.8	1.8	0.0	0.1	0.0	11.7	3.9	100.0	*5.9*
Mineral products	0.3	13.8	0.7	0.6	0.0	0.0	0.0	10.1	11.1	100.0	*0.3*
Chemical, rubber, plastic products	2.7	14.3	6.6	3.0	0.1	0.3	0.2	7.4	2.5	100.0	*10.6*
Minerals nec	8.6	5.8	1.8	10.2	0.6	0.1	0.3	4.9	0.3	100.0	*2.4*
Other manufactured products	1.9	12.0	2.8	2.6	0.1	0.1	0.1	4.6	0.9	100.0	*23.9*
Transport and trade	1.3	1.4	0.5	1.3	0.1	0.3	0.2	1.8	7.1	100.0	*7.0*
Other services	2.5	3.0	0.9	0.6	0.2	0.3	0.1	2.6	6.7	100.0	*5.9*
Import shares by country	*3.0*	*10.4*	*5.4*	*2.8*	*0.2*	*0.2*	*3.8*	*4.4*	*3.0*	*100.0*	*100.0*

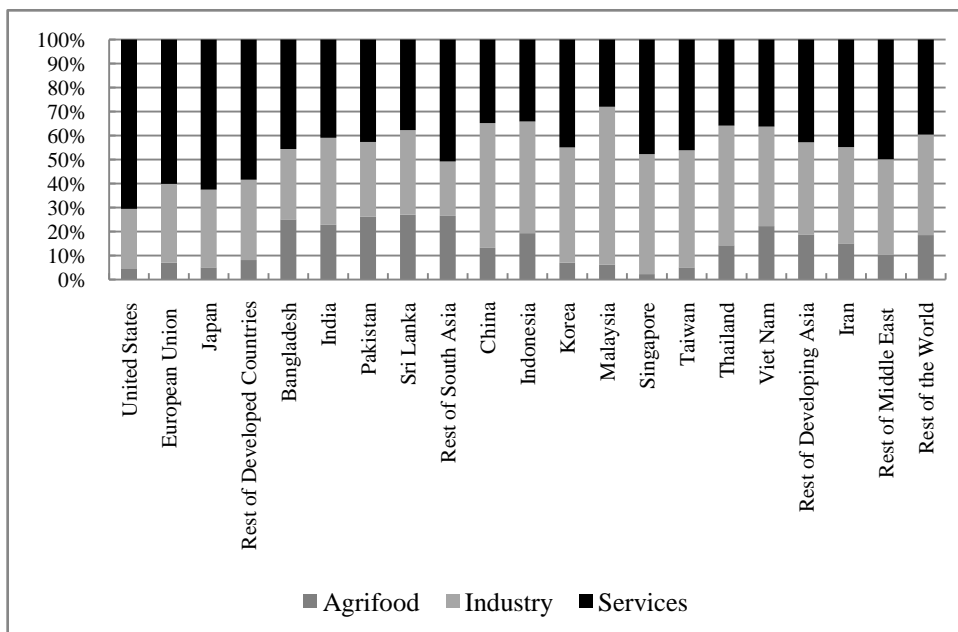Source: Authors' calculations based on the 2004 MAcMapHS6-v2 database.
Note: nec = Not elsewhere classified.

Production

In SAFTA countries, agriculture accounts for a larger share of production than in other developing countries in general and other Asian countries in particular. The contribution of industry to GDP is relatively modest, especially when compared with non-SAFTA developing countries. The service sector dominates production in all the SAFTA countries, but in other Asian countries industry covers the largest share of production (Figure 7).

Sri Lanka's production is specialized. Six sectors account for 70 percent of total production: other services and transport and trade together represent 38 percent of total production; the next most important sectors (between 5 and 10 percent of total production) are vegetables, fruit, and nuts (also 14 percent of agricultural imports), wearing apparel (also a major export), and other manufactured products and textiles (both important in imports and exports). Other agricultural production includes tea (under other crops), paddy rice, other food products, meat and meat products, and milk and dairy products, which combined account for 23 percent of goods production (Figure 8).

Figure 7. Structure of production by country, 2006

Source: Authors' calculation based on the MIRAGE model.

Figure 8. Production structure for Sri Lanka, 2006
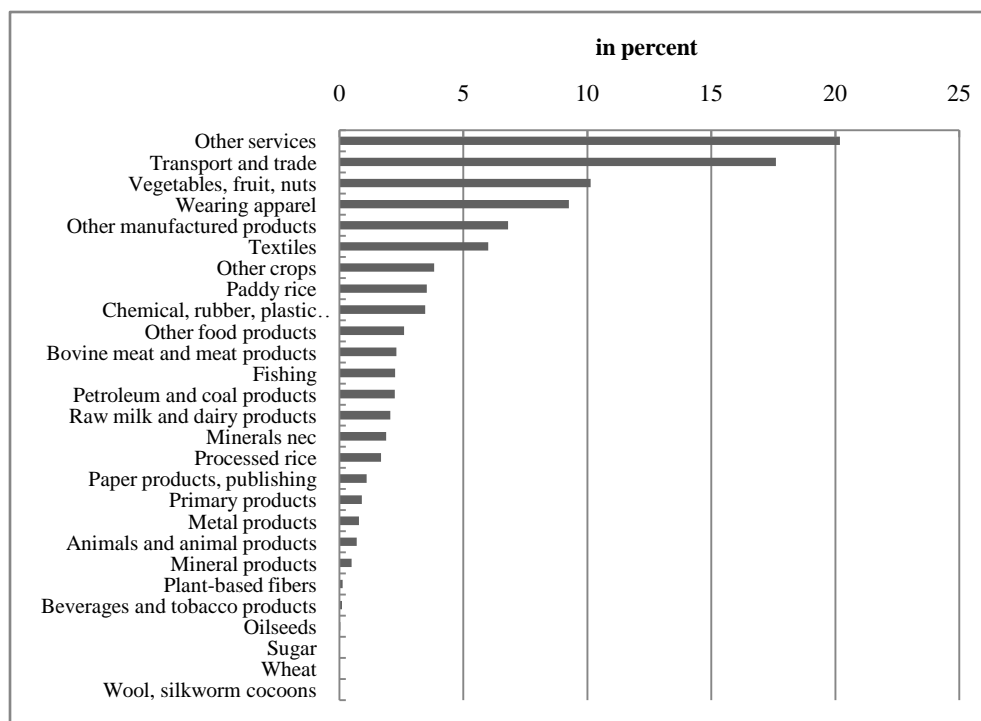
Source: Authors' calculation based on the MIRAGE model.
Note: nec = Not elsewhere classified.

