WTO Accession, "Greater China" Free Trade Area and Economic Integration 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 with import embodied technology transfer, trade policy induced total factor productivity (TFP) growth, and explicit treatment of TRQ of agricultural products. 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.

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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. In recent years, Taiwan has actively pushed for its ambitious drive to be the Asia-Pacific Regional Operation Center along the line with its WTO accession that further liberalized its economy. With more than two decades of market-oriented reform, China has also advanced rapidly in international trade. Its trade volume has grown from 38 billion US dollars in 1980 to 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. In 2002, China became the fifth largest exporter in the world with annual trade over 620 billion U.S. dollars (exports 325.6 billion). The total external trade of China, Taiwan and Hong Kong have been over US$810 billion since 1999 (after netting out intra-regional trade among them), far exceeding the total trade of Japan and amounting to about half of that of the United States. Their 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:"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 $40 billion in 2002. The dependence of Taiwan's exports on China and Hong Kong's market increased dramatically from less than 8 percent in 1987 to about 30 percent in 2002. 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 exceed the United States became Taiwan's largest export market in 2002. The rapid growth of indirect trade was fueled by Taiwan's direct investment in China. The actually used direct investment from Taiwan reached $25.5 billion by

the end of 2002 and accounted for nearly half (48.3%) of Taiwan's total overseas investment[1]. While nearly 60% of China's total FDI inflow during the reform period comes from Taiwan and Hong Kong.

Although political tension over the issue of sovereignty promises no easy solution, economic relations between China and Taiwan are expected to improve further after the two economies entered the WTO. During the accession negotiation, neither China nor Taiwan exercised a legal option under Article 13 of the WTO Charter to exclude the other from MFN treatment. The option was seriously considered by Taiwan, but rejected. It means that Taiwan accepted the obligation to grant mainland China full MFN treatment eventually, which is likely to intensify the already significant economic integration between the mainland and Taiwan. The increasingly deepening economic ties driven by market forces between the three Chinese economies may eventually bond them into a common market exemplified by the West European experience (Cheng, 1998). The world is very likely, therefore, to witness the gradual emergence of a Chinese Economic Area (CEA) in East Asia. It would contain an array of potential markets that far exceed that of Europe and has the potential for providing a principal engine of world economic growth in the twenty-first century.

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. 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 investment. Shortly after their WTO entry, Taiwan open additional 2,126 items in the 10-digit HS schedule for imports from China on February 15, 2002, making the percentage increased to 73 percent. Taiwan also plans to open investment from the mainland on various sectors by three stages and enhance financial exchange across the Strait.

1. Taiwan's official statistics 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. Perng Fai-nan, governor of Taiwan's Central Bank, estimated that by the end of 2002 the real figure of Taiwan's cumulative investment in China was about 66.8 Billion, which is more than 60 percent of Taiwan's total overseas investment (China Times, January 2003).

Implementing these liberalization commitments fully by both parties implies a substantial reduction in tariffs and non-tariff barriers across all economic sectors and across-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? 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 and explicit specification of Tariff Rate Quota (TRQ) in agricultural products 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 2012. Simulation results show that both China and Taiwan will substantially benefit from their WTO memberships. 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. 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 the "invisible hand" and economic globalization.

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. Major Features of the CGE Model

The model used in this paper is an extension of the CGE models used in China's WTO accession study by Wang (1999, 2001, 2003) with import embodied technology transfer, trade policy induced total factor productivity (TFP) growth, and explicit treatment of TRQ of agricultural products. It has 17 fully endogenized regions and 25 production sectors, six primary factors of production in each region. It is part of a family of models used widely to analyze the impact of global trade liberalization and structural adjustment programs. 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 modeling 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. Because of space limitation, only recursive dynamic linkage and the specification of TQR – a new feature of the model first introduced in this analysis are presented here. Classification of factors, sectors and regions of the model are list in Wang (2003, pp3-4), detailed algebraic specification of production, consumption, price system, trade-productivity linkage and intra-period static equilibrium of the model are given in Robinson, Wang and Martin(2002, pp25-31).

2.1. Non-tariff barriers and Tariff rate quotas

It is well known that China's actual tariff rate is already relative low prior to its WTO accession. However, quantitative and trading rights restriction, state trading regulations and other non-tariff barriers (NTB) are still significant barriers to trade, especially in some agricultural commodities and most services sectors. Implementing TRQ on certain agricultural products also constitute an important aspects of China's market access commitment. Without modeling NTB and TRQ properly will miss a major part of China's WTO accession story. Therefore, in a new version of the model used in this analysis, the difference between domestic price and world price are specified in two parts, i.e. the tariff rate and NTBs, which is modeled as the tariff equivalent

that creates a pure rent to the state. Furthermore, the quantitative restriction on imports is modeled either through a binding constraint where imports cannot exceed the quota allocation and the rates of NTBs (quota rent here), TN_{ir}, are solved endogenously to clear the market, or via a tariff rate quota system (certain agricultural goods) formulated as a mixed complementarity problems (MCP). In the latter case, both the rates of quota rent, TN_{ir}, and over-quota import, AM_{ir} is endogenous, i.e. whether the quota is binding or not is endogenously determined by the model. Following equations define the quota and TRQ system in the model as a MCP problem:

$$\frac{1}{\mu_{ir}} \times \{\sum_{s \in R} \xi_{irs}^{\sigma_i} \times [(1 + tmh_{irs}) \times ER_r \times PWM_{irs}]^{1-\sigma_i}\}^{\frac{1}{1-\sigma_i}} \geq PM_{ir} \wedge AM_{ir} \geq 0 \tag{1}$$

$$AM_{ir} \times (\frac{1}{\mu_{ir}} \times \{\sum_{s \in R} \xi_{irs}^{\sigma_i} \times [(1 + tmh_{irs}) \times ER_r \times PWM_{irs}]^{1-\sigma_i}\}^{\frac{1}{1-\sigma_i}} - PM_{ir}) = 0 \tag{2}$$

Here $AM_{i,o}$ is a primal variable and there is a dual (price) equation associates with it in a complementarity specification. The economic logic is that above-quota imports will only occur when the domestic import price PM_{ir} is equal to the aggregate world price plus the above-quota tariff tmh_{irs}. However, when domestic import price less than world price plus the above-quota tariff, the above-quota imports, AM_{ir} has to equal to zero.

$$\frac{1}{\mu_{ir}} \times \{\sum_{s \in R} \xi_{irs}^{\sigma_i} \times [(1 + tm_{irs} + TN_{ir}) \times ER_r \times PWM_{irs}]^{1-\sigma_i}\}^{\frac{1}{1-\sigma_i}} \geq PM_{ir} \wedge QM_{ir} \geq 0 \tag{3}$$

$$QM_{ir} \times (\frac{1}{\mu_{ir}} \times \{\sum_{s \in R} \xi_{irs}^{\sigma_i} \times [(1 + tm_{irs} + TN_{ir}) \times ER_r \times PWM_{irs}]^{1-\sigma_i}\}^{\frac{1}{1-\sigma_i}} - PM_{ir}) = 0 \tag{4}$$

Here QM_{ir} is in-quota imports, a primal variable and there is dual equation associate with it. This equation relates the domestic import price and aggregate world price through the in-quota tariff rate tm_{irs} and the quota rent, TN_{ir}, so that when $QM_{ir} < trq_{ir}$, the domestic import price PM_{ir} is equal to the aggregate world price plus the in-quota tariff tm_{irs}, however, when the quota is binding, i.e. when $QM_{ir} = trq_{ir}$, PM_{ir} can rise higher than the world price plus in-quota tariff, which implies the quota rent TN_{ir} will be greater than zero. Therefore, we need an additional

complementarity-slack condition in the model as:

$$QM_{ir} \le trq_{ir}, \qquad TN_{ir} \ge 0, \qquad TN_{ir} \times (trq_{i,o} - QM_{ir}) = 0 \tag{5}$$

Finally, the total imports will always equal to in-quota imports plus above quota imports, i.e.

$$MX_{ir} = AM_{ir} + QM_{ir} \tag{6}$$

Similar to Hertel et al. (1995), the MFA quota rent is assumed to be captured by exporting countries as export taxes. However, it is also specified as a MCP problem in the model. When the quota is binding, the export tax rates will be greater than zero and adjust endogenously to equate with quotas, while when the quota is non-binding, the export tax rate will equal to zero. Mathematically

$$X_{isr} \le XQT_{isr}, \qquad TE_{isr} \ge 0, \qquad TE_{isr} \times (XQT_{isr} - X_{isr}) = 0 \qquad i \in MFA \in I \tag{7}$$

Where XQT_{isr} is the MFA quota amount that country r imposed on textile and clothing products originate from country s, X_{isr} is exports from country s to country r, TE_{isr} is export tax rate.

2. Inter-period Linkages

The model has a simple recursive dynamic structure. 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 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 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.

