General Equilibrium Evaluation of Japan-Singapore Free Trade Agreement

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Abstract

Japan and Singapore are expected to sign a free trade agreement (FTA) by April 2002. This paper provides a preliminary assessment of the Japan-Singapore FTA using an 18-region, 15-sector dynamic computable general equilibrium (CGE) model. Bilateral removal of trade barriers in all sectors other than agriculture and food and reductions in customs costs are incorporated in the scenarios. In the absence of positive spillovers to productivity, the FTA is estimated to have a negligible impact. Were the FTA to raise total factor productivity via network externalities within and between the trading partners, the potential benefits of the trade agreement would increase substantially. Furthermore, the relative degree of trade diversion would be significantly smaller in the latter scenario.

JEL classifications: F13; F15

Keywords: Japan-Singapore, FTA, CGE model

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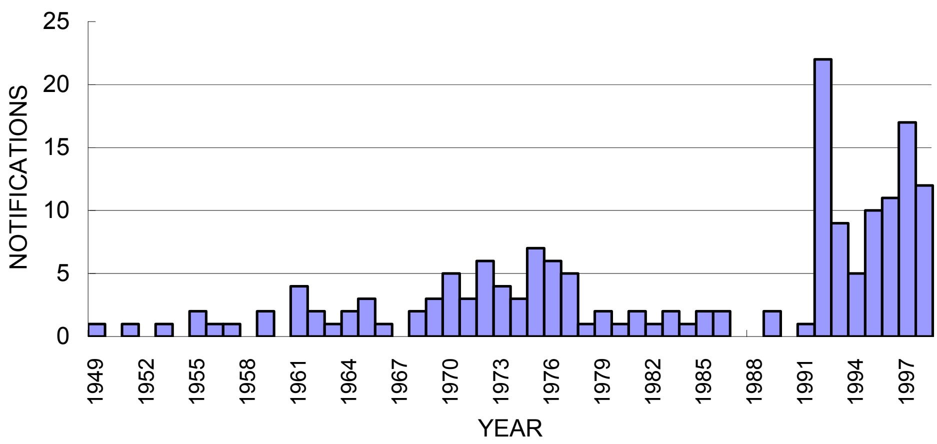
1. Introduction

The number of regional integration agreements (RIAs) has proliferated rapidly over the past decade. By January 1, 1999, the World Trade Organization (WTO) — the successor institution to General Agreement on Tariffs and Trade (GATT) — had been notified of 194 RIAs (World Bank, 2000). Figure 1 provides the number of RIAs notified to the GATT/WTO during the 1949-98 period, indicating a sharp expansion of regional agreements in the 1990s.

Figure 1. Notifications to GATT and WTO of regional Integration Agreements, 1949-1998



Source: World Bank (2000).

The dramatic increase in RIAs in recent years, the Asian financial crisis of 1997-98, and the failure of the WTO to launch the Millennium Round of multilateral trade negotiations have induced Japan and other East Asian countries to consider options for free trade agreements (FTAs). Bergsten (2000, p. 20) states

> The most striking changes in the world trading system, especially in the short run, are not likely to flow from the World Trade Organisation or the proposed "mega-regional" arrangements, such as a Free-Trade Area of the Americas or an expanded European Union. Instead, they will probably come from the host of sub-regional trade agreements now being busily negotiated by Japan, South Korea, Singapore and other countries in East Asia.

In December 1999 Japan and Singapore established a Joint Study Group, consisting of government officials, academics and industry representatives, to evaluate the feasibility and desirability of establishing a bilateral FTA. In January 2001 the two countries started formal negotiations and agreed to eliminate tariffs on all goods other than agricultural and fishery products. They are aiming to establish an FTA by April 2002. In addition to reductions of tariffs and nontariff barriers (NTBs), Joint Study Group (2000) recommends that Japan-Singapore FTA should cover such issues as regulatory reforms, facilitation of customs procedures, services trade liberalization, promotion of foreign direct investment, and cooperation in advancing information and communication technology.[1]

Whether regional agreements are a facilitating intermediate step towards global free trade or a hindrance to greater global trade liberalization is a hotly debated issue.[2] Proponents for regional integration argue that RIAs encourage member countries to liberalize beyond the level committed by multilateral negotiations and that they promote developing countries to carry out trade reforms and stimulate foreign direct investment from developed countries.[3] In addition, a regional agreement makes it easier to handle the tougher negotiating issues (Kahler, 1995). Opponents worry that the proliferation of RIAs is likely to undermine the multilateral trading system and that beneficiaries of RIAs might form a political lobby to deter further multilateral liberalization (e.g., Bhagwati, 1995; Levy, 1997; Srinivasan, 1998ab; Panagariya, 1999).

Empirical evidence on benefits and costs of RIAs suggests that trade creation exceeds trade diversion in almost all RIAs (Robinson and Thierfelder, 1999). The positive effect on economic welfare resulting from the European Union (EU) and North American Free Trade Agreement (NAFTA) is supported by Baldwin et al. (1995), Brown et al. (1992), Harrison et al. (1996), and Roland-Holst et al. (1992). However, Yeats (1998) finds that during 1988-94 Mercosur countries experienced significant trade diversion when their intra-Mercosur trade increased sharply.

