China and the WTO;

the impact on China and the world economy

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Abstract

This paper focuses on the impact of China's accession to the WTO on the sectoral production within China and its main trading partners. We conclude that China benefits much more from trade liberalization if other countries also reduce their trade barriers. A Chinese unilateral action would mainly benefit other countries in South-East Asia. Within China itself the sectors Wearing Apparel and Electronic Equipment expand. Sectoral production is however affected by modelling tariff exemptions for intermediate goods. If these exemptions are not introduced, the sector Textile declines while it expands if we take account of exemptions. The reason is that a large share of these goods is used for intermediate inputs. For sectors like Leather and Food processing which are often used for final consumption the opposite result prevails.

1. Introduction

Thirteen years ago China launched its campaign to enter the GATT/WTO. Since then, many scholars have studies the impact of different rates of tariff reductions by China on itself and other economies. Most studies use an applied general equilibrium model, such as the GTAP model (Hertel, 1997), G-Cubed world model (McKibbin and Wilcoxen, 1998). Almost all simulation results show that both China and its major trading partners (US, European Union, Japan, and countries in South-East Asia) will benefit from China's participation in WTO. Some results also point out that China (including Hong Kong) will be the biggest winner with net welfare gain of about US$ 30 billion (Bach, et al., 1997; Wang, 1997) annually.

At a sectoral level the picture is completely different. The overview of McKibbin and Wilcoxen (1998) shows the lack of agreement on the sectoral effects. Even authors who use the same model and data (GTAP) predict different sectoral effects. Bach et al. (1996) pick Wearing Apparel and Light manufacturing as winners and Textile as the looser. Yang (1996) predicts that Textile is the second winner behind Wearing Apparel.

An important reason for these differences is the lack of agreement of the size of tariff cut, in particular on relative cuts, across sectors. The underlying reason is a lack of high quality data on import protection. Ideally, these data should not only include statutory tariff rates but also tariff exemptions, and indirect subsidies and non-tariff barriers. For example, the import tariffs of the GTAP data (McDougall *et al.* (1998)) are too high to match with the collection rates of imports tariffs in China. The Worldbank (1994) explains these low collection rates for a great part by tariff exemptions for importing intermediate and investment goods used in exports industries. Most models do not take account of these exemption rates, except for Bach et al. (1996) and DRC (1998). However, bilateral data on a sectoral level including the final destination of imports are not available. For this reason it is difficult to introduce the exemptions in an accurate way.

This paper shows that sectoral effects depend whether tariffs exemptions are introduced and in which way these exemptions are modelled. First, we present a unilateral reduction of the import tariffs in China base on the tariff rates according to the GTAP data. However, these data incorporate statutory tax rates which do not match the low collection rates of import tariffs. We incorporate the low collection rates in two different ways in the model. First, we lower all import tariffs ignoring sectors and producing countries by about two thirds to mimic the collection rates in 1995. This is the second simulation. In the third simulation we incorporate the exemption rates for all imports used as intermediate goods and investment goods. Here we follow the Worldbank (1994) which argues that the exemption of imposing tariffs on imported goods used for production is one of the main reasons for a low collection rate. The collection rate is the same as in the second simulation. The effects on the sectoral patterns are different however.

In all simulations we assume that tariffs and non-tariffs barriers are halved between 2000 and 2010. Moreover we assume that the Multi Fibre Agreement (MFA)) phases out between 2000 and 2005. In the fourth simulation trade liberalization takes place with an global framework in which trade barriers

are halved world wide between 2000 and 2010. We carry out these simulations with WorldScan. This is an applied general equilibrium model of the world economy. It focusses on economic growth in the long run and trade patterns between eight regions.

In all simulations the sector Wearing Apparel expands very quickly due to the phase out of the MFA agreement. Motor Vehicles and Lumber and Wood are most hurt by trade liberalization due to the high initial import tariffs and non-tariff barriers. If we compare the three simulations in which China takes a unilateral action the sector Electronic Equipment is a winner and also Other Manufacturing independent of modelling of exemptions.