Equations 8 to 12 define the recursive rules of five types of factor endowment (natural resource are sector specific and held constant, it can be modified if more reliable data become available). For instance, capital stock in each region at period t equals last period's capital stock plus the region's gross investment minus depreciation. While unskilled labor equals last period's employment multiply by population growth rate, plus rural-urban migration, $MIG_{rt,}$ minus the increase of skilled labor SK_{rt} (set exogenously).

$$FS_{RLr,t} = (1 + n_{rt}) \times FS_{RLr,t-1} + MIG_{rt} \tag{8}$$

$$FS_{ULr,t} = (1 + n_{rt}) \times FS_{ULr,t-1} + MIG_{rt} - ds_r \times \overline{\nabla SK_{rt}} \tag{9}$$

$$FS_{KAr,t} = (1 - dk_r) \times FS_{KAr,t-1} + INV_{rt} \tag{10}$$

$$FS_{LDr,t} = (1 - dl_t) \times FS_{LDr,t-1} \tag{11}$$

$$FS_{SLr,t} = (1 + n_{rt}) \times FS_{SLr,t-1} + ds_r \times \overline{\nabla SK_{rt}} \tag{12}$$

(12)

Equation 13 specifies the wage differential between agricultural labor and unskilled manufacturing labor, which drives the rural-urban migration and approach to one over time.

$$\frac{PF_{ALr,t}}{PF_{ULr,t}} = wdf_r^{\exp^{-t\varphi_r}}$$

(13)

The model was calibrated around a world Social Accounting Matrix (SAM) estimated for 1997 based on most recent version (5.3) 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 (Brooke, et. al. 1988) 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 study, 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[2] (China and Taiwan); (3) reduction of non-tariff barriers in agricultural commodities and implementation of TRQ 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).[3]

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

3. 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

Because both China's and Taiwan's market accession commitments to WTO entry will be phased in over a transition period, a baseline from 1998–2012 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 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.

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 as a residual and adjustment mechanism in the 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.

Table 1 summarizes the major macroeconomic assumptions and results from the baseline calibration. The economy-wide TFP variable in each region is solved under assumptions on the three major macroeconomic variables (gross investment, government spending, and balance of trade) in the model to match the pre-specified growth rate. 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 2001–2012 are specified as percentages of GDP and are also 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

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.

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.

During past decade, China's tariff collection has been 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[4]. 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 level of protection with other regions as their commitments to the WTO. Since the model includes an international transportation sector by using route-specific shipping margins from the GTAP database[5], 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. 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.

4. This is a hypothetical scenario based on the fact that there are many proposals and discussions on the possibility of a "greater China" economy in both academic and business cycles across Taiwan Straits.

5. 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).

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 second scenarios with the baseline provide estimates of the impact of China and Taiwan joining the WTO and the differences between the third and the second simulation scenario provide estimates of impact of a greater China FTA. 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.

IV. Simulation Results

4.1 Growth and Aggregate Impact

Table 3 summarizes major aggregate economy-wide effects from the two simulation scenarios by presenting their accumulated difference with the baseline over the simulation period (2003-2012). It shows that China and Taiwan enter the WTO will accelerate world economic growth, the total accumulated world GDP growth would be 0.23 percentage points higher in 2012 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 0.2 percentage points (0.09 percentage points for Taiwan) a year from 2003 to 2012, and 2.1 percentage points higher (0.9 percentage points higher for Taiwan) in 2012 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 2012, real GDP growth would be 0.22 per cent higher in the United States and 0.17 per cent higher in Japan than in the case of a WTO without China and Taiwan. Newly Industrialized 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, will be slightly negatively affected, especially those MFA quota restricted countries in ASEAN, South Asia and South

America.[6] Production resources in those countries' manufacturing sectors will be diverted away to other activities because stronger Chinese competition would reduce the profitability of many manufactured products in the world market.

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 3, real purchasing power measured by the Hicksian equivalent variation (discount to present value of 2002) rises in almost all regions across the world, about US$308 billion for the world as a whole over the ten year simulation 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, real purchasing power would increase by $59, $42 and $36 billion US dollars for the United States, European Union and Japan during the whole simulation period respectively.

It is also apparent from simulation results listed in table 3 that a Greater China FTA is beneficial to the three Chinese economies involved. It entails an additional net accumulated welfare gain of $18 and $71 billion for Taiwan and China respectively, and economic growth rate for all the three Chinese economies will be boost up (accumulated real GDP growth rate increase additional 0.14 percentage point for Hong Hong, 2.5 percentage for Taiwan and 1.3 percentage point for China). Taiwan will gain more by further integrating its economy with China than its WTO entry because of a 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 globally.

However, the results on aggregate trade performance indicated by both the growth rate and volume of real trade reported in table 3 show mixed trade creation and diversion effects by China and Taiwan's WTO accession and the formation of a "greater China' FTA. Total real exports increase significantly for China and Taiwan but decline slightly for other economies.

6 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 from the world trade liberalization process. In other words, those countries gain less than the case excluding China.

Therefore, the welfare effects on other economies are also mixed. Generally speaking, industrial and newly industrialized economies would benefit from further integration of Chinese economies because their factor endowment and stage of technology development are quite different from China. Favorable changes in international terms of trade for those economies are a major underlying factor. As we will discuss more detail in next section, integrating China with Taiwan and Hong Kong and with the world economy enable China dramatically increase its production and exports of manufactured goods, 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 3), 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 (such as countries in the Mideast) may also benefit from surge demand for their exports. While countries have similar endowment and export structure to China such as those MFA quota restricted developing counties in Asia and South America would suffer a small welfare loss. It is partially due to the adverse terms of trade effect, partially caused by trade diversion effect induced by the liberalization of Chinese economy[7].

In general terms, these aggregate results are consistent with findings from other modeling efforts to assess the impact of trade liberalization in China (Gilber and Wahl, 2002). As classical trade theory indicates, removing trade barriers leads to increase in economic efficiency. However, evaluating aggregate effects alone provide limited insight into understanding what

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7 This simulation result 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. In other words, the model in current setting may overstate the competitive effect of China's WTO accession and further liberalization of Chinese economies.

factors shaping these aggregate outcomes. Therefore, to fully understand factors underlying these aggregate outcomes, it is necessary to further investigate the changes in net trade at sector level to find out what factors in particular driven the dynamics of each region's comparative advantages, which are decisive forces cause structural adjustment in each regional economy and shift trade patterns among regions.

4.2 Impact on World Net Trade Patterns

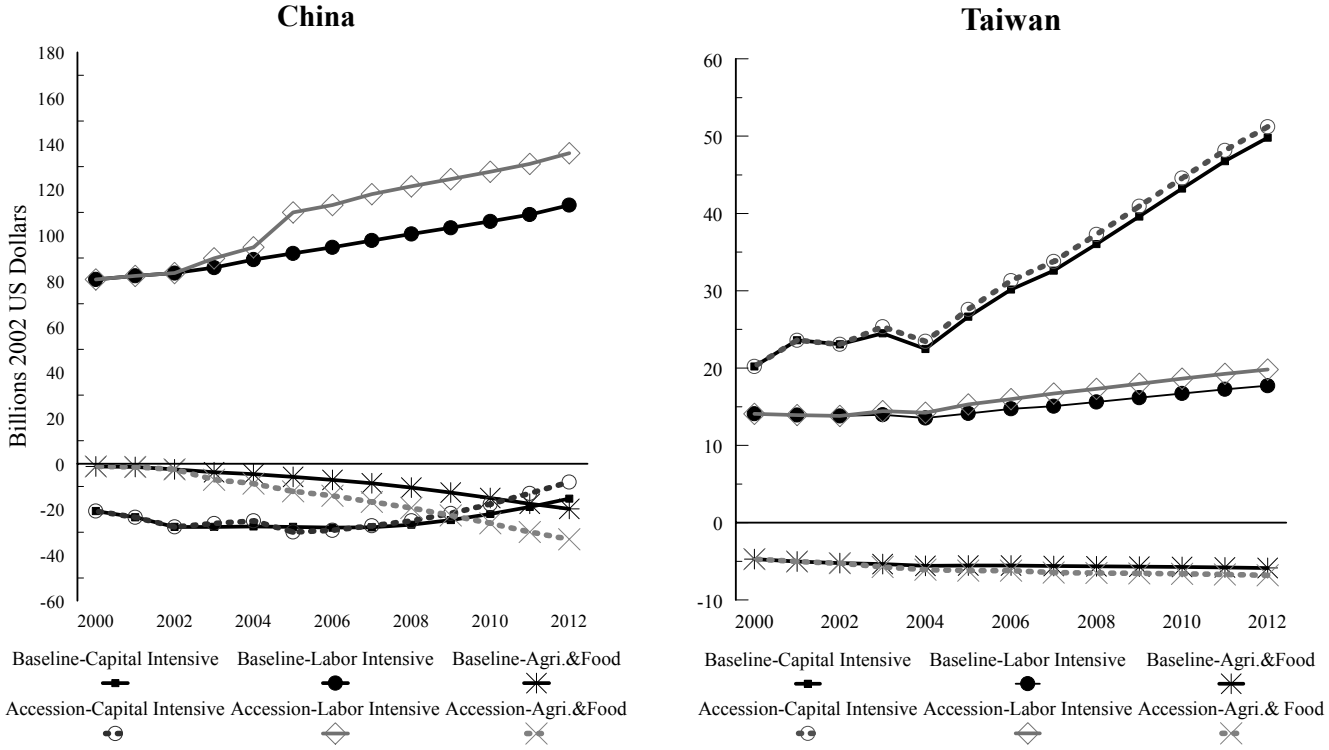
Figure 1 shows the time path of net trade flows in agricultural, labor- and capital-intensive products for China and Taiwan during the simulation period under the first two scenarios. Even if excluded from the WTO, China's net exports of labor-intensive products and net imports of food and agricultural products will continue to increase because of China's rapid industrialization and population growth. WTO accession will accelerate this trend. The average annual growth rate of China's net exports in labor-intensive goods during the ten-year simulation period will increase from 3.1 to 5 percent. Its net land-intensive imports will increase from 16.3 to 27.6 per cent, resulting in an additional US$175 billion net exports of labor-intensive manufactures and US$47 billion additional net imports of food and agricultural products (Table 4). However, the increased net imports of land-intensive products are mainly oilseeds (soybeans, which not subject to TRQ) and feed grains, rice and wheat only consist less than 10 percent because the restriction of in quota imports and very high above quota tariff rates. This simulation result is quite different with many earlier studies conducted by the author and other researchers that did not treat the TRQ system explicitly. In those earlier studies, the increased net imports of rice, wheat and plant fiber for China were much higher (Wang 2001, 2003, Gilber and Wahl, 2002). It may partially explain why China's agricultural imports during its first two-year in the WTO did not increase as rapid as many had expected prior China's WTO accession.

