Economic Implications of a Potential Free Trade Agreement between India and the United States

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Abstract

This paper explores the economic implications of a potential free trade agreement between India and the United States. A series of simulations is conducted assuming 100 percent ad valorem equivalent tariff cuts for goods and 50 percent cuts for services. The overall impacts are likely to be positive for the United States and India. While gains from trade creation are offset by trade diversion on the import side, both countries appear to gain from improved access on the export side. The United States is likely to gain largely through terms of trade improvements for its goods and services, as initial protection in India is particularly high. India would experience an expansion of exports and output, especially in textiles and apparel. As the United

States and India are negotiating other free trade agreements, such as the Trans-Pacific Partnership and India's agreement with the Association of Southeast Asian Nations, the paper also explores how the effects of an India-United States free trade agreement are affected by prior free trade agreements. Adding an India-United States free trade agreement to prior agreements tends to bring additional welfare benefits to both countries. India would also gain substantially if it concluded a free trade agreement with the United States and then extended it to other partners. The results suggest that an India-United States free trade agreement might become a building block toward more liberal trade regimes.

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I. Introduction

A potential Free Trade Agreement (FTA) between India and the United States presents a number of opportunities and may bring economic benefits to both countries. While India has substantially liberalized its trade and investment regime since its economic reform, which started in 1991, it remains a relatively highly protected economy. For India, deeper economic ties with the United States may provide opportunities to continue its own economic reform; to benefit from advanced and efficient technologies through trade and investment; to improve access to the large U.S. market, particularly for India's labor-intensive goods; and to create defenses against the U.S.'s protectionist pressure, especially for its growing service exports. For the United States, after having concluded successfully a number of FTAs since the 1990s, negotiating one with India may be a logical path in pursuing further its economic interests. In particular, the U.S. may expect to improve its access to the fast growing Indian market, including for those parts of the service sector in which the U.S. is likely to have a comparative advantage.

However, many economists are skeptical about using FTAs as a way to advance trade reforms, arguing that regional or bilateral trade agreements result in discriminatory liberalization, which in turn is said to cause FTA member economies to suffer from trade diversion. The uncertainty about the implications of an India-US FTA is increased by the fact the United States and India are negotiating other FTAs such as the US-EU agreement¹, the Trans-Pacific Partnership (TPP), and India's agreement with the Association of Southeast Asian Nations (ASEAN). A key feature of an FTA is that countries reduce barriers on a "reciprocal" basis, so negotiations require FTA parties to agree to reduce their own barriers while winning concessions from their trading partner(s). Thus, the economic impacts resulting from an FTA need to be

¹ More formally known as the Trans-Atlantic Trade and Investment Partnership (TTIP).

evaluated for both imports and exports, addressing such issues as trade creation and trade diversion consequences and gains resulting from access to partners' markets.

The objective of this paper is to provide a preliminary assessment of the potential economic impacts of an FTA between India and the United States. For this, we use the Global Trade Analysis Project (GTAP) model (Hertel 1996) (Version 8).² GTAP is a relatively standard applied Computable General Equilibrium (CGE) model which is used for a variety of applications, including for studies to evaluate, *ex ante*, the welfare impacts of FTAs (Hertel, Hummels, Ivanic and Roman, 2007). To ensure maximum clarity and transparency, the analysis is intentionally simple and “static” in order to address key issues such as the nature and extent of trade creation and diversion from an agreement, and the sensitivity of these effects to the presence of other preferential trade agreements.

There are two major limitations to this study. Because of our focus on simplicity and transparency, the paper does not take into account “dynamic” impacts of an FTA such as the impacts of the increased foreign direct investment (FDI) inflow, positive impacts on productivity growth resulting from access to foreign knowledge, and accelerated domestic reforms (Fukase and Winters, 2003). For the same reason, we use standard trade-weighted averages of protection, rather than the more sophisticated optimal aggregation approach outlined in Laborde, Martin and Van der Mensbrugghe (2011). Since the nature of liberalization to be undertaken is not clear at this stage, the simulation scenarios are based on a uniform assumption, *i.e.* 100 percent Ad Valorem Equivalent (AVE) tariff cuts for goods and 50 percent cuts for services. We use the smaller reduction in barriers on services trade because many of these barriers are qualitative and difficult to distinguish from non-discriminatory liberalization. In sum, the main focus of the

² The base year for GTAP 8 is 2007.

paper is to illustrate mechanisms through which an FTA might cause welfare changes, rather than providing a precise estimate of the aggregate impacts.

Following this introduction, Section II examines the underlying patterns of trade and protection in each country. Section III illustrates theories of preferential trade liberalization. Section IV conducts a series of simulations. We first evaluate the potential impacts of an India-US FTA on trade, output and welfare for both countries. Then we investigate how the economic implications of an India-US FTA vary depending on prior agreements. Section V presents a brief conclusion.

Section II. Recent Trends in Trade and Protection Patterns

General Trends

Figures 1a and 1b show that trade between India and the United States has been growing rapidly. U.S. imports from India rose from \$13 billion to \$54 billion during the period 2000-2011, while U.S. exports to India increased from \$6 billion to \$32 billion. Trade in services is especially important in both directions. In particular, exports of services from India to the U.S. have increased dramatically since around 2005. Trade in manufactures appears to be growing steadily. Trade in agriculture (including processed agriculture) is relatively small in both directions. Throughout the period, the United States has experienced an overall trade deficit relative to India. The U.S. had a trade surplus with India in the services sector until 2005, and a trade deficit since 2006.

Trade and Protection Patterns

The economic implications of an FTA between India and the United States will depend heavily upon the pattern of trade between these two countries and on their patterns of protection. The patterns of their protection and trade flows will in turn influence the extent of gains and losses

due to terms-of-trade effects and the benefits and costs accruing from trade creation and diversion. Figures 2a and 2b show the sources and destinations of US imports and exports by its trading partners for the year 2007 constructed from the GTAP 8 database. The figures show that India accounts for around 2 percent of US imports and exports. The U.S.'s North American Free Trade Agreement (NAFTA) partners, namely Canada and Mexico combined, are the largest sources and destinations of U.S. trade flows (representing 24 percent of imports and 26 percent of exports), followed by the 27 member European Union (EU) in both directions (21 percent of US imports and 25 percent of exports). Figures 3a and 3b show that the U.S. is much more important as a trading partner for India, accounting for 9 percent of imports and 18 percent of exports, respectively. The EU is the most important import source and export destination for India, accounting for 20 percent and 29 percent of India's imports and exports, respectively.

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Figure 1a U.S. Imports from India (\$ million)

Figure 1.b U.S. Exports to India (\$ million)

U.S. Imports from India (\$ million)

	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>
Agriculture	548	445	413	406	491	516	517	562	699	554	657	972
Processed Agriculture	596	573	688	760	804	817	853	860	1046	852	1252	2277
Mining	27	38	25	77	57	74	80	44	85	31	47	50
Manufacturing	9941	9109	11199	12351	14880	18243	21214	23307	24762	20303	28428	33747
Services	1901	1821	1817	1985	2844	4985	7460	9883	12498	12486	14188	16921
Total	13013	11986	14142	15580	19076	24635	30124	34656	39091	34226	44572	53967

U.S. Exports to India (\$ million)

	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>
Agriculture	119	284	180	256	189	225	287	386	406	473	490	585
Processed Agriculture	97	72	96	61	65	70	74	79	73	197	306	144
Mining	43	26	34	30	145	191	177	142	406	414	569	1141
Manufacturing	3221	3203	3668	4435	5460	6865	8765	15934	17437	12904	16335	18752
Services	2580	3016	3270	3776	4464	5137	6587	8851	10267	9945	10382	11108
Total	6060	6601	7248	8558	10323	12488	15891	25392	28587	23933	28083	31730

Sources: The UN Comtrade System for the goods data; Bureau of Economic Analysis for the services data, www.bea.gov.

Figure 2a Sources of U.S. Imports, 2007

Figure 2b Destination of U.S. Exports, 2007

ASEAN = Association of South East Asian Nations, EU = European Union, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SA = South Asia, SSA = Sub-Saharan Africa, NAFTA = North American Free Trade Agreement, SAFTA = South Asian Free Trade Area.

Source: GTAP 8 Database.

Notes: NAFTA share consists of Canada and Mexico and does not include the United States. SAFTA share does not include India.

Figure 3a Sources of India's Imports 2007

Figure 3b Destinations of India's Exports 2007

ASEAN = Association of South East Asian Nations, EU = European Union, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SA = South Asia, SSA = Sub-Saharan Africa, NAFTA = North American Free Trade Agreement, SAFTA = South Asian Free Trade Area.

Source: GTAP 8 Database.

Notes: NAFTA share consists of Canada and Mexico and does not include the United States. SAFTA share does not include India.

Table 1 presents the Trade Intensity Index (TII) (Drysdale and Garnaut 1982), which indicates whether the value of trade between two countries is greater or smaller than would be expected given their relative importance in world trade by the sectors used in the analysis.³ Despite the crudity of this measure—it does not take into consideration factors such as transport cost and other characteristics—the index gives some preliminary indication as to how trade (both imports and exports) of both partners may be reduced by the presence of trade barriers. A value of TII greater than one suggests that country i exports to county j more than would be expected and vice versa.

Specifically,

$$TII_{ij} = [X_{ij}/X_i]/[M_j/(M_w - M_i)]$$

Where X_{ij} is country i 's exports to country j

X_i is i 's total exports

M_j is j 's total imports

M_i is i 's total imports, and

M_w is *total world imports*

M_i is subtracted from M_w because a country cannot export goods to itself.