However, modelling tariff exemptions matters. The textile sector however loses much if no exemptions are introduced because of the high tariffs, but expands if textile imports used for intermediate goods are exempted. In the latter case, trade liberalization does not hurt the Chinese Textile sector. Also the mineral sectors loose from trade liberalization if full tariffs are assumed and expand slightly if exemptions on intermediate goods are assumed. On the other hand, sectors like Leather and Food processing expand less if tariff exemptions are introduced because their intermediate inputs do not become much cheaper in response to trade liberalization.

The main trading partners benefit from China's trade liberalization, in particular South-East Asia and to a lesser extent Japan, Western Europe and the United States. In analysing Chinese growth in the world economy Arndt et al. (1997) also conclude that countries in South-East Asia benefit most of China's growth.

Section 2 presents the model, and the base scenario. Section 3 discuss the current import and export tariffs globally and focusses in particular on China. Section 4 present the simulation results for the unilateral import tariffs reductions by China without exemption rates. This section represents also some sensitivity analysis. Section 5 introduces the exemption rates. Two simulations are presented: one with an overall exemption rate of about 70% and a second one in which imported intermediate and investment goods are exempted. Section 6 focusses on a world-wide elimination of trade barriers. Section 7 concludes.

2. The model and the baseline

WorldScan has been developed to analyse long-term developments in the global economy. The model relies on the neoclassical theories of growth and international trade. The standard neoclassical theory of growth distinguishes three factors to explain changes in production: physical capital, labour, and technology. WorldScan augments the simple growth model in three ways. First, WorldScan allows overall technology to differ across countries. It also takes up the related idea that developing countries can catch up quickly by adopting foreign state-of-the-art technologies. Second, the model distinguishes two types of labour: high-skilled and low-skilled labour. Sectors differ according to the intensity with which they use high-skilled and low-skilled labour. Countries can raise per capita growth by schooling and training the labour force. Third, in developing countries part of the labour force works in low-

productivity sectors. In these sectors workers do not have access to capital and technology. Reallocation of labour from the low-productivity sectors to the high-productivity sectors enables countries to raise per capita growth as well. In principle, all these three factors affect the performance of a region only temporarily.

Box 1 WorldScan, a global general equilibrium model

At the heart of WorldScan are the neoclassical theories of economic growth and international trade. The core of the model is extended to add realism to scenarios. In doing so, we aim at bridging the gap between academic and policy discussions. The extensions include:

- an Armington trade specification, explaining two-way trade and allowing market power to determine trade patterns in the medium run, while allowing Heckscher-Ohlin mechanisms in the long run;
- imperfect financial capital mobility;
- consumption patterns depending upon per capita income, and developing towards a universal pattern;
- a Lewis-type low-productivity sector in developing regions, from which the high-productivity economy can draw labour, enabling high growth for a long period.
- two types of labour: low- and high-skilled.

The simulations in section 4 are permutations of a scenario. They are not necessarily independent of the characteristics of this scenario. Therefore, we discuss the main characteristics briefly.[1]

The so-called Globalization scenario (OECD, 1997) aims to explore the linkages between OECD and non-OECD economies in the near and distant future. It is not necessarily the most plausible or the most realistic one. In fact, it depicts a rather optimistic picture of the years to come, at least so far as developing countries are concerned. The idea is that when developing countries grow fast or start to grow rapidly, the linkages between the OECD and the non-OECD countries intensify. To attain and sustain high growth rates developing countries should pursue sound domestic policies. Countries that do not create favourable conditions for market-based development, are likely to fail.

In the Globalization scenario many poor countries catch up, though not completely, with rich countries. Non-OECD countries grow at a per capita rate of about 5%. The factor endowments change significantly in these countries, see Table 2.1.