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[1] Some of the other recommendations include establishment of paperless trading, protection of intellectual property rights, provisions for dispute settlement, and facilitating movement of labor (professionals in particular) between the two countries.

[2] See, for example, Krueger (1999) and Laird (1999).

Deep integration, evidenced by the EU and NAFTA, suggests that regional integration agreements can include more extensive coverage of economic activities and policy issues than multilateral trade agreements. Negotiations at a regional level are often perceived as more focused and expedient venues for resolving complex issues (Roland-Holst, 2000). By including such issues as smoother transborder flow of capital and labor, substantial reductions of customs costs, and collaboration on education and training, the Japan-Singapore FTA can complement multilateral trade liberalization (Joint Study Group, 2000).

In this paper, the effects of the proposed free trade agreement between Japan and Singapore are assessed using an 18-region, 15-sector dynamic computable general equilibrium (CGE) model of the global economy. The next section provides an overview of bilateral trade between the two countries during the 1980-99 period. A brief description of the model is given in section 3, followed by the establishment of a baseline scenario in section 4. Section 5 presents the aggregate and sectoral results of FTA experiments, and the final section summarizes the main policy conclusions.

2. Bilateral Trade between Japan and Singapore, 1980-99

Figures 2 and 3 provide trends in the ratios of Japan and Singapore's bilateral to total trade. Three arresting features are readily observed from these figures. First, Japan's exports to Singapore have been more than double its imports from Singapore. Second, Japan's imports from Singapore range only from 1.0 to 2.1 percent of its total imports, whereas Singapore's imports from Japan range from 16 to 22 percent. To some extent, this reflects the asymmetry in economic size between the two economies, but Singapore's high dependence on Japanese machinery and other capital goods also contributes to the large bilateral trade imbalance. Third, Japan's trade with Singapore relative to its total trade shows an upward trend (at least until the mid-1990s) while Singapore's trade with Japan relative to the rest of the world does not exhibit such a trend.

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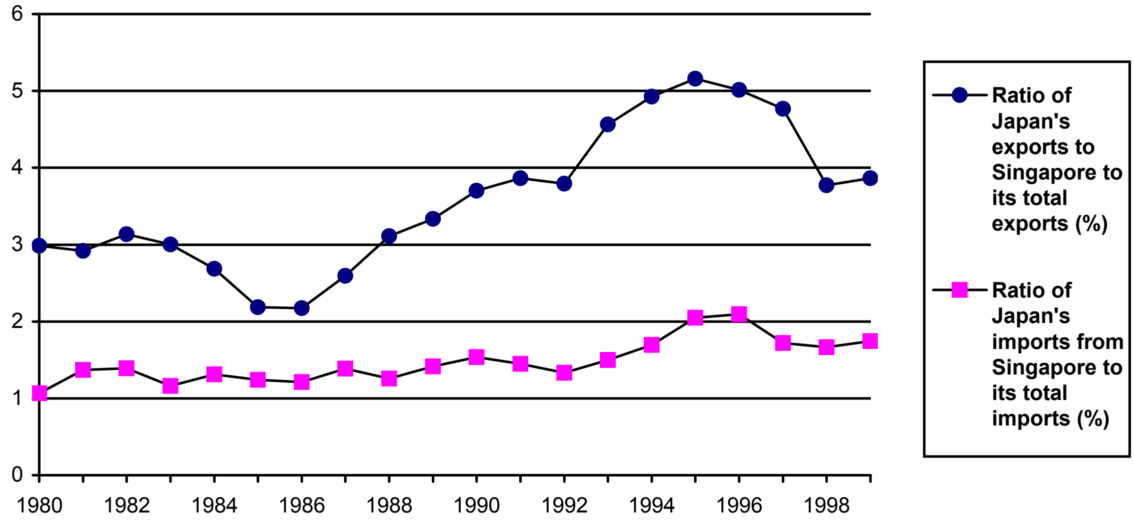
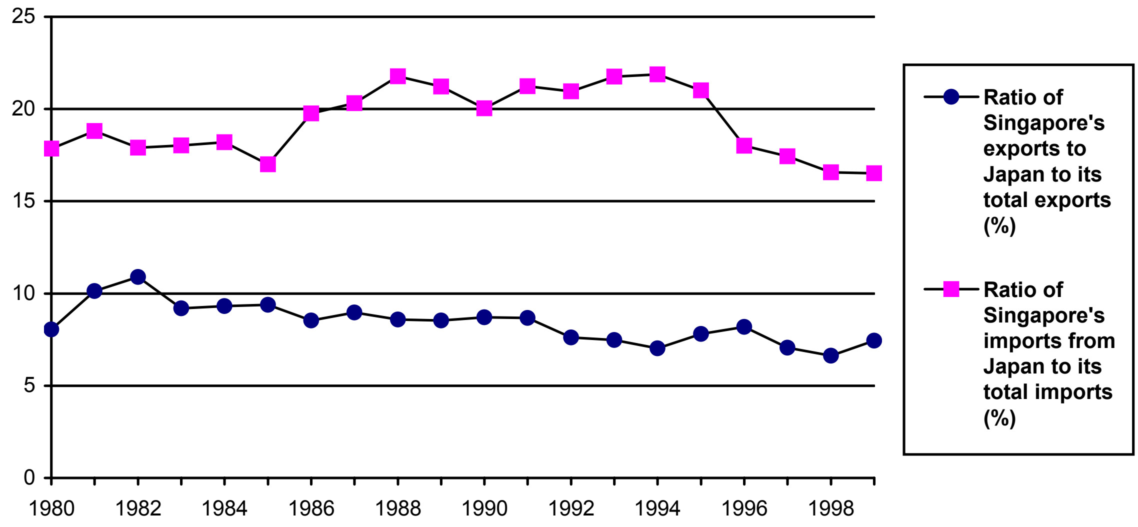
[3] Ethier (1998) suggests that small-country members are induced to lock in their liberalized trade regimes and that RIAs are congruent with further multilateral liberalization.