5. EXPERIMENT RESULTS

The MIRAGE Model

The MIRAGE model is a multisector, multiregion computable general equilibrium model designed for trade policy analysis. The dynamic version of the model has a sequential recursive setup that takes into account GDP and population growth projected to 2020 and where capital supply is modified each year due to depreciation and investment. The macroeconomic closure of the model is obtained in our application by assuming that the sum of the balance of goods and services and of foreign direct investment is constant (see Appendix A for a detailed description of the MIRAGE model).

The dynamic MIRAGE model generates a baseline extending from 2001 to 2020, and the time line for the implementation of changes in tariffs spans 2006 to 2016. The simulation results reflect percentage deviations from the baseline at the end of the period, 2020.

The MIRAGE model includes many features and assumptions that affect the magnitude of the results obtained from trade liberalization scenarios. In particular, as discussed in Bouët (2008), those features and assumptions may underestimate the real income gains from trade liberalization. First, the model is based on market access data that fully incorporate regional agreements and preferential schemes assuming full use of such schemes by beneficiary countries, overestimating the preference margins of those countries and underestimating their expected gains from trade liberalization. Second, the model uses low trade elasticities, which affect the level of trade creation and therefore real income.[11]

In this study, we make further simplifying assumptions in the MIRAGE model that also may underestimate the real income gains from trade liberalization. Whereas the model describes imperfect, as well as perfect, competition, we model all sectors under perfect competition. This assumption may underestimate the real income gains from full trade liberalization for countries that specialize in sectors that would otherwise be modeled under imperfect competition. Expansion of sectors under imperfect competition (usually nonagriculture sectors, including textiles and wearing apparel) implies new welfare effects in addition to allocation efficiency and terms-of-trade effects: as production increases, average costs and prices are cut, which results in greater efficiency (Bouët 2008).

Conversely, this feature has negative consequences on countries where specialization in perfect-competition activities increases because of liberalization. Results for Bangladesh illustrate this effect. Bouët (2008), who models textiles and wearing apparel (major Bangladesh exports) under imperfect competition, shows positive results in real income gains of 1.5 percent from full trade liberalization. In contrast, as shown in the next section, the current study results in a small but negative real income effect for Bangladesh (-0.8 percent).

The SAFTA Agreement[12]

During the 12th summit of members of SAARC in 2004 in Islamabad, Pakistan, the governments of SAARC member countries signed an agreement to form the South Asian Free Trade Area. SAFTA replaced the earlier Agreement on SAARC Preferential Trading Arrangement (SAPTA), which was signed in 1993 in Dhaka, Bangladesh. SAFTA, which took effect January 1, 2006, was designed to liberalize trade in order to increase the intraregional flow of goods among the seven SAARC members. Within the agreement, LDCs are given special and differential treatments, which translate into lower reductions of tariffs and a longer period of implementation.

During phase one of SAFTA's Trade Liberalization Program, India, Pakistan, and Sri Lanka were to reduce their tariff to 20 percent, and LDC members Bangladesh, Bhutan, the Maldives, and Nepal, to 30 percent. The first tariff reduction took effect July 1, 2006, for all member states with the exception of Nepal, which had until August 1, 2006. In the second phase, non-LDC member states India, Pakistan, and

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[11] The selection of behavioral parameters is based on recent econometric work by Hertel et al. (2000).
[12] This section is based on SAFTA documents available on the SAARC website (SAARC 2009).

Sri Lanka are to reduce their tariff to less than 5 percent on imports from Bangladesh, Bhutan, the Maldives, and Nepal by January 1, 2009, and complete the full implementation of SAFTA by 2012 (2013 for Sri Lanka). However, Bangladesh, Bhutan, the Maldives, and Nepal are given until January 2016 to reciprocate (Table 12).

Table 12. Provisions of SAFTA Trade Liberalization Program

	SAFTA non-LDC importers		SAFTA LDC importers	
	Phase 1 (2006–2007)	**Phase 2 (2008–2013)**	**Phase 1 (2006–2007)**	**Phase 2 (2009–2016)**
SAFTA non-LDC exporters				
	Tariffs ≥ 20% reduce linearly to 20%.	Reduce tariff linearly to 0%.	**Tariffs ≥ 30%** reduce linearly to 30% by 2008.	Reduce tariff linearly to 0%.
	Tariffs < 20% reduce initial most-favored- nation (MFN) tariff by 10% each year. New tariff is smallest of the reduced MFN and previous-year tariff.		**Tariffs < 30%** reduce initial MFN tariff by 5% each year. New tariff is smallest of the reduced MFN and previous-year tariff.	
SAFTA LDC exporters				
	2006–2009: Linear reduction to 0%.		Same as above.	Same as above.
Compensation to LDCs				
2007–2008			Not more than 1% of custom duty collected.	
2009			Not more than 5% of custom duty collected.	
2010			Not more than 3% of custom duty collected.	

Source: SAARC (2009).

Table 13. SAFTA Trade Liberalization Program: Sensitive product lines

	Number of sensitive products		Share of sensitive products in total Harmonized System lines (%)	
	Non-LDCs	**LDCs**	**Non-LDCs**	**LDCs**
Non-LDCS				
India	865	744	17	14
Pakistan	1,190	1,190	23	23
Sri Lanka	1,079	1,079	21	21
LDCs				
Bangladesh	1,254	1,249	24	24
Bhutan	157	157	3	3
Maldives	671	671	13	13
Nepal	1,338	1,302	26	25

Source: SAARC (2009).