³ Throughout the paper, the 57 GTAP sectors are aggregated into 13 more manageable categories. Agriculture ("paddy rice", "wheat", "other grains", "veg & fruit", "oil seeds", "cane & beet", "plant fibres", "other crops", "cattle", "other animal products", "raw milk", "wool", "forestry" and "fishing"); Processed agriculture ("cattle meat", "other meat", "vegetable oils", "milk", "processed rice", "sugar", "other food" and "beverages & tobacco"); Coal, oil, gas and other mining ("coal", "oil", "gas" and "other mining"); Textiles and apparel ("textiles" and "wearing apparel"); Other light manufacturing ("leather" and "lumber"); Paper and mineral products ("paper & paper products" and "non-metallic minerals"); Chemical, rubber and plastic products ("chemical & rubber products"); Petroleum and coke products ("petroleum & coke"); Iron, steel and metal products ("iron & steel", "non-ferrous metals" and "fabricated metal products"); Transport Equipment ("motor vehicles" and "other transport equipment"); Electronics and machinery ("electronic equipment" and "other machinery & equipment"); Other manufacturing ("other manufacturing"); and Services ("electricity", "gas distribution", "water", "construction", "trade", "water transport", "air transport", "other transport", "communications", "other financial intermediation", "insurance", "other business services", "recreation & other services", "other services (government)" and "dwellings"). Between parentheses are the original GTAP sectors available in the GTAP 8 database.

Table 1 Trade intensity indexes for the U.S. and India, 2007

	i = US j = India	i = India j = US
Agriculture	0.5	1.0
Processed agriculture	0.3	0.8
Coal, oil, gas and other mining	0.1	0.0
Textiles and apparel	0.9	1.4
Other light manufacturing	0.7	0.6
Paper and mineral products	1.1	1.8
Chemical, rubber and plastic products	0.9	1.2
Iron, steel and metal products	0.6	0.9
Petroleum and coke products	0.3	0.5
Transport equipment	2.8	0.6
Electronics and machinery	0.7	1.2
Other manufacturing	1.6	1.1
Services	1.3	2.0
Total	0.9	1.2

Source: GTAP 8 database.

Table 1 reveals several features of India-US trade patterns. The first is that US exports to India are smaller than would be expected given India's share in world trade, while India's exports to the United States are greater than would be expected. Within US exports, the trade intensities are particularly low for agricultural goods (0.5 for agriculture and 0.3 for processed agriculture) and for the products of the mining sector (0.1). Exports of transport equipment and services from the US to India are disproportionately large, with trade intensities of 2.8⁴ and 1.3, respectively. Within India's exports to the U.S., trade intensities are particularly low for mining sector products (0.0), and particularly high for services (2.0).

⁴ This particularly high TII appears to reflect India's large purchases of transport equipment in 2007.

Table 2a U.S. AVE protection against goods by suppliers, 2007 (percent)

	<u>India</u>	<u>US</u>	<u>NAFTA</u>	<u>EU27</u>	<u>LAC</u>	<u>Japan</u>	<u>China</u>	<u>MENA</u>	<u>ASEAN</u>	<u>SAFTA</u>	<u>SSA</u>	<u>ROW</u>	<u>Total</u>
Agriculture	1.0	n.a.	0.3	3.7	2.5	1.4	1.3	0.9	2.5	3.7	2.0	6.4	1.6
Processed agriculture	2.2	n.a.	2.0	3.3	3.9	4.0	3.5	4.3	2.3	0.8	5.6	4.7	3.1
Coal, oil, gas and other mining	0.0	n.a.	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Textiles and apparel	9.1	n.a.	0.0	8.2	3.9	6.3	10.1	5.4	12.1	10.6	0.5	10.1	8.5
Other light manufacturing	3.8	n.a.	0.0	3.1	1.7	0.6	6.2	0.8	3.2	3.9	0.3	1.7	3.6
Paper and mineral products	1.5	n.a.	0.0	2.6	1.4	1.4	2.5	0.6	1.0	1.6	0.1	1.2	1.2
Chemical, rubber and plastic products	0.7	n.a.	0.0	1.2	0.4	1.9	2.7	0.4	0.9	0.3	0.0	1.5	1.1
Iron, steel and metal products	0.1	n.a.	0.0	1.3	0.3	1.7	1.9	0.3	0.5	0.8	0.0	1.0	0.7
Petroleum and coke products	0.7	n.a.	0.0	1.3	0.5	1.1	0.1	0.8	0.6	0.0	0.0	1.0	0.7
Transport equipment	0.0	n.a.	0.0	0.9	0.2	1.2	1.5	0.1	0.2	0.0	0.0	1.1	0.6
Electronics and machinery	0.2	n.a.	0.0	0.8	0.1	0.9	0.9	0.0	0.2	0.1	0.0	0.7	0.6
Other manufacturing	0.0	n.a.	0.0	1.3	0.0	1.7	1.1	0.0	0.3	0.3	0.0	1.4	0.8
Total	2.7	n.a.	0.1	1.4	0.9	1.2	2.8	0.3	2.4	9.6	0.1	1.6	1.3

Table 2b India AVE protection against goods by suppliers, 2007 (percent)

	<u>India</u>	<u>US</u>	<u>NAFTA</u>	<u>EU27</u>	<u>LAC</u>	<u>Japan</u>	<u>China</u>	<u>MENA</u>	<u>ASEAN</u>	<u>SAFTA</u>	<u>SSA</u>	<u>ROW</u>	<u>Total</u>
Agriculture	n.a.	26.5	56.0	32.1	44.3	13.7	33.6	19.8	20.6	25.5	23.4	59.4	33.9
Processed agriculture	n.a.	54.1	72.4	90.1	50.5	42.4	37.1	52.4	97.6	14.4	50.4	55.4	78.8
Coal, oil, gas and other mining	n.a.	13.1	9.4	12.7	5.7	13.1	15.3	10.1	11.0	9.9	10.0	18.2	10.6
Textiles and apparel	n.a.	15.0	15.9	15.4	14.6	15.0	17.0	15.3	15.0	10.2	15.5	15.3	15.8
Other light manufacturing	n.a.	14.8	14.7	14.3	11.4	14.8	14.9	11.8	13.9	5.8	10.8	12.8	13.4
Paper and mineral products	n.a.	13.7	11.6	14.4	13.6	15.1	14.3	14.9	13.0	5.1	13.3	14.6	13.8
Chemical, rubber and plastic products	n.a.	10.8	13.6	14.8	15.2	14.5	14.3	12.8	15.6	6.3	15.4	14.1	13.8
Iron, steel and metal products	n.a.	16.8	17.5	16.9	18.8	18.2	16.4	15.5	16.8	9.8	15.3	15.5	16.0
Petroleum and coke products	n.a.	15.0	13.9	14.8	11.2	15.0	15.0	13.6	13.3	14.1	13.3	14.5	13.8
Transport equipment	n.a.	4.9	13.0	11.2	12.1	29.9	15.4	12.3	17.8	2.0	25.5	16.1	10.4
Electronics and machinery	n.a.	9.7	8.3	12.3	12.7	13.2	7.6	7.2	6.5	2.8	10.0	11.4	9.9
Other manufacturing	n.a.	15.0	15.2	15.1	11.5	15.1	13.7	15.0	13.6	6.5	14.0	15.0	14.8
Total	n.a.	9.9	19.4	13.8	12.3	16.3	11.7	11.2	23.3	12.1	11.5	16.5	13.8

Source: GTAP 8 Database.

Notes: n.a. = not applicable.

Table 3a AVE protection that U.S. goods exports face by destinations, 2007 (percent)

	<u>India</u>	<u>US</u>	<u>NAFTA</u>	<u>EU27</u>	<u>LAC</u>	<u>Japan</u>	<u>China</u>	<u>MENA</u>	<u>ASEAN</u>	<u>SAFTA</u>	<u>SSA</u>	<u>ROW</u>	<u>Total</u>
Agriculture	26.5	n.a.	3.3	3.7	10.2	13.3	11.3	5.3	5.1	5.7	5.1	67.8	16.4
Processed agriculture	54.1	n.a.	11.0	14.6	13.0	30.0	10.5	17.6	9.3	17.0	17.2	20.1	15.7
Coal, oil, gas and other mining	13.1	n.a.	0.0	0.0	1.6	0.0	0.7	1.1	1.7	5.4	3.4	0.5	0.3
Textiles and apparel	15.0	n.a.	0.0	7.6	8.1	7.0	8.5	5.4	8.1	9.3	19.2	6.9	4.6
Other light manufacturing	14.8	n.a.	0.0	2.2	13.4	3.8	4.0	6.1	5.2	15.5	15.5	3.8	2.7
Paper and mineral products	13.7	n.a.	0.0	1.0	7.8	0.2	2.6	4.6	4.4	10.4	8.0	2.1	1.8
Chemical, rubber and plastic products	10.8	n.a.	0.0	2.3	7.4	1.5	142.5	4.4	3.5	8.7	5.3	3.2	11.9
Iron, steel and metal products	16.8	n.a.	0.0	1.6	9.8	0.9	4.2	3.8	3.0	10.0	8.8	1.0	1.8
Petroleum and coke products	15.0	n.a.	0.0	1.9	5.0	0.2	6.0	2.6	1.8	13.9	7.3	2.3	2.4
Transport equipment	4.9	n.a.	0.0	3.3	8.3	0.0	6.8	3.0	3.0	7.7	9.4	4.0	2.4
Electronics and machinery	9.7	n.a.	0.0	1.1	6.8	0.1	3.3	3.8	0.9	8.6	4.3	2.3	2.0
Other manufacturing	15.0	n.a.	0.0	1.2	14.3	1.7	13.0	2.4	78.9	10.8	15.4	5.1	5.7
Total	9.9	n.a.	0.7	2.3	7.6	5.0	29.8	4.3	3.3	8.5	7.2	7.9	5.3

Table 3b AVE protection that Indian goods exports face by destinations, 2007 (percent)

