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WTO Accession, "Greater China" Free Trade Area and Economic Relations across the Taiwan Strait

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Abstract

This paper evaluates the impact of China's WTO accession on trade and economic relation across the Taiwan Strait and its implications for rest of the world by a recursive dynamic, 17-region, 25-sector computable general equilibrium (CGE) model according to actual market access commitments that China and Taiwan have made in their final official WTO offers. The simulation results shown that China will gains the most from its WTO entry. It will emerge as one of the world largest manufacturing center during its integration into the world economy. Taiwan will become an upstream supplier for China's massive manufacturing productions. Taiwan will gain more economically by further integrate its economy with China via greater China FTA or other means after its WTO entry. The economic dependence of Taiwan on China will further increase and enable China to replace the US as the number one of its export market.

A greater China FTA will further reduce the cost of vertical integration among manufacturing industries across the Taiwan Strait and enhance the efficiency of production factor allocation within the three Chinese economies, thus enable them become a stronger competitor of manufactured goods, especially for labor-intensive products, electronics and low-end capital-intensive products in the world market. Rest of the world, especially developed countries and Asian newly industrialized economies, as well as resource abundant developing countries would also benefit from further liberalization of Chinese economies. Only developing countries with an endowment and export structure similar to China's, such as South Asia and ASEAN countries may experience keener competition in labor-intensive exports and lower prices for their products.

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I. Introduction

Taiwan has long been an active player in the world economy and an important trader in the global market. Its total volume of exports and imports reached US$148 billion and US$140 billion, respectively in 2000. With more than two decades of market-oriented reform, China has also advanced rapidly in international trade. Its trade volume has grown from US$38 billion in 1980 to US$474 billion in 2000, doubling more than three times in two decades, far faster than world trade growth as a whole during the same period. China, Hong Kong and Taiwan have been among the fifteen largest trading regions in the world since 1992. The total external trade of these three Chinese economies reached US$810 billion in 1999 (after netting out US$137 billion of intra-regional trade), far exceeding the total trade of Japan (US$731 billion) and amounting to nearly half of that of the United States. Its roles in the world economy will likely to grow as the integration among the three Chinese economies intensifies by the re-unification of Hong Kong and Macao with China in 1997 and 1999, and by the recent entry to the World Trade Organization (WTO) of both China and Taiwan. As predicted by Nicholas Lardy: China "seems almost certain in the next few years to overtake Canada, France, and the United Kingdom to become the fourth largest trading country in the world. Within a decade China's trade is likely to surpass that of Japan and Germany, making China the world's second largest trader" (Lardy, 2002).

In spite of huge political differences, complementary factor endowment and mutual economic interests, geographical proximity and cultural affinity, plus the efficiency of Hong Kong as a "commercial middleman," have enabled China and Taiwan to develop a rather intense trade and investment linkages in the past 15 years. The indirect trade between Taiwan and China increased from less than $1 billion in 1987 to more than $31 billion in 2001. The dependence of Taiwan's exports on China and Hong Kong's market increased dramatically from less than 8 percent in 1987 to nearly 28 percent in 2000. Cross-Straits trade has become the major source of Taiwan's trade surplus in recent years. Surplus with China has exceeded Taiwan's total trade surplus every year since 1993, and China has become Taiwan's second largest export market, next only to the United States. Taiwan has also become the second largest import source for China next only to Japan since then. The rapid growth of indirect trade was fueled by Taiwan's direct investment in China. The actually used direct investment from Taiwan reached $27.5 billion by the end of June 2001 and accounted for nearly 40 percent of Taiwan's total overseas investment[2]. While nearly 60% of China's total FDI inflow during the reform period comes from Taiwan and Hong Kong.

However, trade between China and Taiwan, even indirectly going through Hong Kong, is still highly regulated today. For example, as of the end of 2000, only 56 per cent (or 5,777 items) of 10,238 10-digit commodities under the Harmonized Tariff Schedule (HS) system are permitted to be imported from China to Taiwan[3.] However, in order to fulfill their membership requirements to the WTO, both China and Taiwan have to implement their commitment to adopt broad and deep trade liberalization measures to make their trade regimes consistent with WTO rules, including de-regulating cross-Straits trade and

1.*Cross-Strait Economic Statistics Monthly*, no. 108, August 2001, p. 51-2. Taiwan Economic Research Institution (compiled), Taipei, ROC.

2. *Cross-Strait Economic Statistics Monthly*, no. 108, August 2001 p.26. Taiwan Economic Research Institution (compiled), Taipei, ROC. The number was based on data from Ministry of Foreign Trade and Economic Cooperation, PRC, while the investment approved by Ministry of Economic affair ROC was $18.5 billion. However, even PRC's figure might underestimate Taiwan's "real" investment in China because many Taiwan businesses began in the mid-90s to investment in China through their holding companies in third tax-exempt countries such as British Central America.

3 On February 15, 2002, Taiwan open additional 2,126 items in the 10-digit HS schedule for imports from China, making the percentage increased to 77 percent.

investment. Implementation of these liberalization measures implies a substantial reduction in tariffs and non-tariff barriers across all economic sectors and cross-Straits in one of the world's largest and most rapidly expanding markets. Obviously, its impact on the structure of production and import demand in both economies will have significant effects on trade patterns across the Taiwan Straits as well as trade relations between the emerging Chinese Economic Area and its major trade partners. World trade patterns and production structures in the rest of the world will have to adjust to accommodate such changes. What opportunities will the growth and liberalization of Chinese markets bring to Taiwan and other countries in the world? What challenges will the rest of the world have to face as the tremendous low-cost Chinese labor force is integrated into the world economy? How will the increase in the export competitiveness of Chinese products affect world markets? Who will gain? Who will lose? What are the geographical and sectoral distributions of these gains and losses? To answer these questions, I used a 17-region, 25-sector recursive dynamic Computable General Equilibrium (CGE) model with import embodied technology transfer to estimate the differences in world trade and economic growth under alternative scenarios of the world trade liberalization with or without China's and Taiwan's participation, and further trade liberalization within the CEA. The model includes major trading partners of China, Hong Kong and Taiwan in both developed and developing countries and covers major production and trade activities in the world economy from 1997 to 2011. Simulation results show that both China and Taiwan will substantially benefit from their WTO memberships. Their economic structures and trade flows across the Taiwan Strait will undergo substantial changes. The economic interdependence between China and Taiwan and their interdependence with the rest of the world will further deepen and the integration of the two economies will accelerate after both of them enter the WTO. By viewing CEA's future development in a comparative world economic system, this analysis shows that economic integration across the Taiwan Straits is an unavoidable trend driven by economic globalization and market forces.

The rest of the paper is organized as follows: the next section outlines the basic structure of the model used in the analysis. Section 3 describes the major assumptions in calibrating the baseline and designing the simulation scenarios. Major simulation results are presented and discussed in Section 4. Section 5 concludes the paper with its policy implications.

II Structure of the Model

The model used in this paper is an extension of the CGE models used in China's WTO accession study by Wang (1997, 1999) with import embodied technology transfer and trade policy induced total factor productivity (TFP) growth. It is part of a family of models used widely to analyse the impact of global trade liberalization and structural adjustment programmes. It focuses on the real side of the world economy and incorporates considerable detail on sectoral output and real trade flows, both bilateral and global. However, this structural detail is obtained at the cost of not explicitly modelling financial markets, interest rates, and inflation. While not designed to generate short-term macroeconomic forecasts, the model could be linked to a macroeconomic model including asset flows and generating macro scenarios. Given a macro scenario, however, this model could then be used to determine the resulting real trade flows and sectoral structural adjustments for each region in a recursive dynamic framework. Under assumptions for a likely path of future world economic growth, it generates the pattern of production and trade resulting from world economic adjustment to the shocks specified in the alternative scenarios.

In this study, 17 fully endogenized regions and 25 production sectors in each region are specified to represent the world economy. The 17 regions are: (1) the United States, (2) Canada, (3) West Europe (4) Japan, (5) Australia and New Zealand, (6) Mexico, (7) Korea, (8) Singapore, (9) Taiwan, (10) Hong Kong, (11) China, (12) South East Asia (ASEAN, includes Malaysia, Thailand, Philippines, Indonesia, and Viet Nam), (13) South Asia (Indian, Bangladesh, Nepal, Pakistan, and Sri Lanka), (14) Latin American MFA restricted countries (Central America and Caribbean, Brazil, Colombia, Peru, Uruguay),

(15) Mid-east and South African MFA restricted countries (Turkey, Botswana, rest of south African customs Union, and rest of Middle East), (16) Low income South African countries (Malawi, Mozambique, Tanzania, Zambia, and rest of sub-Saharan Africa) and (17) Rest of the World.[4]

The 25 sectors are: (1) rice, (2) wheat, (3) other grains (4) oilseeds, (5) plant based fibre, (6) other non-grain crops, (7) livestock, (8) meats and dairy products, (9) processed food, (10) beverages and tobacco, (11) forestry and fishery, (12) mineral products, (13) energy products (14) textiles, (15) wearing apparel, (16) leather, shoes and sport goods, (17) other light manufactures, (18) wood and paper products, (19) manufactured intermediates, (20) motor vehicles and parts, (21) other transport equipment, (22) electronic equipment, (23) other machinery, (24) utility, housing and construction, (25) transportation and traded services, a portion of which is allocated to international shipping. (The correspondence between sectors in the model, Global Trade Analysis Project (GTAP) and International Standard Industrial Classification (ISIC) are available upon request from the author).

There are six primary factors of production: agricultural land, natural resources, capital, agricultural labor, unskilled labor, and skilled labor. Skilled and unskilled laborers have basic education in common, but skilled laborers usually have more advanced training. The agricultural laborers are those who have little or no education and work only in farm sectors. Natural resources are sector specific, while other primary factors are assumed to be mobile across sectors, but immobile across regions. Land is only used in agricultural sectors.

Agricultural labor and urban unskilled labor are not substitutable in the production function, but are linked by rural-urban migration flows. These flows are endogenous in the model and are driven by the rural-urban wage differential and structural changes in production and trade. The increase in the skilled labor force is based on the growth in the stock of tertiary educated labor in each region estimated by the World Bank (Ahuja and Filmer, 1995), which provides an indication of changes in the numbers of those qualified for employment as professional and technical workers. That is, as tertiary education grows, the share of the skilled labor force will grow correspondingly.

Accumulation patterns for the capital stock depend upon the depreciation rate and gross real investment rate. The latter is set exogenously based on forecasts from the Oxford world macroeconomic model (Oxford Economic Forecasting, 1999). However, household savings, government surplus (deficit), and foreign capital inflow (foreign savings) are assumed to be perfect substitutes and collectively constitute the source of gross investment in each region. Given the assumption that aggregate real investment is determined as a share of real GDP, changes in the trade balance, which directly affect foreign savings, are assumed to have only a partial effect on aggregate real investment in the region. Instead, they lead to an equilibrium adjustment in the domestic savings rate, which partially offsets the change in foreign savings. Household saving decisions are endogenous in the model. It represents future consumption goods for the household with zero subsistence quantity (by assuming inter-temporal separable preferences, ELES demand system). Government surplus (deficit) is the difference between government tax revenue and its spending, the latter is fixed as a percentage of each region's GDP based on forecasts from the Oxford model. There are no expectations explicitly specified in the model.

Foreign capital inflow or outflow is determined by the accumulation of the balance of trade, which is also fixed as a percentage of GDP in each region based on the Oxford model's projection except for the United States. The model does not include financial markets and portfolio investment. The trade balance is the only source of foreign savings (can be inflow or outflow). There is no explicit specification of foreign

4 MFA denotes 'Multi-Fibre Arrangement '.

direct investment (FDI). However, it is counted by trade flows, because in order to convert FDI into production capital, technology and equipment have to be purchased via domestic or international trade.

There are both an economy-wide and a set of sector-specific TFP growth variables for each region in the model. The economy-wide TFP variable is solved endogenously in baseline calibration to match a pre-specified path of real GDP growth in each region based on forecasts from the Oxford model. Then the economy-wide TFP variable is fixed when alternative scenarios are simulated. In such a case the growth rate of real GDP and the sector-specific TFP variables that link productivity growth and imports are solved endogenously.

Similar to Hertel et al. (1995), the MFA quota rents are assumed to be captured by exporting countries as export taxes. These export tax rates are adjusted endogenously to equate with quotas. Such a treatment assumes that all quotas are binding constraints at the equilibrium. Consistent with this modeling practice, we divide developing countries subject to MFA quota restrictions into quota binding and non-binding regions[5] based on historical trade statistics (Linkins, 1999). Quantity constraints only apply to those regions with binding quotas. The tariff rate quota of major agricultural commodities are modeled as mixed complimentarily problems (MCP), allowing lower tariff within quota limits while higher tariff for imports above quotas.