The SAFTA Trade Liberalization Program calls for the elimination of tariffs, para-tariffs (border charges and fees other than tariffs), and nontariff measures (which include regulations or practices other than tariffs and para-tariffs), and it calls for the adoption of direct trade measures to enhance sustainable exports from LDC partners (including trade facilitation and other measures that support and complement SAFTA). Finally, the agreement also calls for a mechanism to compensate LDC members (Bangladesh, Bhutan, the Maldives, and Nepal) for the loss of revenue resulting from lowering custom tariffs.

Nevertheless, various measures restrict the Trade Liberalization Program:

1. The most restrictive is the inclusion by each contracting member of a list of sensitive products that are exempted from tariff cuts (Table 13). The lists include some of the most protected sectors in the region such as agriculture, textiles, and wearing apparel (Table 7). This study focuses on the role the sensitive lists play in undermining the benefits from trade liberalization.

2. The second restriction results from the *rules of origin,* which determine the eligibility of preferential tariffs on nonsensitive products under SAFTA. A recent study from the Inter-American Development Bank offers a framework for briefly addressing this issue (Estevadeordal and Suominen 2008). SAFTA's provisions include basic elements found in most rules of origin. In addition to the *wholly obtained or produced* criteria for determining origin for primary products, the rules contain a substantial *transformation component* for processed goods. The transformation criteria combines both a *change in tariff classification* (from the classification of the inputs) and a *value content* that specifies that the value-added of the transformation process must constitute at least 40 percent (35 percent for Sri Lanka and 30 percent for LDC members) of the product's free on board (FOB) value.[13] It also requires that the final process of manufacture be performed within the territory of the exporting member country. The rules also allow for *regional cumulation,* requiring that the aggregate content (value of inputs plus domestic value-added from further processing originating in SAFTA member countries) be at least 50 percent of the FOB value; and that the domestic value content (originating in the exporting contracting country) be at least 20 percent of the exported product's FOB value (for more details, see SAARC 2009).

3. Modeling the effects of the rules of origin is beyond the scope to this study, but a recent study by Estevadeordal and Suominen (2008) reports on the level of restrictiveness resulting from the application of rules of origin for SAFTA: on a scale of 1 to 7, the score is 5 for 2000 or 3 for 2007 depending on the methodology used (Estevadeordal and Suominen 2008). Although these measures are inconclusive in the case of SAFTA, they do reveal a certain level of restrictiveness, which Krishna (2005) argues has consequences for the benefits expected from trade liberalization of preferential trade agreements.

By the end of the implementation period of the tariff schedule planned under SAFTA, Sri Lanka would have lowered its overall tariff by 55 percent with respect to India and by 34 and 37 percent for Pakistan and Bangladesh, respectively, but by only 11 percent with respect to the Rest of South Asia. Notably, while the LDCs under the SAFTA tariff schedule are given special and differential treatment, they face at the end of the implementation period relatively higher tariffs than non-LDC SAFTA partners; especially, the average rate applied by Sri Lanka to the Rest of South Asia, 8 percent, is twice the highest level that it applies to non-LDC SAFTA partners, 4 percent. But relative to other SAFTA countries, Sri Lanka will still more open (Table 14).

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[13] The change in tariff classification requires that the final product be classified in a heading at the four-digit level of the Harmonized Commodity Description and Coding System differently from those of the non-originating materials used in its manufacture. In addition, products corresponding to 191 tariff lines (HS6 level) for nonsensitive products are subject to product-specific rules that combine both a change in classification and a value content requirement ranging from 30 to 60 percent depending on the product (for more details, see Annex A of Annex-IV of SAFTA Agreement in SAARC 2009).

Impact on Macroeconomic Variables

We apply the MIRAGE model to three liberalization scenarios:

- Full trade liberalization scenario, in which all countries eliminate tariff protection, domestic support, and export subsidies over five years for developed countries and 10 years for developing countries. This stylized scenario provides "first-best" results by which to assess the efficacy of SAFTA.

- SAFTA scenario 1, in which tariffs are reduced in SAFTA countries according to the schedule specified in Table 12 and exclude each country's list of sensitive products (Table 13). The new tariffs are applied at the HS6 level and bilaterally before being aggregated in the MIRAGE model. So although the results are being reported at the aggregate level in accordance with the aggregations shown in tables 4 and 6, they represent changes made at the most disaggregated level of products and countries.

- SAFTA scenario 2, in which the elimination of tariff protection applies to all products.

Table 14. Average tariff rates applied at the end of each phase of SAFTA

Importers	Exporters														
	2006					2008					2016				
	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
	(in percent)														
Bangladesh		19	24	18	21		19	23	17	20		9	9	8	12
India	21		20	22	12	14		18	20	10	10		12	14	9
Pakistan	15	18		16	19	11	17		14	14	8	8		7	12
Sri Lanka	6	6	6		11	3	6	5		9	2	3	4		8
Rest of South Asia	18	15	13	11	11	17	14	12	11	10	8	5	4	5	7

Source: Authors' calculations based on the provisions of the SAFTA Trade Liberalization Program and the 2004 MAcMapHS6-v2 database.

Net Income

Under full trade liberalization, SAFTA countries, with the exception of Bangladesh, gain, although the effects on real income are small. Sri Lanka gains the most, followed by India. This is consistent with Sri Lanka's initial tariff structure, under which the country faces higher tariffs than it applies, so trade liberalization for Sri Lanka results in increased market access to other economies (Table 15). On the other hand, Bangladesh experiences small but negative changes in real income, the net effect of efficiency gains due to the elimination of distortions under full trade liberalization and terms-of-trade losses due to the erosion of preferences Bangladesh initially enjoyed with respect to the E.U.[14]

The SAFTA simulations have small but positive effects on SAFTA countries, except in the case of Bangladesh. There are two notable results. First, Sri Lanka is the largest gainer under all three scenarios, and the gains are larger the more liberalized the scenario. That finding does not contradict previous studies (Pigato et al. 1997; Bandara and Yu 2003) that conclude that unilateral and multilateral trade liberalization yield larger gains for South Asian countries than SAFTA would. On the other hand, it does not support the expected higher gains for India under SAFTA. Our results show that with the exception of Bangladesh, India gains the least from the SAFTA scenarios.