	<u>India</u>	<u>US</u>	<u>NAFTA</u>	<u>EU27</u>	<u>LAC</u>	<u>Japan</u>	<u>China</u>	<u>MENA</u>	<u>ASEAN</u>	<u>SAFTA</u>	<u>SSA</u>	<u>ROW</u>	<u>Total</u>
Agriculture	n.a.	1.0	3.3	3.0	11.0	3.2	36.8	6.8	8.4	11.2	10.5	27.6	12.6
Processed agriculture	n.a.	2.2	5.7	10.9	11.5	3.2	9.7	7.0	6.6	10.9	14.6	11.6	8.6
Coal, oil, gas and other mining	n.a.	0.0	4.2	0.0	2.5	0.2	0.1	2.4	2.5	8.3	5.2	0.2	0.3
Textiles and apparel	n.a.	9.1	16.9	7.9	13.6	5.4	5.3	9.5	9.2	8.8	18.3	7.4	9.2
Other light manufacturing	n.a.	3.8	8.6	2.2	11.6	12.8	5.9	8.8	4.4	14.6	17.5	4.3	3.8
Paper and mineral products	n.a.	1.5	5.2	0.5	8.8	0.0	4.5	5.9	6.6	15.2	12.7	3.8	4.5
Chemical, rubber and plastic products	n.a.	0.7	3.6	0.5	7.0	0.1	5.5	6.3	2.7	7.8	6.8	3.4	3.6
Iron, steel and metal products	n.a.	0.1	4.4	0.3	8.1	0.9	3.2	3.2	3.9	6.1	13.2	2.2	3.0
Petroleum and coke products	n.a.	0.7	7.1	0.0	0.8	0.5	5.8	7.6	3.0	13.7	7.8	3.2	4.7
Transport equipment	n.a.	0.0	24.0	2.4	16.4	0.0	8.3	7.9	17.1	14.8	7.7	4.6	7.1
Electronics and machinery	n.a.	0.2	3.6	0.1	8.7	0.0	4.3	5.2	2.9	6.9	5.8	3.0	2.6
Other manufacturing	n.a.	0.0	1.1	0.7	7.1	0.2	2.9	4.0	0.6	14.5	17.1	0.5	1.6
Total	n.a.	2.7	8.9	3.0	6.5	1.2	3.9	5.6	4.5	10.9	10.1	4.8	4.8

Source: GTAP 8 Database.

Notes: n.a. = not applicable.

The analysis of TII in table 1 suggests that current trade flows may partly reflect the prevailing trade distortions that influence these flows. Using the GTAP 8 database, Column 1 in table 2a shows the U.S.'s Ad Valorem Equivalent (AVE) tariff rates against India's goods, for which reductions would increase U.S. imports from India. The remaining columns of table 2a show the barriers which apply to other U.S. trading partners—these exports to the U.S. are likely to be reduced by an India-US FTA and the associated U.S. tariff revenues to be reduced, with consequent reductions in economic welfare.

An important feature of the GTAP 8 database is the use of protection data which include a comprehensive treatment of trade preferences resulting from preferential trade arrangements (PTAs) as well as the conversion of specific tariffs for both agricultural and non-agricultural goods (Guimbard, Jean, Mimouni and Pichot 2012). Overall, the average AVE rate of protection in the U.S. is relatively low at 1.3 percent. The variation of tariff rates by source countries reflects both preferential schemes and the composition of U.S. imports. The U.S. AVE protection against India's goods of 2.7 percent is higher than average and the U.S. retains particularly high barriers in the textile and clothing sector (9.1 percent). In contrast, the U.S. grants duty-free access to NAFTA partners for their apparel and textile products and applies substantially lower tariffs against the SSA region (0.5 percent) which reflects particularly the preferential rates under the African Growth and Opportunity Act (AGOA). As the US FTAs with Morocco, Chile, and Central America all allowed for immediate duty-free access to textile and apparel products meeting the agreements' rules of origin (Lawrence and Chadha 2004), a similar agreement with India— or, better, one that does not include restrictive rules of origin—would be likely to give Indian producers of textile and apparel products a competitive advantage in the US market.

Table 2b shows that India's AVE tariffs are generally high (13.8 percent on average), and are particularly high in the agricultural sectors against exports from all regions. India's AVE against US goods of 9.9 percent is lower than for India's other partners, while the tariffs against some of its trading partners are especially high, for instance, 23.3 percent against its ASEAN suppliers. This is particularly important because trade diversion is more likely to generate costs when the protection against imports from other partners exceeds that from the country for which import barriers are being reduced.

On the export side, the removal of barriers by a country's FTA partner is a key factor in reaping gains from reciprocal trade liberalization. The higher the initial barriers imposed by a country's trading partner, the larger the (potential) scope of improved market access resulting from an FTA, and the bigger the potential terms-of-trade gains to the exporter. Table 3a compares the AVE protection that US exporters encounter in the Indian market with the protection they face in other markets. Overall, US exports face on average a tariff of 5.3 percent across all export markets. The protection that US exporters face in the Indian market (9.9 percent) is nearly double the average. This structure of protection suggests that the U.S. is likely to gain greatly from improved market access resulting from an India-US FTA. Similarly, table 3b compares the protection Indian exporters face in the US market and those in India's other export destinations. Indian exporters face on average 4.8 percent of protection globally against their exports of goods. Since US barriers against Indian exports (2.7 percent) are relatively low overall, India's terms of trade gains on the export side may be relatively small on average—although the potential volumes of trade are very large. On the other hand, since the U.S. is among India's leading export destinations (figure 3b) and the US tariff against Indian labor-

intensive goods remains high, Indian market access to the U.S. is likely to remain an important issue in its negotiation.

Many economists believe that the potential gains from liberalization in the service sector may be larger than gains available from liberalization of the trade in goods (e.g., Gervais and Jensen 2013 for the United States; Konan and Maskus 2006 for Tunisia; Chadha, Brown, Deardorff and Stern 2000 for India). The scope for gains from services trade liberalization may be higher since barriers to trade in services tend to be higher than the remaining barriers to trade in goods. Moreover, it is increasingly recognized that service sector trade liberalization not only directly affects service production and trade, but also has positive impacts on productivity or exports of goods, especially in developing countries (Arnold, Javorcik, Lipscomb and Mattoo 2012; Cebula, Mazumdar and Nair-Reichert 2011; Fukui and McDaniel 2010; Konan and Maskus 2006; Robinson, Wang and Martin 2002).

Analysis of the impacts of services trade liberalization is severely constrained by the lack of reliable services trade and protection data. The estimates of services trade barriers vary widely in the literature, depending on methodologies, how the barriers are defined, which sectors are included and whether the barriers include non-discriminatory impediments or apply only against foreign suppliers. However, many economists generally view the services barriers in India to be high, and those in the U.S. to be low (e.g., Borchert, Gootiiz and Mattoo 2014; Gervais and Jensen 2013; Hufbauer, Schott and Wong 2010; Petri, Plummer, and Zhai 2012).⁵ As the best available educated guesstimate at the time of writing, we used the tariff equivalents of services

⁵ For instance, according to the Services Trade Restrictions Database which was released recently by the World Bank, India is found to be among the countries which have the most restrictive policies in services while service trade in the United States is found to be generally open (figure 4, Borchert et al.2014). The Services Trade Restrictions Indices (STRI), which range from 0 to 100, are found to be 17.7 and 65.7 for the U.S. and India respectively. However, the STRI does not cover cross-border trade in business processing services associated with the “outsourcing” phenomenon.

barriers reported in Hufbauer, Schott and Wong (table B.2, 2010). According to these measures, the tariff equivalents of services barriers are estimated to be 6.03 percent for the U.S. and 68.06 percent for India. In future work, it would be desirable to consider ad valorem equivalents of services barriers of the type estimated by Jafari and Tarr (2014).

Section III. The Theory of Preferential Trade Liberalization

In this section, we outline the basic framework used to evaluate the effects of reciprocal liberalization between the United States and India (Fukase and Martin 2001). On the import side, the concepts of trade creation and trade diversion are central to the evaluation of discriminatory trade liberalization. Trade creation measures the gains from expanding trade in the products being liberalized. Trade diversion, by contrast, reflects the reductions in trade of products disadvantaged by preferential liberalization, and particularly the losses of government revenue associated with this phenomenon.

Figure 4a Welfare impacts of US liberalization of imports from India

Figure 4b Welfare Impact of preferential liberalization on imports from non-partner countries

To measure these impacts, we first consider the effects of changes in the tariffs that the United States levies on its imports from India (or vice versa). To aid understanding of the concept of trade creation, the market for goods imported by the United States from India is illustrated in figure 4a. In the initial equilibrium, the US imposes a tariff τ_{India} ($P_d = P_w + \tau_{\text{India}}$ where P_d and P_w are the domestic and the world price respectively). Let us now eliminate the tariff on imports from India. This reduces tariff revenues on initial imports from India by

P_dacP_w . However, the gains to consumers are greater as they increase the quantity of Indian goods that they purchase. Following the decline in the domestic price, consumers move down the (compensated) demand curve for Indian goods, D_{India} from initial quantity m to final quantity m' . Consumers gain the value P_dacP_w that would formerly have been paid to the government in tariffs. In addition, consumer surplus increases by the area abc . The net gain to the U.S. in this market can be approximated by the shaded area abc . This is the welfare benefit from trade creation.

If the import distortion being liberalized is the only distortion in the economy, then the welfare impacts of liberalization can be analyzed by considering only the trade creation effects depicted above. If, however, there are distortions in other markets, the problem is one of the second best and the impacts of liberalization on trade flows through these barriers must be considered. Perhaps the best known type of second-best welfare effect when considering a preferential trade agreement is trade diversion. In the analytical framework used in this study, this potential source of loss is readily seen by examining conditions in the market for imports from non-partner countries, represented in figure 4b. Assuming that imports from non-partner countries are substitutes for imports from partner countries, the reduction in the price of imports from India shown in figure 4b leads to a reduction in the demand for goods from non-partner countries, shifting the demand curve for these goods from D_{others} to D'_{others} . This has adverse welfare consequences that can be measured by the tariff revenues collected on non-partner imports. The welfare loss to the US is also the resulting loss in tariff revenues, shown by the area $defg$.