Figure 2
Trends in Japan's Trade with Singapore



Source: World Bank, World Integrated Trade Solution (WITS) database.

Figure 3
Trends in Singapore's Trade with Japan



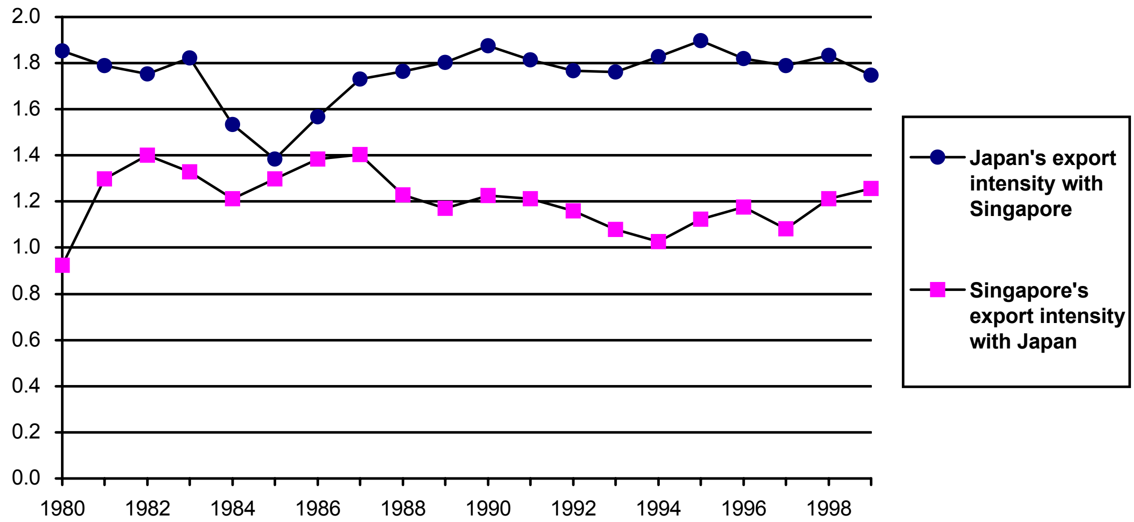
Source: World Bank, World Integrated Trade Solution (WITS) database.

The fact that Japan's trade with Singapore increased during the 1980-95 period might be entirely explained by the rapid average growth of the Singaporean economy (Frankel, 1993; Frankel et al., 1998). Bilateral trade would be affected by the partner country's growth rate of real GDP and changes in relative openness. In order to adjust for the bilateral partners' real GDP and relative openness, one should compute the trade intensity index instead.[4] Let x_{rs} be the share of country *r*'s exports to country *s*, and m_s be the share of country *s*'s imports in world imports.[5] Then the index of country *r*'s export intensity with country *s* is given by

$$I_{rs} = x_{rs} / m_s = x_{rs} / (q_s \cdot w_s) \tag{1}$$

where q_s is the share of country *s* in world GDP (net of country *r*'s), and w_s is country *s*'s import to GDP ratio divided by the world's (net of country *r*'s) import to GDP ratio.

Figure 4
Export Intensity Indices for Japan and Singapore



Source: World Bank, World Integrated Trade Solution (WITS) database.

[4] The trade intensity index was first proposed by Brown (1949) and has been developed in a number of studies, including Drysdale and Garnaut (1982) and Anderson and Norheim (1993).

[5] Since country *i* cannot export to itself, *i*'s imports are excluded from world imports (Anderson and Norheim, 1993, p. 94).

Figure 4 gives the trends of Japan and Singapore's export intensities with the bilateral partner. After adjusting the GDP growth rates and changes in relative openness, neither country's trade intensity exhibits any clear trend over the 1980-99 period. The value of the index exceeds 1.0 in all years for both countries with the exception of Singapore's export to Japan in 1980, implying that the bilateral trade between the two countries is relatively intensive compared with the average of the other trading partners.

3. Overview of the Model

A CGE model is an empirical tool that is well suited to evaluating of free trade agreements. First, it captures extensive indirect effects, such as inter-industry linkages between sectors and trade linkages between countries and regions. Second, it can evaluate the effect of removing trade barriers on resource allocation and structural adjustment in each country. Third, it can detail the impacts on both member and nonmember countries and thereby better elucidate implications for the negotiating environment.