Second, removing the exclusion of sensitive products has a positive effect on the SAFTA non-LDCs—India, Pakistan, and Sri Lanka—but is harmful to SAFTA LDCs. It increases losses for Bangladesh and reduces gains for the Rest of South Asia (Table 15). As shown in Section 5.4, whereas all countries experience trade diversion in imports under both SAFTA scenarios, it is relatively small in the case of the SAFTA non-LDCs. But for Bangladesh and the Rest of South Asia, it is much more important, especially under SAFTA scenario 2.

GDP and Returns to Factors of Production Variables

Changes in GDP and trade are also very small, especially for SAFTA non-LDCs, but the more open the liberalization, the greater the growth in GDP and exports. Under full trade liberalization, Sri Lanka sees a modest increase in exports (19 percent) relative to other SAFTA countries (76 percent for Bangladesh, 63 percent for India). In all three simulations, LDCs register larger export gains relative to other SAFTA countries and more so when sensitive products are removed (Table 16), although it should be noted that initial trade values in those countries are quite small.

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[14] Currently, Bangladesh's two main exports, wearing apparel and textiles (together the two sectors represent 63 percent of Bangladesh's total exports), enter the E.U. duty free. Under full trade liberalization, other competitive countries, such as China, will also be able to export to the E.U. duty free, eroding Bangladesh's preferences.

Table 15. Real income effect under trade liberalization scenarios

	Full trade liberalization		SAFTA scenario 1		SAFTA scenario 2	
	Percentage change	Change in million $US	Net income gains	Change in million $US	Net income gains	Change in million $US
United States	0.12	1.19	0.00	0.00	0.00	0.01
European Union	0.61	4.39	0.00	0.00	0.00	0.00
Japan	1.27	4.33	0.00	0.00	0.00	0.00
Rest of Developed Countries	1.77	2.65	0.00	0.00	0.00	0.00
Bangladesh	-0.77	-0.04	-0.02	0.00	-0.51	-0.02
India	1.10	0.54	0.02	0.01	0.10	0.05
Pakistan	0.49	0.04	0.09	0.01	0.17	0.01
Sri Lanka	2.35	0.04	0.19	0.00	0.92	0.01
Rest of South Asia	0.44	0.01	0.36	0.01	0.25	0.01
China	0.20	0.22	0.00	0.00	-0.01	-0.01
Indonesia	1.26	0.16	-0.01	0.00	-0.03	0.00
Korea	2.93	1.08	0.00	0.00	0.00	0.00
Malaysia	4.28	0.16	-0.02	0.00	-0.04	0.00
Singapore	1.14	0.09	0.00	0.00	-0.02	0.00
Taiwan	0.38	0.10	0.00	0.00	0.00	0.00
Thailand	2.91	0.29	-0.01	0.00	-0.03	0.00
Vietnam	2.05	0.07	0.00	0.00	-0.01	0.00
Rest of Developing Asia	-0.17	-0.03	0.00	0.00	0.00	0.00
Iran	0.73	0.08	0.00	0.00	-0.01	0.00
Rest of Middle East	0.47	0.27	-0.01	0.00	-0.02	-0.01
Rest of the World	0.10	0.27	0.00	0.00	0.00	-0.01

Source: Simulation results.

Table 16. Changes in macroeconomic variables under trade liberalization scenarios

	Full trade liberalization					SAFTA scenario 1					SAFTA scenario 2				
	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
(in percent)															
Exports (vol)	76.4	62.7	33.3	18.5	33.3	4.5	1.1	1.1	1.8	10.3	18.8	2.7	3.2	4.6	17.6
	(8.7)	(77.0)	(16.7)	(8.0)	(4.1)	(8.7)	(77.0)	(16.7)	(8.0)	(4.1)	(8.7)	(77.0)	(16.7)	(8.0)	(4.1)
GDP (vol)	0.8	1.6	1.3	1.8	0.7	0.1	0.0	0.1	0.1	0.3	-0.1	0.1	0.1	0.5	0.3
	(56.9)	(631.8)	(86.5)	(20.2)	(33.8)	(56.9)	(631.8)	(86.5)	(20.2)	(33.8)	(56.9)	(631.8)	(86.5)	(20.2)	(33.8)
Real effective exchange rate	-5.8	-1.9	-2.2	2.6	-0.7	-0.4	0.1	0.2	0.3	0.7	-1.7	0.3	0.4	1.3	-0.1
Real return to capital	-0.1	1.2	-0.7	-0.6	-1.0	-0.1	0.0	0.0	0.1	-0.3	-0.2	0.1	0.0	0.2	-0.4
Real return to land	-1.3	-3.0	1.7	4.2	3.5	0.2	0.0	0.1	0.2	1.8	-0.3	0.0	0.5	2.1	1.6
Real return to natural resources	-10.1	-15.8	-16.0	2.6	5.0	-0.6	-0.1	-0.6	1.0	-0.5	-2.4	-0.4	-2.6	5.2	-0.1
Skilled real wages	-1.3	3.7	-0.6	0.8	-0.2	-0.1	0.0	0.1	0.0	0.0	-0.9	0.1	0.0	-0.3	-0.1
Unskilled real wages	-1.0	0.9	0.4	2.1	0.2	-0.1	0.0	0.1	0.1	0.3	-0.6	0.1	0.2	0.8	0.1
Unskilled real wages in agriculture	-1.7	-0.8	0.8	3.4	1.4	0.0	0.0	0.1	0.2	1.0	-0.7	0.1	0.4	1.5	0.8
Unskilled real wages in nonagricultural sectors	-0.9	1.5	0.2	1.7	-0.2	-0.1	0.0	0.1	0.1	0.1	-0.6	0.1	0.1	0.6	-0.1
Net income	-0.8	1.1	0.5	2.3	0.4	0.0	0.0	0.1	0.2	0.4	-0.5	0.1	0.2	0.9	0.2

Source: Simulation results.
Note: Figures in parentheses are initial values in US$ millions.

Trade liberalization also affects returns to factors of production. In Sri Lanka, trade liberalization has positive effects on the remuneration of the factors of production, especially for land and natural resources, suggesting that agriculture stands to gain from liberalization. In Sri Lanka under full trade liberalization, returns to unskilled labor, the main source of income for poor people, show on average gains nearly three times those of skilled labor. Within unskilled labor, the gain in agriculture is twice the gain in nonagriculture. This pattern is similar under both SAFTA scenarios, and even more pronounced under SAFTA scenario 2. These results suggest that trade liberalization at the multilateral and regional level may provide Sri Lanka with opportunities to reduce poverty.