Whether there is a net gain or loss to the importing country depends on the relative sizes of the two shaded areas. Clearly, the gains from trade creation will be larger, the higher the rate

of protection initially applied on these trade flows, the more price responsive is the total domestic demand for these goods (particularly, the more substitutable are domestic and imported goods) and, if the size of the increase in trade is proportional to the initial trade volume, the larger the initial trade volume. Trade diversion costs are likely to be greater the higher the tariffs applied in the non-partner markets and the greater the reduction in the quantity of imports from these markets—a quantity that reflects both the size of the drop in domestic prices of goods from the partner, and the cross-price effect of the decline in the price of imports from the partner.

Terms of Trade (TOT) effects, which are defined as a change in export prices relative to import prices, are another key component of welfare changes, as an improvement in the terms of trade contributes to welfare gains. In the case of reciprocal liberalization, the TOT gains resulting from the improved access to the partner's market are likely to be central in evaluating the welfare consequence on the export side. In figure 4c, it is shown that the reduction in Indian tariffs on exports from the US shifts India's import demand curve for exports from ED to ED'. This causes the price received by US exporters to rise from P to P'. The result is an increase in the price received for these exports and an increase in the volume of exports from the U.S. to India (shaded area *hijk*).

For large traders such as the US and India, there are other potentially important terms-of-trade effects.⁶ An increase in a country's import demand associated with liberalization may lead to a rise in its import prices, causing the country's TOT to deteriorate. Liberalization also causes a reduction in input costs and hence improved competitiveness and exports. If this increase in export supplies causes a decline in export prices in both partner and non-partner markets, there may be a terms of trade effect that needs to be incorporated into the analysis.

⁶ The GTAP model assumes that products are differentiated by origin (the Armington assumption).

Figure 4c Terms of Trade impacts of improved access to a partner

The net effect on the overall TOT depends primarily on the difference between the TOT loss resulting from trade expansion and the TOT gains from preferential access to the partner's market. All of the impacts of discriminatory trade liberalization outlined above need to be taken into account simultaneously in forming an overall assessment of the proposed approach. While diagrams of the type shown above aid understanding, they do not provide a practical basis for making an overall evaluation since many of the relationships depicted are interdependent. By contrast, quantitative models such as GTAP allow all of these effects to be taken into account at once.

Section IV. Simulation Results

IV.1 US-India FTA

Trade and Output Effects

In this section, we implement a series of simulations pertaining to a potential India-US FTA. We have aggregated the original 57 GTAP sectors and 113 countries/regions into 13 broad categories (see footnote 3) and 15 regions, namely, the United States, India, Australia/New Zealand,

Canada/Mexico, EU27, Chile/Peru, Rest of LAC, Japan, China, ASEAN (TPP members), ASEAN (non TPP members), MENA, SAFTA, SSA and Others. Since the nature of goods and services liberalizations may be different, we first simulate the impacts of goods and services liberalization separately. Table 4a estimates the percentage changes to be expected in U.S-India bilateral trade and in total imports and exports when the United States and India reduce AVE protection for goods to zero on imports from each other. According to our simulation, U.S. exports to India increase by 63 percent while Indian exports to the U.S. rise by 15 percent. The expansion of U.S. exports to India tends to be large across all the goods sectors, ranging from 719 percent in processed agriculture to 23 percent in transport sector, reflecting generally high levels of initial protection in India. Given the relatively low initial US protection, Indian export growth to the U.S. tends to be much smaller overall. However India experiences a large export expansion in textiles and apparel, about 85 percent, followed by other light manufacturing (31 percent). As these sectors are labor-intensive, the employment effects resulting from the expansion of exports are disproportionately large. When the U.S. lowered its tariffs against Vietnam's goods from general to Most-favored Nation (MFN) rates in 2001 (Fukase and Martin 2001), Vietnam's exports of labor-intensive manufacturing such as clothing to the U.S. expanded dramatically, and this led to a disproportionately large job creation effect in Vietnam (Fukase 2013).

Table 4b estimates the trade effects to be expected when the United States and India reduce their AVE protection for services by 50 percent. U.S. exports of services to India and those from India to the U.S. are expected to increase by 113 percent and 12 percent, respectively, which would lead to a rise in overall exports from the U.S. to India by 28 percent and from India to the U.S. by 5 percent. Interestingly, the liberalization of services would appear to impact the

pattern of trade in goods differently in the U.S. and in India. In the United States, the liberalization of services appears to lead to a slight contraction in goods exports, with resources reallocated toward now more profitable service sectors. In contrast, the rise in exports of services from the United States to India appears to contribute to a rise in India's exports of "goods". This is perhaps because imported services provide important inputs into the production of goods, and the increased availability of efficient services may also reduce transaction/transportation costs. Several papers find that service imports may cause developing countries to increase their international competitiveness and facilitate exports (e.g., Cebula et al. 2011; Hoekman and Braga 1997). Analyzing U.S. trade data, Cebula et al. (2011) find that service imports from the U.S. have a significant and positive impact on goods exports to the U.S. in the case of low-income countries but not in the case of high-income countries.

Table 4a Trade effects resulting from 100 percent AVE protection cut for goods

	Exports from the U.S. to India	Exports from India to the U.S.	Total U.S. imports	Total Indian Imports	Total U.S. Exports	Total Indian exports
Agriculture (%)	183.2	5.3	0.5	10.1	0.9	0.2
Processed agriculture (%)	718.8	11.6	0.4	11.0	1.4	0.7
Coal, oil, gas and other mining (%)	325.9	0.5	0.2	-0.3	1.5	0.2
Textiles and apparel (%)	179.2	84.7	2.1	4.9	0.6	21.0
Other light manufacturing (%)	164.1	31.3	0.4	2.9	-0.1	3.6
Paper and mineral products (%)	97.5	9.5	0.4	6.0	0.9	1.9
Chemical, rubber and plastic products (%)	83.0	6.2	0.4	4.3	0.7	1.5
Iron, steel and metal products (%)	187.6	1.8	0.5	2.5	2.8	0.4
Petroleum and coke products (%)	75.8	3.1	0.1	1.4	0.5	0.2
Transport equipment (%)	22.5	1.0	0.3	4.8	0.3	0.5
Electronics and machinery (%)	100.8	2.8	0.4	3.1	0.4	1.4
Other manufacturing (%)	143.9	0.7	0.3	11.8	4.8	0.4
Services (%)	-0.1	-0.2	0.3	0.3	-0.5	-0.4
Total (%)	62.5	14.7	0.4	2.3	0.5	2.6
Change in Trade Value (\$ million)	15220	5502	8924	6563	6945	5584

Table 4b Trade effects resulting from 50 percent AVE protection cut for services

	Exports from the U.S. to India	Exports from India to the U.S.	Total U.S. imports	Total Indian Imports	Total U.S. Exports	Total Indian exports
Agriculture (%)	-0.2	0.0	0.0	0.0	-0.1	0.1
Processed agriculture (%)	-0.6	0.5	0.1	-0.3	-0.2	0.6
Coal, oil, gas and other mining (%)	-0.2	0.0	0.0	0.0	-0.2	0.1
Textiles and apparel (%)	-1.2	1.5	0.1	-0.7	-0.5	1.4
Other light manufacturing (%)	-0.8	1.1	0.1	-0.4	-0.4	1.0
Paper and mineral products (%)	-0.8	0.8	0.1	-0.5	-0.3	0.7
Chemical, rubber and plastic products (%)	-0.5	0.8	0.1	-0.1	-0.3	0.8
Iron, steel and metal products (%)	-0.5	0.9	0.0	0.0	-0.4	1.0
Petroleum and coke products (%)	-0.1	0.0	0.0	-0.1	-0.1	0.1
Transport equipment (%)	-0.7	1.3	0.1	-0.5	-0.3	1.2
Electronics and machinery (%)	-1.1	2.0	0.1	-0.6	-0.4	1.9
Other manufacturing (%)	-1.0	1.4	0.1	-0.5	-0.5	1.3
Services (%)	112.9	12.2	0.4	12.2	1.8	3.1
Total (%)	27.4	5.4	0.1	1.2	0.1	1.5
Change in Trade Value (\$ million)	6670	2025	2643	3445	1680	3196

Source: Authors' simulation Results.