The model was calibrated around a world Social Accounting Matrix (SAM) estimated for 1997 based on version 5 of the Global Trade Analysis Project (GTAP) database (Dimaranan and McDougall, 2001). Details of this type of multi-regional SAM and its construction from the GTAP database are described in Wang (1994). The model is implemented in GAMS and solved in levels.

III Baseline Calibration and Simulation Design

Both China's and Taiwan's market accession commitments for WTO membership include a complex package of trade and investment liberalization measures. In this paper, however, only the following five aspects are considered: (1) tariff reduction in both agricultural and manufacturing products (China and Taiwan); (2) elimination of non-tariff barriers in manufacturing sectors[6] (China and Taiwan); (3) reduction of non-tariff barriers in agricultural commodities and liberalization of import quotas on major agricultural products (China and Taiwan); (4) opening of major service sectors in China and further liberalization of traded service in Taiwan (via reduction of non-tariff barriers); and (5) the phase out of MFA quotas on textiles and clothing (China and Taiwan). Once China and Taiwan become members of the WTO, their exports in textiles and apparel to North American and European markets will be subject to accelerated MFA quota growth from 2001–2004 similar to other developing countries that are WTO members. The remaining quota restrictions will be eliminated in the year 2005 according to the Agreement on Textiles and Clothing (ATC).[7]

Because both China's and Taiwan's market accession commitments to WTO entry will be phased in over a transition period, a baseline from 1998–2011 is established first as Scenario I (the Uruguay Round Case) under a set of assumptions. It generates a reference growth path of the world economy with the

5 There are eleven developing regions in the model, nine of them are subject to binding MFA quotas. They are Korea, Singapore, Taiwan, Hong Kong, China, ASEAN, South Asia, Latin America MFA restricted countries, Mid-east and Africa MFA restricted countries. While low income Africa countries and the rest of the world are modelled as MFA quota non-binding countries.

6. NTBs are modeled as tariff equivalent. Notes under Table 2a provide more details on the data sources.

7. On January 1, 1995, the ATC entered into force and replaced the old Multi Fibre Arrangements (MFA). The ATC provides for the elimination of the quotas and the complete integration of textiles and apparel into the WTO regime over a 10-year transition period ending on January 1, 2005. All WTO countries are subject to ATC disciplines, and only WTO members are eligible for ATC benefits.

implementation of the Uruguay Round trade liberalization, but without China's and Taiwan's participation. This calibrated 'benchmark' will serve as a basis of comparison for counterfactural simulation conducted in Scenario II and III.

Table 1 summarizes the major macroeconomic assumptions and results from the baseline calibration. It uses the economy-wide TFP variable in each region as a residual and adjustment mechanism to match the pre-specified real GDP growth rate under assumptions on the three major macroeconomic variables (gross investment, government spending, and balance of trade) in the model. It incorporates the impact of the recent Asian financial crisis by imposing actual negative GDP growth during 1998–99 and current account surplus of the affected regions. All the three macro-variables from 2001–2011 are specified as percentages of GDP and are based on forecasts by the Oxford model. China's imports of rice, wheat, other grains and plant-based fiber and Taiwan's imports of rice are subject to tariff rate quota (TRQ) controls. Because China and Taiwan are excluded from the WTO under this scenario, their exports in textiles and clothing are subjected to a constant growth in MFA quotas and the quantity restriction continues after 2005. All other MFA quota restricted regions are subject to accelerated quota growth and the termination of the quota system in 2005. The base quota growth rates are calculated from bilateral data provided by the International Textiles and Clothing Bureau in Geneva. The annual quota growth rate is 25 per cent higher for WTO members during 1998–2001 than quota growth rate in 1995–97, then an additional 27 per cent is applied to the last three years of ATC implementation.

In Scenario II (the Accession Case), all the macroeconomic assumptions and exogenous growth factors are the same as in Scenario I, but with both China and Taiwan joining the global trade liberalization process. The extent of China's tariff reduction is aggregated from the Harmonized Commodity Description and Coding System (HS) tariff schedules at the 6-digit level based on China's final official offer (November, 2001) and weighted by 2000 import data from the World Bank. Taiwan's tariff reduction is based on Taiwan's official WTO offer download from WTO website. It is also aggregated from the 6–digit HS tariff schedules and weighted by Taiwan's import data during 1998–2000 from the World Bank. The import quotas for agricultural commodities under TRQ control are assumed to grow at a 5 per cent annual rate, 3 percent higher than the baseline, and the above quota tariff rates are reduced according to China and Taiwan's final official offers. All non-tariff barriers of manufacturing products in both China and Taiwan are reduced by 20 per cent each year from 2002 and set to zero in 2006, while non-tariff barriers of agricultural commodities are reduced 10 per cent a year and eliminated to zero in 2011. A 50 per cent cut in protection on the traded service sector is also implemented to represent the opening of major service sectors in China's WTO offer and further liberalization of traded services in Taiwan's offer. The base year service sector protection rate in China and Taiwan were adopted from Hertel, Walmsley and Itakura (2001). Both China's and Taiwan's tariff rates for all sectors each year in the simulation period and China and Taiwan's initial and final NTB rates are listed in Tables 2a and 2b. Because China and Taiwan both become WTO members under this scenario, their exports of textiles and apparel are subjected to the same treatment as other developing countries.

It is well known that China's tariff collection is significantly below its normal tariff level because of a large volume of processed trade and extensive import duty exemptions. By 1998, about 49 per cent of all imports in China were inputs used in production of exports and exempted from tariff collections. This implies that the Chinese economy is more open than it seems and the existing import restriction by tariff measures has been largely lifted prior to China's WTO accession. Several studies have shown that failing to account for the presence of duty exemptions in China's trade regime leads to a serious overestimate of the impact of China's WTO entry at both aggregate and sectoral levels (Ianchovichina, Martin and Fukase, 2000; Lejour, 2000). By using China's 1998 Custom Statistics, I incorporated China's processing trade and duty exemption pattern by sectors and by import sources into the simulation design, which

scales down the tariff level by routine-specific information. The tariff rates in the lower panel of Table 2a are the tariff levels that take duty exemption into consideration, which are substantially lower than the normal tariff (listed in the up panel of Table 2a) and is much closer to China's actual tariff collect rate at the aggregate level (about 4 percent in 2000).

In Scenario III (the Greater China FTA Case), impact of creating a free trade area among China, Taiwan and Hong Kong after China's and Taiwan's WTO entry is simulated[8]. All barriers to imports among the three Chinese economies suppose to be eliminated within ten years start from 2003, with each of them retaining their current level of protection with other regions. Since the model includes an international transportation sector by using route-specific shipping margins from the GTAP database[9], therefore, part of the trade barrier caused by the current political situation across the Taiwan Straits could be captured as a special case of ad valorem equivalent non-tariff trade barriers. A free trade area among the three Chinese economies implies a decrease in average bilateral transaction costs between Taiwan and China since their indirect trade via Hong Kong will dramatically decrease as a results of resuming direct trade cross the Strait, even though possibly not decline to zero[10]. However, since there is no data available on the split of cross-Straits trade that currently is via Hong Kong and that is via other routines, we assume all current cross-Straits trade is via Hong Kong and the transportation cost will decline by 60 percent when direct trade across the Taiwan Straits is resumed. The actual shock applied in this scenario is a combination of a 60 percent cut in shipping margin between China and Taiwan, and elimination of all import protections among the three Chinese economies listed in Table 2.

For each of the three scenarios, the CGE model generates results regarding the effects on social welfare, terms of trade, the volume of trade, output, consumption, the real wages paid to each factor, and changes in prices and resource allocation. The differences in results generated by the two simulation scenarios with the baseline provide estimates of the impact of China and Taiwan joining the WTO and the impact of a greater China FTA respectively. impact of China and Taiwan joining the WTO and the impact of a greater China FTA respectively However, those estimates should be regarded as outcomes from conditional projections rather than as forecasts. In reality, actual trade and output patterns are affected by many more factors than just trade liberalization, such as domestic macroeconomic and income policy changes.

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8. This is a hypothetical scenario based on the fact that there are many proposals and discussions on such a possibility in both academic and business cycles across Taiwan Straits.

9. These international shipping margins are generated by an estimated margin function with the ratio of c.i.f. and f.o.b. value as dependent variable and world freight rates index, route distances, volume of trade and country-specific dummy variables as explanatory variables. The detailed methodology for determining these estimates was documented by Gehlhar (1993).

10. As Sung (1992) has argued, because of the significant economies of scale and economies of agglomeration in trading activity, Hong Kong as the established center for China's trade, will continue to play a "middleman" role and will still be important even if Taiwan and China establish official relation. Historical data show that after the United State, Canada and Indonesia established direct commercial or diplomatic relations with China there was a sharp and once for all decline in their dependence on Hong Kong. Their dependence on Hong Kong rose again, however, as China decentralized its trading system. In the case of China's exports to US, the share of indirect exports via Hong Kong fell Sharply from 100% to 15% in 1975. However, the share rose in 1979 with the decentralization of China's trade, and increased to over 62% in 1990. In the case of China's exports to Canada, the share of indirect exports via Hong Kong also fell sharply to 7%. But it also rose in 1978, and it increased to 59% in 1990. In the case of China's exports to Indonesia, the share of indirect exports via Hong Kong fell to below 50% in 1988, but rose slowly thereafter.

IV. Simulation Results

4.1 Impact on Patterns of World Trade

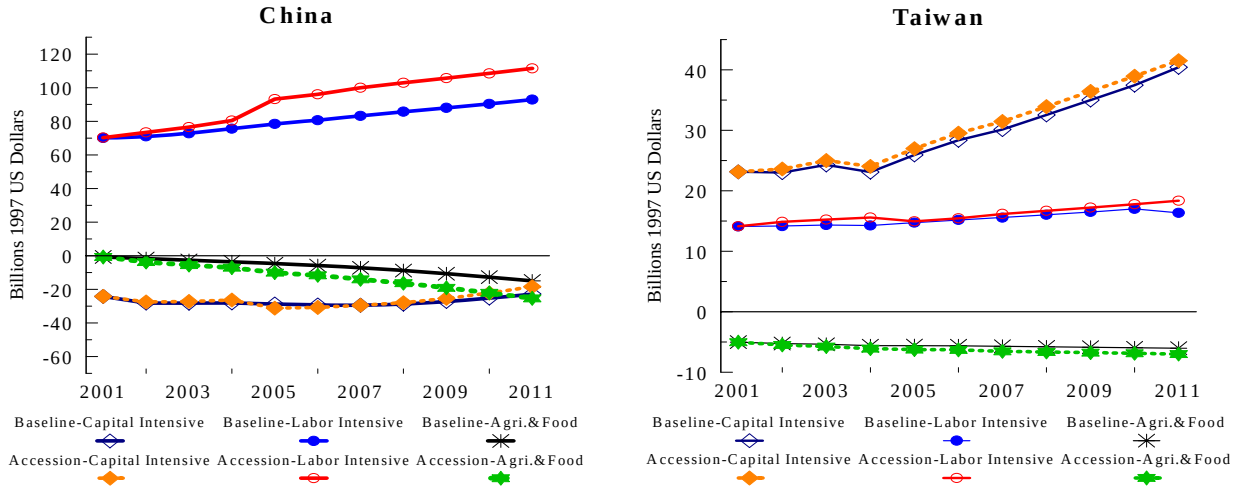
Figure 1 shows the time path of net trade flows in agricultural, labour- and capital-intensive products for China and Taiwan during the simulation period under the first two scenarios. Even if excluded from the WTO, China's net exports of labour-intensive products and net imports of food and agricultural products will continue to increase because of China's rapid industrialisation and population growth. WTO accession will accelerate this trend. The annual growth rate of China's net exports in labour-intensive goods will increase from 2.8 to 4.7 percent. Its net land-intensive imports annual growth rate will increase from 15.4 to 26.5 per cent, resulting in an additional US$130 billion net exports of labour-intensive manufactures and US$35 billion additional net imports of food and agricultural products during the ten year simulation period (Table 3). In the same period, China's net imports of capital-intensive products will increase by US$9 billion because of its WTO accession (Table 3). However, there is a general declining trend in China's net capital-intensive imports over time under both simulation scenarios. It indicates that exports in some capital-intensive products from China are rising and there is an industrial upgrade process going on as China continues to grow and industrialise. A check in the sector composition of China's net trade of capital intensive products in Table 3 shows that China's net exports in three categories of finished capital-intensive goods will increase during the ten-year simulation period. They are electronics (US$28 billion), machinery (US$31 billion) and other transportation equipment (US$9 billion), and those products would replace part of the net exports previously from OECD countries. At the same time, China's net imports of manufactured intermediates will dramatically increase by US$44 billion, especially from Japan, Korea, Taiwan and other Asian countries. This pattern of net trade changes is consistent with the important character of China's manufacturing exports: it is dominated by processing trade with high imported contents fuelled by FDI inflow. Firms in the US, Japan and Asian NICs provide China with intermediate and capital goods accompanied with their FDI to China, and China serves as the production and assembly base for those countries that export finished final products to developed country markets. In the earlier stage of China's economic reform, it is concentrated in the labour-intensive sector and is now happening in the above-mentioned three categories of capital-intensive products.[11] Similar patterns also occur in the changes of Taiwan's net trade. However, the increase in net exports of capital intensive goods is more dramatic than the increase in net exports of labor-intensive products since Taiwan as a newly industrialized economy started its industrial upgrade nearly two decades ago and become very competitive in world manufacturing market.