Not all SAFTA countries experience similar patterns as Sri Lanka. In India, returns to skilled real wages stand to gain but to the detriment of unskilled labor in agriculture under full trade liberalization. With the exception of Bangladesh, trade liberalization affects LDCs' unskilled labor in agriculture more positively than other labor categories. But for LDCs, SAFTA scenario 1 seems to be a more pro-poor option than SAFTA scenario 2 (Table 16).

Impact on Trade and Production for SAFTA Countries

Trade

Full trade liberalization is trade creating in both exports and imports, but SAFTA countries favor different partners (tables 17 and 18). Sri Lanka's trade with SAFTA countries increases by more than with developed countries or non-SAFTA developing countries, which may reflect Sri Lanka's initial small export share within SAFTA (4 percent of total exports). Most of the export increase is directed to India and Pakistan, two countries where Sri Lanka initially faces the highest protection. Among developed countries, Sri Lanka increases its exports to Japan and the rest of developed countries, which originally absorbed 10 percent of Sri Lanka's total exports. Under full trade liberalization, Sri Lanka also increases imports within SAFTA, mostly from Bangladesh, although initial levels of imports from that country were very low. Among non-SAFTA developing countries, Sri Lanka's exports to Asia are favored by trade liberalization, especially to Taiwan, and its imports from Malaysia and Vietnam increase by 47 and 97 percent, respectively (Tables 17 and 18).

Table 17. Percentage change in SAFTA countries' exports by destination under trade liberalization scenarios

	Exporters														
	Full trade liberalization					SAFTA scenario 1					SAFTA scenario 2				
Importers	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
	(in percent)														
Developed countries	72	71	16	12	5	3	0	-1	-1	-2	17	-2	-2	-6	1
United States	113	17	26	6	10	4	0	-1	-1	-2	17	-2	-2	-5	2
European Union	28	136	-3	5	-4	3	0	-1	-1	-3	16	-2	-2	-6	1
Japan	53	29	28	37	15	3	0	-1	-1	-3	12	-1	-2	-6	0
Rest of Developed Countries	37	40	48	63	9	3	0	-1	-1	-2	16	-2	-2	-8	2
SAFTA countries	119	57	89	88	77	47	33	50	66	44	126	104	134	235	61
Bangladesh		58	124	49	34		36	68	77	15		132	255	158	51
India	152		120	131	71	83		63	75	45	169		179	325	61
Pakistan	84	72		110	161	17	39		66	31	85	134		365	61
Sri Lanka	97	31	55		62	28	15	14		47	72	41	43		65
Rest of South Asia	142	93	64	39	76	21	56	50	56	36	129	115	62	94	41

Table 17. Continued

Importers	Exporters														
	Full trade liberalization					**SAFTA scenario 1**					**SAFTA scenario 2**				
	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
Non-SAFTA developing countries	90	52	62	25	56	2	0	-1	-2	-3	11	-2	-2	-12	1
China	79	47	51	4	18	3	0	-1	-2	-3	12	-2	-2	-7	0
Indonesia	86	48	61	23	20	3	0	-1	-2	-3	12	-2	-2	-7	0
Korea	88	35	77	45	32	3	0	-1	-2	-4	12	-1	-2	-5	-1
Malaysia	69	42	85	32	33	3	0	-1	-1	-2	13	-1	-2	-6	1
Singapore	56	12	5	-10	6	3	0	-1	-2	-3	16	-2	-2	-6	1
Taiwan	69	43	65	168	37	3	0	-1	-2	-3	11	-1	-2	-9	0
Thailand	107	98	125	63	69	2	0	-1	-2	-3	9	-2	-2	-6	0
Vietnam	154	57	161	22	23	3	0	-1	-2	-2	11	-1	-2	-7	1
Rest of Developing Asia	90	45	35	18	327	3	0	-1	-2	-4	11	-1	-2	-9	-1
Iran	125	93	121	46	52	2	0	-1	-2	-2	9	-1	-2	-20	2
Rest of Middle East	69	37	44	35	22	2	0	-1	-2	-2	9	-2	-2	-15	2
Rest of the World	127	72	96	21	71	2	0	-1	-2	-3	12	-2	-2	-13	1

Source: Simulation results.

Table 18. Percentage change in SAFTA countries' imports by provenance under trade liberalization scenarios

	Importers														
	Full trade liberalization					SAFTA scenario 1					SAFTA scenario 2				
Exporters	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
	(in percent)														
Developed countries	19	41	24	13	10	-2	0	0	0	1	-9	1	0	0	-2
United States	-10	19	2	1	-2	-1	0	0	0	1	-7	1	1	0	-1
European Union	0	35	18	16	6	-2	0	0	0	1	-8	1	0	1	-2
Japan	21	89	116	0	24	-3	0	0	0	0	-10	1	0	0	-3
Rest of Developed Countries	-2	71	-2	25	4	-2	0	0	0	2	-10	1	0	1	-1
SAFTA countries	67	89	87	37	75	41	53	38	17	53	151	111	144	43	95
Bangladesh		152	84	97	142		83	17	28	21		169	85	72	129
India	58		72	31	93	36		39	15	56	132		134	41	115
Pakistan	124	120		55	64	68	63		14	50	255	179		43	62
Sri Lanka	49	131	110		39	77	75	66		56	158	325	365		94
Rest of South Asia	34	71	161	62	76	15	45	31	47	36	51	61	61	65	41