The model used in this study is a dynamic CGE model of the global economy, which is to a large extent based upon OECD's LINKAGE model (OECD, 1997). In addition to Japan and Singapore, it contains 16 other countries/regions: Australasia (Australia and New Zealand), China (which includes Hong Kong), South Korea, Taiwan, Malaysia, Thailand, Indonesia, the Philippines, Vietnam, Canada, the United States, Mexico, Chile, the rest of Latin America, Western Europe, and the rest of the world.[6]

One of the key features of the model is that goods are differentiated by region of origin and modeled as imperfect substitutes. On the import side, this is reflected by the implementation of the so-called Armington assumption, where a constant elasticity of substitution (CES) specification is used to incorporate imperfect substitution of imported goods with respect to domestically produced goods. A symmetric specification is used to model export supply, the latter being implemented with constant elasticity of transformation (CET) functions.[7]

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[6] The model is calibrated to social accounting matrices (SAMs) of the 18 regions, which are constructed from the Global Trade Analysis Project (GTAP) database, version 4. See Gehlhar et al. (1997) and McDougall et al. (1998) for detailed descriptions of the GTAP database.

[7] Note that the CET export specification was not implemented in the LINKAGE model.

In our model, sectoral demands for composite goods, imported goods, and domestically produced goods in country *r* are denoted by $XA_{r,i}$, $XM_{r,i}$, and $XD_{r,i}$. Let $XM_{r,s,i}$ be country *r*'s imports of product *i* from country *s*. Then, the CES aggregate demands for $XA_{r,i}$ and $XM_{r,i}$ are given by

$$XA_{r,i} = \alpha^{a}_{r,i} \left[\beta^{m}_{r,i} \left(XM_{r,i} \right)^{(\sigma^{m}_{r,i}-1)/\sigma^{m}_{r,i}} + (1-\beta^{m}_{r,i}) \left(XD_{r,i} \right)^{(\sigma^{m}_{r,i}-1)/\sigma^{m}_{r,i}} \right]^{\sigma^{m}_{r,i}/(\sigma^{m}_{r,i}-1)} \tag{2}$$

and

$$XM_{r,i} = \alpha^{m}_{r,i} \left[\sum_{s \neq r} \beta^{w}_{r,s,i} \left(XM_{r,s,i} \right)^{(\sigma^{w}_{r,i}-1)/\sigma^{w}_{r,i}} \right]^{\sigma^{w}_{r,i}/(\sigma^{w}_{r,i}-1)} \tag{3}$$

where $\sigma^{m}_{r,i}$ and $\sigma^{w}_{r,i}$ are the elasticities of substitution between imported and domestic goods and between goods imported from different trading partners, respectively. The parameters $\alpha^{a}_{r,i}$, $\alpha^{m}_{r,i}$, $\beta^{m}_{r,i}$, and $\beta^{w}_{r,s,i}$ are constant.

Similarly, let $XP_{r,i}$, $XE_{r,i}$, and $XE_{r,s,i}$ denote country *r*'s sectoral output, exports to all trading partners, and exports to country *s*, respectively. Then the CET aggregate supplies for $XP_{r,i}$ and $XE_{r,s,i}$ are given by

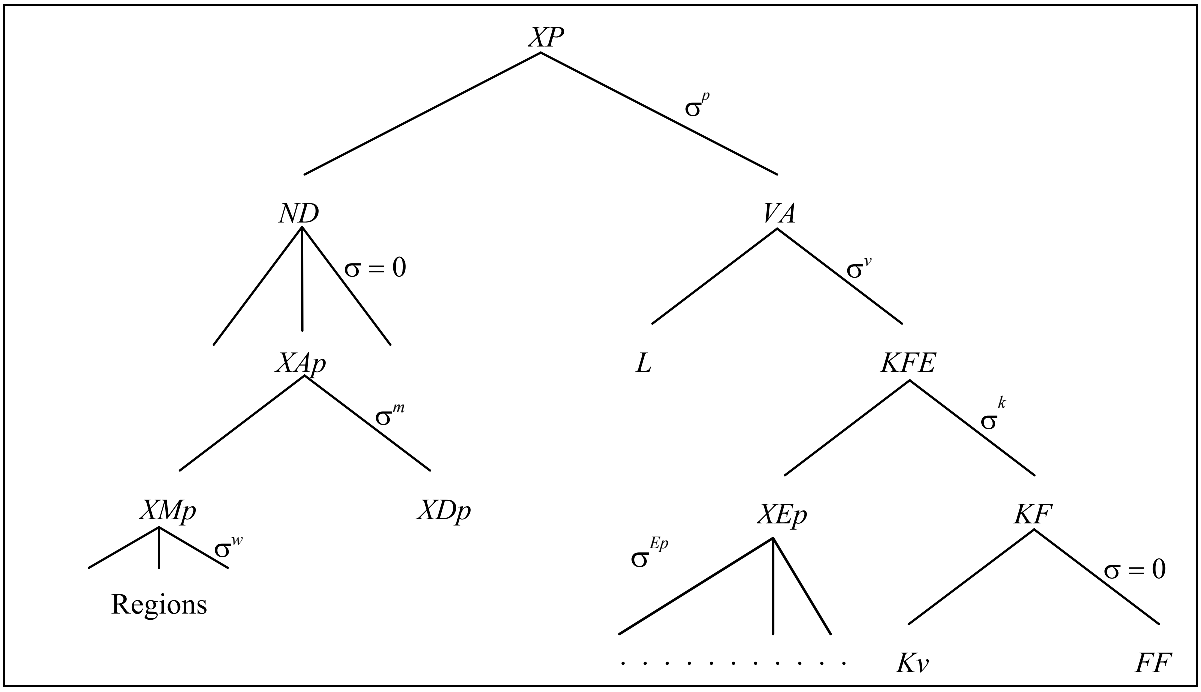
$$XP_{r,i} = \alpha^{p}_{r,i} \left[\delta^{e}_{r,i} \left(XE_{r,i} \right)^{(\lambda^{e}_{r,i}+1)/\lambda^{e}_{r,i}} + (1-\delta^{e}_{r,i}) \left(XD_{r,i} \right)^{(\lambda^{e}_{r,i}+1)/\lambda^{e}_{r,i}} \right]^{\lambda^{e}_{r,i}/(\lambda^{e}_{r,i}+1)} \tag{4}$$