To understand the key role of FDI has played in the structural change of China's exports in recent year, one need to know that the international segmentation of commodity production processes is an important aspect of economic globalization. Since 80's, production has become internationally fragmented and specialized firms in different countries take part in the production process of a commodity but at different stages of the value-added chain. It allows more in-depth specialization and brings efficiency gains as countries specialize in the segments of production in which they have a comparative advantage. The increase of trade in goods belonging to a single industry but at different stages of production is an organic part of the globalization process that implies the reorganization of production on a world-wide basis. Large amount of FDI flows to China in the 90's represents relocation of the downstream, labour-intensive stage of manufacturing production to China, transferred foreign markets together with production capacities, facilitated China become integrated in the international segmentation of production process. In the meantime, FDI inflow also induced China to build up comparative advantages in some capital and

11 Based on China Custom statistics, 93 per cent of China's electronic equipment exports was process exports in 1998, while the numbers for other machinery and other transport equipment were 71 and 77 per cent, respectively.

technology intensive sectors, based on in-depth specialisation along production process. China became specialised in the downstream segments of manufacturing production, in which it has a comparative advantage, relying on imports of intermediate goods and components (Lemoine, 2000).

Figure 1 Impact of WTO accession on China's and Taiwan's net trade patterns – agricultural, labour and capital-intensive products, 2001–2011

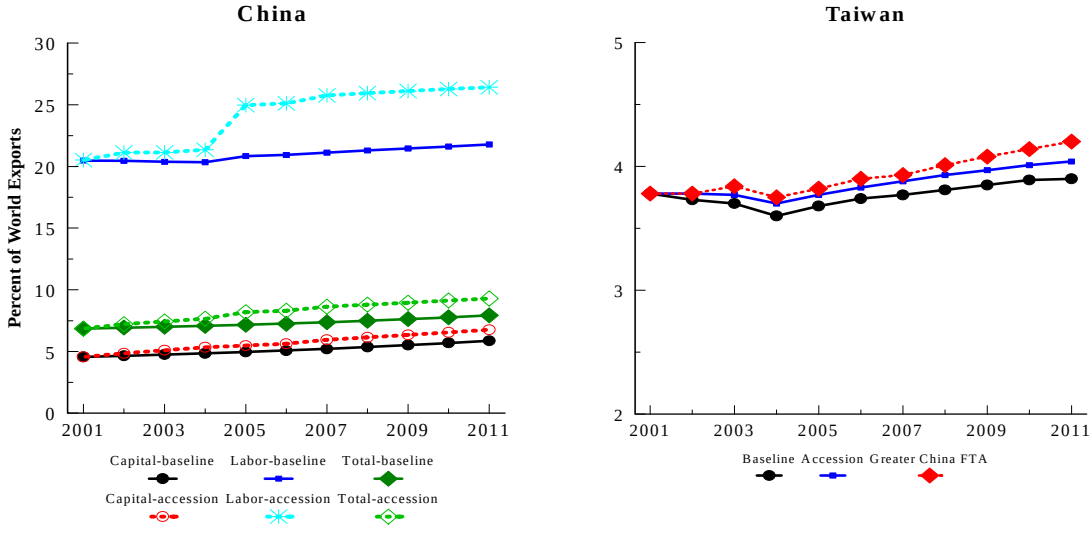


Where would those additional net manufactured exports from China and Taiwan go and where would those additional net imports in food and agricultural products by China and Taiwan come from? Table 3 shows that part of those increased labor-intensive exports from China will go to markets in industrial countries, where import demand increases because of the elimination of MFA quotas, while part of them are substitutes for net exports originally from other MFA restricted developing countries in Asia and Latin America (more than 60 per cent). Table 3 also shows that a large part of those increased net imports of land-intensive agricultural products to China and Taiwan after they join the WTO will come from land-abundant developed countries such as Australia, Canada and the United States. However, a significant portion (about one third) of them will come from other developing countries. The major underlying reason is that China's entry to the WTO diverts exports of labor-intensive products from other developing countries to China. The labor-intensive sectors in those regions cannot attract as many production resources as they could when WTO excluded China and Taiwan because of reduced profitability from lower world prices for their manufacturing exports. Therefore, more factors of production will remain in those countries' agricultural sectors. At the same time, the increased agricultural import demand from China and Taiwan pushes up world food prices, agricultural exports become relatively profitable and agricultural imports become relatively expensive. It results in an expansion of production and exports of agricultural products in those countries (most of those countries have a higher land/labor ratio than China's). However, the increase of production in labor-intensive sectors in China also demands more manufactured inputs from the world market, causing the manufacturing sector to expand and agricultural production to decline in Japan, Korea and Taiwan, thus increasing these countries' net import demand for food and agricultural products, as shown in Table 3. Another underlying reason for this disparity other than relative scarcity of agricultural production factors in those countries is that they are in a higher stage of economic development and have the technology to produce what China's manufacturing sector demands. Because of their lower stage of economic development, most developing countries do not have such capacities or are not able to produce what China's manufacturing sector needs at a competitive cost.

Why do China's net imports in capital-intensive products show a declining trend over time in both simulation scenarios (Figure 1)? There are three fundamental factors that contribute to this trend. First, there are quantitative constraints such as MFA quotas in developed countries' markets that limit China's growth potential in producing labor-intensive products and cause China to divert its production resources to other manufacturing activities, including capital-intensive sectors. Second, China has been undergoing rapid investment growth and capital accumulation during the last decade. During 1991–2000, China was the largest FDI recipient among developing countries, with over US$320 billion FDI inflows. The direct impact is the booming of capital-intensive manufacturing industries. As trade theory points out, an increase in the supply of capital will lead to an increase in the output of the sector which uses capital intensively, and a reduction in the output in sectors that use other factors intensively (Rybczynski theorem). Finally, as mentioned earlier, China's manufacturing exports usually contain very high import content with low value-added rates due to the rapid growth of processing trade in recent years, which may exaggerate the extent of industrial upgrade in China's exports.[12]

Joining the WTO cannot fundamentally change this trend because China is already starting to upgrade its industrial structure as most newly industrialized countries did a decade ago, especially in its southeast coast area. But as Table 3 shows, joining the WTO will increase China's net imports in capital-intensive products about US$9 billion over the ten-year simulation period, concentrated on intermediate manufactured products. This is because the expansion of the labor-intensive sector (and/or labor intensive segments of other manufacturing sectors) will bid productive resources away from capital-intensive production on the one hand, and increase domestic demand for intermediate inputs on the other hand, causing exports to decline and imports to increase. However, the simulation results also indicate that China will become a net exporter of most manufacturing products, include low end capital-intensive products as a long term trend, and functioning as the world largest and cheapest manufacturing center in the yeas to come. Figure 2 illustrates WTO accession will increase world market share of manufactured products for both China and Taiwan, strengthen their position as world major exporters, especially in labor-intensive products during next 10 years.

Figure 2 WTO entry and a 'Greater China' FTA increase both China and Taiwan's manufactured export share in the world market, 2001-2011



12 For example, the largest items of electronics exports in 1995 were radio cassette players and telephone sets. They are produced from imported semi-processed materials and assembled using spare parts from abroad for re-exports. The portion of the production process conducted in China was basically labour-intensive in nature.

The driving force for China emerging as a world manufacturing center is the globalization of commodity production discussed earlier and the competition in the global market. Numerous studies (Gereffi, 1998) noticed the growing globalization of business activities along a world commodity production chain[13] that spans many economies, with each economy performing certain tasks in which it has a comparative advantage. To minimize cost, enterprises, especially multi-nationals always tend to locate each segment of their business network to places that have cost advantage. Once one of them moves certain segments of its manufacturing activities to China to lower production cost, others have to follow in order to keep competitive in the world market. This is the basic economic reason that most Taiwan companies are anxious to establish business presence in China regardless the restriction from their government.

There are at least three aspects of China's comparative advantage in engaging labor-intensive productions. First, low wages alone do not necessarily mean low labor costs since the latter is determined at least in part by output per worker. Therefore, it is more meaningful to compare wage cost per unit of output value among major competing countries. It is widely agreed that China has a much lower labor cost in terms of percent of wage cost in per unit output, not only relative to major developed countries, but also relative to most developing countries. Second, the size of the labor force in China is very large. The urban labor force of China's export-oriented coastal area alone is larger than the labor forces of Japan and the four Asian NICs combined, and an additional 120 million underemployed agricultural laborers could also be shifted to manufacturing enterprises. Third, this huge labor force is distributed over vast geographical regions that differ greatly in stages of economic development. This implies that cheap labor supply will last for a quite long time regardless of China's high economic growth rate. The infusion of foreign funds, technology, and marketing expertise after its WTO accession will further enhance China's prospective as a high-volume, low-price producer of manufacturing products in the years to come.

4.2 Impact on Trade Flows between China, Taiwan and Their Major Trade Partners

China's emerging as a center of world manufacture has significant implications for its major trade partners. As pointed out by Naughton (1997), the adjustment of trade flow among East Asian countries and between East Asia and developed economies since the late 80s reflected the reorganization of various global commodity productions among these countries. The basic trend is intermediate and capital goods were exported from Asian newly industrialized economies to China, where Chinese workers processed those intermediate goods into finished products and exported them to the developed countries, especially the United States. At the same time, exports from East Asian newly industrialized economies to developed countries have been substituted by exports of their direct investment firms in China and thus dramatically declined. As a result, for example, Taiwan's trade with both the United States and China has radically shifted.[14] Simulation results show that this redirection of trade flow will further accelerate after both China and Taiwan enter the WTO and the formation of a greater China FTA after their WTO entry.

This is shown in Tables 4 and 5, which report the differences in exports by destination and imports by source between the first two simulation scenarios for both China and Taiwan. With the reduction of trade barriers, total exports increase significantly for both China and Taiwan during the ten-year simulation period. China and Taiwan trade more with each other and the increased trade are almost totally

13 They define a commodity chain as a network of labor and production processes whose end result is a finished commodity. A global commodity chain consists of sets of inter-organizational networks clustered around one commodity or product, linking households, enterprises, and states to one another within the world economy.

14 In 1986, Taiwan's exports to the United States accounted for 48 per cent of its total exports while Taiwan's exports to China accounted for only 2 per cent. In 1999, Taiwan's exports to the United States accounted for 25 per cent of its total exports while Taiwan's exports to China accounted for 18 per cent.

concentrated in manufacturing sectors (US$25 billion labor-intensive and US$50 billion capital-intensive). Such a dramatic increase of trade flows in industrial products reflects that the interdependence of manufacturing activities across the Taiwan Strait is deepening at an accelerated speed as firms on both sides are further integrated via input-output linkages. Most of Taiwan's export expansion to China are intermediates and capital goods demanded by Taiwanese FDI firms in China, which includes textiles (US$20.2 billion), manufactured intermediates (US$17.4 billion), electronics (US$5.8 billions) other machinery and transport equipment (US$12.6 billions). The relatively smaller increase of China's exports to Taiwan comes from Taiwan's current highly restrictive import policy for goods from China on which the model simulation is based.

While increasing its exports to China dramatically, Taiwan reduces its labor-intensive exports to many of its trade partners. Most of its increased exports because of WTO accession will go to China. This is because Taiwan, as a newly industrialized economy, is upgrading its industrial structure and becoming a strong competitor in the world market for manufactured goods, especially in electronic products and high-end labor-intensive goods. Even though its manufacturing export expansion to China reduces its labor-intensive exports to other economies, it increases its exports of capital and technology-intensive goods, especially electronic products to the rest of the world, reflecting integration with China will accelerate its industrial structure upgrade.