Despite China's net imports of capital-intensive products will increase by US$23 billion because of its WTO accession (Table 4) during the same period, there is a general declining trend over time under both simulation scenarios after 2006, and it will decline in a faster pace after China's WTO accession. It indicates that exports in some capital-intensive products from China are rising faster than their imports and there is an industrial upgrade process going on as China continues to grow and industrialize. A check in the sector composition of China's net trade of

capital intensive products in Table 4 (China column) 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$36 billion), machinery (US$49 billion) and other transportation equipment (US$11 billion), and those products would replace part of the net exports previously from OECD and some Asian NICs. At the same time, China's net imports of manufactured intermediates will dramatically increase by US$56 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 labor-intensive sector and is now happening in the above-mentioned three categories of capital-intensive products.[8] Similar patterns also occur in the changes of Taiwan's net trade. However, the growth rate in net exports of capital intensive goods is much higher than the growth rate in net exports of labor-intensive products because Taiwan as a newly industrialized economy started its industrial upgrade nearly two decades ago and already very competitive in world manufacturing market.

8 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.

Figure 1 Impact of WTO accession on China's and Taiwan's net trade patterns – agricultural, labour and capital-intensive products, 2000–2012



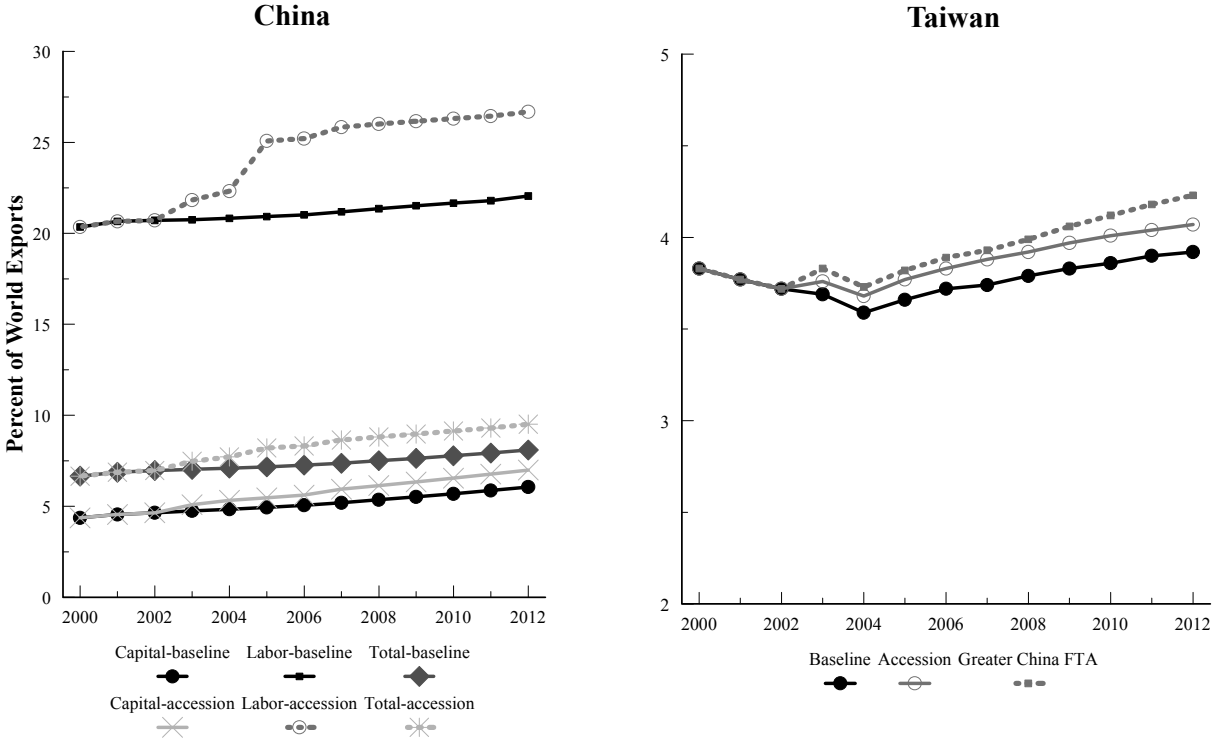
Where would those additional net manufactured exports from China and Taiwan go and where would those additional net imports in food and agricultural products by China and Taiwan come from? Table 4 shows that part of those increased labor-intensive exports from China will go to markets in industrial countries, 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 4 also shows that a large part of those increased net imports of land-intensive and other food 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 quarter) 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 (which are land scarce economies), thus increasing these countries' net import demand for land-intensive agricultural products, as shown in Table 4. It is also interesting to note the different adjustment pattern in net trade between Japan, Asian NICs, ASEAN and other countries in response to China's dramatic expansion in apparel production. Contracting to net exports decline in both apparel and textile industries in most countries, Japan Asia NICs and ASEAN reduce their clothing net exports on one hand, but increase their textile net exports on the other hand (see textile row of table 4). This disparity in adjustment reflects the continuing trend that labor intensive production are further shifting from other part of Asian to China as a results of production relocation process in East Asia. Trade liberalization in China will accelerate this trend. The Asia NIEs are becoming upstream suppliers of many intermediate inputs for China's labor intensive products (textile is one of them, China will increase its net imports by nearly 45 Billion during the simulation period), while China is becoming a downstream processing and assembling base for Asian NIEs.

Why do China's net imports in capital-intensive products show a declining trend over time in both simulation scenarios (Figure 1)? Wang (2003) pointed out three factors that contribute to this trend. (1) The quantitative constraints such as MFA quotas in developed countries' markets that limit China's growth potential in producing labor-intensive products. (2) Rybczynski effect due to dramatic FDI inflows in recent years, and (3) the rapid growth of processing trade in China's total exports may exaggerate the extent of industrial upgrade in China's exports. However, understand the linkage between the distribution of global FDI and international segmentation of commodity production in recent years and the role of FDI has

played in driving structural change in China are the key to understand such simulation results. Since 1980'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 the same industry but at different stages of production is an organic part of the globalization process that implies the reorganization of production on a worldwide basis. Distributing and re-distributing global FDI along such a segmented commodity production chain according to changing comparative advantage of different geographic locations is an important aspect of economic globalization. Large amount of FDI flows to China in the 1990's represents relocation of the downstream, labor-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 certain capital and technology intensive sectors, based on in-depth specialization along production process. China became specialized in the downstream segments of manufacturing production, in which it has a comparative advantage, relying on imports of intermediate goods and components (Lemoine, 2000). As results, it not only becomes more and more competitive as a net exporter of labor-intensive goods, but also emerges as an net exporter in some capital-intensive manufactured products in the world market during its integration with the global economy. This trend will become stronger and stronger over next decades as our simulation results indicate. It means China will be a net exporter of most manufacturing products, include low end capital-intensive products as a long term trend, and emerging as the world largest and cheapest manufacturing center in the yeas to come. Figure 2 illustrates WTO accession and forming a 'greater China' FTA will increase world market share of manufactured products for both China and Taiwan, strengthen their position as world major exporters during next decade. By 2012, China's labor intensive manufactured exports will take about 30 percent of world market, and the Chinese Economic Area will provide about 15 percent of global manufactured exports.