Table 18. Continued

Exporters	Importers														
	Full trade liberalization					SAFTA scenario 1					SAFTA scenario 2				
	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
Non-SAFTA developing countries	68	70	28	25	29	-6	0	-1	-1	-7	-18	1	-3	-1	-13
China	100	97	46	21	37	-6	0	-1	-1	-8	-22	1	-3	-2	-17
Indonesia	44	345	59	11	41	-6	-1	-1	-3	-6	-21	0	-2	-6	-17
Korea	51	41	45	11	53	-3	0	0	0	-2	-9	1	-1	0	-6
Malaysia	96	63	93	47	16	-5	0	0	0	-9	-17	1	-1	2	-14
Singapore	23	35	17	18	14	-7	0	-1	-1	-9	-18	1	-3	-1	-17
Taiwan	73	38	36	18	22	-2	0	0	0	-1	-8	1	0	0	-4
Thailand	69	117	100	28	61	-6	0	-1	-2	-7	-22	0	-4	-6	-16
Vietnam	59	282	33	97	1	-3	0	-1	-7	1	-19	-5	-3	-8	-2
Rest of Developing Asia	135	66	24	41	20	-6	0	0	-1	-1	-21	0	-1	-2	-5
Iran	42	92	20	35	133	-1	0	0	8	-6	-4	0	-7	31	-13
Rest of Middle East	77	28	5	28	26	-7	0	0	-2	-5	-14	1	-4	-3	-8
Rest of the World	37	29	47	32	24	-2	0	-1	-1	-1	-9	1	-3	-3	-5

Source: Simulation results.

On the other hand, the SAFTA scenarios are trade diverting in both exports and imports. Intraregional trade improves at the expense of exterior trade. This happens to a larger extent in Bangladesh and when the sensitive products are no longer exempted from tariff cuts. These results are consistent with Baysan, Panagariya, and Pitigala's (2006) prediction of SAFTA's potential trade diversion effects, and they are particularly important for SAFTA LDCs.

For Sri Lanka, trade diversion under the SAFTA scenarios is much more pronounced in imports than in exports. Exports to Sri Lanka's main destinations do not change. On the other hand, imports from developing countries, the larger source of imports to Sri Lanka, are reduced to the benefit of imports from its SAFTA partners.

Production

On average trade liberalization has small but positive effects on production in Sri Lanka's agrifood sector. Production of some traditional sectors benefits from liberalization at the multilateral level (full trade liberalization); production in the "other crops" category (tea, spices) increases by 18 percent or around $192 million from the baseline. A major component of other crops is tea, of which Sri Lanka is the fourth-most-important producer after China, India, and Kenya. The average production of tea is valued around $320 million (FAO 2009), or a third of other crops' value ($1.09 billion). Under SAFTA scenario I, this sector is on the sensitive list and is therefore not affected by the agreement. Oilseeds, a less traditional sector, profits from all liberalization scenarios but the most from SAFTA scenario 2, 44 percent or $5 million.[15] Production of sugar increases under full trade liberalization, mostly as a result of liberalized policies in developed countries' sugar markets, but it also increases under SAFTA scenario 2 once removed from the sensitive list. These changes in agricultural production underline the opportunity for diversifying Sri Lanka's production base following trade liberalization.

Changes in the industry sector's production are positive on average under full trade liberalization and SAFTA scenario 1 but negative under SAFTA scenario 2. Under full trade liberalization, the gains are driven by the textiles and wearing apparel sectors, already important productive sectors in Sri Lanka, which show changes of 6 and 15 percent, respectively. But whereas wearing apparel is the largest export (32 percent of total exports), textiles are the second-most-important import (18 percent of total imports), and the changes in production reflect the changes in trade flows. Under the SAFTA scenarios, production in the wearing apparel sector is negatively affected; production of textiles increases under SAFTA scenario 1 but decreases slightly under SAFTA scenario 2. Under SAFTA scenario 2, Sri Lanka's textiles and wearing apparel sectors are open to more competition within South Asia, and cheaper imports replace domestic production. Production of primary products gains under all three scenarios, more so under SAFTA scenario 2, 23 percent (Table 19). Primary products include coal, gas, oil, and forestry and initially amount to 2 percent of total production and 4 percent of total imports (Figure 8 and Table 11). This is also a sector on which Sri Lanka applies an average tariff rate of 0.9 percent but on which it faces high protection of 8.7 percent. Trade liberalization increases exports of primary products by a much greater margin than it does imports, driving up domestic production (Table 19).

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[15] Initial values generated by MIRAGE are based on the GTAP 6.2 database. They are available upon request.

Table 19. Percentage change in SAFTA countries' production by sector under trade liberalization scenarios

	Full trade liberalization					SAFTA scenario 1					SAFTA scenario 2				
	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
	(in percent)														
Agrifood	-3	3	0	2	5	0	0	0	0	3	0	0	0	1	3
Wheat	6	-6	-8	7	-5	0	0	0	0	-2	5	0	1	-1	2
Paddy rice	-3	-3	25	15	1	0	0	0	0	0	-1	0	2	0	0
Vegetables, fruit, nuts	-3	-6	0	-2	0	0	0	1	0	0	-2	0	2	-1	0
Oilseeds	-5	-5	14	37	8	0	0	0	24	-1	1	0	0	44	2
Other crops	0	-5	-4	18	-11	0	0	0	0	-3	3	-1	0	12	-8
Plant-based fibers	14	-3	12	4	-9	3	0	0	1	-3	5	0	0	0	-2
Wool, silkworm cocoons	-22	-10	5	4	13	3	0	4	-1	-2	17	0	5	8	0
Animals and animal products	-1	8	-1	-4	13	0	0	0	0	7	0	0	0	0	7
Bovine meat and meat products	28	1677	6	2	56	8	-18	8	0	27	14	-20	7	1	28
Processed rice	-3	-3	21	-2	1	0	0	0	0	0	-1	0	4	-4	0
Raw milk and dairy products	-22	1	-1	-11	11	0	0	0	0	8	-2	0	0	0	8
Sugar	-7	1	-6	49	3	0	0	0	0	2	-2	1	-2	3	-2
Beverages and tobacco products	-3	1	0	-13	-31	0	0	0	5	-1	-1	0	0	7	-5
Other food products	-11	-39	-19	-4	-4	0	0	1	-1	-1	1	0	2	-1	3