Table 2.1 Assumptions on exogenous variables in the Globalization scenario

annual growth 1995 -2020	OECD	China	South-East Asia	South Asia	Rest of the World
population growth	0.3	0.8	1.2	1.6	1.8
average TFP growth	1.4	2.0	1.6	1.2	0.9
growth supply of high-skilled labour	0.1	1.6	3.8	3.7	2.9

sources: population growth projections are from UN (1995). The projections on labour supply are based on own calculations and data from, Ahuja and Filmer (1995), Barro and Lee (1996) and own calculations.

[1] CPB (1999) discusses this scenario more extensively.

The assumptions on TFP growth are based on the Globalization scenario in order to mimic high growth rates. High growth does indeed occur. However, not only TFP growth is responsible for this. To a large extent capital accumulation and changes in the endowment labour contribute to growth. Capital accumulation accounts for about 40% to GDP growth. The increase in high-skilled labour through schooling and labour reallocation from low-productivity to high-productivity sectors increases growth for about 20% in the developing regions. In China the increase in high-skilled labour is relatively less important compared to the other Asian regions and the Rest of the World. For the greater part this is due to population dynamics. While the labour force expands in the other Asian regions that is not the case for China. High economic growth in all Asian countries stimulates the labour shift from low-productivity to high-productivity sectors. This shift is about 25% of the total labour supply see Table 2.2.

The savings ratio in Asia rises, while it decreases in the OECD. The rise in China is spectacular. The already high saving rates are pushed upwards. Because a large share of savings are invested in the own country this stimulates capital accumulation to a large extent. High economic growth stimulates also changes in the consumption pattern. If per capita income rises consumer spend relatively less money on agriculture (excluding the products of the food processing industries) are more on services. The shares of China, South-East Asia and South Asia in the world economy will double the next 25 years at the expense of the OECD. In most regions the trade to GDP ratio falls in a scenario without trade liberalization. The most important reason is the demand shift to services which are hardly tradable. Even if trade in manufacturing does not decline the overall trade to GDP ratio will go down. For the same reason the relative low trade to GDP ratios in the OECD can be explained by the importance of services.

Table 2.2 Characteristics globalization scenario (all numbers are %)

levels/quotes	OECD		China		South-East Asia		South Asia		Rest of the world	
year	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020
informal sector (% labour supply)	6.5	6.5	63.6	41.1	37.6	17.4	62.0	43.5	31.5	20.2
savings ratio (% national income)	20.8	17.6	37.0	46.8	32.9	36.9	15.3	31.0	19.1	20.0
ratio of value of trade to GDP	10.9	13.2	31.2	28.3	38.7	33.0	14.2	12.9	18.1	15.9
consumption share on Agriculture	1.3	0.8	22.3	4.4	8.5	2.4	22.6	8.9	7.4	3.3
consumption share on Services and Trade ..	72.7	75.0	40.0	69.3	56.2	71.1	38.5	60.5	54.7	67.2
world share GDP	77.2	65.8	2.9	5.6	4.7	8.6	2.4	4.1	12.7	15.9
world share population	14.4	11.3	21.5	18.9	8.2	8.0	24.1	26.1	31.8	35.6

3. Trade and Tariffs

Section 2 presented some general characteristics of the scenario and some macroeconomic outcomes for the most relevant regions. Given the overall picture this section focusses on trade and the import tariffs, in particular those of China. The trade relations of China and the height of the tariffs will drive for the greater part the results for the various sectors and regions.