Figure 2 WTO entry and a 'Greater China' FTA increase both China and Taiwan's manufactured export share in the world market, 2000-2012



Besides the globalization of commodity production, the competition in the global market has also played a key role for China emerging as a world manufacture center. Numerous studies (Gereffi, 1998) noticed the growing globalization of business activities along a world commodity production chain[9] that spans many economies, with each economy only 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.

9 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.

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 (liu, 2003). Second, the size of the labor force in China is very large, consisted 29 percent of world labor supply in 1995. It is expected to reach 814 million by 2025, which is 2.1 times the figure of all OECD countries. 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 175 million underemployed agricultural laborers could also be shifted to manufacturing enterprises.(Wang, 1999) 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 almost all manufacturing products in the years to come.

4.3 Impact on Economic Integration between China and Taiwan and Trade Relation with their Major Trade Partners

China’s emerging as a center of world manufacture has significant implications for its major trade partners. Naughton (1997) has noticed that 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.[10] 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 5 and 6, 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 concentrated in manufacturing sectors (US$34 billion labor-intensive and US$62 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$28 billion), manufactured intermediates (US$22 billion), electronics (US$7 billions) other machinery and other transport equipment (US$20 billions). Due to Taiwan's current highly restrictive import policy for goods from China on which the model simulation is based, the increase of China's exports to Taiwan is relatively smaller in value term, but high in percent term. It also concentrates in manufacture goods, with more than 70 percent capital-intensive products. Such dramatic increase in intra-industrial trade across strait, reflecting capital-intensive manufacture firms in both sides will be deeply integrated.

While increasing its exports to China dramatically, Taiwan reduces its manufactured exports to its other trade partners in many sectors. However, its exports of motor vehicle parts and electronic products to the rest of the world would increase, indicates integration with China will accelerate Taiwan's specialization and industrial upgrade. In the mean time, Taiwan's imports would increase significantly, not only from China, but also from major industrial countries and some advanced Asia neighboring economies such as Singapore and Korea (Table 5). This is because when Taiwan increase its manufactured exports to China, its demand for high-end capital and technology-intensive manufactured inputs and services from industrial

10 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

countries and advanced Asian economies also increase in order to meet demand on upgrading its industrial structure and enlarging production capacities.

Interestingly, different from what happens in Taiwan, Table 6 shows that when China increases its exports to Taiwan, its exports 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 back to Taiwan or industrial countries.[11] The dramatic increase of such products imported from Taiwan further boost China's manufactured exports.

It is evident from Tables 5 and 6 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 the world manufactured goods market. Therefore, there is a simultaneous expansion of capital and technology-intensive production and exports from both China and Taiwan, especially for electronics and machinery. 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 (see China's export expansion to other countries in Table 6)[12].

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

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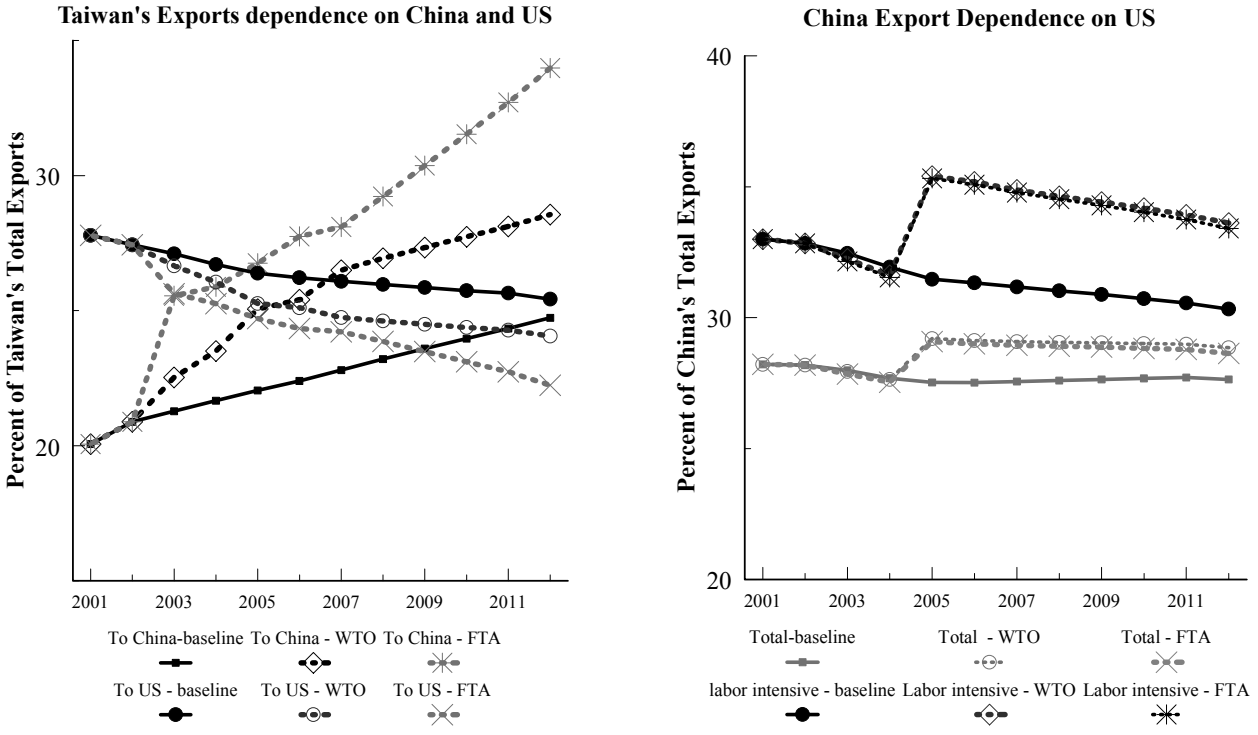
accounted for 25 per cent of its total exports while Taiwan's exports to China accounted for 18 per cent.

11 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.

12 Eliminate trade barriers across Taiwan Strait will further accelerate this trend, the detailed simulation results on changes in trade flows from the 'greater China' FTA scenario will not report here because of space limitation, but available from the author upon request.

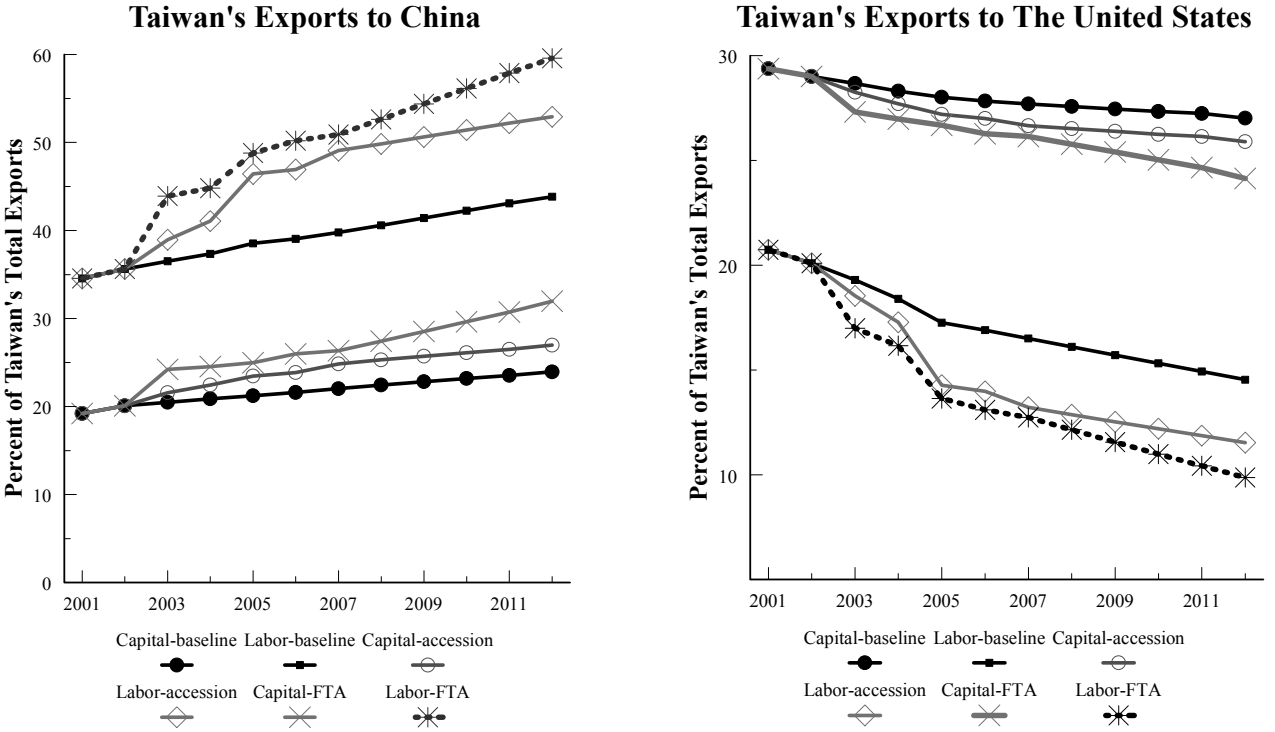
formation of greater China FTA, will further increase Taiwan's export dependence on China by additional 4 and 9 percentage points respectively, decrease its dependence on US and other countries' markets, and thus enable China to exceed the United States to become its largest export market. China will absorb nearly half of Taiwan's labor-intensive exports and more than a quarter of Taiwan's capital-intensive exports by 2008 after China and Taiwan enter the WTO, and these shares will increase to 59.6 and 32 percent in 2012 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 3-4 percentage points increase would be incurred if the greater China FTA proposal were adopted.[13] In the meantime, Taiwan's export dependence on the United States further decline by about 3 percentage points.