Table 19. Continued

	Full trade liberalization					SAFTA scenario 1					SAFTA scenario 2				
	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia	Bangladesh	India	Pakistan	Sri Lanka	Rest of South Asia
	(in percent)														
Industry	9	1	3	1	-5	0	0	0	0	-1	2	0	0	-1	-2
Fishing	-2	13	1	1	1	0	0	0	0	0	-1	0	0	0	0
Primary products	-9	-25	-13	16	12	0	0	-1	5	-1	-1	-1	-3	23	1
Paper products, publishing	-11	0	-8	-11	-5	-2	0	0	0	-1	-3	1	0	-1	-2
Textiles	8	3	16	6	-13	0	0	0	2	-3	2	1	1	0	-2
Wearing apparel	96	27	5	15	3	4	0	-1	-1	1	20	-1	-2	-3	1
Petroleum and coal products	-29	10	-19	-24	-35	-5	0	0	-1	-8	-4	1	1	-5	-8
Metal products	-13	-1	-9	-5	-7	-4	0	-1	5	-1	-7	0	-1	7	2
Mineral products	-5	-2	-7	-7	-4	0	0	-1	-1	-1	-1	0	-2	-3	-2
Chemical, rubber, plastic products	-1	4	-6	-7	-12	1	0	-1	1	1	1	1	-3	1	1
Minerals nec	-12	3	-3	-10	-7	0	0	0	-2	-1	-4	1	0	-5	-4
Other manufactured products	1	1	-7	-5	-13	0	0	0	-1	-4	0	0	0	-4	-7
Services	-1	2	0	-1	0	0	0	0	0	0	0	0	0	0	0
Transport and trade	-2	4	1	-2	0	0	0	0	0	0	0	0	0	-1	0
Other services	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0

Source: Simulation results.
Note: nec = Not elsewhere classified.

Another feature of the Trade Liberalization Program is the compensation for lost revenue to SAFTA LDCs by India, Pakistan, and Sri Lanka. For LDCs, tariff revenues may contribute substantially to government revenue, and given their high tariffs on imports, they stand to lose those revenues under trade liberalization. The MIRAGE model quantifies such losses under SAFTA. SAFTA LDCs, Bangladesh, and the Rest of South Asia are the most affected by fiscal revenue losses. Losses under SAFTA scenario 1 can be as much as 16 percent for the Rest of South Asia. Sri Lanka stands to lose as much as Bangladesh under this scenario, slightly more than 6 percent. Under SAFTA scenario 2, losses are significant: 30 percent for Bangladesh and more than 40 percent for the Rest of South Asia. Therefore, compensation against this loss of revenue could go a long way in buffering the negative effects of SAFTA on LDCs.

Figure 9. Change in tariff revenue, 2020
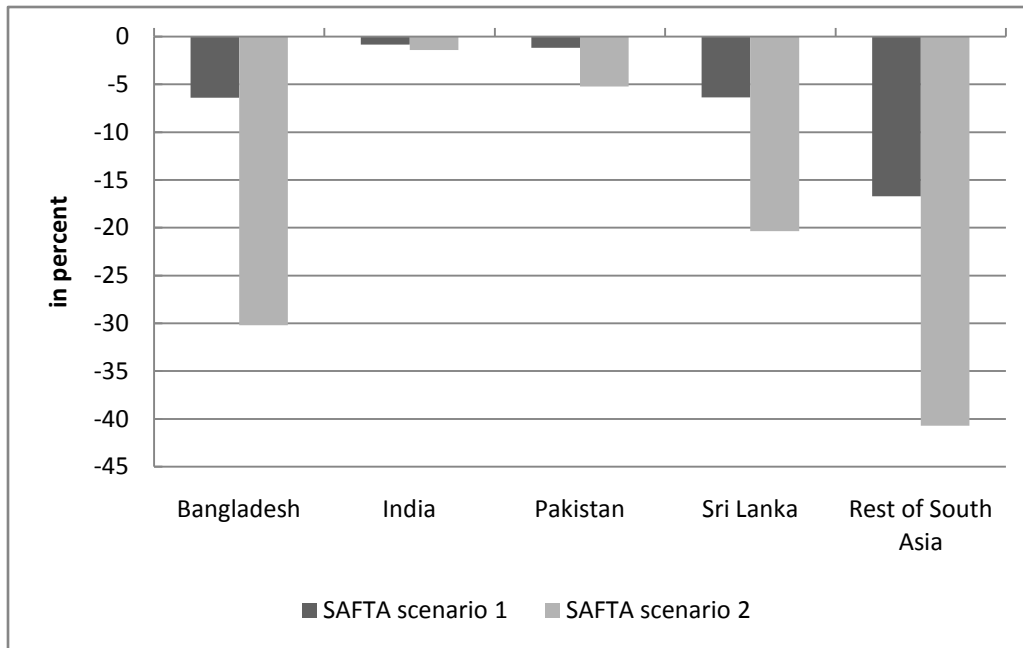
Source: Simulation results

6. CONCLUSION

There has been general skepticism in the literature about the economic benefits from SAFTA. The free trade agreement was predicted to lead to large trade diversions given the small initial volume of trade within the region combined with high initial tariffs. Given the narrow trade base in products in SAFTA countries, it was thought that the list of sensitive products exempt from the trade liberalization agreement could limit or even preclude potential benefits from the agreement.

This study tries to address those concerns through a quantitative analysis of the effects of SAFTA on the contracting states and more specifically on Sri Lanka. The MIRAGE model and the MAcMapHS6-v2 database on applied bilateral protection at the HS6 level were instrumental in simulating specifically the provisions of SAFTA regarding the schedule of tariff cuts and the specification of sensitive products.

Our results do not contradict the possibility that SAFTA will lead to trade diversion, but we also find that the scale and the effects on welfare are not homogeneous across SAFTA members. On average, SAFTA scenarios lead to very small but positive changes on macro variables, net income and GDP, for most countries. Whereas intraregional trade increases under all scenarios, full trade liberalization is trade creating across all partners but SAFTA scenarios are trade diverting in exports and imports for SAFTA non-LDCs. Under the SAFTA scenarios, Bangladesh and the Rest of South Asia increase market access to SAFTA countries and the world; however, full trade liberalization leads to trade diversion in imports, even more so when sensitive products are no longer excluded. This has a negative effect on income as the countries switch from tariff-burdened imports to duty-free imports.