Table 4c Trade effects resulting from 100 percent AVE protection cut for goods and 50 percent cut for services

	Exports from the U.S. to India	Exports from India to the U.S.	Total U.S. imports	Total Indian Imports	Total U.S. Exports	Total Indian exports
Agriculture (%)	183.0	5.3	0.5	10.2	0.8	0.2
Processed agriculture (%)	714.7	12.3	0.6	10.7	1.1	1.1
Coal, oil, gas and other mining (%)	325.5	0.7	0.2	-0.2	1.4	0.3
Textiles and apparel (%)	176.4	87.4	2.3	4.3	0.1	22.7
Other light manufacturing (%)	162.2	32.8	0.6	2.6	-0.5	4.6
Paper and mineral products (%)	96.1	10.4	0.6	5.6	0.6	2.6
Chemical, rubber and plastic products (%)	82.4	7.1	0.5	4.2	0.4	2.3
Iron, steel and metal products (%)	186.3	2.7	0.6	2.5	2.4	1.3
Petroleum and coke products (%)	75.7	3.2	0.1	1.4	0.5	0.3
Transport equipment (%)	21.7	2.3	0.4	4.4	0.0	1.7
Electronics and machinery (%)	98.8	4.8	0.6	2.6	-0.1	3.2
Other manufacturing (%)	141.9	2.1	0.5	11.3	4.2	1.6
Services (%)	112.9	12.0	0.7	12.6	1.6	3.1
Total (%)	89.6	20.3	0.6	3.5	0.7	4.1
Change in Trade Value (\$ million)	21829	7606	12614	10180	9258	8925

Table 4d Trade effects resulting from 100 percent cut for goods and 50 percent cut for services plus India's MFN liberalization

	Exports from the U.S. to India	Exports from India to the U.S.	Total U.S. imports	Total Indian Imports	Total U.S. Exports	Total Indian exports
Agriculture (%)	13.7	31.3	-0.1	80.0	0.7	24.3
Processed agriculture (%)	36.9	37.6	-0.1	233.2	0.5	23.8
Coal, oil, gas and other mining (%)	41.3	43.3	-0.3	12.1	0.2	48.5
Textiles and apparel (%)	43.6	134.4	2.3	50.0	-0.3	55.0
Other light manufacturing (%)	44.1	67.2	-0.2	32.2	0.5	33.1
Paper and mineral products (%)	25.8	27.6	0.0	26.0	0.5	19.2
Chemical, rubber and plastic products (%)	2.3	44.0	0.0	21.9	0.0	37.1
Iron, steel and metal products (%)	35.5	33.2	0.0	28.6	0.7	32.4
Petroleum and coke products (%)	14.4	32.6	0.0	9.6	-0.8	26.4
Transport equipment (%)	-21.4	25.4	-0.2	14.1	-0.5	25.0
Electronics and machinery (%)	12.0	48.3	-0.2	15.1	0.5	46.9
Other manufacturing (%)	41.3	29.2	0.2	40.3	0.9	28.0
Services (%)	45.7	19.7	0.2	45.3	0.8	10.5
Total (%)	12.5	44.9	0.0	25.8	0.3	29.1
Change in Trade Value (\$ million)	3043	16834	700	74752	3880	62837

Source: Authors' simulation results.

Table 5 Output effects (percent change in output)

	Goods		Services		Goods + Services		Goods + Services +	
	Liberalization		Liberalization		Liberalization		India MFN	
	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>
Agriculture (%)	0.10	-0.06	-0.05	0.05	0.05	-0.01	0.15	-1.99
Processed agriculture (%)	0.05	-0.31	-0.02	0.07	0.04	-0.24	0.03	-8.89
Coal, oil, gas and other mining (%)	-0.05	-0.16	-0.04	0.13	-0.09	-0.04	-0.03	-1.91
Textiles and apparel (%)	-0.92	7.05	-0.18	0.68	-1.10	7.83	-1.28	19.07
Other light manufacturing (%)	-0.13	0.74	-0.07	0.47	-0.20	1.20	0.03	7.89
Paper and mineral products (%)	0.02	-0.49	-0.06	0.07	-0.04	-0.42	0.04	-1.12
Chemical, rubber and plastic products (%)	0.05	-0.47	-0.18	0.4	-0.12	-0.07	-0.05	4.31
Iron, steel and metal products (%)	0.29	-1.17	-0.21	0.53	0.08	-0.65	0.08	-1.54
Petroleum and coke products (%)	0.09	-0.21	0.01	0.08	0.09	-0.13	-0.13	6.51
Transport equipment (%)	0.00	-1.55	-0.14	0.47	-0.13	-1.09	-0.14	-0.44
Electronics and machinery (%)	-0.07	-1.01	-0.24	0.72	-0.3	-0.3	0.12	2.13
Other manufacturing (%)	0.81	-0.88	-0.23	0.65	0.58	-0.25	-0.16	8.71
Services (%)	0.00	0.02	0.03	-0.13	0.03	-0.11	0.00	0.06

Source: Authors' simulation results.

Combining goods and service liberalizations, the results in table 4c predict that exports from the U.S. to India and those from India to the U.S. may expand by 90 percent and 20 percent respectively. The impacts on total trade for the United States are 0.6 percent and 0.7 percent increases in import and export values respectively whereas the corresponding figures are 3.5 percent and 4.1 percent for India. In terms of trade values, the resulting increase in bilateral trade (imports plus exports) is estimated to be \$29 billion (0.21 percent and 2.4 percent of the U.S.'s and India's initial GDP respectively).⁷ Overall, the U.S.'s total trade and that of India may increase by \$22 billion (0.16 percent of initial GDP) and by \$19 billion (1.6 percent of initial GDP) respectively.

Table 4d presents the results of a scenario in which India first signs a free trade agreement with the United States and then liberalizes with all its other trading partners on an MFN basis. Using an India-US FTA for further liberalization may be particularly suitable for India relative to using mechanisms under the World Trade Organization (WTO). This is because India is not required to lower its tariff rates under the WTO as India's bound tariff rates are far higher than its applied rates; and an India-US FTA is likely to become a comprehensive, deep and symmetrical agreement while India has little obligation to reduce its protection at the WTO because of the special and differential treatment principle (Lawrence and Chadha 2004). The simulation results show that total Indian imports and exports both expand substantially by 26 percent and 29 percent respectively; and India's exports to the United States increase disproportionately relative to other countries (45 percent) since India continues to receive preferential market access in the US market. The rise in India's imports is especially large in the

⁷ These estimates are based on the initial trade values in 2007, which is the reference year of GTAP 8. As trade between the U.S. and India has continued to grow since 2007, the magnitude of the trade effect is likely to be larger if an FTA takes effect at a later time.

processed agricultural sector (233 percent) whereas India's exports tend to expand across sectors, because of the real exchange rate depreciation associated with reduction in trade barriers (Salter 1959). In value terms, India's trade expansion is about seven times larger relative to the base scenario, with India's total trade expanding by \$138 billion (11 percent of initial GDP).

Table 5 reports the output effects resulting from the simulation experiments reported in tables 4a through 4d. Columns 1-2 of table 5 reveal that the impacts of goods liberalization on output are most pronounced in textiles and apparel: while the output of this sector in India increases by 7 percent, that in the U.S. contracts by 0.9 percent. It appears that, resulting from goods liberalization, productive resources are allocated more efficiently and India is able to allocate additional resources to sectors in which it has a comparative advantage.

As a result of service trade liberalization (columns 3-4), the output of services contracts slightly in India due to increased competition from the United States. However, the increased efficiency of the services sectors contributes to an expansion of output across all goods sectors. This result is broadly consistent with the view that opening services sectors to foreign providers is a channel through which services liberalization contributes to improved performance of downstream manufacturing sectors (e.g., Arnold et al. 2012 for India; Arnold, Javorcik and Mattoo 2011 for Czech Republic). For instance, examining the link between policy reforms in services and the production of manufacturing firms from 1993 to 2005, Arnold et al. (2012) show that India's reforms in services, which include banking, telecommunications, insurance and transport reforms, had positive effects on the productivity of manufacturing.

Combining goods and services liberalizations (columns 5-6), the performance of the Indian goods sector tends to be slightly better relative to goods market liberalization alone. For instance, the change in textile and apparel output increases from 7.1 percent to 7.8 percent. When

India extends its goods and services liberalization to all its suppliers (last two columns of table 5), this strategy appears to accelerate resource reallocation across sectors in India. Relative to the baseline scenario, the expansion of the textiles and apparel sector more than doubles; other sectors such as light manufacturing, chemical, rubber and plastic products, petroleum and coke products also expand sizably; but the contractions of some sectors, for instance, that of processed agriculture, are more pronounced. An India-US FTA is also likely to promote resource reallocation in the United States, but its impact on the structure of U.S. production appears to be generally small.

Welfare Effects

In order to analyze the impacts of FTAs on economic welfare, we use a decomposition of the Equivalent Variation (EV) into allocative efficiency and terms of trade (TOT) components, following Huff and Hertel (2000). The allocative efficiency effects are further decomposed into trade creation, trade diversion effects and other allocative efficiency components.⁸ The first eight columns of table 6 report the results of welfare decomposition using the same scenarios described above (the baseline scenario is reported in bold). The economic impacts from goods liberalization are positive for both the United States and India as they experience welfare gains of \$2.3 billion and \$0.2 billion respectively (column 1-2). The gains coming from the TOT component are especially large for the United States (\$2.0 billion), mainly reflecting initially high protection in India. India appears to suffer from some trade diversion in goods

⁸ The GTAP model incorporates many pre-existing distortions in the forms of taxes and subsidies (Huff and Hertel 2000). The welfare changes in the model are attributed to the interactions between taxes (or subsidies) and equilibrium quantity changes taking place over the course of simulations. Among allocative efficiency effects, this paper focuses on quantifying trade creation and trade diversion type effects illustrated in figure 4ab. These effects are measured as the summation of the tariff revenue weighted by imports quantity changes, *i.e.*, by aggregating the changes in tariff revenues within FTA (trade creation) and outside of the FTA (trade diversion) (Hertel et al. 2007). The welfare effect resulting from changes in the relative prices of savings and investment is not included in our welfare decomposition.

liberalization⁹ although generally improved allocative efficiency may outweigh this loss. The corresponding figures resulting from services liberalization for the U.S. and India are \$1.4 billion and \$1.2 billion (Columns 3-4).

When goods and services liberalizations are combined (baseline scenario), the United States and India gain by \$3.7 billion and \$1.4 billion respectively (about 0.03 percent and 0.1 percent of initial U.S. and Indian GDP respectively) (Columns 5-6). When India extends the removal of barriers on an MFN basis (Columns 7-8), India's welfare expands dramatically to \$13.5 billion (about 1.0 percent of its initial GDP) as its much larger allocative efficiency gains far surpass its deteriorating TOT effects. The strategy of lowering external barriers in the aftermath of an FTA is documented both in ASEAN (Calvo-Pardo, Freund, and Ornelas 2011) and in Latin America (Estevadeordal, Freund and Ornelas 2008). For instance, Estevadeordal et al. (2008) find strong evidence that regional agreements induced a faster decline in external tariffs in Latin America and conclude that free trade areas are likely to be building blocks in the region.