Figure 3 Redirection of trade flows between China, Taiwan and the United States, 2002-2012



13 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, 2000–2012



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 3 (nominal trade balance) because of the reductions of US trade deficits with Taiwan and other Asian countries (see table 5, first column, Taiwan reduce its export to but increase its import from US because WTO accession). As China exports more finished manufactured products to the United States, it will import more intermediate and capital inputs from Japan, Taiwan, Hong Kong, Korea, Singapore and ASEAN countries, increasing its trade deficit with those Asian economies (compare China's exports to and imports from those economies in Table 6). Trade surplus with the US and trade deficit with the Asian region clearly show the fact that China will play the role of a downstream manufacturing base for Asian affiliates producing for developed country markets in the coming decades. 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. Trade liberalization in China and Taiwan's 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 efforts are made by governments on both sides of the Strait, this economic integration process may only be slowed down or accelerated. The future direction of the course is impossible to change fundamentally by any political wills.

V Conclusions and Policy Implications

This paper provides a quantitative assessment of the impact of China's and Taiwan's WTO memberships and forming a 'Greater China' FTA on cross-Strait economic integration by a numerical applied general equilibrium model for world production and trade. Results 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 accelerate its industrialization from expansion of imports from Taiwan fuelled by direct investment, reduce the pressure of unemployment and expand its manufacturing exports to the rest of the world.

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 after its WTO entry. 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 and integration of Chinese economies. Only developing countries with an endowment and export structure similar to China's, such as South Asia and ASEAN countries will experience keener competition in labor-intensive exports and lower prices for their products.

In recognizing the 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 integration between China and Taiwan will further accelerate after their WTO accession. 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. As a politically unified China remains a distant goal rather than a short-term possibility, a realistic and desirable strategy to promote a peaceful and stable cross-Strait relationship after WTO entry could be started from resuming the 'three direct links' towards establishing a Greater Chinese Common market, which includes Taiwan, Hong Kong and Macao and mainland China as equal active partners. This integrated economic entity will be able to consider the division of labor among Chinese economies from a global market perspective and promote the best strategy for upgrading the industrial structure for all members. The intermediate role of Hong Kong in trade and investment relations across the Taiwan Strait may diminish during such cross strait economic integration process. However, given Hong Kong's "free port" status, a free trade area among the three Chinese economies may have more economic rational than a custom union to form the economic foundation for a Chinese common market. If the

leaders on both sides of the Taiwan Strait have enough political wisdom to make full use of the opportunity brought by China's and Taiwan's WTO entry to establish such deep and broad dimensions of economic cooperation[14] as their clear mid-term objective, it may not only generate economic benefits to all Chinese economies but also prevent future security incidents in the Taiwan Strait area. This strategy hence provides a win-win prospect for China, Taiwan and the United States.

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 model 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, the paper 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. 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[15] (See Appendix B in Wang (2001) for key elasticities used in the model). Therefore, the results

14 It includes free trade and mobility of production factors among members, financial and monetary integration and co-ordination of economic policies. It will be based on WTO rules to make the institutional arrangement for cross-Strait trade and investment.

15 The major conclusions from this study are robust. There are similar studies conducted by the author using an earlier versions of the model and version 4 or 5 GTAP database (Wang, 1999, 2001, 2003). Although there are substantial changes in model structures, base year data, macro assumptions and initial protection rate as well as different versions of China and Taiwan's WTO offers, the basic results obtained from this paper are quite similar to previous studies, in spite of variation in the numerical size of estimated impact. For sensitivity of simulation results due to variations in elasticities, see section 8.5 in Wang (1994).

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, %, 2003-2012																		
Real GDP	**3.1**	**2.6**	**1.4**	**3.4**	**3.0**	**4.7**	**4.9**	**5.4**	**3.9**	**5.0**	**6.9**	**5.5**	**6.8**	**4.3**	**4.3**	**3.8**	**6.1**	**3.5**
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	**3.4**	**3.4**	**3.4**	**4.0**	**3.2**	**8.4**	**8.0**	**2.7**	**2.6**	**6.3**	**7.9**	**6.8**	**5.9**	**5.6**	**8.4**	**8.4**	**6.6**	**6.0**
TFP	0.8	1.1	0.3	0.7	1.2	0.5	2.3	4.5	1.0	1.8	3.3	2.1	2.7	1.5	1.0	0.4	3.6	1.5
Capital Stock	4.5	2.9	2.0	4.2	4.0	4.7	4.6	4.9	2.9	5.1	9.5	4.8	7.0	3.1	2.3	2.8	3.9	3.8
Gross Investment	4.4	3.4	1.6	4.7	4.4	7.5	4.5	4.9	2.1	4.6	8.0	6.2	7.4	4.2	4.1	4.0	5.7	4.3
Government Spending	2.3	1.5	1.4	2.6	2.5	3.1	2.2	4.0	1.5	3.5	8.1	4.6	5.2	4.6	4.7	4.4	6.6	2.7
Real Exports	2.9	3.3	2.3	2.7	2.8	2.7	5.2	5.6	1.7	4.3	5.2	5.1	7.8	4.0	4.3	3.9	5.3	3.9
Real Imports	3.6	3.5	2.2	3.9	3.3	5.6	4.7	5.9	3.5	4.5	5.9	5.4	5.6	4.1	4.4	3.9	5.4	4.2
HH. Consumption	3.0	2.6	1.3	3.4	2.9	4.9	5.3	6.2	6.0	5.4	5.7	5.4	6.5	4.2	4.3	3.6	6.2	3.4
Total Absorption	3.2	2.5	1.4	3.6	3.2	5.3	4.8	5.4	4.6	5.0	7.0	5.5	6.5	4.3	4.4	3.8	6.1	3.5
Average annual agricultural labor force migration, 1000 persons, 2003-2012																		
Ag. Labor migration	20	60	4	5	2	166	41	0	0	14	3245	1098	2530	278	676	1249	1392	10781
Labor composition, %, 2002																		
Agricultural labor	**2.3**	**4.7**	**4.5**	**5.5**	**2.7**	**21.6**	**10.9**	**0.2**	**0.6**	**9.5**	**69.5**	**54.2**	**59.5**	**22.9**	**31.0**	**66.1**	**27.5**	**46.3**
Unskilled labor	**60.4**	**62.7**	**75.0**	**59.6**	**58.1**	**63.2**	**74.2**	**70.5**	**78.5**	**72.9**	**20.0**	**39.1**	**35.5**	**65.6**	**53.7**	**29.1**	**53.7**	**40.6**
Skilled labor	**37.3**	**32.6**	**20.6**	**35.0**	**39.2**	**15.2**	**14.9**	**29.2**	**20.9**	**17.6**	**10.6**	**6.7**	**4.9**	**11.5**	**15.3**	**4.9**	**18.8**	**13.2**
Labor composition, %, 2012																		
Agricultural labor	2.1	4.4	4.4	5.1	2.6	18.2	9.3	0.2	0.6	8.2	65.5	49.8	55.9	21.2	26.1	62.1	24.2	43.6
Unskilled labor	49.5	49.9	66.1	48.2	47.1	55.0	61.8	62.7	73.0	61.7	13.5	39.5	37.1	62.2	48.5	29.9	44.9	36.2
Skilled labor	48.4	45.7	29.5	46.7	50.3	26.9	28.9	37.0	26.4	30.2	21.0	10.7	7.0	16.6	25.4	8.1	30.9	20.2
Gross investment as % of real GDP																		
2002	**20.8**	**19.9**	**24.5**	**21.1**	**19.4**	**20.1**	**26.0**	**34.8**	**27.5**	**20.3**	**39.4**	**23.6**	**23.5**	**19.0**	**21.3**	**15.0**	**19.8**	
2012	**23.4**	**21.4**	**25.0**	**24.1**	**22.1**	**26.1**	**25.0**	**33.2**	**23.2**	**19.6**	**44.0**	**25.3**	**25.0**	**19.0**	**20.9**	**15.3**	**19.0**	
Government spending as % of nominal GDP																		
2002	**14.2**	**19.0**	**17.1**	**18.4**	**17.7**	**10.0**	**8.7**	**11.3**	**8.9**	**12.5**	**13.8**	**9.1**	**13.5**	**17.3**	**21.2**	**10.6**	**12.0**	
2012	**13.1**	**17.1**	**17.0**	**16.9**	**16.8**	**8.5**	**6.6**	**9.9**	**7.0**	**10.9**	**15.5**	**8.3**	**11.6**	**17.8**	**21.9**	**11.2**	**12.5**	
Balance of trade as % of nominal GDP																		
2002	-4.3	**2.7**	**1.7**	**-0.9**	**3.9**	**-6.7**	**14.0**	**13.5**	**5.4**	**5.8**	**1.1**	**7.2**	**0.4**	**-4.1**	**-0.3**	**-4.7**	**-2.0**	
2012	-4.7	**3.5**	**2.3**	**-2.4**	**2.7**	**-13.1**	**15.1**	**13.0**	**-0.9**	**5.6**	**-0.2**	**6.9**	**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	2010-2012	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	91.76	63.98
Wheat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	113.00	64.00
Other grains	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	90.07	2.03
Oilseeds	96.87	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	-95.97	16.34	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	6.85	17.28
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	0.91	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	2.42	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	8.31	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	28.62	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	4.75	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	-26.19	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	1.82	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	9.86	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	13.75	8.49	7.46	6.71	6.32	6.18	6.10	6.04	6.02	6.01	-56.31	10.10	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	90.14	58.84
Wheat	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.00	83.56	47.33
Other grains	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.00	60.20	1.36
Oilseeds	79.98	3.22	3.22	3.22	3.22	3.22	3.22	3.22	3.22	3.22	-95.98	37.76	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	8.41	3.88
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	5.50	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	6.60	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	15.97	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	44.15	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	1.31	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	25.26	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	15.58	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	8.23	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	4.61	2.66	2.37	2.18	2.08	2.02	2.00	1.98	1.99	1.99	-56.79	13.33	1.07