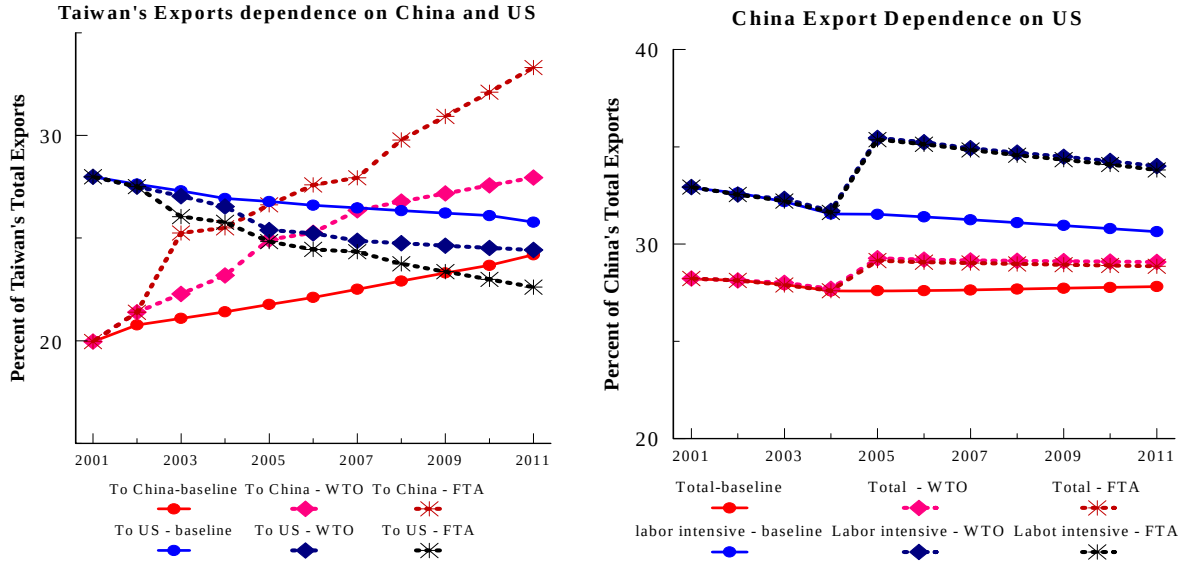
Interestingly, different from what happens in Taiwan, Table 5 shows that when China increases its exports to Taiwan, its exports in labor-intensive consumer goods and electronics products to other countries do not decline but increase dramatically. There is no trade diversion in manufactured products for China, its exports of manufactured products to other countries increase much more rapidly than its sales to Taiwan. There are two factors contributing to this interesting trade pattern. First, the expansion of imports of capital and intermediate goods from Taiwan enhances the capacity of China to export manufactured goods. Second, the manufactured goods from Taiwan to China usually contain a large portion of semi-processed products and parts for assembling or further processing operations in China, then re-export to industrial countries.[15] The dramatic increase of such products imported from Taiwan further boost China's manufactured exports.

It is evident from Tables 4 and 5 that WTO entry would increase the complementarities of manufacturing industries across the Taiwan Strait, allowing the combination of Taiwan's capital and know-how with the efficient use of the huge reservoir of low-cost labor in China, making both China and Taiwan stronger competitors in manufactured products in the world market. Therefore, there is a simultaneous expansion of capital and technology-intensive production and exports from both China and Taiwan, especially for electronics, machinery, intermediates and other transportation equipment. It indicates that WTO entry will facilitate the industrial upgrade process for both economies and enable them to become stronger competitors in producing relatively sophisticated manufactured products (such as computers and motor bicycles) to meet the demand for low-end capital and technology intensive products from both developed and developing economies. There seems a natural division of labor between manufacturing firms across the Strait: Taiwan firms provide China with intermediates and capital goods, and China serves as the production base for Taiwan and exports finished final products to developed countries' markets. However, such complementarities of manufacturing activities across the Strait have shown a declining trend in recent years due to rapid economic growth in the south east coast of China. However, because of the disparity of economic development over China's vast inland area, such complementarities will exist for a long time if taking Mainland China as a whole as our simulation results has shown.

15 The processing trade (processing and assembling, processing with import materials) was 46.7 per cent of China's total exports in 1995, and more than a half of its exports (55.8 per cent) in 1996.

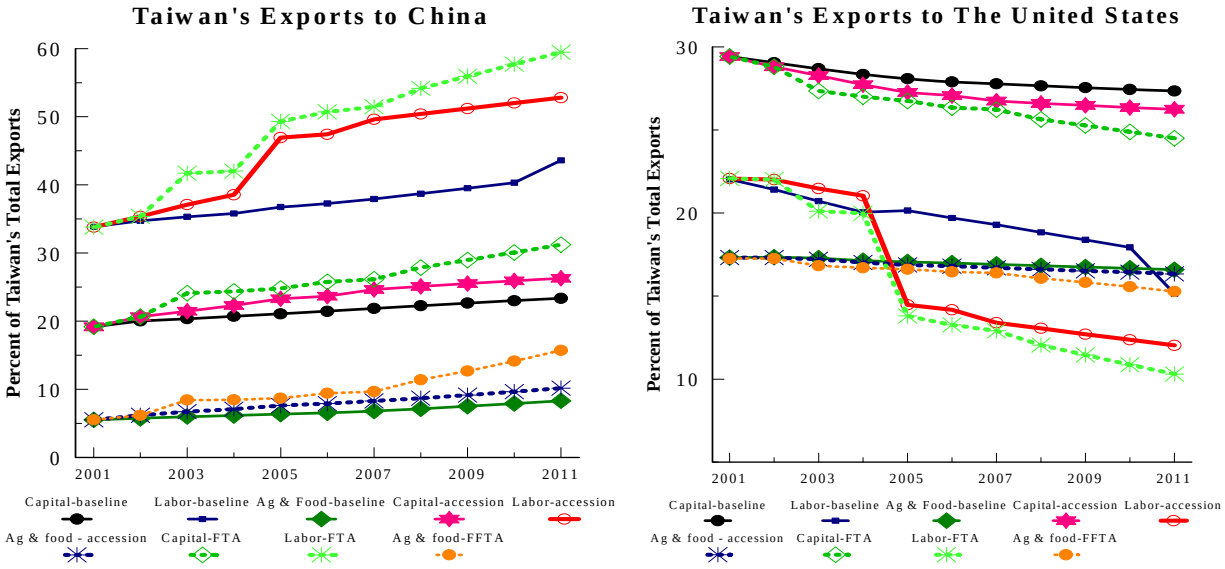
Figure 3 shows that Taiwan's total export dependence on China's market will increase over time as the result of economic integration among Chinese economies driven by market forces regardless of China and Taiwan's WTO membership. However, entry to the WTO and the formation of greater China FTA, will further increase Taiwan's export dependence on China by additional 4 and 8 percentage points respectively, decrease its dependence on US and other countries' markets, and thus enable China to exceed the United States to become its largest export market. China will absorb more than half of Taiwan's labor-intensive exports and a quarter of Taiwan's capital-intensive exports by 2008 after China and Taiwan enter the WTO, and these shares will increase to 31 and 59 percent in 2011 if a greater China FTA were formed (figure 4). Overall, Taiwan's export dependence on China and Hong Kong combined will be over 30 per cent in 2010 by their WTO accession, and additional 3 percentage points increase would be incurred if the greater China FTA proposal were adopted.[16] In the meantime, Taiwan's export dependence on the United States decline by more than 3 percentage points.

Figure 3 The redirection of trade flows between China, Taiwan and the United States



16 In 1997, exports from Taiwan to China and Hong Kong accounted for 18.8 per cent and 3.8 per cent, respectively, of its total exports to the world.

Figure 4. WTO entry and greater China FTA will increase Taiwan's export dependence on China, but decrease its dependence on the US market, especially in manufactured products, 2001–2011



This redirection of trade flows among China, Taiwan and the United States is mainly due to dramatic increase of manufactured exports from China to the United States during the ten-year simulation period. It suggests that after China and Taiwan enter the WTO, the US trade deficit with China may increase. However, the total US trade deficit may not change very much as shown in Table 6 because of the reductions of US trade deficits with Taiwan and other Asian countries. As China exports more finished manufactured products to the United States, it will import more intermediate and capital inputs from Taiwan, Hong Kong, Korea, and Singapore, increasing its trade deficit with those newly-industrialized economies (compare China's exports to and imports from those economies in Table 5). Trade surplus with the US and trade deficit with the Asian region clearly show the fact that China will become a downstream manufacturing base for Asian affiliates producing for developed country markets. Such an adjustment is a continuation of Taiwan, Hong Kong and Korea shifting their trade surplus with industrial countries to China that started in the late 80s due to production relocation in East Asia, driven by segmentation of commodity production and changing comparative advantages of each economy within the region. The further increase in NICs' exports of intermediate and capital goods to China, the further increase in China's exports of manufactured finished goods to developed countries and low-end durable manufactured products to developing countries, the further decline of NICs' exports of labor-intensive finished goods to developed countries, and the further increase of NICs' high technology products imports from advanced industrial countries are all the results of such an adjustment process. China and Taiwan's WTO entry will further accelerate this process.

Those simulation results on changes in world trade patterns have important implications on cross Strait economic relations. They clearly show that the economic integration across the Taiwan Strait is not a policy preference but a fact of life determined by the 'invisible hand'. It is bound by both the forces of globalization and production relocation in East Asia, rooted from the position of China and Taiwan in the dynamic chain of international comparative advantage. No matter what may happen in the future, this

economic integration process may slow down or accelerate, but the future direction of the course is impossible to change fundamentally.

4.3 Impact on economic growth in China, Hong Kong and Taiwan and their major trade partners

The expansion of trade accelerates economic growth, increasing real purchasing power for households. Table 6 summarises major aggregate economy-wide effects between a WTO with and without China and Taiwan and the impact of Greater China FTA. China and Taiwan enter the WTO will accelerate world economic growth, the average annual growth rate of world real GDP would be 0.02 percentage points higher and the total accumulated world GDP growth would be 0.22 percentage points higher in 2011 than that in the baseline scenario. However, the strongest stimulus to economic growth occurs to China and Taiwan. China's real GDP growth would increase by 0.11 percentage points (0.05 percentage points for Taiwan) a year from 2002 to 2011, and 1.9 percentage points higher (0.8 percentage points higher for Taiwan) in 2011 than in the case if they are excluded from the WTO. Real GDP growth in all developed countries and most developing countries also increases from China and Taiwan's WTO accession. These increases may seem small in annual terms, however, they are notable if accumulated over the whole simulation period. By 2011, real GDP growth would be 0.22 per cent higher in the United States and 0.16 per cent higher in West Europe than in the case of a WTO without China and Taiwan. Newly Industrialised Economies such as Singapore, Hong Kong, and Korea that have closer ties with China and Taiwan will benefit more and grow faster because of China's and Taiwan's WTO accession. Certain developing countries that have an endowment and export structure similar to China's, may be slightly negatively affected, especially those MFA quota restricted countries in ASEAN, South Asia and South America.[17] They have to divert resources from manufactures to food and agricultural products because stronger Chinese competition would reduce their potential export shares in the world manufactured goods market. This result, however, may be partially due to the highly aggregate nature of textile and apparel sectors in the model. They are treated as two commodities. In the real economy, there are thousands of types of textile and apparel products. Developing countries that produce and export different types or less substitutable textiles and apparels compared with China will be less effected.

Households in China and its major trade partners would benefit from further realization of each region's comparative advantage in a freer trade environment and through faster economic growth. As shown in Table 6, real purchasing power measured by the Hicksian equivalent variation rises in almost all regions across the world, about US$74 billion a year on average for the world as a whole over the 2002–2011 period. Similar to other trade liberalization exercises, the liberalizers – China and Taiwan, gain the most. However, the rest of the world also gains substantially, especially industrial countries. For example, US real purchasing power would increase by US$127 billion during the whole simulation period, and about US$24 billion annually after 2011. Only households in MFA quota restricted developing counties of Asia, South America and Mexico slightly lose because trade will be diverted away from those countries to China after China's WTO entry as discussed in the previous section.

It is also apparent from the simulation results that a Greater China FTA is beneficial to the Greater China economic area. Real GDP and social welfare (EV) increases more than their WTO accession case in both China and Taiwan. Specifically, a Greater China FTA would entails a additional net welfare gain of $5.1, and $13.5 billion per year for Taiwan and China respectively, and the real economic growth rate for all the three Chinese economies will be boost up significantly.