Our results also show that sensitive products play a significant role in the magnitude and the distribution of the gains. Although gains in net income and GDP remain small for Sri Lanka under both SAFTA scenarios, SAFTA scenario 2 (no sensitive products) leads to gains that are more than four times larger than the results under SAFTA 1 (the current version of SAFTA). On the other hand, the inclusion of sensitive products is not beneficial to LDCs—it leads to losses in Bangladesh and lowers the gains accrued to the Rest of South Asia.

At the sectoral level, the production of oilseeds and other crops in Sri Lanka, bovine meat and meat products in Bangladesh and the Rest of South Asia, and wearing apparel in Bangladesh gain the most under SAFTA scenario 2.

Noteworthy in this analysis is the distribution of gains to the factors of production. With the exception of Bangladesh, trade liberalization under multilateral or regional agreements is more beneficial to unskilled labor, the main source of income for poor people, favoring unskilled labor in agriculture more so than in nonagriculture. For Sri Lanka, trade liberalization may provide an opportunity to address poverty concerns.

Finally, under SAFTA, contracting members face lower tariff revenues as they substitute tariff-loaded imports for tariff-free imports. The loss can be substantial, ranging from 30 to 40 percent for LDCs under SAFTA scenario 2.

The potential bias of SAFTA against LDCs strengthens the argument that India, Pakistan, and Sri Lanka should compensate LDCs for loss of revenue. In addition to the potential impact of sensitive products quantified in this study, SAFTA faces other challenges such as nontariff barriers and rules of origin. Those concerns could not be addressed in this version of the MIRAGE model, but they remain strong obstacles to the effectiveness of the agreement.

APPENDIX: SPECIFICATIONS OF THE MIRAGE MODEL

MIRAGE is a multisector, multiregion, computable general equilibrium model devoted to trade policy analysis. The model is performed in a sequential, dynamic, recursive setup: it is solved for each period, and all variable values determined at the end of one period are used as initial values in the next one. Macroeconomic data, in particular in the form of social accounting matrixes, come from the GTAP 6.2 database (Dimaranan 2006). Applied tariff averages have been calculated using the MAcMap-HS6 methodology (Bouët et al. 2008).

On the supply side, the production function in each sector is a Leontief function of added value and intermediate consumption. The intermediate consumption is an aggregate constant elasticity of substitution (CES) function of all goods, meaning that substitutability exists between two intermediate goods, depending on the relative prices of those goods. Similarly, added value is a Cobb-Douglas function of unskilled labor, land, natural resources, and a CES bundle of skilled labor and capital.[16] This nesting allows modeling less substitutability between capital and skilled labor than between those two and other factors. So, when the relative price of unskilled labor is increased, that factor is replaced by a combination of capital and skilled labor, which are more complementary.[17]

Factor endowments are fully employed. The only factor whose supply is constant is natural resources. Capital supply is modified each year because of depreciation and investment. Growth rates of labor supply are fixed exogenously. Land supply is endogenous; it depends on the real remuneration of land. In some countries, land is a scarce factor (for example, Japan and the E.U.), such that elasticity of supply is low. In others (such as Argentina, Australia, and Brazil), land is abundant and elasticity is high.

Skilled labor is the only factor that is perfectly mobile. Installed capital and natural resources are sector specific. New capital is allocated among sectors according to an investment function. Unskilled labor is imperfectly mobile between agricultural and nonagricultural sectors according to a constant elasticity of transformation function: unskilled labor's remuneration in agricultural activities is different from that in nonagricultural activities. This factor is distributed between these two series of sectors according to the ratio of remunerations. Land is also imperfectly mobile among agricultural sectors.

Therefore, in MIRAGE there is full employment of labor; more precisely, there is a constant aggregate employment in all countries (wage flexibility). It is quite possible to suppose that total aggregate employment is variable and that there is unemployment, but that choice greatly increases the complexity of the model, so that simplifying assumptions have to be made in other areas (such as the number of countries or sectors). That assumption could amplify the benefits of trade liberalization for developing countries (see Diao et al. 2005): in full-employment models, increased demand for labor (from increased activity and exports) leads to higher real wages, such that the origin of comparative advantage is progressively eroded; but in models with unemployment, real wages are constant and exports increase much more.

Capital in a given region, whatever its origin, domestic or foreign, is assumed to be obtained by assembling intermediate inputs according to a specific combination. The capital good is the same whatever the sector.

MIRAGE describes imperfect, as well as perfect, competition. In sectors under perfect competition, there is no fixed cost, and price equals marginal cost. Imperfect competition is modeled according to a monopolistic competition framework.[18]

The demand side is modeled in each region through a representative agent whose propensity to save is constant. The unsaved national income is used to purchase final consumption. Preferences across sectors are represented by a constant elasticity of substitution–linear expenditure system (CES–LES)

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[16] The "natural resources" factor is interpreted as all natural resources other than land endowment: for example, mining, forestry, and sea resources.

[17] Substitution elasticity between unskilled labor, land, natural resources, and the bundle of capital and skilled labor is 1.1, whereas it is only 0.6 between capital and skilled labor.

[18] For more details on imperfect competition specifications in the MIRAGE model, see Bouët (2008).

function. This implies CES for the excess of consumption above a minimal level, resulting in different income elasticities of demand across products.

When competition is imperfect, the product is horizontally differentiated (called "product variety"), and consumers have increased utility with more variety. MIRAGE introduces two additional specific features. First, in some sectors (such as industry), products coming from developed countries and those from developing countries are supposed to belong to different quality ranges. Their substitutability, therefore, is assumed to be lower than the substitutability among products coming from the same quality range. Second, domestic products benefit from a specific status of consumers; they are less substitutable for foreign products than foreign products are among one another within a given quality range.

The sector utility function used in MIRAGE is a nesting of four CES functions. Armington elasticities are drawn from the GTAP database and are assumed to be the same across regions. The other elasticities used in the nesting for a given sector are linked to the Armington elasticity by a simple rule (Bchir et al. 2002; Decreux and Valin 2007). Finally, the elasticity of substitution in the CES–LES function is set at 0.6. Macroeconomic closure is obtained by assuming that the sum of the balance of goods and services and foreign direct investments is constant and equal to its initial value.

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