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	2011-2012	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	14.18	30
Wheat	6.44	6.44	6.44	6.44	6.44	6.43	6.43	6.43	6.43	6.43	6.43	-0.11	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	0.63	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-98.08	1.79	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	6.54	0
Livestock	0.78	0.71	0.71	0.70	0.70	0.70	0.70	0.70	0.70	0.71	0.71	-10.08	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	23.98	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	5.80	0
Energy products	5.75	4.84	4.63	4.58	4.53	4.53	4.53	4.53	4.53	4.52	4.52	-21.35	0.35	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	0.03	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	0.59	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	0.75	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.74	-78.71	0.40	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	1.18	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	3.07	3.00	2.96	2.93	2.90	2.87	2.84	2.83	-36.16	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 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 2003-2012, percentage point change from baseline, accumulated Changes																		
WTO accession																		
Real GDP	0.23	0.16	0.19	0.36	0.21	-0.15	0.74	1.43	2.17	0.91	2.12	-0.23	-1.28	-0.12	0.15	-0.07	-0.02	0.23
Real Export	-0.09	-0.16	0.43	-0.22	-0.18	-0.37	0.57	0.47	-0.04	7.70	50.82	-0.69	-3.35	-0.47	-0.60	-0.58	-0.52	2.76
Real Import	2.43	1.93	2.47	1.63	0.61	-0.47	2.89	1.90	3.63	9.07	29.59	-0.06	-2.88	0.15	0.64	0.49	0.44	3.08
TFP	0.00	0.00	0.00	0.00	0.00	-0.04	-0.08	-0.55	0.13	0.21	2.04	-0.11	-0.18	-0.09	-0.09	-0.19	-0.09	0.12
Capital Stock	0.13	0.08	0.08	0.21	0.08	-0.14	0.32	0.72	0.57	0.84	1.54	-0.08	-0.75	-0.05	0.06	0.05	-0.02	0.13
Greater China Free Trade Area																		
Real GDP	0.22	0.14	0.17	0.36	0.21	-0.16	0.62	1.20	2.31	3.42	3.38	-0.29	-1.31	-0.13	0.17	-0.07	-0.02	0.29
Real Export	-0.10	-0.01	0.49	-0.20	-0.15	-0.37	0.67	0.45	-0.11	10.85	54.41	-0.74	-3.29	-0.42	-0.56	-0.57	-0.43	3.08
Real Import	2.42	1.84	2.37	1.63	0.61	-0.48	2.71	1.81	4.05	16.96	34.04	-0.16	-2.94	0.16	0.69	0.47	0.42	3.44
TFP	0.00	0.00	0.00	0.00	0.00	-0.04	-0.09	-0.65	0.15	0.28	2.46	-0.12	-0.18	-0.09	-0.09	-0.19	-0.09	0.15
Capital Stock	0.13	0.07	0.08	0.21	0.08	-0.14	0.29	0.62	0.24	2.22	2.70	-0.10	-0.75	-0.05	0.06	0.07	-0.02	0.18
Agricultural Labor Force Migration, 2003-2012, 1000 persons, accumulated changes																		
WTO accession	-33	-11	4	-6	-3	-14	-3	0	0	19	2858	-161	-211	-124	-3	20	-57	2276
Greater China FTA	-34	-14	2	-6	-4	-15	-3	0	0	28	2594	-187	-229	-128	-5	30	-71	1959
Change of Equivalent variation, Billion US$ at baseline price, discount by interest (capital returns) to2002 present value, accumulated changes																		
WTO accession	59.1	41.6	35.7	4.9	5.1	-2.4	12.6	5.0	7.9	10.8	152.1	-4.1	-18.5	-5.2	3.0	-0.5	-0.9	306.0
Greater China FTA	58.7	37.3	33.5	4.8	4.9	-2.4	11.3	4.3	3.4	28.8	223.2	-5.0	-18.7	-5.1	3.1	-0.1	-1.5	380.4
Real Exports, Change from baseline, 2003-2012, Billion 2002 US$ in cif price, accumulated changes																		
WTO accession	-1.3	-12.0	22.0	-0.1	-2.1	-2.2	12.8	6.1	-1.5	87.8	1089.4	-11.8	-19.0	-3.8	-12.1	-1.9	-18.0	1132.4
Greater China FTA	0.2	3.2	24.4	0.3	-1.2	-2.1	15.4	7.3	-4.1	114.6	1106.4	-11.7	-18.4	-3.2	-10.5	-1.4	-13.6	1205.6
Real imports, Change from baseline, 2003-2012, Billion 2002 US$ in cif price, accumulated changes																		
WTO accession	200.1	131.6	75.7	10.2	9.5	-4.5	31.0	17.4	18.8	77.6	568.1	-3.4	-18.9	-1.4	8.7	1.1	11.0	1132.4
Greater China FTA	195.8	122.6	72.5	10.0	9.4	-4.4	29.7	16.7	10.3	122.6	624.8	-4.5	-19.1	-1.4	8.7	2.1	9.8	1205.6
Nominal trade balance, Change from baseline, Billion US$, accumulated changes																		
WTO accession	-11.1	0.9	3.0	-0.4	-0.1	2.8	7.2	1.1	0.2	0.2	-0.7	-2.3	-4.7	2.4	0.0	0.1	1.2	0.0
Greater China FTA	-13.3	-0.5	2.8	-0.4	-0.1	2.8	6.4	0.9	-0.2	5.3	-0.5	-2.3	-4.8	2.4	0.0	0.1	1.3	0.0
Term of trade, Change from baseline at 2012, percent																		
WTO accession	0.65	0.46	0.89	1.02	0.42	-0.22	1.36	0.44	1.50	-0.54	-5.37	0.20	-1.24	0.21	0.35	0.53	0.24	
Greater China FTA	0.65	0.42	0.84	1.03	0.43	-0.22	1.25	0.43	1.81	2.04	-4.83	0.18	-1.28	0.21	0.36	0.56	0.24	

Data source: Results from simulation.