As classical trade theory indicates, removing trade distortions leads to further realization of each region's comparative advantage, more efficient allocation of production factors, and expansion of trade. This type

17 Please note it does not mean that these countries' growth rates will be lower than their current actual growth rate, it only indicates economic growth in those countries will be lower than the situation excluding China and Taiwan in the world trade liberalization process. In other words, those countries gain less than the case excluding China.

of efficiency gain is driven by each region's comparative advantages, resulting in a structural adjustment in each regional economy and reshaping of the world net trade pattern. In addition, there will be a strong positive feedback between trade expansion and productivity growth. As China expands its labor-intensive exports to the world market after joining the WTO, Chinese firms will import more capital and technology intensive goods as both investment and intermediate inputs from industrial counties. Those goods are usually embodied with advanced technology from other countries, thus stimulating productivity growth. The simulation results show that WTO membership will accelerate China's TFP growth by about 0.1 percentage points a year, and contribute significantly to the additional real GDP growth due to its entry to the WTO and formation of a greater China FTA over the whole simulation period. The growth and welfare impacts of the two simulation scenarios are summarized in figure 5.

Figure 5 China is the biggest gainer in its WTO accession, Taiwan gains more from further integration with china, the United States and rest of the world also gain from liberalization in Chinese Economies

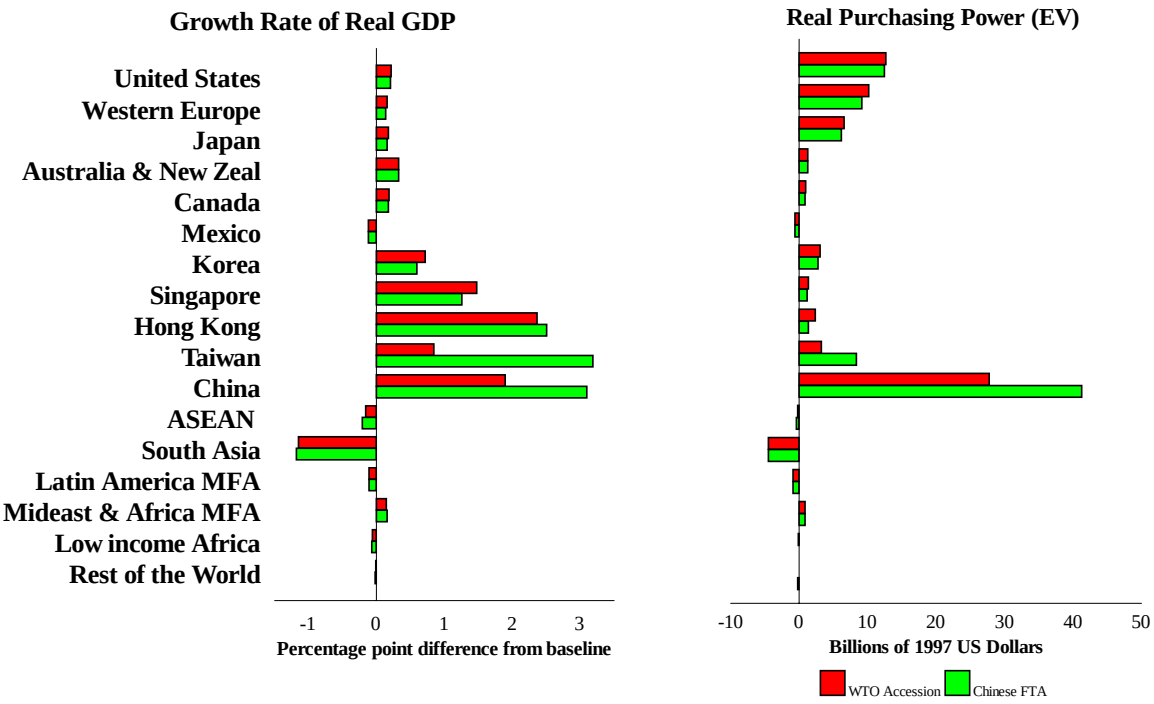


Figure 5 show clearly that China is the biggest gainer in its WTO accession. Taiwan will gain more by further integrating its economy with China via greater China FTA or other means because very simple and obvious economic reasons. A preferential tariff arrangement with China will enhance market opportunity for Taiwan firms after China's WTO accession, continue the preference treatment they have been enjoyed in the past two decades over firms from other regions. This will enable Taiwan's products and capital to enter the world's largest potential market at lower costs and make them more competitive in the global market.

The growth and welfare effects on other economies are mixed. Generally speaking, industrial countries would benefit from further economic integration of Chinese economies because of the difference in their factor endowment and stage of technology development. Favorable changes in international terms of trade are another fundamental factor. As we showed earlier, integrating China with Taiwan and Hong Kong and with the world economy enable China dramatically increase its production and exports of manufactured goods, especially labor intensive products and electronics, thus intensifying competition in the world

market. This will in turn reduce export prices in developing countries and import prices in industrial countries, the largest final market for such products. The expansion of China's manufacturing production and trade results in higher demand for food and agricultural products as well as capital and skill-intensive manufactured goods through input-output linkage, thus driving up the world prices for such products, which are major exports of industrialized countries. Such a world price movement would improve international terms of trade for industrial countries (as shown in the bottom of Table 6), thus enable them benefit from the liberalization of Chinese economies. Developing countries with abundant endowment in arable land and natural resources and large export share on agricultural and energy products (Mideast and rest of the world) may also benefit from surge demand for their exports. While countries have similar endowment structure or exports as the three Chinese economies (ASEAN, South Asia and Latin America MFA restricted countries) would suffer a small welfare loss, which is partially due to the adverse term of trade effect, partially caused by trade diversion effect.

V Conclusions and Implication for Cross-Strait Relation Policies

This paper provides a quantitative assessment of the anticipated impact of China's and Taiwan's WTO memberships on cross-Strait trade and economic relations based on the actual final market access offers that China and Taiwan have made using a numerical applied general equilibrium model for world production and trade. However, market access is only a part of WTO membership, the analysis does not take into account other major aspects of WTO membership. Nevertheless results obtained already show that the economic structures in both China and Taiwan as well as the cross-Strait economic relationship will undergo substantial changes due to their entry to the WTO. The economic dependence of Taiwan on China will further increase and enable China to replace the US as the number one of its export market. A greater China FTA will further reduce the cost of vertical integration among manufacturing industries across the Strait and enhance the efficiency of production factor allocation within the three Chinese economies, thus enable them become a stronger competitor of manufactured goods, especially for labor-intensive products, electronics and low-end capital-intensive products in the world market. China will emerge as the world largest manufacturing center during this integration process and Taiwan will become an upstream supplier for China's massive manufacturing productions. China will obtain the benefit from expansion of imports from Taiwan fuelled by direct investment to accelerate its industrialization, reduce the pressure of unemployment and expand its manufacturing exports to the rest of the world because of its huge reservoir of cheap labour and gradually improved infrastructures. The simulation results also shown that China will gains the most from its WTO entry. Taiwan will gain more economically by further integrate its economy with China via greater China FTA or other means. In the meantime, the rest of the world, especially developed countries and Asian newly industrialized economies, as well as resource abundant developing countries would also benefit from further liberalization of Chinese economies. Only developing countries with an endowment and export structure similar to China's, such as South Asia and ASEAN countries *may* experience keener competition in labour-intensive exports and lower prices for their products.

Furthermore, by recognizing the proper position of China and Taiwan in a comparative world economic system based on their factor endowments and stages of technology development, this analysis indicates that the economic interdependence between China and Taiwan will further deepen and economic integration of the two economies will accelerate because of their WTO entry. This is a continued trend that started in the mid-80s driven by the "invisible hand" and is a part of the production relocation process based on changing comparative advantages in East Asia region. It is also an organic component of economic globalization.

The results of this paper provide useful insights for understanding the impact of China's accession to the

WTO on trade and economic relations across the Taiwan Strait and demonstrate that CGE modeling can be a valuable tool for policy evaluation. Although the numerical model is large (there are more than 30,000 equations in each simulation period), the results are followed transparently from the model's (conceptually straightforward) structure based on the basic theory of international trade. However, there are several obvious limitations that should be mentioned. First, it does not take into account other major aspects of WTO membership, such as reduction of barriers in foreign investment, protection of intellectual property rights, securing market access, enforcement of commitment, and co-operation in dispute settlement. It at best captures only one aspect of the issue at hand. Second, there are uncertainties about the actual size of China's non-tariff barriers especially barriers to service trade. A relatively stylized representation of trade liberalization measures in these areas was adopted in the simulation design. Third, the CGE model used in this paper is a highly stylized simplification of the world economy, and is far from perfect (Wang, 1997a). Finally, there are uncertainties on the value of parameters, such as elasticities of substitution of products from different sources and elasticities between capital goods imports and TFP growth, while the actual magnitude of the impact is very sensitive to those key parameters (See Appendix B for key elasticities used in the model). Therefore, the results reported in this paper need to be interpreted with caution: they can be viewed as indicative but not as precise real outcomes.

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Table 1 Major Assumptions for Baseline Calibration in the Model[a]

	United States	Western Europe	Japan	Australia & New Zealand	Canada	Mexico	Korea	Singapore	Hong Kong	Taiwan	China	ASEAN	South Asia	Latin America MFA	Mideast & Africa MFA	Low income Africa	Rest of the World	World Average
Average annual growth rate, %, 2002-2011																		
Real GDP	**3.0**	**2.5**	**1.2**	**3.4**	**2.8**	**4.4**	**4.9**	**5.1**	**4.5**	**4.6**	**6.9**	**5.3**	**6.7**	**3.9**	**4.3**	**3.7**	**5.9**	**3.3**
Labor Force	**0.8**	**-0.1**	**-0.2**	**1.0**	**0.6**	**2.4**	**1.1**	**0.3**	**0.2**	**0.8**	**0.8**	**1.9**	**2.2**	**1.8**	**3.1**	**3.0**	**1.5**	**1.6**
Skill Labor	**3.6**	**3.5**	**3.6**	**4.1**	**3.3**	**8.4**	**8.0**	**4.3**	**4.2**	**6.3**	**6.1**	**6.8**	**5.9**	**5.6**	**8.4**	**8.4**	**6.6**	**5.6**
TFP	0.7	1.0	0.0	0.7	0.9	0.3	2.2	3.2	0.7	1.3	3.1	2.2	2.6	1.2	1.0	0.3	3.3	1.3
Capital Stock	4.5	2.9	2.1	4.2	4.0	4.5	4.6	4.8	4.6	5.1	9.8	4.7	6.9	3.0	2.2	2.7	3.9	3.7
Gross Investment	3.7	3.1	0.9	5.0	4.2	7.3	4.2	4.7	5.1	4.1	8.2	6.2	7.5	3.8	4.1	3.9	5.6	3.9
Government Spending	2.3	1.3	1.5	2.5	2.4	2.9	1.8	3.0	2.6	3.4	8.4	4.1	4.9	4.2	4.6	4.3	6.2	2.6
Exports	2.6	3.4	2.1	2.4	2.4	1.6	5.1	4.6	2.3	3.9	4.9	4.9	7.9	3.7	4.2	3.8	5.0	3.7
Imports	3.4	3.4	2.1	4.1	3.2	5.7	4.7	5.1	4.0	4.2	6.0	5.4	5.6	3.8	4.5	3.9	5.2	4.0
HH. Consumption	2.9	2.4	1.2	3.4	2.8	4.9	5.4	6.3	5.5	5.1	5.7	5.3	6.3	3.8	4.3	3.6	5.9	3.3
Total Absorption	3.0	2.4	1.2	3.6	3.1	5.2	4.7	5.2	5.1	4.7	7.1	5.4	6.4	3.9	4.3	3.7	5.9	3.3
Average annual agricultural labor force migration, 1000 persons, 2002-2011																		
Ag. Labor migration	18	56	-1	6	2	161	41	0	0	12	957	1042	2372	230	682	1152	1556	8288
Labor composition, %, 2001																		
Agricultural labor	**2.3**	**4.7**	**4.4**	**5.5**	**2.7**	**21.9**	**11.0**	**0.2**	**0.6**	**9.4**	**69.7**	**54.0**	**59.6**	**22.7**	**31.5**	**66.2**	**27.7**	**46.3**
Unskilled labor	**61.9**	**64.1**	**76.0**	**61.0**	**59.3**	**63.8**	**75.1**	**69.4**	**77.7**	**73.9**	**21.1**	**39.6**	**35.6**	**66.2**	**53.9**	**29.2**	**54.5**	**41.3**
Skilled labor	**35.9**	**31.2**	**19.6**	**33.5**	**38.0**	**14.3**	**13.9**	**30.4**	**21.7**	**16.7**	**9.2**	**6.4**	**4.8**	**11.1**	**14.6**	**4.6**	**17.9**	**12.4**
Labor composition, %, 2011																		
Agricultural labor	2.1	4.4	4.4	5.1	2.6	18.4	9.4	0.2	0.6	8.3	68.5	49.8	56.2	21.3	26.4	62.5	24.0	44.4
Unskilled labor	50.6	51.3	67.1	49.4	48.3	56.2	63.6	54.9	67.3	63.2	16.0	40.0	37.1	62.7	49.4	29.9	46.7	37.3
Skilled labor	47.3	44.3	28.6	45.6	49.1	25.4	27.0	44.9	32.1	28.6	15.5	10.2	6.8	16.0	24.2	7.7	29.4	18.4
Gross investment as % of real GDP																		
2001	**21.6**	**20.1**	**25.7**	**20.4**	**19.3**	**19.9**	**26.4**	**33.8**	**30.3**	**20.5**	**38.9**	**23.2**	**23.0**	**19.0**	**21.4**	**14.9**	**20.4**	
2011	**23.3**	**21.4**	**25.0**	**24.0**	**22.0**	**26.2**	**24.9**	**32.7**	**32.2**	**19.6**	**43.9**	**25.1**	**24.8**	**19.0**	**20.9**	**15.2**	**19.8**	
Government spending as % of nominal GDP																		
2001	**13.9**	**19.1**	**16.5**	**18.5**	**17.5**	**9.8**	**8.9**	**11.2**	**8.6**	**12.1**	**13.1**	**9.3**	**13.6**	**17.2**	**21.2**	**10.6**	**11.8**	
2011	**13.1**	**17.1**	**17.0**	**16.9**	**16.8**	**8.5**	**6.6**	**9.2**	**7.2**	**10.8**	**15.1**	**8.3**	**11.5**	**17.7**	**21.9**	**11.2**	**12.1**	
Balance of trade as % of nominal GDP																		
2001	-4.3	**2.4**	**1.7**	**-0.1**	**4.7**	**-4.0**	**14.2**	**15.3**	**4.7**	**6.1**	**1.8**	**7.4**	**0.3**	**-4.2**	**-0.3**	**-4.8**	**-2.0**	
2011	-4.8	**3.4**	**2.3**	**-2.4**	**2.6**	**-13.1**	**15.1**	**13.4**	**-0.8**	**5.6**	**-0.2**	**7.0**	**3.1**	**-3.9**	**-0.2**	**-4.6**	**-1.8**	