Table 3.1 Tariffs levied and faced by China

Sector	import tariff levied	import tariff faced	export tariff faced	export tariff levied	Non-tariff barriers	final consump-tion[2]
Agriculture	5.2	17.3	-0.6	3.4	0.0	60.4
Raw materials	2.3	4.6	1.3	14.9	45.7	6.1
Food Processing	9.1	27.8	-7.4	2.8	2.7	70.7
Textiles	43.1	18.7	0.1	(2.7)[1] -4.6	24.3	29.8
Wearing Apparel	15.4	11.8	0.7	(7.7)[1] 5.4	18.4	84.3
Leather products	21.0	9.0	0.4	-6.8	18.4	50.8
Lumber and wood	18.9	3.0	3.8	-6.8	32.5	32.7
Publishing, paper	12.4	8.8	0.5	-4.0	0.0	26.4
Petrol and coal refinery	3.3	14.9	1.3	12.7	15.0	5.6
Chemicals, rubbers and plastics	15.5	10.8	0.6	-11.5	3.3	18.4
Nonmetallic minerals	20.4	9.0	0.6	-22.1	0.0	5.3
Ferrous minerals	9.5	7.2	0.2	-4.1	15.9	0.4
Nonferrous minerals	10.2	3.9	0.3	-11.0	15.9	4.5
Fabricated Metal Products	24.6	7.9	0.4	-9.3	0.0	22.7
Motor Vehicles	71.7	19.6	0.3	49.9	26.3	0.5
Other transport industries	8.0	9.6	0.5	-7.2	0.0	10.3
Electronic equipment	11.8	5.9	0.7	-2.2	6.2	32.0
Machinery and equipment	13.0	5.9	0.5	-6.9	5.1	10.0
Other Manufacturing	25.0	9.0	0.5	45.2	0.0	15.5
Services	0.9	0.5	1.5	0.0	15.8	31.6
Trade and Transport	0.0	0.6	2.0	0.0	50.5	29.8

source McDougall et al. (1998). Data on non-tariff barriers are from Development Research Center (1998), Hoekman (1995).

[1]The numbers in parentheses refer to the tariffication of the MFA. These are included in the export taxes of developing countries in the GTAP data base.

[2]Final consumption as share of total demand (including intermediate and investment demand).

From Table 3.1 we can conclude that import tariffs are the highest in manufacturing, and negligible in Services. In the sectors Motor Vehicles and Textiles the import tariffs are very high. The non-trade barriers in these sectors are also high. Other high non-tariff barriers can be found in Trade and Transport, Raw Materials, Lumber and Wood. Within manufacturing import tariffs and non-trade barriers for Consumer Good such as Food processing, Textiles, Wearing Apparel, Leather products and other Manufacturing are in general high than for other sectors. In general, China faces lower tariffs if it exports goods and services. Only in Agriculture and Food processing the import tax faced is high, in particular due to Japan and Western Europe. China levies also export taxes. This prevents the export of Raw Materials which are necessary for producing goods. A lot of manufacturing exports are subsidized.

The imports in manufacturing are the most important for China and the import tariffs are the highest. Therefore we analyse these tariffs in more detail in Table 3.2. It appears that China levies different tariffs for products of different origin. For convenience we have classified the manufacturing sectors in Consumer Goods consisting of Food processing, Textiles, Wearing Apparel, Leather, Lumber and Wood and other Manufacturing, Energy-intensive Goods consisting of minerals, Paper and publishing, chemicals, rubbers and plastics nd petrol refineries, and Capital Goods consisting of Fabricated metal products, transport equipment, machinery and electronic equipment.

Table 3.2 Import tariffs in manufacturing by region of origin

sector	Consumer Goods	Energy-int. Goods	Capital Goods
United States	12.2	10.5	10.6
Japan	37.8	13.3	20.3
Western Europe	13.0	10.5	21.9
Pacific OECD	12.3	7.1	8.4
South-East Asia	34.3	17.9	12.5
rest of the world	16.5	7.5	19.9

If the average imports tariffs in China per sector are split up to the producing regions the import tariffs for Consumer Goods are higher than for other manufacturing sectors except for the import from Western Europe and the Rest of the world. In all cases there seem to be a relation between the value of imports (against world prices), see Table 3.3, and the rate of the import tariff. The import tariff in energy-intensive goods is the highest for imports from South-East Asia. This is also the most important trade partner in this sector. The same is valid for the tariff rate in Consumer Goods. These tariffs are the highest for Japan and South-East Asia, which are also the most important trade partners. Japan and Western Europe are also the most important exporters of Capital Goods to China, and face the highest import tariffs compared to the other trade partners.