Table 4 Differences between a WTO with and without China: Accumulated Sectoral Net Trade by Region during 2003 - 2012

	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	-0.1	-0.2	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	1.0	0.4	0.0	0.0	0.0	-0.1
Wheat	0.1	0.1	-0.1	0.0	2.3	0.0	-0.1	0.0	0.0	0.0	-3.6	-0.1	0.5	0.0	0.1	0.0	0.9
Other grains	-0.7	0.7	-0.1	9.0	4.3	0.1	0.4	0.0	0.0	0.1	-13.5	0.0	0.0	0.0	0.1	0.0	-0.5
Oilseeds	20.4	-0.1	-0.1	0.0	0.2	0.0	-0.1	0.0	0.0	0.1	-26.6	0.1	0.3	5.1	0.0	0.0	0.7
Planted fiber	1.0	0.2	-0.2	-0.1	0.0	0.1	-0.5	0.0	0.0	-0.3	-2.9	0.7	0.7	0.2	0.1	0.1	0.7
Sub-total	20.3	0.9	-0.6	8.7	6.8	0.2	-0.3	0.0	0.0	-0.1	-46.8	1.6	2.0	5.4	0.2	0.1	1.6
Non-grain crops	-1.0	-1.3	-0.4	-0.9	-0.4	0.3	-0.3	-0.4	0.0	-1.5	0.3	0.4	2.9	0.8	0.1	-0.1	1.6
Livestock	-0.8	0.9	-0.1	-0.9	-0.6	0.1	0.2	0.0	-0.1	0.4	1.0	0.0	0.3	0.0	0.1	0.0	-0.6
Sub-total	-1.7	-0.5	-0.5	-1.8	-0.9	0.4	-0.1	-0.4	-0.1	-1.1	1.3	0.4	3.2	0.8	0.2	-0.1	1.0
Dairy and meats	2.0	0.1	-0.2	-0.7	-0.2	0.1	-0.1	0.0	0.0	-0.7	-1.8	0.2	0.3	0.3	0.2	0.0	0.6
Processed food	3.0	7.0	-0.2	0.0	0.5	0.1	0.9	2.1	0.6	-1.0	-20.0	-0.2	2.4	3.6	0.3	0.0	0.9
Tobacco & Beve.	4.2	15.1	0.9	-0.1	0.0	0.1	0.1	0.6	0.4	-5.5	-17.1	0.3	0.2	0.2	0.1	0.0	0.5
Sub-total	9.1	22.2	0.5	-0.9	0.3	0.4	0.9	2.7	1.0	-7.2	-39.0	0.3	2.8	4.1	0.6	0.0	2.1
Forest and fishery	0.0	0.2	0.2	0.5	0.0	0.0	-0.1	0.0	-0.1	-0.4	-0.7	0.0	0.6	0.0	0.0	-0.2	0.0
Energy products	-0.5	0.5	-0.9	-0.1	0.3	0.7	-1.1	0.5	-0.1	-2.0	-12.3	2.4	2.7	0.8	5.1	0.3	3.8
Mineral products	-1.3	0.9	-1.4	-0.6	-0.5	0.2	-0.3	0.0	0.1	0.0	0.0	1.2	2.6	0.4	-0.6	-0.1	-0.6
Wood & paper	-0.2	-0.4	0.6	-0.2	-0.7	0.5	2.1	-0.1	0.5	0.0	-8.7	3.5	0.8	0.7	0.2	0.0	1.4
Sub-total	-1.9	1.2	-1.6	-0.4	-0.9	1.4	0.6	0.4	0.5	-2.5	-21.6	7.0	6.7	1.9	4.6	0.0	4.6
Textiles	-0.5	-5.6	12.4	-0.5	0.1	-1.2	16.6	0.4	4.9	21.7	-44.2	1.9	-2.3	-1.4	-1.5	-0.1	-0.6
Clothing	-3.6	-17.5	-3.7	-0.5	-1.9	-3.0	-5.0	-0.6	-4.5	-2.4	162.6	-19.6	-48.6	-16.7	-7.7	-0.3	-27.1
Leather & shoes	-0.8	-12.6	-0.7	-0.3	0.0	-0.4	1.4	-0.1	-0.3	0.3	32.6	-10.2	0.1	-3.3	-0.6	-0.1	-5.1
Other light mann.	-0.7	-14.1	-1.7	-0.3	-0.5	-0.3	-0.3	-0.3	1.1	-0.4	24.1	-1.5	1.1	-0.5	-2.7	-1.0	-2.0
Sub-total	-5.6	-49.8	6.2	-1.6	-2.3	-4.8	12.7	-0.5	1.2	19.1	175.1	-29.4	-49.7	-21.9	-12.4	-1.5	-34.8
Intermediates	0.0	-1.8	13.3	0.1	-0.7	1.3	9.9	1.0	0.7	7.6	-55.7	8.6	7.7	1.9	0.2	0.2	5.8
Motor vehicle	1.4	10.9	4.1	-0.6	1.0	2.6	-5.1	-0.2	-0.5	-4.7	-18.0	1.4	2.7	2.0	0.2	0.1	2.8
Other Trans	-5.7	-3.4	-3.3	-0.4	-0.6	0.1	-3.8	0.1	-0.2	2.3	11.4	0.9	1.8	0.8	0.1	0.0	-0.1
Electronics	-10.5	-9.8	-4.4	-0.2	-1.3	-0.7	-4.2	-2.1	0.4	0.8	36.4	-5.1	1.3	0.5	-0.6	0.1	-0.6
Machinery	-24.4	-27.5	-6.6	-1.3	-3.1	-0.2	-1.6	0.3	2.9	5.7	49.4	2.6	4.0	1.4	-0.7	0.4	-1.4
Sub-total	-39.1	-31.5	3.1	-2.4	-4.7	3.1	-4.8	-0.8	3.2	11.7	23.4	8.4	17.5	6.6	-0.8	0.7	6.5
Traded Services	0.0	13.1	-5.9	-1.3	0.5	2.1	-4.1	-1.7	-5.7	-10.2	-18.4	7.5	10.0	4.1	2.4	0.4	7.3
Construction	0.3	1.6	-0.2	0.0	0.0	0.0	0.0	0.0	-0.1	-0.8	-2.1	0.1	0.1	0.2	0.2	0.0	0.6
Total	-18.5	-42.9	1.0	0.3	-1.2	2.8	4.9	-0.2	-0.1	9.0	71.8	-4.1	-7.3	1.2	-5.0	-0.5	-11.3

Data source: Results from simulations. Difference from baseline at cif prices.

Table 5 Differences between a WTO with and without China and Taiwan: Accumulated sectoral real trade during 2003 – 2012: 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									Billion U.S. dollars								
Food & agriculture	0.09	0.02	0.19	0.01	0.00	0.00	0.02	0.04	0.01	0.49	0.03	0.00	0.00	0.00	0.00	0.00	0.92
Resource based	-0.16	-0.05	0.07	-0.01	0.00	0.00	-0.01	-0.02	0.04	4.49	0.03	-0.02	-0.01	0.01	0.00	0.00	4.36
Textile	-1.11	-0.44	-0.18	-0.07	-0.09	-0.02	-0.09	-0.15	-0.24	27.71	-1.12	-0.11	-0.07	-0.1	-0.01	-0.24	23.67
Apparel	-1.68	-0.15	-0.06	-0.01	-0.05	-0.01	0	-0.02	-0.02	0.25	-0.03	-0.01	-0.01	-0.01	0	-0.02	-1.83
Leather & shoes	-0.28	-0.16	-0.06	-0.01	-0.01	-0.03	-0.01	-0.02	0.01	1.34	-0.08	0	-0.01	-0.03	0	-0.03	0.62
Other Light Manuf	-0.56	-0.25	-0.13	-0.05	-0.05	-0.01	-0.01	-0.02	0	1.63	-0.04	-0.01	-0.03	-0.02	0	-0.06	0.41
Labor-intensive total	-3.63	-1.00	-0.43	-0.14	-0.20	-0.07	-0.11	-0.21	-0.25	30.93	-1.27	-0.13	-0.12	-0.16	-0.01	-0.35	22.87
Intermediates	-0.21	-0.14	-0.03	0	0	-0.01	0.02	-0.01	0.07	21.94	-0.22	-0.06	-0.01	-0.01	0	-0.01	21.32
Motor vehicle	0.5	0.08	0.12	0.03	0.04	0.03	0	0.03	0.07	0.28	0.05	0	0.01	0.03	0	0.03	1.3
Other Trans	-0.03	-0.01	-0.01	0	0	-0.01	0	0	0.01	4.21	-0.01	-0.02	0.01	0	0	-0.02	4.12
Electronics	-0.04	0.2	0.02	0.03	0.13	0.05	0.09	0.04	0.64	7	0.19	-0.02	0.02	-0.01	0	0.1	8.44
Machinery	-0.52	-0.34	-0.24	0.01	0.01	0.01	0.02	-0.05	0.16	16.1	-0.12	-0.05	-0.01	0	0	0.01	14.98
Capital –intensive total	-0.30	-0.21	-0.14	0.07	0.18	0.07	0.13	0.01	0.95	49.53	-0.11	-0.15	0.02	0.01	0.00	0.11	50.16
Services	-0.39	-0.45	-0.14	-0.02	-0.03	-0.04	-0.01	0.00	0.00	0.50	-0.04	-0.09	-0.08	-0.05	0.00	-0.14	-1.01
Total	-4.38	-1.68	-0.46	-0.06	-0.06	-0.04	0.03	-0.17	0.74	85.95	-1.37	-0.37	-0.19	-0.21	-0.01	-0.37	77.34
Imports																	
Food & agriculture	0.09	0.02	0.19	0.01	0.00	0.00	0.02	0.04	0.01	0.49	0.03	0.00	0.00	0.00	0.00	0.00	0.92
Resource based	0.53	2.04	0.43	0.76	0.10	0.00	0.25	0.20	0.02	1.36	0.69	0.10	0.10	0.11	0.00	0.11	6.83
Textile	0.05	0.28	0.15	0.02	0.00	0.00	0.13	0.02	0.22	0.67	0.19	0.20	0.00	0.01	0.00	0.03	1.99
Apparel	0.01	0.02	0.00	0.00	0.00	0.00	-0.02	0.00	-0.01	0.58	0.02	0.01	0.00	0.00	0.00	0.00	0.61
Leather & shoes	-0.02	-0.04	0.00	-0.02	0.00	0.00	-0.02	0.01	-0.01	0.52	-0.02	0.00	-0.02	0.00	0.00	-0.03	0.33
Other Light Manuf	-0.01	-0.04	0.04	0.00	0.00	0.00	0.01	-0.01	-0.04	0.84	0.02	0.01	0.00	0.00	0.00	0.01	0.81
Labor-intensive total	0.03	0.22	0.19	0.00	0.00	0.00	0.10	0.02	0.16	2.61	0.21	0.22	-0.02	0.01	0.00	0.01	3.74
Intermediates	1.12	2.90	4.16	0.26	0.17	0.03	0.64	0.44	0.03	2.58	0.45	0.19	0.17	0.12	0.00	0.50	13.76
Motor vehicle	1.09	3.73	0.39	0.01	0.09	0.00	0.10	0.03	0.00	0.37	0.14	0.00	0.00	0.02	0.00	0.01	5.97
Other Trans	-0.99	-0.14	0.36	0.00	-0.01	0.00	0.44	0.63	0.00	1.07	0.29	0.06	0.00	0.16	0.00	0.00	1.88
Electronics	0.44	1.26	-0.51	0.01	0.10	0.00	-0.17	1.57	0.06	3.08	1.80	0.01	0.00	0.02	0.00	-0.01	7.65
Machinery	0.10	1.63	0.80	0.01	0.02	0.01	0.45	0.18	0.06	5.59	0.35	0.02	0.01	0.00	0.00	0.03	9.25
Capital –intensive total	1.76	9.38	5.20	0.29	0.37	0.04	1.46	2.85	0.15	12.69	3.03	0.28	0.18	0.32	0.00	0.53	38.51
Services	2.28	2.87	1.17	0.13	0.21	0.11	0.17	0.04	0.05	0.70	0.25	0.38	0.40	0.32	0.06	0.81	9.94
Total	6.19	18.33	8.24	1.93	0.70	0.18	2.14	3.18	0.46	17.87	4.29	1.12	0.96	0.79	0.10	1.83	68.31