Experiments in the last four columns of table 6 separate the baseline scenario into two parts, *i.e.*, the effects from the US lowering its protection against India's exports (Column 9-10) and from India's doing so against U.S. exports (Columns 11-12). The results reveal that both countries lose if they only lower their own barriers without obtaining reciprocal commitments, as gains resulting from doing so appear to be reaped by their partners. Our finding suggests that FTA models which focus only on the import side are misleading, and highlights the importance of negotiating concessions by FTA partner countries.

⁹ This result is partly attributable to the fact that India's initial AVE protection of 9.9 percent against the U.S. goods (table 3b) is lower than the rates India applies to its other trading partners. Thus, as a result of the discriminatory trade liberalization, India would expect a large tariff revenue loss from the other partners.

Table 6 Welfare effects of potential FTA between India and the United States (\$ million)

	Goods Liberalization		Services Liberalization		Goods + Services Liberalization		Goods + Services + India MFN		Only the U.S. removes protection		Only India removes protection	
	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>
1. Allocative efficiency effect	289	234	257	1550	536	1804	-171	26205	-74	738	642	1097
1.1 Net TC vs. TD	80	-462	176	1340	176	898	-221	16361	-71			310
Trade Creation (TC)	207	939	292	3292	292	4241	482		247			4144
Trade Diversion (TD)	-127	-1401	-116	-1952	-116	-3343	-704		-319			-3834
1.2 Other allocative efficiency effect	210	696	80	210	360	906	50	9844	-2	738	642	786
2. Terms of Trade (TOT) Effects	2033	9	1104	-400	3133	-392	642	-12692	-477	1227	3551	-1647
Total EV Change	2322	243	1360	1150	3669	1412	471	13513	-551	1965	4193	-550

Source: authors' simulation results.

Table 7a Total and incremental welfare effects under different scenarios A1W-C5W (\$ million)

A. Alternative FTA	A1W: TPP		A2W: US-EU27		A3W: India-EU27		A4W: India-ASEAN		A5W: TPP US-EU27 India-EU27 India-ASEAN	
	US	India	US	India	US	India	US	India	US	India
1. Allocative efficiency effect	918	-108	1184	-165	-74	4410	-30	5651	2096	11130
1.1 Net TC vs. TD	334		541			3677		3466	912	6715
Trade Creation (TC)	709		913			8640		8293	1465	15173
Trade Diversion (TD)	-375		-371			-4963		-4828	-554	-8458
1.2 Other allocative efficiency effect	584		642			733		2186	1185	4415
2. Terms of Trade (TOT) Effects	5434	-211	5169	-222	-91	-2284	8	-3133	10458	-4968
Total EV Change (A)	6352	-319	6353	-387	-165	2126	-22	2518	12555	6162
B. Alternative FTA (A) + India-US	B1W: A1W + India-US		B2W: A2W + India-US		B3W: A3W + India-US		B4W: A4W + India-US		B5W: A5W + India-US	
	US	India	US	India	US	India	US	India	US	India
1. Allocative efficiency effect	1480	1701	1713	1656	327	6945	400	7980	2465	13836
1.1 Net TC vs. TD	541	830	720	807	54	3677	72	4929	1005	8685
Trade Creation (TC)	973	4136	1197	4126	311	11590	337	11496	1763	16301
Trade Diversion (TD)	-433	-3306	-477	-3319	-257	-7913	-264	-6567	-758	-7616
1.2 Other allocative efficiency effect	940	871	993	849	274	3268	328	3051	1460	5151
2. Terms of Trade (TOT) Effects	8549	-649	8242	-646	2445	-2250	2812	-3250	12731	-4861
Total EV Change (B)	10030	1052	9954	1009	2772	4696	3212	4730	15196	8975
C. Alternative FTA (A) + India-US (B) + India MFN Liberalization	C1W: B1W + India MFN		C2W: B2W + India MFN		C3W: B3W + India MFN		C4W: B4W + India MFN		C5W: B5W + India MFN	
	US	India	US	India	US	India	US	India	US	India
1. Allocative efficiency effect	819	26116	1085	26065	-165	27054	-167	26729	2078	27338
1.1 Net TC vs. TD	184	16285	391	16264	-191	17143	-207	16697	844	17291
Trade Creation (TC)	1124	16285	1302	16264	420	17143	457	16697	1824	17291
Trade Diversion (TD)	-940		-911		-611		-664		-980	
1.2 Other allocative efficiency effect	635	9831	694	9801	26	9911	40	10032	1235	10047
2. Terms of Trade (TOT) Effects	6103	-12949	5822	-12946	351	-10480	511	-11782	10807	-10109
Total EV Change (C)	6922	13167	6907	13119	186	16574	344	14947	12885	17229
D. Incremental EV Change (B) – (A)	3678	1371	3601	1396	2937	2569	3234	2212	2642	2813
E. Incremental EV Change (C) – (B)	-3108	12115	-3047	12110	-2586	11878	-2868	10217	-2311	8254

Source: Authors' simulation results.

Notes: The simulations are based on a hypothetical scenario, namely, reciprocal removal of 100 percent and 50 percent of AVE protections for goods and services respectively.

Table 7b Total and incremental changes in trade (imports plus exports) under different scenarios A1T- C5T (\$ million)

A. Alternative FTA	A1T: TPP		A2T: US-EU27		A3T: India-EU27		A4T: India-ASEAN		A5T : TPP US-EU27 India-EU27 India-ASEAN	
	US	India	US	India	US	India	US	India	US	India
1. Change in Exports (\$ million)	15087	-316	27416	-267	-355	22213	-572	17182	41085	35686
To Partners	28973		42171			15301		6539	63443	24656
To Non-partners	-13886		-14755			6912		10643	-22358	11030
2. Change in Imports (\$ million)	21020	-649	34753	-737	-2766	25631	-748	20044	51926	40593
From Partners	23312		41260			65652		43126	56017	89148
From Non-partners	-2292		-6507			-40021		-23083	-4091	-48556
Total Trade Change 1 + 2 (A)	36107	-965	62169	-1004	-3121	47844	-1320	37226	93011	76279
Of which: Change in India-US Trade ^a	-570	-570	-812	-816	-2893	-3051	194	49	-3967	-4223
B. Alternative FTA (A) + India-US	B1T: A1T +India-US		B2T: A2T + India-US		B3T: A3T + India-US		B4T: A4T + India-US		B5T: A5T + India-US	
	US	India	US	India	US	India	US	India	US	India
1. Change in Exports (\$ million)	24177	8451	36429	8424	7676	29325	8094	25148	48413	42179
To Partners	47211	7219	58936	7067	14019	24000	18036	16271	68593	40992
To Non-partners	-23034	1232	-22506	1357	-6342	5325	-9942	8877	-20179	1187
2. Change in Imports (\$ million)	33429	9350	46908	9157	7966	33701	10752	29081	61686	47964
From Partners	31521	21774	50092	21697	9310	74594	10140	59217	67215	93807
From Non-partners	1909	-12424	-3184	-12540	-1344	-40893	612	-30134	-5529	-45843
Total Trade Change 1 + 2 (B)	57606	17801	83337	17581	15642	63026	18846	54229	110099	90143
Of which: Change in India-US Trade ^a	28662	28993	28444	28763	23329	23410	28176	28254	20241	20143

(Table 7b Continued)

C. Alternative FTA (A) + India-US (B) + India MFN Liberalization	C1T: B1T + India MFN		C2T: B2T + India MFN		C3T: B3T + India MFN		C4T: B4T + India MFN		C5T: B5T + India MFN	
	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>	<u>US</u>	<u>India</u>
1. Change in Exports (\$ million)	19428	62541	31753	62475	4015	66351	4313	64707	45674	67325
To Partners	31829	16423	45313	16271	3545	38529	3269	25336	62575	44015
To Non-partners	-12401	46118	-13560	46204	470	27822	1044	39371	-16901	23310
2. Change in Imports (\$ million)	22610	74138	36230	73903	787	79168	1116	76966	55378	79702
From Partners	37270		54632		15237		16614		70057	
From Non-partners	-14660		-18402		-14449		-15498		-14679	
Total Trade Change 1 + 2 (C)	42038	136679	67983	136378	4802	145519	5429	141673	101052	147027
Of which: Change in India-US Trade ^a	19776	19107	19585	18902	18781	18202	19883	19243	16143	15616
D. Incremental Trade Change (B) – (A)	21499	18766	21168	18585	18763	15182	20166	17003	17088	13864
Of which: Change in India-US Trade ^a	29232	29563	29256	29579	26222	26461	27982	28205	24208	24366
E. Incremental Trade Change (C) – (B)	-15568	118788	-15354	118798	-10840	82493	-13417	87444	-9047	56884
Of which: Change in India-US Trade ^a	-8886	-9886	-8859	-9861	-4548	-5208	-8293	-9011	-4098	-4527

Source: Authors' simulation results.

Notes: The simulations are based on a hypothetical scenario, namely, reciprocal removal of 100 percent and 50 percent of AVE protections for goods and services respectively.

^aThe differences in bilateral trade between the United States and India reflect the differences between “cost, insurance and freight” (CIF) and “free on board” (FOB).

IV.2 India-US FTA in the Presence of Other FTAs

The series of simulations in Section IV.1 assume that both countries negotiate only an India-US FTA. However, as the United States and India have already begun negotiating other FTAs, an important question arises of how the welfare and trade impacts of an India-US FTA are affected by prior decisions to proceed with other agreements. To answer this question, we first consider the impacts of several regional agreements that are under negotiation. Then, we will examine what would happen if the United States and/or India were to add an India-US FTA “after” the completion of any or all of the other agreements.