and

$$XE_{r,i} = \alpha^{e}_{r,i} \left[\sum_{s \neq r} \delta^{w}_{r,s,i} \left(XE_{r,s,i} \right)^{(\lambda^{w}_{r,i}+1)/\lambda^{w}_{r,i}} \right]^{\lambda^{w}_{r,i}/(\lambda^{w}_{r,i}+1)} \tag{5}$$

where $\lambda^{e}_{r,i}$ and $\lambda^{w}_{r,i}$ are the elasticities of transformation between exported and domestic goods and between goods exported to different trading partners. The parameters $\alpha^{p}_{r,i}$, $\alpha^{e}_{r,i}$, $\delta^{e}_{r,i}$, and $\delta^{w}_{r,s,i}$ are exogenous estimates.

Figure 5
Production Structure[a]



XP:	Output (by vintage)
ND:	Aggregate demand for intermediate goods (other than energy)
VA:	Capital, labor, energy, and sector-specific factor composite good
KFE:	Capital, energy, and sector-specific factor composite good
KF:	Capital and sector-specific factor composite good
Kv:	Capital demand (by vintage)
XEp:	The aggregate energy bundle
K, *L*, and *FF*:	Capital, labor, and sector-specific factor, respectively
XAp:	Armington demand for intermediate goods (other than energy)
XDp:	The domestic component of intermediate demand
XMp:	The imported component of intermediate demand

Note: The following production elasticities are differentiated by capital vintage, the others are vintage independent: σ^p, σ^v, and σ^k.

[a] The sector-specific factor includes land in agricultural sectors and the resource base in the coal, crude oil, natural gas, and mining sectors.

All sectors are assumed to be perfectly competitive and operate under constant returns to scale. Production is modeled using a nested CES structure. The CES nests for production archetype are depicted in Figure 5. At the top nest, production is formed by the combination of aggregate intermediate demand other than energy (*ND*) and value added (*VA*). The second nest consists of two nodes. The first node decomposes aggregate intermediate demand into sectoral demand for goods and services. The second node decomposes *VA* between demand for labor (*L*) and demand for capital, energy, and sector-specific factor composite (*KFE*). The third and fourth nodes are decomposed by a similar fashion, as illustrated in Figure 5.

Labor supply is assumed to be fixed in all regions and for all time periods, and the wage rate adjusts to ensure equilibrium in the domestic labor market. While we assume no international migration, labor is free to move across all sectors within each domestic economy. Thus, there is a single equilibrium average wage rate, with sectoral relative wages differing only by calibrated productivity levels.

Within each period, capital is classified as being either *old* or *new*. New capital is generated by the previous period's investment. This vintage structure of capital allows for differentiating the substitution possibilities across inputs by the age of capital. Similar to labor, *new* capital is assumed to be perfectly mobile across sectors and there is a single economywide rate of return on capital.

All income generated by economic activity is assumed to be distributed to consumers. A single representative consumer (or household) allocates optimally his/her disposable income among the consumer goods and saving. The consumption/saving decision is static: saving is treated as a good and its amount is determined simultaneously with the demands for the other goods. The price of saving is set arbitrarily equal to the average price of consumer goods. Investment is driven by aggregate saving, or the sum of household, government, and foreign savings. We assume that foreign saving is exogenous and that the ratio of government expenditures to GDP remains constant in each region over time.

The model spans the period 1995-2020. It solves every year from 1995-2010 and every five years from 2010-2020. While the model relies on sequential static computation of equilibria, intertemporal trends are specified for factor growth (labor) and accumulation (capital), as well as changes in productivity. Land is assumed to be price-responsive, however, with no time trend on the supply curve.