a. Data in bold face are based on forecast by Oxford Macro Economic Model and set exogenously during the calibration (Oxford, 1999). Economy-wide TFP growth is a weighted average (Dormar weights) of sector level TFP growth generated by the model endogenously.

Table 2a Tariff and Non-tariff Protection Rates in China for its WTO Accession (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010-2011	Rate of Reduction	Initial NTBs	Final NTBs
Nominal Tariff													
Rice	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	96.73	64.98
Wheat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	114.00	65.00
Other grains	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	91.07	3.03
Oilseeds	96.87	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	-95.98	16.26	0.00
Planted fiber	2.60	2.20	1.80	1.40	1.00	1.00	1.00	1.00	1.00	1.00	-61.54	7.08	16.16
Non-grain crops	24.23	16.80	13.83	10.87	10.72	10.71	10.71	10.71	10.71	10.71	-55.81	0.85	0.00
Livestock	11.16	10.71	10.51	10.31	10.31	10.31	10.31	10.31	10.31	10.31	-7.60	2.34	0.00
Dairy and meats	17.68	13.01	11.47	9.93	9.72	9.72	9.72	9.72	9.72	9.72	-45.05	2.71	0.00
Processed food	31.81	18.89	16.85	15.07	13.31	11.53	11.53	11.53	11.53	11.53	-63.76	8.35	0.00
Tobacco & Beverage	31.27	19.73	14.85	11.98	10.42	10.42	10.41	10.40	10.40	10.39	-66.78	28.68	0.00
Forest and fishery	3.47	2.31	2.16	2.07	2.03	2.03	2.03	2.03	2.03	2.03	-41.52	0.94	0.00
Energy products	4.76	3.51	3.51	3.51	3.51	3.51	3.51	3.51	3.51	3.51	-26.20	7.52	0.00
Mineral	8.58	6.97	6.78	6.64	6.59	6.59	6.59	6.59	6.59	6.59	-23.15	7.71	0.00
Textiles	20.46	15.77	13.06	10.49	8.81	8.81	8.81	8.81	8.81	8.81	-56.95	5.60	0.00
Clothing	23.76	21.20	18.90	16.67	14.90	14.90	14.90	14.90	14.90	14.90	-37.28	4.36	0.00
Leather & shoes	11.63	8.53	8.27	8.00	7.98	7.98	7.98	7.98	7.98	7.98	-31.42	4.08	0.00
Other light manufacture	19.49	17.00	16.10	15.34	14.70	14.70	14.70	14.70	14.70	14.70	-24.59	1.81	0.00
Wood & paper	9.30	5.50	4.40	3.48	3.27	3.34	3.34	3.34	3.34	3.34	-64.06	8.80	0.00
Intermediates	11.89	8.13	7.57	7.08	6.82	6.61	6.40	6.18	6.18	6.18	-47.99	12.72	0.00
Motor vehicle	31.32	21.86	19.27	17.41	15.69	14.80	14.07	14.07	14.07	14.07	-55.07	21.04	0.00
Other Trans	5.04	3.96	3.77	3.60	3.59	3.59	3.59	3.59	3.59	3.59	-28.63	9.85	0.00
Electronics	10.59	3.06	2.42	2.30	2.29	2.29	2.29	2.29	2.29	2.29	-78.38	6.24	0.00
Machinery	13.47	8.44	7.27	6.69	6.59	6.59	6.59	6.59	6.59	6.59	-51.07	4.08	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	32.00	12.80
Average	13.73	8.49	7.46	6.71	6.32	6.18	6.10	6.03	6.02	6.00	-56.28	10.13	1.21
Tariff after taking processing trade and duty exemption into account													
Rice	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.00	96.91	59.75
Wheat	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.00	84.30	48.07
Other grains	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.00	60.86	2.02
Oilseeds	79.99	3.22	3.22	3.22	3.22	3.22	3.22	3.22	3.22	3.22	-95.98	37.77	0.00
Planted fiber	0.28	0.23	0.19	0.15	0.11	0.11	0.11	0.11	0.11	0.11	-61.45	8.11	3.99
Non-grain crops	16.36	11.34	9.34	7.34	7.24	7.23	7.23	7.23	7.23	7.23	-55.81	5.44	0.00
Livestock	3.88	3.72	3.65	3.58	3.58	3.58	3.58	3.58	3.58	3.58	-7.59	8.55	0.00
Dairy and meats	11.52	8.48	7.47	6.46	6.33	6.33	6.33	6.33	6.33	6.33	-45.05	6.63	0.00
Processed food	20.67	12.28	10.95	9.79	8.64	7.49	7.49	7.49	7.49	7.49	-63.76	16.09	0.00
Tobacco & Beverage	15.84	10.00	7.52	6.07	5.28	5.28	5.27	5.27	5.27	5.26	-66.78	44.06	0.00
Forest and fishery	2.50	1.67	1.56	1.49	1.46	1.46	1.46	1.46	1.46	1.46	-41.53	1.33	0.00
Energy products	3.52	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	-26.19	7.52	0.00
Mineral	3.53	2.87	2.79	2.73	2.71	2.71	2.71	2.71	2.71	2.71	-23.17	10.28	0.00
Textiles	0.71	0.55	0.45	0.36	0.31	0.31	0.31	0.31	0.31	0.31	-56.98	19.46	0.00
Clothing	0.45	0.41	0.36	0.32	0.29	0.29	0.29	0.29	0.29	0.29	-37.22	25.27	0.00
Leather & shoes	0.20	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	-31.34	9.58	0.00
Other light manufacture	1.38	1.20	1.14	1.09	1.04	1.04	1.04	1.04	1.04	1.04	-24.55	15.59	0.00
Wood & paper	3.73	2.20	1.76	1.39	1.31	1.34	1.34	1.34	1.34	1.34	-64.05	9.57	0.00
Intermediates	3.78	2.58	2.40	2.25	2.17	2.10	2.03	1.96	1.96	1.96	-48.00	12.72	0.00
Motor vehicle	23.45	16.36	14.43	13.03	11.74	11.08	10.53	10.53	10.53	10.53	-55.07	21.07	0.00
Other Trans	4.32	3.40	3.23	3.09	3.08	3.08	3.08	3.08	3.08	3.08	-28.63	10.17	0.00
Electronics	3.00	0.87	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-78.40	8.24	0.00
Machinery	3.96	2.48	2.14	1.96	1.94	1.94	1.94	1.94	1.94	1.94	-51.06	7.89	0.00
Traded Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	32.00	12.80
Average	4.60	2.65	2.37	2.17	2.07	2.02	1.99	1.98	1.98	1.98	-56.91	13.33	1.08

Data Source: China's tariff cut is aggregated by the author from 6 digit Harmonized Commodity Description and Coding System (HS) tariff schedules based on China's final official offer downloaded from the WTO website (**http://www.wto.org/english/thewto_e/acc_e/completeacc_e.htm**) and weighted by 2000 import data from the World bank. The tariff rate for rice, wheat, other grains, and plant based fiber are in quota rate. China's non-tariff barrier (NTB is the difference between import protection rate in version 5 GTAP database and China's tariff after adjustment for duty exemptions. Industrial products are modified on additional information from Zhang et al. (1998) and Li et al. (1998). Detailed data on processing trade and duty exemption are kindly provided by Dr. Shunli Yao based on the China trade database maintained at the University of California-Davis (Yao, Shunli and Robert Feenstra, 1999). The base year sevice sector protection rate was adopted Hertel, Walmsley and Itakura (2001). and they are tariff equelent of no-tariff barriers.

Table 2b Tariff Rates in Taiwan for its WTO Accession (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Rate of Reduction	Initial NTBs	Final NTBs
Rice	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	15.61	30
Wheat	6.45	6.45	6.44	6.44	6.44	6.44	6.44	6.44	6.44	6.44	6.44	-0.08	0.00	0
Other grains	1.04	0.08	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	-93.94	0.00	0
Oilseeds	0.62	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-98.08	1.81	0
Planted fiber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0
Non-grain crops	22.61	13.33	12.52	12.26	12.03	11.80	11.80	11.80	11.80	11.80	11.80	-47.82	6.20	0
Livestock	0.79	0.71	0.71	0.70	0.71	0.70	0.71	0.71	0.71	0.71	0.71	-10.19	0.02	0
Dairy and meats	13.09	9.94	7.95	7.88	7.86	7.83	7.83	7.83	7.83	7.83	7.83	-40.16	5.70	0
Processed food	16.57	13.22	12.02	11.63	11.45	11.27	11.27	11.27	11.27	11.27	11.27	-31.97	1.86	0
Tobacco & Beverage	24.26	16.79	16.29	16.12	16.11	16.10	16.10	16.10	16.10	16.10	16.10	-33.66	24.01	0
Forest and fishery	13.84	10.76	8.64	8.28	7.96	7.89	7.89	7.89	7.89	7.89	7.89	-42.97	5.61	0
Energy products	5.75	4.83	4.62	4.56	4.51	4.51	4.51	4.51	4.51	4.51	4.51	-21.51	0.36	0
Mineral	5.11	4.66	4.23	4.10	4.03	4.03	4.03	4.03	4.03	4.03	4.03	-21.13	0.93	0
Textiles	6.09	5.79	5.54	5.44	5.43	5.43	5.43	5.43	5.43	5.43	5.43	-10.80	0.79	0
Clothing	13.29	12.37	11.46	11.27	11.27	11.27	11.27	11.27	11.27	11.27	11.27	-15.24	0.02	0
Leather & shoes	4.36	4.16	3.99	3.83	3.67	3.67	3.67	3.67	3.67	3.67	3.67	-15.82	0.61	0
Other light manufacture	3.85	2.99	2.17	2.12	2.07	2.07	2.07	2.07	2.07	2.07	2.07	-46.19	0.78	0
Wood & paper	3.49	2.10	0.76	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.74	-78.69	0.39	0
Intermediates	3.42	2.65	1.90	1.89	1.88	1.88	1.88	1.88	1.88	1.88	1.88	-45.05	0.50	0
Motor vehicle	23.45	21.11	18.97	17.89	17.28	16.68	16.09	15.57	15.05	14.53	14.53	-38.05	2.10	0
Other Trans	1.54	1.38	1.23	1.19	1.16	1.16	1.16	1.16	1.16	1.16	1.16	-24.79	1.20	0
Electronics	0.43	0.27	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	-50.58	2.02	0
Machinery	3.35	2.85	2.43	2.41	2.39	2.39	2.39	2.39	2.39	2.39	2.39	-28.86	1.30	0
Traded Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	8.00	3.2
Average	4.44	3.64	3.13	3.08	3.01	2.96	2.94	2.90	2.88	2.85	2.84	-35.85	2.11	0.31

Data Source: Taiwan's tariff cut is aggregated by the author from 6 digit Harmonized Commodity Description and Coding System (HS) tariff schedules based on Taiwan's final official WTO offer downloaded from WTO website (http://www.wto.org/english/thewto_e/acc_e/completeacc_e.htm) and weighted by its import data from 1998-2000 from World Bank. The weights of each year are 0.2, 0.3, and 0.5 respectively. Taiwan's non-tariff barrier (NTB is the difference between import protection rate in version 5 GTAP database.