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

Table 6 Differences between a WTO with and without China and Taiwan: Accumulated sectoral real trade during 2003 – 2012: 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								Billion U.S. dollars									
Land-intensive	0.0	0.2	0.7	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.5	0.0	0.0	0.1	0.0	0.2	2.1
Other agriculture	0.5	0.8	1.2	0.0	0.1	0.0	0.3	0.4	0.6	0.2	0.7	0.0	0.1	0.3	0.1	0.4	5.6
Processed food	0.7	0.8	2.9	0.1	0.1	0.0	0.7	0.3	1.0	0.3	0.6	0.1	0.0	0.2	0.0	1.0	8.8
Wood & paper	2.9	1.1	1.5	0.2	0.2	0.0	0.3	0.2	0.4	0.5	0.2	0.0	0.1	0.2	0.0	0.2	7.9
Other Resource based	3.3	2.3	3.5	0.3	0.3	0.1	2.5	0.8	0.6	0.9	1.7	0.7	0.2	0.8	0.1	1.2	19.3
Textile	13.9	10.5	2.6	0.6	1.3	0.1	1.7	0.4	1.1	0.7	0.7	0.3	0.6	0.8	0.4	1.9	37.5
Apparel	99.9	43.2	10.8	1.3	5.6	0.5	1.1	0.5	1.3	0.6	0.8	0.1	2.1	2.1	0.3	7.8	177.9
Leather & shoes	16.9	7.3	3.6	0.7	0.9	0.4	0.6	0.3	0.0	0.5	0.5	0.1	1.1	1.8	0.3	5.1	40.1
Other Light Manuf	10.9	8.9	3.1	0.6	0.9	0.3	0.5	0.4	0.0	0.8	0.6	0.3	0.8	1.4	0.2	2.2	31.9
Intermediates	12.4	10.1	5.6	1.1	1.3	0.2	5.1	2.0	1.9	2.6	3.5	1.2	0.9	2.2	0.6	2.7	53.5
Motor vehicle	2.6	0.8	0.9	0.1	0.1	0.0	1.5	0.2	1.1	0.4	0.2	0.3	0.1	0.2	0.2	0.2	9.0
Other Trans	4.7	4.2	1.5	0.5	0.8	0.1	0.3	1.0	0.2	1.1	1.1	0.3	1.1	0.8	0.8	1.7	20.0
Electronics	32.2	22.0	10.1	1.5	1.9	1.5	3.0	7.1	0.0	3.1	4.9	0.4	1.3	3.1	0.2	2.9	95.1
Machinery	35.4	23.8	11.3	2.1	2.1	0.7	2.6	3.8	0.0	5.6	5.4	2.0	1.8	4.7	1.2	4.9	107.3
Services	2.5	8.4	1.5	0.3	0.3	0.2	0.4	0.4	0.3	0.7	1.0	0.1	0.4	0.7	0.2	1.5	19.0
Total	238.9	144.5	60.7	9.4	15.7	4.2	20.7	17.9	8.4	17.9	22.5	5.9	10.7	19.2	4.4	33.9	634.8
Imports																	
Land-intensive	23.0	0.9	0.0	9.8	7.6	0.0	0.0	0.0	0.0	0.0	1.2	0.3	4.6	0.1	0.4	1.1	48.8
Other agriculture	1.3	1.4	0.1	0.3	0.2	0.0	0.3	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.2	4.3
Processed food	11.1	22.2	1.3	0.4	0.8	0.0	1.6	3.3	1.5	0.4	0.3	-0.1	3.5	0.3	0.0	1.2	47.8
Wood & paper	2.1	1.6	1.6	0.2	0.5	0.0	2.8	0.2	1.2	2.4	2.7	0.0	0.1	0.1	0.0	1.0	16.6
Other Resource based	1.2	5.5	1.2	0.5	0.1	0.0	3.6	6.6	0.6	2.1	2.8	0.8	0.2	5.3	0.2	1.5	32.2
Textile	-0.2	1.8	14.2	0.1	-0.1	-0.1	26.2	0.2	7.1	27.7	3.1	1.2	-0.1	0.0	0.0	0.6	81.7
Apparel	0.1	0.3	1.6	0.1	0.0	0.0	1.0	0.0	11.4	0.3	0.1	0.4	0.0	0.0	0.0	0.0	15.3
Leather & shoes	0.6	0.4	0.1	0.0	0.0	0.0	4.3	0.0	0.0	1.3	0.1	0.4	0.0	0.0	0.0	0.0	7.5
Other Light Manuf	0.5	-0.5	2.0	0.0	0.0	0.0	1.3	0.1	2.4	1.6	0.1	0.2	0.0	0.1	0.0	-0.1	7.7
Intermediates	9.1	11.8	19.9	1.6	1.0	0.2	18.8	2.7	3.7	21.9	5.6	0.8	0.6	2.3	0.1	9.2	109.2
Motor vehicle	1.1	7.9	14.5	0.0	0.0	0.1	2.2	0.1	0.0	0.3	0.1	0.1	0.2	0.0	0.0	0.4	27.0
Other Trans	1.2	1.5	0.6	0.0	0.1	0.0	0.3	0.2	0.0	4.2	0.4	0.0	0.0	0.0	0.0	0.3	8.7
Electronics	2.8	2.3	22.3	0.1	0.3	0.0	11.6	4.5	3.9	7.0	3.8	0.1	0.0	0.0	0.0	0.1	58.7
Machinery	1.8	4.4	17.9	0.0	-0.2	0.0	7.1	2.0	7.2	16.1	2.0	0.0	0.1	0.0	0.0	-0.2	57.9
Services	5.3	18.3	1.9	0.6	0.4	0.3	0.9	1.6	0.6	0.5	2.0	0.8	0.8	1.8	0.3	3.4	39.5
Total	60.8	79.8	99.1	13.8	10.7	0.6	82.0	21.4	39.9	86.0	24.4	4.9	10.2	10.0	1.0	18.4	562.9

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