4. The Baseline Scenario

To assess the implications of the proposed free trade agreement, we first establish a baseline, which shows the path of each economy in the absence of the FTA over the period 1995-2020. In the baseline, several key variables, including GDP growth rates, population and labor supply, are predetermined by the exogenous assumptions. Projections of real GDP, population and labor supply are obtained from the World Bank, but rough estimates on real GDP growth rates had to be made after the year 2008. The dynamics are calibrated in each country/region by imposing the assumption of a balanced growth path. This implies that the ratio between labor and the capital/fixed-factor bundle (in efficiency units) is held constant over time.[8] When Japan-Singapore FTA scenarios are simulated, the growth of capital is endogenously determined by the saving-investment relation.

There are four types of taxes in the model: commodity taxes, production taxes, trade taxes, and income taxes. Commodity and production taxes are held constant throughout the simulation period. The tariff rates are lowered during the 1995-2005 period in all regions except China and Taiwan based upon the post-Uruguay Round tariffs estimated by Francois and Strutt (1999).[9] Finally, it is assumed that the income tax rates adjust to compensate changes in the government budget. This assumption is considered the appropriate fiscal closure for long-term simulations (OECD, 1997).

Table 1 summarizes projected post-Uruguay Round bilateral tariff rates for Japan and Singapore in 2005. The bilateral tariff rates in sectors other than construction and other services for Japan are obtained from the baseline experiment. The applied tariffs on all commodities except alcoholic beverages (aggregated into processed food) have already become zero in Singapore (WTO, 2000). Tariff equivalents of trade barriers in construction and other services are taken from Francois (1999).

Japan has extremely high tariff equivalents of quantitative restrictions on rice (503%), wheat (535%), and other grains (450%) (McDougall et al., 1998), but it does not

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[8] This involves computing in each period a measure of Harrod-neutral technical progress in the capital/fixed-factor bundle as a residual, given that the growth of the labor force (in efficiency units) is pre-determined. This is a standard calibration procedure in dynamic CGE modeling.

[9] While it is more realistic to assume that China and Taiwan would reduce tariffs following their accession to the WTO, Hertel et al. (2000) state "the omission of China's accession from the baseline has only a minimal effect on the consequences of the Japan-Singapore free trade agreement."

import grains from Singapore. This is reflected in its low bilateral tariff rate on agriculture (1.6%).[10] The sectors with high bilateral tariffs or tariff equivalents of NTBs in Japan are processed food 23.0%), construction (29.7%), and other services (19.7%). In Singapore, only construction (10.3%) and other services (2.1%) have noticeable bilateral tariff equivalents.

Table 1
Projected Post-Uruguay Round Bilateral Tariff Rates in 2005 (%)[a]

		Japan's imports from Singapore	Singapore's imports from Japan
1	Agriculture	1.6	0.0
2	Natural resources	0.0	0.0
3	Energy	2.2	0.0
4	Processed food	23.0	0.8
5	Textiles and clothing	6.6	0.0
6	Wood and paper	0.2	0.0
7	Chemicals	0.1	0.0
8	Metal and products	0.2	0.0
9	Machinery	0.1	0.0
10	Electronics equip.	0.3	0.0
11	Automobiles	0.0	0.0
12	Other manufac.	0.5	0.0
13	Construction	29.7	10.3
14	Trade and transport	2.3	0.0
15	Other services	19.7	2.1

[a] The tariff rates in sectors 1-12 and 14 for Japan are obtained from the author's baseline experiment. The tariffs in these sectors for Singapore are based on applied rates for 1999 (WTO, 2000). Tariff equivalents of NTBs in sectors 13 and 15 are taken from Francois (1999).

[10] By comparison, the tariff equivalents of Japan's imports of agricultural products from Australasia, Canada, and the United States are projected to be 110.5, 149.6, and 205.4 percent, respectively, in 2005.

5. Numerical General Equilibrium Results

In this section, we evaluate aggregate and sectoral effects of the Japan-Singapore FTA. Despite its extremely small share of agricultural import from Singapore, Japan does not appear to be ready for further trade liberalization in agricultural commodities (Joint Study Group, 2000, Chapter 2). Hence, trade barriers on agricultural and food products are left out of the agreement. Japanese officials are concerned that liberalization of these products would provide third countries with strong incentives to re-export them from Singapore to Japan unless rules of origin are strictly enforced.

Joint Study Group (2000) also suggests that the establishment of a system that allows electronic transfer of trade-related information and documents would significantly reduce customs costs. We assume that a fall in customs costs resulting from setting up an Electronic Trade Document Exchange System (ETDES) would reduce the price of imports to consumers by 0.5 percent in Japan and 0.25 percent in Singapore.[11]

While the implementation of the FTA might start earlier, the year 2005 is chosen as the starting point mainly because it simplifies the design of simulation experiments. The following assumptions are made concerning the Japan-Singapore FTA:

- Barriers on bilateral trade in mining and manufacturing sectors except food will be completely removed by the year 2010.
- Barriers on bilateral trade in services sectors will be completely removed by 2020.
- Reductions in customs costs will lower the price of bilateral imports by 0.5 percent in Japan and by 0.25 percent in Singapore by 2010.

It is assumed that protection rates and customs costs decline linearly from 2005 to 2010/2020.