Table 3 Differences between a WTO with and without China: Accumulated Sectoral Net Trade by Region during 2002 - 2011

	United States	Western Europe	Japan	Australia & New Zealand	Canada	Mexico	Korea	Singapore	Hong Kong	Taiwan	China	ASEAN	South Asia	Latin America MFA	Mideast & Africa MFA	Low income Africa	Rest of the World
									Billion U.S. dollars								
Rice	-0.4	0.0	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.9	0.3	0.0	0.0	0.0	-0.1
Wheat	0.1	0.1	-0.1	0.0	2.0	0.0	-0.1	0.0	0.0	0.0	-3.1	-0.1	0.4	0.0	0.0	0.0	0.6
Other grains	-0.6	0.5	0.0	6.3	3.0	0.1	0.4	0.0	0.0	0.1	-9.4	-0.1	0.0	0.0	0.1	0.0	-0.4
Oilseeds	15.8	-0.1	-0.1	0.0	0.2	0.0	-0.1	0.0	0.0	0.1	-20.6	0.1	0.3	3.9	0.0	0.0	0.5
Planted fiber	0.9	0.2	-0.1	-0.1	0.0	0.1	-0.4	0.0	0.0	-0.2	-2.3	0.3	0.6	0.2	0.1	0.2	0.5
Non-grain crops	-1.0	-1.0	-0.3	-0.7	-0.3	0.2	-0.3	-0.1	0.0	-1.2	0.7	0.3	2.0	0.9	0.0	-0.1	1.0
Sub-total	14.9	-0.3	-0.8	5.4	4.8	0.4	-0.4	-0.1	0.0	-1.2	-34.9	1.3	3.6	5.1	0.2	0.1	2.1
Livestock	-0.7	0.5	-0.1	-0.9	-0.5	0.1	0.2	0.0	-0.1	0.4	1.5	0.0	0.2	0.0	0.1	0.0	-0.5
Dairy and meats	1.4	0.0	-0.2	-0.6	-0.2	0.1	-0.1	-0.1	0.0	-0.6	-1.1	0.2	0.2	0.3	0.2	0.0	0.5
Processed food	2.1	5.1	-0.3	0.0	0.3	0.1	0.7	1.7	0.5	-0.8	-14.9	0.0	1.7	3.2	0.1	0.0	0.5
Tobacco & Beve.	3.1	11.4	0.7	-0.1	0.0	0.1	0.0	0.5	0.5	-4.7	-12.8	0.2	0.1	0.3	0.1	0.0	0.5
Sub-total	6.0	16.9	0.2	-1.7	-0.4	0.3	0.9	2.2	0.9	-5.7	-27.3	0.4	2.3	3.7	0.4	0.0	0.9
Forest and fishery	0.0	0.1	0.1	0.4	0.0	0.0	-0.1	0.0	-0.1	-0.4	-0.4	0.0	0.4	0.0	0.0	-0.2	0.0
Energy products	-0.2	0.4	-0.7	-0.1	0.3	0.5	-0.8	-0.1	-0.1	-1.5	-9.1	2.0	1.9	0.7	3.9	0.2	2.8
Mineral products	-0.9	0.4	-1.1	-0.5	-0.4	0.1	-0.2	-0.1	0.0	0.1	0.0	1.0	1.8	0.6	-0.5	-0.1	-0.5
Wood & paper	0.0	-0.4	0.4	-0.1	-0.7	0.3	1.6	-0.2	0.5	0.0	-6.8	3.0	0.6	0.7	0.1	0.0	1.0
Sub-total	-1.2	0.5	-1.3	-0.3	-0.8	0.9	0.6	-0.3	0.3	-1.8	-16.2	6.0	4.7	2.0	3.5	0.0	3.3
Textiles	-2.5	-3.4	9.5	-0.5	-0.5	-0.8	11.6	-0.1	4.4	14.8	-33.5	5.1	-2.0	-0.4	-1.4	-0.1	-0.3
Clothing	-13.0	-7.9	-2.8	-0.3	-1.1	-1.2	-3.8	-0.2	-3.5	-6.7	120.8	-11.3	-35.8	-7.8	-6.0	-0.2	-19.5
Leather & shoes	0.6	-10.5	-0.3	-0.2	0.0	-0.3	1.1	-0.1	-0.3	0.4	25.4	-7.9	-0.2	-2.6	-0.5	-0.1	-4.3
Other light mann.	0.8	-11.0	-1.4	-0.2	-0.3	-0.2	-0.3	-0.1	1.0	-0.3	17.0	-1.1	0.7	-0.3	-2.2	-0.9	-1.3
Sub-total	-14.1	-32.8	5.1	-1.1	-1.8	-2.5	8.6	-0.6	1.6	8.2	129.7	-15.3	-37.3	-11.0	-10.0	-1.2	-25.3
Intermediates	0.1	-1.9	10.4	0.1	-0.7	0.9	7.7	0.5	0.4	6.3	-43.6	7.4	5.9	2.3	-0.1	0.2	4.2
Motor vehicle	1.4	9.4	3.5	-0.5	0.8	1.9	-4.0	-0.1	-0.6	-3.9	-15.5	1.2	2.1	2.1	0.2	0.1	1.9
Other Trans	-4.9	-2.4	-2.8	-0.4	-0.5	0.0	-3.2	0.1	-0.2	2.0	9.2	0.9	1.4	0.9	0.0	0.0	-0.2
Electronics	-7.4	-7.6	-5.1	0.0	-1.1	-0.9	-4.2	-0.4	0.3	1.6	27.7	-3.6	1.0	0.7	-0.4	0.1	-0.7
Machinery	-16.4	-20.4	-5.6	-0.8	-2.3	-0.4	-1.2	0.3	2.6	5.3	31.5	3.3	3.2	1.9	-0.2	0.4	-1.1
Sub-total	-27.1	-22.8	0.4	-1.6	-3.8	1.6	-5.0	0.5	2.5	11.3	9.3	9.2	13.5	7.9	-0.5	0.6	4.2
Traded Services	0.7	11.4	-5.1	-1.1	0.4	1.6	-3.5	-2.1	-5.2	-8.2	-16.6	7.0	8.1	4.4	1.8	0.3	6.1
Construction	0.3	1.3	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.6	-1.8	0.1	0.1	0.2	0.2	0.0	0.4
Total	-20.7	-25.7	-1.6	-0.4	-1.7	2.3	1.2	-0.5	0.1	2.0	42.2	8.7	-5.1	12.2	-4.4	-0.2	-8.4

Table 4 Differences between a WTO with and without China and Taiwan: Accumulated sectoral trade during 2002 – 2011: Taiwan

	United States	Western Europe	Japan	Australia & New Zealand	Canada	Mexico	Korea	Singapore	Hong Kong	China	ASEAN	South Asia	Latin America MFA	Mid east Africa MFA	Low income Africa	Rest of the world	World Total
Exports																	
Primary agriculture	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dairy and meats	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Processed food	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Tobacco Beverage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Forestry & Fishery	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Energy products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Mineral products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Textile	-1.0	-1.5	-0.2	-0.1	-0.2	0.0	-0.1	-0.1	-0.2	20.2	-1.4	-0.1	-0.1	-0.1	0.0	-0.1	15.2
Apparel	-4.7	-1.4	-0.1	0.0	-0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	-6.3
Leather & shoes	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.6
Other Light Manuf	-0.4	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Wood & paper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	1.8
Intermediates	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	17.4	-0.1	0.0	0.0	0.0	0.0	0.0	17.5
Motor vehicle	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Other Trans	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	3.6
Electronics	0.5	0.5	0.1	0.1	0.2	0.1	0.1	0.2	0.7	5.8	0.3	0.0	0.0	0.0	0.0	0.1	8.6
Machinery	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.2	12.6	0.0	0.0	0.0	0.0	0.0	0.0	12.6
Traded Services	-0.2	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.5
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	-5.7	-3.0	0.0	0.0	-0.2	0.1	0.1	0.1	0.9	66.5	-1.3	-0.3	-0.1	-0.1	0.0	-0.1	57.1
Imports																	
Primary Agriculture	0.3	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.2	0.0	0.0	0.3	1.3
Dairy and meats	0.2	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Processed food	0.1	0.0	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	1.1
Tobacco Beverage	0.7	3.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
Forestry & Fishery	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.7
Energy products	0.1	1.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.1	0.0	0.1	0.1	0.0	0.0	1.9
Mineral products	0.2	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.2	0.1	0.0	0.0	0.0	0.0	1.4
Textile	0.0	0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Apparel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Leather & shoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Other Light Manuf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Wood & paper	0.2	0.3	0.2	0.0	0.1	0.0	0.2	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	1.9
Intermediates	0.9	2.5	3.6	0.2	0.2	0.0	0.5	0.4	0.0	2.2	0.4	0.2	0.2	0.1	0.0	0.4	11.7
Motor vehicle	1.0	3.3	0.3	0.0	0.1	0.0	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	5.2
Other Trans	-0.9	-0.1	0.3	0.0	0.0	0.0	0.4	0.5	0.0	0.9	0.3	0.1	0.0	0.1	0.0	0.0	1.6
Electronics	0.5	1.2	-0.4	0.0	0.1	0.0	-0.1	1.4	0.1	2.8	1.8	0.0	0.0	0.0	0.0	0.0	7.3
Machinery	0.1	1.4	0.7	0.0	0.0	0.0	0.4	0.1	0.1	4.7	0.3	0.0	0.0	0.0	0.0	0.0	8.0
Traded Services	1.8	2.2	0.9	0.1	0.2	0.1	0.1	0.0	0.1	0.5	0.2	0.3	0.3	0.3	0.1	0.6	7.7
Construction	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6
Total	5.2	15.8	7.0	1.6	0.6	0.2	1.7	2.7	0.3	15.2	3.8	0.8	0.8	0.7	0.1	1.5	57.8

Data source: Results from simulations at current fob/cif price. A positive number indicates an increase in exports/imports from China and Taiwan entering the WTO..