Welfare Effects

Panel A of table 7a considers the welfare consequences of alternative FTAs, namely under the TPP¹⁰ (scenario A1W) and the US-EU FTA (scenario A2W) for the United States as well as an India-EU FTA (scenario A3W) and an India-ASEAN FTA (scenario A4W). For the sake of transparency and for the purpose of comparing the results of alternative FTAs with an India-US FTA which does not yet exist, we apply the same assumption applied to the preceding simulations, *i.e.* 100 percent AVE tariff cuts for goods and 50 percent cuts for services each other.

The results suggest that the United States would gain roughly equally from the TPP and US-EU FTA (\$6.4 billion) and that the welfare gains from each of these agreements appear to be larger than that resulting from a potential India-US FTA (\$3.7 billion). Turning to alternative FTA partners for India, the welfare gains for India from an India-EU FTA and an India-ASEAN FTA are estimated to be \$2.1 billion and \$2.5 billion respectively. These gains are also larger

¹⁰ At the time of writing (2013), eleven official TPP members included: Australia, Brunei Darussalam, Canada, Chile, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States, and Vietnam.

than the gains likely to result from a potential India-US FTA presented in table 6 (\$1.4 billion).¹¹ Scenarios A1W-A4W of Panel A in table 7a show that the countries that are excluded from FTAs tend to lose because they are discriminated against in FTA members' markets. These losses are particularly marked for India when the US concludes an FTA with Europe (loss of \$387 million/year) and India's exports to both these major markets face greater competition from suppliers within these trading blocs.

The last two columns show what happens if we combine all these FTAs, namely, the TPP, US-EU, India-EU and India-ASEAN (scenario A5W). The results show that both the United States and India gain much more than under any individual FTA (\$12.6 billion for the United States and \$6.2 billion for India).

Panel B of table 7a reports the "total" welfare changes resulting from adding an India-US FTA involving both goods and services to each alternative FTA evaluated in Panel A (scenarios B1W-B5W). The results show that the total welfare would rise by adding an India-US FTA to prior agreements in each case. Panel D of table 7a shows the "incremental" benefits resulting from adding an India-US FTA, which are the differences between welfare gains reflected in Panels A and B. Comparing the welfare changes in Panel E with those in the baseline scenario (Columns 5-6 in table 6), the benefits to India are found to rise if it has undertaken prior agreements. With an India-EU agreement in place, for example, the gains from an India-US agreement rise from \$1.4 billion (baseline scenario) to \$2.6 billion for India (scenario B3W). Similarly, given an India-ASEAN agreement, the incremental gains from an India-US FTA rise

¹¹ However, the results need to be interpreted in the context of our assumptions. These are estimates of the potential and do not take into account leakages from measures such as "sensitive" products that might later be excluded from liberalization. For instance, in the ASEAN-India FTA, India has excluded a number of agricultural products from liberalization, putting them in the "Exclusion List" (Hoda and Gulati 2014).

to \$2.2 billion (scenario B4W).¹² With all of the other agreements in place, the incremental gains from an India-US agreement rise to \$2.8 billion.

Panel C in table 7a reports the “total” welfare effects when India liberalizes on an MFN basis conditional on one or more prior agreements including an India-US FTA (scenarios C1W-C5W). The results show that the benefits for India tend to rise substantially relative to the corresponding scenarios explored in this paper (\$17 billion).¹³ For the United States, the incremental welfare change resulting from India’s MFN liberalization is negative (Panel E), as it loses from the erosion of its preferential access to the Indian market.

Trade Effects

Table 7b repeats the same experiments, but reports the trade effects (evaluated by the changes in import plus export values) instead of the welfare measures. Panel A shows that the United States and India would experience a rise in trade by concluding an FTA, while the excluded country tends to lose trade (scenarios A1T-A4T). For instance, following the conclusion of the TPP (scenario A1T) and an US-EU FTA (scenario A2T), the U.S. trade would increase by \$36 billion and by \$62 billion respectively. If the trade effects from the TPP and a US-EU FTA are combined (scenarios A1T + A2T), the change in total trade for the United States would rise to \$98 billion.¹⁴ However, these agreements would lead Indian trade to decrease by about \$1 billion in scenarios A1T and A2T and by \$2 billion in the combined scenario of A1T and A2T. Panel A

¹² This is mainly because, with an India-ASEAN agreement in place, India would have reduced its initially high barriers against the ASEAN market (23.3 percent) (table 2b). Thus, the loss from trade diversion by adding an India-US FTA would be smaller.

¹³ It is noted that the “incremental” benefit from unilateral liberalization tends to be smaller relative to the corresponding scenario without prior agreements. For instance, under scenario C5W, the incremental gain coming from unilateral liberalization of \$8 billion (Panel E) is smaller than the corresponding scenario without prior agreements of \$12 billion (the difference between column 6 and column 8 in table 6). The smaller net gain from unilateral liberalization conditional on more prior FTAs is not surprising, since the scope of the liberalization becomes smaller when India has already removed its protection against more FTA partners.

¹⁴ The result of the combined scenario is not reported in table 7b in order to conserve the space.

of table 7b also shows that the trade effect resulting from concluding an alternative FTA on Indian-US bilateral trade tends to be negative except in scenario A4T.

Panel B and Panel D in table 7b confirm that adding an India-US FTA conditional on prior FTA agreements creates trade for both countries (scenarios B1T-B5T). For instance, by concluding an India-US FTA in addition to the TPP (scenario B1T) or an US-EU FTA (scenario B2T), the total U.S. trade may increase by \$58 billion and by \$83 billion respectively. If TPP, a US-EU FTA and an India-US FTA are combined (scenarios B1T + B2T), the change in total trade for the United States would rise to \$119 billion (not reported in table 7b). For India, concluding an FTA with the United States may lead to an increase in its total trade by \$18 billion in scenarios B1T and B2T and by \$17 billion in the combined scenario of B1T and B2T. In terms of the impacts of these scenarios on trade between India and the United States, the estimated increase in bilateral trade ranges from \$20 billion in scenario B5T to \$29 billion in scenario B1T.

With India extending its concession on an MFN basis (Panel C), India's trade would expand considerably while the US's trade would decrease subsequent to the loss of the preference (scenarios C1T-C5T). As a result, the largest trade effects are found in the combination of scenario B1T and B2T for the United States (\$119 billion) and in scenario C5T for India (\$147 billion).

Finally, appendix table A shows how these free trade agreements (baseline scenario and scenarios A1T-C5T) would impact trade for non-member countries/regions. (The numbers of scenarios in appendix table A correspond to those in table 7b.) The results broadly confirm that countries tend to expand trade by concluding an FTA whereas the non-party countries lose from trade diversion. For instance, China appears to lose trade by not entering into any of these FTAs, although the magnitudes of loss vary from \$680 million (scenario C5T) to \$11 billion (scenario

B5T). In scenarios C1T-C5T under which India extends unilateral liberalization after forging FTA(s), some countries appear to experience increases in trade resulting from improved access to the Indian market.

Section V. Conclusion

This paper explored the economic implications of a potential FTA between India and the United States using an applied general equilibrium model. Since the nature of the liberalization to be adopted is unknown at this stage, the potential impacts of an FTA are evaluated under a hypothetical scenario, namely 100 percent and 50 percent Ad Valorem Equivalent (AVE) tariff cuts for goods and services respectively. The results reveal that the overall impacts of an India-US FTA could be positive both for the United States and India. While gains from trade creation tend to be offset by trade diversion on the import side, both countries appear to gain from improved access to each other's markets on the export side. The U.S. is likely to gain largely through terms of trade improvement for its goods and services as the initial protection in India is particularly high. India appears to experience an expansion of exports and of output especially in the textiles and apparel sectors. Moreover, the availability of more efficient "services" imported from the United States appears to have positive impacts on production and exports of "goods" in India.

As the United States and India are negotiating other FTAs such as the US-EU agreement, the Trans-Pacific Partnership (TPP), and India's agreement with the Association of Southeast Asian Nations (ASEAN), the paper explored how the economic implications of an India-US FTA vary depending on the existence of different prior FTAs. The results reveal that adding an India-US FTA to prior agreements tends to bring additional welfare benefits to both countries. In

particular, India would be likely to gain substantially if it were to conclude an FTA with the U.S. and other trading partners and then to extend its commitment to all its trading partners on an MFN basis. This is because MFN liberalization unwinds costly trade diversion and promotes a more efficient resource allocation towards sectors in which India has a comparative advantage. Finally, since countries excluded from FTAs tend to lose since they are discriminated against in FTA parties' markets and their trade is diverted in favor of FTA members, both the United States and India appear to have an incentive to enlarge the scopes of their FTAs. All the above findings suggest that an India-US FTA may potentially become a building block towards a more liberal trade regime for both countries.

Finally, our simulation exercises are subject to a number of limitations and many related issues may be subjects for future research. First, since the base year of our simulations is 2007 and our scenarios are based on simplified assumptions, future simulations might use actual liberalization schedules (when available) along with updated data. Second, it is well known that trade-weighted averages of tariff rates tend to underestimate the impact of protection and that this in turn is likely to result in the underestimate of welfare changes. In order to overcome this problem, more refined aggregators of trade distortions of a type done by Laborde et al. (2011) would be needed. Third, while our results suggest both countries gain in aggregate resulting from an FTA, we do not address the distributional consequences of trade liberalization. As there exist studies which suggest negative impacts of trade reforms on poverty in India (e.g., Anderson, Cockburn and Martin 2010; Topalova 2010),¹⁵ further studies would be required to evaluate the effects of an India-US FTA on the poor. Despite these limitations, it is hoped that our analytical

¹⁵ Examining the 1991 Indian trade liberalization episode, Topalova (2010) finds that rural districts, in which production sectors more exposed to import liberalization were concentrated, experienced slower reduction in poverty in India.

framework and simulation results may provide some ingredients for ongoing discussions concerning a potential India-US FTA.