[11] A 0.5 percent reduction of customs costs in Japan is based on an unpublished source from the Japanese Ministry of International Trade and Industry. This figure might be rather conservative as the World Bank (2000) indicates that in the early 1990s border formalities on intra-EU trade were over 1.2 percent of the gross value of internally traded goods.

Two FTA scenarios are considered. The first incorporates only the above three assumptions and does not include the possibility of a change in the total factor productivity (TFP) relative to the baseline. However, the removal of trade barriers and reductions in customs costs might increase competition among firms and induce them to make efficiency improvements. In the second scenario, we assume that the free trade agreement would lead to an increase in TFP of all sectors but agriculture and food by 0.1 percent per year over the baseline during the period 2005-2020.

5.1 Aggregate Results

Table 2 summarizes the aggregate results for the two FTA experiments. Under the first scenario, which assumes no change in the TFP growth rate, the FTA has a minimal impact on Japan and Singapore, as well as on other countries/regions. Real GDP of Japan and Singapore in 2020 would be only 0.01 and 0.08 percent higher over the baseline projections. Malaysia's real GDP is predicted to rise by 0.02 percent relative to the baseline mainly because its export share to Singapore is relatively large. Real GDP for most of the other countries/regions would decline slightly, but the magnitude is negligible. In the absence of positive spillovers to TFP, the overall impact of the Japan-Singapore FTA would be extremely small.

When the FTA induces TFP in non-agricultural sectors to increase by 0.1 percent per year (scenario 2), the results are more encouraging. Real GDP of Japan and Singapore in 2020 are expected to be 1.4 and 1.8 percent higher than their baseline values. No countries/regions would suffer reductions in real GDP although the magnitude of positive change is extremely small. However, as Lee and Roland-Holst (2000) show, the impact on nonmember countries is expected to be much greater when there are technological spillovers between trading partners.

Table 2

Aggregate Results of Japan-Singapore Free Trade Agreement

(% deviations from the baseline in 2020)

	FTA with no change in TFP growth			FTA with higher TFP growth[a]		
Country/Region	Real GDP	Exports	Imports	Real GDP	Exports	Imports
Australasia	-0.007	-0.011	0.100	0.008	0.011	0.178
Japan	0.010	0.948	0.337	1.385	1.343	0.607
China (incl. Hong Kong)	-0.008	0.023	0.041	0.018	0.104	0.194
Korea	-0.015	-0.004	0.085	0.023	0.067	0.216
Taiwan	-0.022	0.001	0.067	0.030	0.076	0.197
Singapore	0.082	0.230	0.245	1.799	1.369	0.790
Malaysia	0.018	-0.004	0.005	0.096	0.136	0.265
Thailand	-0.032	0.016	0.042	0.040	0.053	0.129
Indonesia	-0.012	-0.035	0.004	0.025	0.045	0.170
Philippines	-0.027	-0.004	0.219	0.023	0.136	0.442
Vietnam	-0.003	-0.052	-0.079	0.046	0.386	0.662
Canada	-0.003	0.032	0.118	0.003	0.051	0.169
United States	-0.010	-0.044	0.023	0.011	-0.043	0.046
Mexico	-0.008	-0.012	-0.003	0.013	-0.009	0.016
Chile	-0.024	-0.025	0.094	0.011	-0.001	0.078
Other Latin America	0.000	0.007	0.015	0.000	0.014	0.033
Western Europe	-0.001	-0.007	0.009	0.002	-0.002	0.032
Rest of World	-0.004	-0.003	0.022	0.005	0.046	0.133
World Total	0.000	0.004	0.004	0.208	0.102	0.102

[a] It is assumed that the free trade agreement would induce the TFP growth rate in non-agricultural sectors to increase by 0.1% per year over the baseline scenario for the 2005-2020 period.

5.2 Sectoral Results

The aggregate results of the FTA can give misleading signals about the political feasibility of trade accords because trade agreements will lead to reallocation of resources, which affects some sectors adversely. In this section, we discuss the sectoral adjustments under the two alternative FTA scenarios.

Tables 3 presents percentage changes in sectoral output, exports, and imports resulting from Japan-Singapore FTA. In the absence of positive externalities, the FTA would have very little impact on sectoral output in Japan, primarily because the shares of Japanese imports from Singapore represent less than 2% in most of the sectors. One of the sectors with a noticeable impact is “other services,” where imports would increase by 1.15% ($665 million) and output would decline by 0.01% ($335 million) compared with the baseline values in 2020. Japanese exports of other services are predicted to increase largely because lower prices of intermediate imports would reduce the cost of production. Output of every non-service sector is expected to increase, but only by an extremely small percentage.