Table 5 Differences between a WTO with and without China and Taiwan: Accumulated sectoral trade during 2002 – 2011: China

	United States	Western Europe	Japan	Australia & New Zealand	Canada	Mexico	Korea	Singapore	Hong Kong	Taiwan	ASEAN	South Asia	Latin America MFA	Mid east Africa MFA	Low income Africa	Rest of the world	World Total
Exports																	
Land-intensive	0.0	0.2	0.6	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.0	0.2	1.8
Non-grain crops	0.2	0.3	0.8	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.5	0.0	0.1	0.2	0.1	0.2	3.0
Livestock	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.2	2.0
Dairy and meats	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.2	1.2
Processed food	0.6	0.5	2.2	0.1	0.1	0.0	0.4	0.1	0.5	0.2	0.2	0.1	0.0	0.1	0.0	0.3	5.3
Tobacco Beverage	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.2	0.0	0.0	0.1	0.0	0.3	1.3
Forestry & Fishery	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Energy products	0.4	0.4	1.2	0.0	0.0	0.0	1.2	0.5	0.2	0.3	0.9	0.2	0.0	0.1	0.0	0.2	5.7
Mineral products	2.2	1.4	1.4	0.2	0.2	0.1	0.6	0.2	0.3	0.3	0.5	0.3	0.1	0.5	0.1	0.7	9.1
Textile	10.8	8.3	2.1	0.5	1.0	0.1	1.3	0.3	0.9	0.3	0.1	0.3	0.4	0.7	0.3	1.5	29.0
Apparel	74.8	31.4	8.9	1.0	4.3	0.4	0.9	0.4	1.1	0.4	0.5	0.1	1.7	1.6	0.2	6.3	133.9
Leather & shoes	13.2	5.8	2.8	0.5	0.7	0.3	0.5	0.2	0.0	0.4	0.4	0.1	0.9	1.4	0.3	4.0	31.6
Other Light Manuf	8.1	6.5	2.3	0.4	0.6	0.2	0.4	0.3	0.0	0.6	0.4	0.2	0.6	1.0	0.1	1.5	23.2
Wood & paper	2.3	0.9	1.2	0.1	0.1	0.0	0.2	0.2	0.3	0.4	0.2	0.0	0.0	0.1	0.0	0.2	6.2
Intermediates	9.7	8.2	4.6	0.9	1.0	0.2	4.1	1.6	1.7	2.1	2.8	1.0	0.7	1.8	0.5	2.2	42.9
Motor vehicle	2.1	0.7	0.7	0.1	0.1	0.0	1.2	0.2	1.0	0.3	0.2	0.3	0.0	0.2	0.1	0.2	7.3
Other Trans	3.7	3.5	1.2	0.4	0.7	0.1	0.2	0.9	0.2	0.9	0.8	0.3	0.9	0.7	0.6	1.4	16.4
Electronics	26.1	17.7	8.5	1.2	1.5	1.2	2.5	5.0	0.0	2.6	4.1	0.3	1.0	2.4	0.2	2.2	76.4
Machinery	25.7	17.2	8.7	1.5	1.5	0.5	2.0	2.8	0.0	4.2	4.2	1.6	1.4	3.5	0.9	3.6	79.1
Traded Services	2.1	6.9	1.2	0.3	0.3	0.2	0.3	0.3	0.2	0.5	0.8	0.1	0.4	0.6	0.2	1.2	15.4
Construction	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8
Total	182.0	110.8	49.3	7.2	12.0	3.2	16.6	13.3	7.6	13.9	17.4	4.8	8.3	15.1	3.5	26.5	491.7
Imports																	
Land-intensive	19.9	0.9	0.0	8.8	6.8	0.0	0.0	0.0	0.0	0.0	1.1	0.2	3.8	0.0	0.3	0.9	42.8
Non-grain crops	1.2	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.1	0.8	2.8
Livestock	-0.2	1.0	0.0	0.1	-0.1	0.0	0.2	0.0	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	-0.7	0.4
Dairy and meats	2.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.7
Processed food	4.1	7.9	0.9	0.3	0.7	0.0	1.1	2.4	0.7	0.1	0.2	-0.1	3.1	0.3	0.0	1.0	22.8
Tobacco Beverage	3.3	10.4	0.2	0.0	0.0	0.0	0.2	0.7	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.1	16.1
Forestry & Fishery	0.1	0.3	0.3	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.2	0.0	0.0	0.0	-0.1	-0.2	0.8
Energy products	0.4	0.5	0.2	0.2	0.0	0.0	2.3	5.5	0.0	0.0	1.5	0.1	0.0	4.4	0.3	1.2	16.5
Mineral products	0.6	4.0	0.6	0.3	0.1	0.0	0.7	0.3	0.6	1.7	0.8	0.5	0.2	0.1	0.0	0.2	10.5
Textile	-0.2	1.5	12.3	0.1	-0.1	-0.1	22.5	0.1	6.6	24.1	2.6	1.0	-0.1	0.0	0.0	0.5	71.2
Apparel	0.1	0.2	1.3	0.1	0.0	0.0	0.8	0.0	10.5	0.2	0.1	0.3	0.0	0.0	0.0	0.0	13.6
Leather & shoes	0.5	0.4	0.1	0.0	0.0	0.0	3.7	0.0	0.1	1.2	0.1	0.4	0.0	0.0	0.0	0.0	6.5
Other Light Manuf	0.4	-0.4	1.7	0.0	0.0	0.0	1.1	0.1	2.3	1.4	0.1	0.2	0.0	0.1	0.0	-0.1	6.8
Wood & paper	1.8	1.4	1.4	0.2	0.4	0.0	2.4	0.2	1.2	2.1	2.4	0.0	0.1	0.1	0.0	0.9	14.6
Intermediates	7.9	10.3	17.4	1.4	0.9	0.1	16.2	2.4	3.5	19.4	4.8	0.6	0.5	2.0	0.1	7.9	95.5
Motor vehicle	1.0	7.0	12.9	0.0	0.0	0.1	1.9	0.0	0.0	0.2	0.1	0.1	0.2	0.0	0.0	0.4	24.0
Other Trans	1.0	1.4	0.5	0.0	0.1	0.0	0.2	0.1	0.0	3.7	0.4	0.0	0.0	0.0	0.0	0.2	7.7
Electronics	2.5	2.1	20.0	0.0	0.2	0.0	10.2	3.4	3.7	6.3	3.4	0.0	0.0	0.0	0.0	0.1	51.9
Machinery	1.6	3.9	15.7	0.0	-0.1	0.0	6.1	1.8	7.0	14.2	1.8	0.0	0.0	0.0	0.0	-0.2	51.9
Traded Services	4.4	14.6	1.2	0.6	0.4	0.3	0.8	1.4	0.6	0.4	1.8	0.7	0.7	1.4	0.2	2.7	32.0
Construction	0.2	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	2.6
Total	52.6	69.2	87.3	12.2	9.5	0.5	70.6	18.6	37.5	75.7	21.8	4.1	8.8	8.5	0.9	16.0	493.6

Data source: Results from simulations at current fob/cif prices. A positive number indicates an increase in exports/imports from China and Taiwan entering the WTO.

Table 6 Impact of WTO Accession and Greater China Free Trade Area : Aggregated Economic Indicators by Region

	United States	Western Europe	Japan	Australia & New Zealand	Canada	Mexico	Korea	Singapore	Hong Kong	Taiwan	China	ASEAN	South Asia	Latin America MFA	Mideast & Africa MFA	Low income Africa	Rest of the World	World Average
Accumulated Growth from 2002-2011, percentage point change from baseline, accumulated Changes																		
WTO accession																		
Real GDP	0.22	0.16	0.18	0.33	0.2	-0.12	0.72	1.48	2.33	0.81	1.93	-0.17	-1.19	-0.11	0.14	-0.06	-0.01	0.22
Real Export	-0.10	-0.25	0.68	0.27	-0.25	-0.68	1.06	0.37	1.75	6.29	27.44	-1.10	-5.16	-0.73	-0.50	-0.46	-0.68	1.42
Real Import	1.94	1.59	2.36	1.43	0.54	-0.48	2.89	1.68	3.76	8.73	29.72	-0.19	-2.99	0.05	0.53	0.21	0.33	2.56
TFP	0.00	0.00	0.00	0.00	0.00	-0.04	-0.07	-0.31	0.14	0.19	1.92	-0.10	-0.17	-0.08	-0.08	-0.17	-0.07	0.10
Capital Stock	0.12	0.07	0.07	0.19	0.07	-0.10	0.29	0.65	0.81	0.74	1.38	-0.02	-0.58	-0.03	0.05	0.04	-0.01	0.12
Greater China Free Trade Area																		
Real GDP	0.21	0.14	0.16	0.33	0.19	-0.13	0.6	1.26	2.48	3.15	3.14	-0.22	-1.22	-0.12	0.16	-0.07	-0.02	0.27
Export	-0.10	-0.18	0.68	0.32	-0.21	-0.67	1.01	0.45	2.21	11.95	29.87	-1.10	-5.19	-0.69	-0.43	-0.41	-0.63	1.74
Import	1.93	1.49	2.27	1.43	0.54	-0.48	2.72	1.62	4.22	16.14	33.69	-0.26	-3.04	0.06	0.57	0.11	0.32	2.88
TFP	0.00	0.00	0.00	0.00	0.00	-0.04	-0.08	-0.37	0.16	0.26	2.32	-0.11	-0.17	-0.09	-0.08	-0.17	-0.08	0.13
Capital Stock	0.11	0.06	0.07	0.19	0.07	-0.1	0.27	0.56	0.42	2.02	2.46	-0.04	-0.58	-0.03	0.06	0.06	-0.02	0.16
Agricultural Labor Force Migration, 2001-2011, 1000 persons, accumulated changes																		
WTO accession	-30	-8	5	-5	-3	-14	-2	0	0	20	2780	-100	-257	-117	5	25	-47	2252
Greater China FTA	-31	-11	4	-5	-3	-14	-2	0	0	29	2495	-120	-275	-121	3	34	-66	1917
Change of Equivalent variation, Billion 1997 US$, annual average																		
WTO accession	12.7	10.2	6.6	1.3	1.0	-0.6	3.1	1.4	2.4	3.3	27.8	-0.2	-4.5	-0.9	0.9	-0.1	0.0	64.2
Greater China FTA	12.5	9.2	6.2	1.3	0.9	-0.6	2.8	1.2	1.4	8.4	41.3	-0.4	-4.5	-0.9	0.9	0.0	-0.2	79.4
Real Exports, Change from baseline, 2001-2011, Billion 1997 US$ in fob price, annual average																		
WTO accession	-0.6	-1.4	1.4	-0.2	-0.3	-0.2	0.7	0.4	0.2	6.7	94.1	-0.8	-2.1	0.1	-1.2	-0.2	-1.7	95.1
Greater China FTA	-0.5	0.0	1.6	-0.1	-0.2	-0.2	1.0	0.5	-0.1	8.4	95.7	-0.7	-2.1	0.1	-1.1	-0.1	-1.3	101.0
Real imports, Change from baseline, 2001-2011, Billion 1997 US$ in fob price, annual average																		
WTO accession	15.8	9.9	6.7	0.8	0.8	-0.3	2.7	1.5	1.9	6.8	49.5	-0.8	-1.5	-0.5	0.7	0.0	0.9	95.1
Greater China FTA	15.6	9.3	6.5	0.8	0.8	-0.3	2.6	1.4	1.1	10.8	53.3	-0.8	-1.5	-0.5	0.8	0.1	0.8	101.0
Nominal trade balance, Change from baseline, Billion US$, annual average																		
WTO accession	-1.0	0.1	0.3	0.0	0.0	0.2	0.6	0.1	0.0	0.0	-0.1	-0.2	-0.4	0.2	0.0	0.0	0.1	0.0
Greater China FTA	-1.4	0.0	0.3	0.0	0.0	0.3	0.7	0.1	0.0	0.5	-0.1	-0.2	-0.5	0.3	0.0	0.0	0.1	0.0
Term of trade, Change from baseline at 2011, percent																		
WTO accession	0.63	0.47	0.89	0.98	0.40	-0.20	1.34	0.53	1.42	-0.57	-5.51	0.20	-1.24	0.18	0.34	0.52	0.22	
Greater China FTA	0.63	0.43	0.85	0.99	0.41	-0.21	1.24	0.52	1.71	1.94	-4.99	0.18	-1.28	0.19	0.35	0.55	0.22	

Data source: Results from simulation.

Appendix Table Key Substitution Elasticities Used in the Model

	Domestic / Imports [a]	Sources of Imports [a]	Primary Factors [a]	Value-added / Intermediate [b]
Rice	1.760	3.520	0.248	0.628
Wheat	1.760	3.520	0.248	0.628
Other grains	1.760	3.520	0.248	0.628
Oilseeds	1.760	3.520	0.248	0.628
Planted fiber	1.760	3.520	0.248	0.628
Non-grain crops	1.760	3.520	0.248	0.628
Livestock	2.100	4.387	0.248	0.628
Dairy and meats	1.430	2.860	1.120	0.628
Processed food	1.430	2.860	1.120	0.628
Tobacco & Beverage	2.015	4.030	1.120	0.978
Forest and fishery	1.820	3.640	0.200	0.628
Energy products	1.455	3.245	0.398	1.147
Mineral	1.820	3.640	0.977	1.147
Textiles	1.430	2.860	1.260	0.978
Clothing	2.860	5.720	1.260	0.978
Leather & shoes	2.860	5.720	1.260	0.978
Other light manufacture	1.820	3.640	1.260	0.978
Wood & paper	1.382	2.925	1.260	0.978
Intermediates	1.513	2.949	1.260	0.978
Motor vehicle	3.380	6.760	1.260	0.804
Other Trans	3.380	6.760	1.260	0.804
Electronics	1.820	3.640	1.260	0.804
Machinery	1.820	3.640	1.260	0.804
Traded Services	1.235	2.470	1.407	0.321
Housing, utility and construction	1.336	3.021	1.326	0.321

Data Source: a. Down scale from version 5 GTAP elasticities (Hertel, 1997).
b. Based on G-cubed model (McKibbin, 1998).