References

- Anderson, Kym, John Cockburn, and Will Martin. 2010. *Agricultural Price Distortions, Inequality, and Poverty*. Washington: World Bank.
- Arnold, Jens, Beata Javorcik, Molly Lipscomb, and Aaditya Mattoo. 2012. *Services Reform and Manufacturing Performance: Evidence from India*. World Bank Policy Research Working Paper 5948. Washington: World Bank.
- Arnold, Jens, Beata Javorcik, and Aaditya Mattoo. 2011. Does Services Liberalization Benefit Manufacturing Firms?: Evidence from the Czech Republic. *Journal of International Economics* 85, no. 1: 136-146.
- Borchert, Ingo, Batshur Gootiiz, and Aaditya Mattoo. 2014. Policy Barriers to International Trade in Services: Evidence from a New Database. *The World Bank Economic Review* 28, no. 1: 162-188.
- Calvo-Pardo, Hector, Caroline Freund, and Emanuel Ornelas. 2011. The ASEAN Free Trade Agreement: Impact on Trade Flows and External Trade Barriers. In *Costs and Benefits of Regional Economic Integration in Asia*, ed. Robert Barro and Jong-Wha Lee. Oxford: Oxford University Press.
- Cebula, Richard, Joy Mazumdar, and Usha Nair-Reichert. 2011. US Trade and Access to Trade Facilitating Services in Partner Countries: An Empirical Analysis. *Journal of Economic Integration* 26, no. 3: 411-432.
- Chadha, Rajesh, Drusilla Brown, Alan Deardorff, and Robert Stern. 2000. Computational Analysis of the Impact on India of the Uruguay Round and the Forthcoming WTO Trade Negotiations. Mimeo, University of Michigan.
- Drysdale, Peter, and Ross Garnaut. 1982. Trade Intensities and the Analysis of Bilateral Trade Flows in a Many-Country World: a Survey. *Hitotsubashi Journal of Economics* 22, no. 2: 62-84.
- Estevadeordal, Antoni, Caroline Freund, and Emanuel Ornelas. 2008. Does Regionalism Affect Trade Liberalization toward Nonmembers? *The Quarterly Journal of Economics* 123, no. 4: 1531-1575.
- Fukase, Emiko. 2013. Export Liberalization, Job Creation, and the Skill Premium: Evidence from the US–Vietnam Bilateral Trade Agreement (BTA). *World Development* 41, 317-337.

- Fukase, Emiko, and Will Martin. 2001. A Quantitative Evaluation of Vietnam's Accession to the ASEAN Free Trade Area. *Journal of Economic Integration* 16, no. 4: 545-567.
- Fukase, Emiko, and Will Martin. 2000. The Effects of the United States Granting MFN Status to Vietnam. *Weltwirtschaftliches Archiv* 136, no. 3: 539-559.
- Fukase, Emiko, and L. Alan Winters. 2003. Possible Dynamic Effects of AFTA for the New Member Countries. *The World Economy* 26, no. 6: 853-871.
- Fukui, Tani, and Christine McDaniel. 2010. Services Liberalization and Computable General Equilibrium Modeling: Beyond Tariff Equivalents. *Journal of International Commerce and Economics*. Washington: United States International Trade Commission.
- Gervais, Antoine, and Bradford Jensen. 2013. *Are Services Tradable? Evidence from US Microdata*. Mimeo, Georgetown University.
- Guimbard, Houssein, Sébastien Jean, Mondher Mimouni, and Xavier Pichot. 2012. MACMap-HS6 2007, an Exhaustive and Consistent Measure of Applied Protection in 2007. *International Economics* 130, 99-121.
- Hoda, Anwarul, and Ashok Gulati. 2014. Towards India-US FTA in Agriculture. Mimeo.
- Hoekman, Bernard, and Carlos Primo Braga. 1997. Protection and Trade in Services: a Survey. *Open Economies Review* 8, no. 3: 285-308.
- Hertel, Thomas. 1996. *Global Trade Analysis: Modeling and Applications*. New York: Cambridge University Press.
- Hertel, Thomas, David Hummels, Maros Ivanic, and Roman Keeney. 2007. How Confident Can We Be of CGE-based Assessments of Free Trade Agreements? *Economic Modelling* 24, no. 4: 611-635.
- Hufbauer, Gary, Jeffrey Schott, and Woan Wong. 2010. *Figuring Out the Doha Round*, no. 91. Washington: Peterson Institute for International Economics.
- Huff, Karen, and Thomas Hertel. 2000. *Decomposing Welfare Changes in the GTAP Model*. GTAP Technical Paper 5, Purdue University.
- Jafari, Yaghoob, and David Tarr. 2014. Estimates of Ad Valorem Equivalents of Barriers against Foreign Suppliers of Services in Eleven Services Sectors and 103 countries. *World Bank Policy Research Working Paper* 7096. Washington: World Bank.
- Konan, Denise Eby, and Keith Maskus. 2006. Quantifying the Impact of Services Liberalization in a Developing Country. *Journal of Development Economics* 81, no. 1: 142-162.

- Laborde, David, Will Martin, and Dominique van der Mensbrugghe. 2011. Measuring the Benefits of Global Trade Reform with Optimal Aggregators of Distortions. *World Bank Policy Research Working Paper* 5665. Washington: World Bank.
- Lawrence, Robert, and Rajesh Chadha. Should a US–India FTA Be Part of India’s Trade Strategy? In *India Policy Forum 2004*. ed. Suman Bery, Barry Bosworth and Arvind Panagariya. Brookings Institution Press.
- Petri, Peter, Michael Plummer, and Fan Zhai. 2012. *The Trans-Pacific Partnership and Asia-Pacific Integration: A Quantitative Assessment*. Policy Analyses in International Economics 98. Peterson Institute for International Economics and East-West Center.
- Robinson, Sherman, Zhi Wang, and Will Martin. 2002. Capturing the Implications of Services Trade Liberalization. *Economic Systems Research* 14, no. 1: 3-33.
- Salter, Wilfred. 1959. Internal and External Balance: the Role of Price and Expenditure Effects. *Economic Record* 35, no. 71: 226-238.
- Topalova, Petia. 2010. Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty from India. *American Economic Journal: Applied Economics* 2, no. 4: 1-41.

Appendix Table A Change in trade (imports plus exports) by scenarios and by regions (\$ million)

<u>Scenario</u>	<u>Baseline</u>	<u>A1T</u>	<u>A2T</u>	<u>A3T</u>	<u>A4T</u>	<u>A5T</u>	<u>B1T</u>	<u>B2T</u>	<u>B3T</u>	<u>B4T</u>	<u>B5T</u>	<u>C1T</u> <u>B1T</u>	<u>C2T</u> <u>B2T</u>	<u>C3T</u> <u>B3T</u>	<u>C4T</u> <u>B4T</u>	<u>C5T</u> <u>B5T</u>
<u>FTA</u>	<u>India-US</u>	<u>US-TPP</u>	<u>US-EU27</u>	<u>India-EU27</u>	<u>India-ASEAN</u>	<u>A1T+A2T</u> <u>+A3T+A4T</u>	<u>A1T</u> <u>+Indi-US</u>	<u>A2T</u> <u>+India-US</u>	<u>A3T</u> <u>+India-US</u>	<u>A4T</u> <u>+India-US</u>	<u>A5T</u> <u>+India-US</u>	<u>+India</u> <u>MFN</u>	<u>+India</u> <u>MFN</u>	<u>+India</u> <u>MFN</u>	<u>+India</u> <u>MFN</u>	<u>+India</u> <u>MFN</u>
United States	21872	36107	62169	-3121	-1320	93011	57606	83337	15642	18846	110099	42038	67983	4802	5429	101052
India	19105	-965	-1004	47844	37226	76279	17801	17581	63026	54229	90143	136679	136378	145519	141673	147027
Australia/New Zealand	-480	2168	-641	-971	-611	44	1684	-1226	-1443	-1159	-281	4494	1569	2180	2101	3684
Canada/Mexico	-475	24232	-2970	-744	32	20292	23681	-3480	-1266	-527	19760	24264	-2991	-296	-203	20696
EU 27	-7018	-13765	23864	48399	-2810	50326	-20714	11259	34837	-15144	43089	-8641	23072	1687	-1769	15696
Chile/Peru	-95	1673	-262	-212	-85	1096	1551	-686	-628	-513	993	1278	-956	-737	-723	934
Rest of LAC	-662	-749	-1665	-614	-493	-3361	-1383	-1461	-355	-278	-3879	-747	-832	614	684	-2680
Japan	-594	-608	-1188	-810	-602	-3350	-1193	-1823	-1386	-1247	-3838	1109	476	1371	1402	-627
China	-1765	-1585	-2617	-3315	-1954	-9223	-3285	-4278	-4743	-3587	-10550	-1987	-3002	-1217	-680	-5549
MENA	-2193	-2152	-2596	-4407	-1630	-10426	-4309	-5237	-6633	-4149	-11980	872	-72	2003	2378	-2296
ASEAN (no TPP)	-618	-826	-893	-1000	10020	6694	-1423	-1617	-1649	9135	6094	2413	2213	2969	5005	3237
SAFTA	-339	-445	-325	-457	-247	-1419	-764	-708	-838	-640	-1711	-1018	-969	-956	-685	-1636
ASEAN (TPP)	-767	11401	-1118	-1509	7124	14838	10455	-2141	-2422	5906	13930	10039	-2482	-1651	364	10163
SSA	-608	-700	-990	-1115	-659	-3358	-1296	-1597	-1622	-1229	-3790	-450	-757	62	161	-1647
Others	-2939	-2355	-5802	-1996	-1797	-12075	-5255	-8400	-4170	-4325	-14298	-144	-3313	1379	1937	-7486

Source: Authors simulation results.

Notes: The change in trade reflects relative to the base year 2007.

Scenarios A1T through C5T correspond to those in table 7b.