In percentage terms, the proposed FTA leads to a larger impact on individual sectors in Singapore. Output of other services would expand by 0.66% ($980 million), largely driven by new export demand arising from removal of this sector’s trade barriers in the two countries. Another winner in Singapore is the refined petroleum sector (aggregated into energy), where output in 2020 is projected to be 0.25% ($129 million) higher than in the baseline. However, almost all manufacturing sectors are predicted to contract their output because labor and *new* capital are drawn from these sectors to the services and petroleum sectors. Thus, even the industries with comparative advantage (e.g., electronics equipment) might contract as other sectors contend for limited factors of production.[12]

When the FTA results in an increase in TFP over the 2005-2020 period, the sectoral results change significantly. Every sector in both countries, with the exception of construction in Singapore, would experience higher growth rates of output and exports. In Japan output expansion is relatively large in trade and transport (1.50%), energy (1.49%),

[12] This result critically depends upon the assumption that labor is homogeneous and perfectly mobile across sectors. If we had disaggregated labor by type and skill, labor mobility would have been limited and several of the manufacturing sectors might not have contracted.

other services (1.40%), and chemicals (1.29%), whereas in Singapore wood and paper (1.92%), other services (1.88%), metal and products (1.60%), and energy (1.38%) would experience relatively large output gains.

Table 3
Changes in Sectoral Output, Exports and Imports Resulting from Japan-Singapore FTA
(% deviations from the baseline in 2020)

	Japan			Singapore		
Scenario/Sector	Output	Exports	Imports	Output	Exports	Imports
1. FTA with no change in TFP growth						
Agriculture	0.00	0.02	-0.02	-0.26	-0.21	0.14
Natural resources	0.02	0.03	-0.01	-0.09	-0.09	0.09
Energy	0.04	0.06	-0.01	0.25	0.05	0.23
Processed food	0.00	0.03	-0.02	-0.13	-0.10	0.07
Textiles and clothing	0.01	0.02	-0.02	-0.22	-0.15	0.08
Wood and paper	0.00	0.03	-0.02	-0.09	-0.14	0.15
Chemicals	0.01	0.03	-0.02	-0.23	-0.14	0.04
Metal and products	0.01	0.03	-0.02	-0.13	-0.10	0.05
Machinery	0.02	0.03	-0.03	-0.14	-0.09	0.06
Electronics equip.	0.01	0.03	-0.04	-0.06	-0.06	-0.01
Automobiles	0.02	0.03	-0.03	0.10	-0.05	0.19
Other manufac.	0.01	0.04	-0.02	-0.18	-0.14	0.14
Construction	0.00	0.04	0.06	0.28	0.16	0.19
Trade and transport	0.00	0.01	-0.02	0.02	-0.05	0.14
Other services	-0.01	0.65	1.15	0.66	3.26	0.45
2. FTA with higher TFP growth[a]						
Agriculture	0.49	0.81	0.38	0.43	0.54	0.68
Natural resources	1.12	0.55	0.66	0.96	0.60	0.93
Energy	1.49	0.76	0.87	1.38	1.32	0.27
Processed food	0.75	1.23	-0.78	1.19	1.21	-0.30
Textiles and clothing	0.95	0.51	0.56	0.97	0.47	1.83
Wood and paper	1.22	0.65	0.67	1.92	1.25	1.31
Chemicals	1.29	0.67	0.72	0.79	0.53	1.20
Metal and products	0.74	0.43	0.47	1.60	0.75	1.81
Machinery	0.44	0.20	0.44	0.10	0.07	0.41
Electronics equip.	0.57	0.23	0.43	0.41	0.41	0.34
Automobiles	0.62	0.26	0.56	0.49	0.25	0.52
Other manufac.	1.06	0.61	0.57	0.34	0.23	0.61
Construction	0.62	0.33	0.38	-0.33	-0.04	-0.21
Trade and transport	1.50	0.75	0.70	1.21	1.13	0.34
Other services	1.40	1.12	1.47	1.88	3.59	0.85

[a] See Table 2.

Another important result that emerges from the second scenario is that trade with the rest of the world increases significantly. In the first scenario, bilateral trade between Japan and Singapore expands in most sectors, but trade with the rest of the world contracts. By contrast, when increased competition raises the total factor productivity, reductions in export prices of goods produced in Japan and Singapore lead to expansion of exports to both the bilateral partner and the rest of the world. At the same time, greater intermediate and final demand of the two countries will expand their demand for imports from most of the trading partners. Thus, the relative degree of trade diversion would be considerably smaller than under the first scenario.

6. Concluding Remarks

This paper has provided a preliminary assessment of the Japan-Singapore FTA using an 18-region, 15-sector dynamic CGE model. The first scenario incorporates bilateral trade liberalization of all goods and services other than agricultural and food products, as well as reductions in customs costs. However, in the absence of positive factor productivity spillovers, the FTA will have a negligible impact on the two economies.

In addition to the removal of bilateral trade barriers and facilitation of customs procedures, the second scenario assumes that the FTA leads to increased competition and efficiency improvements. Under this scenario, the potential benefits of the trade agreement would increase substantially. By 2020 Japan and Singapore are predicted to realize 1.4 and 1.8 percent gain in real GDP over the baseline projections. Furthermore, the relative degree of trade diversion would be significantly smaller in the latter scenario.

There are three directions in which to extend the present work: a detailed literature survey on estimations of NTB protections in both countries, the inclusion of foreign direct investment and multinational firms into the model, as done by Petri (1997) and Lee and van der Mensbrugghe (2001), and more detailed specification of technological spillovers between trading partners. Each of these elements can make an important contribution to improving the scope and accuracy of results that are being estimated.

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