Table 3.3 import values in manufacturing in billion US dollar

sector	Consumer Goods	Energy-int. Goods	Capital Goods
United States	3.2	5.7	12.4
Japan	6.8	11.1	28.6
Western Europe	5.0	7.3	25.0
Pacific OECD	1.2	1.9	1.9
South-east Asia	23.2	19.4	27.8
Rest of the world	4.1	7.6	2.2

From this analysis we draw the following conclusions. If import tariffs in China are eliminated, the Consumer Goods sector in South-East Asia will benefit most and the Energy-intensive Goods sector in South-East Asia and the Capital Goods sector in Japan and Western Europe. Overall South-East Asia can

be expected the winner of trade liberalization in China.

4. Trade liberalization

If China wants to enter the WTO it has to lower its import tariffs. This section analyses the effects of reducing the import tariffs and non-tariff barriers by about 50% for the various sectors and various regions and the abolishment of the MFA agreement in 2005. The first simulation shows the effects of reducing the tariffs according to the GTAP data (high-tariff simulation). The second and third simulation reveal the results if the tariffs rates are substantially lower such that the collection rate (is the value of import tariffs to the value of imports) is 4.9% as it was in 1992 the case, see World Bank (1994). Those simulations are discussed in Section 5 (reduced-tariff and exempted-imports simulation, respectively). Our fourth simulation assumes a world-wide reduction of trade barriers (global-reduction simualtion). It takes the view that China's accession to the WTO and the Millennium round will lead to a complete abolishment of trade barriers. Section 6 presents this simulation.

We present results for the end of the simulation period 2020. We show the differences with our baseline described in section 3 in particular for the sectoral structure in China and the macroeconomic affects for the most important trade partners, that is to say the United States, Japan, Western Europe, Pacific OECD and South-East Asia.

trade liberalization in China according to the GTAP data (high-tariff simulation)

We assume that import and export tariffs and non-tariff barriers are lowered proportionally from 2000 onwards until they are halved in 2010. The reduction of import tariffs will stimulate imports, in particular in manufacturing. The MFA agreements gradually phases out between 2000 and 2005. Most trading partners of China, like the United States, Japan, Western Europe, Pacific OECD and South-East Asia will benefit. Table 4.1 shows that the volume of consumption and GDP for the OECD regions will slightly go up. Their welfare gain in 2020 measured by the equivalent variation[1] varies between 9 and 40 billion US$. The relative gains for the more close OECD regions, Japan and Pacific OECD are higher than for Western Europe and Unite States, although the latter two benefit to a larger extent from the elimination of the MFA. The welfare gains for South-East Asia are substantially higher. The terms-of-trade in most OECD regions slightly improves due to increased import competition in the textiles and wearing apparel markets. This is a response to the phase out of the MFA.

[1]The equivalent variation is measured is the difference between the volume of consumption in the policy simulation and the base line multiplied by the consumption price in the base line.

Table 4.1 Macro economic effects of trade liberalization (GTAP data) in 2020

deviations from baseline

	volume of GDP(%)	volume of consumption (%)	EV measure (billion US$)	terms of trade (%)
China	2.1	2.8	52.9	-0.4
United States	0.0	0.1	18.8	0.1
Japan	0.2	0.5	30.3	0.0
Western Europe	0.1	0.3	39.4	0.1
Pacific OECD	0.2	0.6	8.8	0.2
South-East Asia	1.4	2.2	76.4	0.1

source: WorldScan.

China benefits more from unilateral trade liberalization than its main trading partners. The volume of GDP and consumption go up by more than 2%. The welfare gain is about 50 billion US$. China experiences a small terms-of-trade loss. Export prices are even more reduced than import prices because Chinese producers want to increase their foreign market shares as a response to the decline in home markets hares.

The breakdown of the fairly high tariffs according to the GTAP data boosts imports of manufacturing goods. These goods are not only demanded by consumers but also by firms. The first row in Table 4.2 shows that the imports in manufacturing increase by about 300 billion dollar. The larger part of the increase in Consumer Goods is imported from South-East Asia. The already high imports in the base year and high import tariffs explain this result. The sector Consumer Goods is relatively low-skill intensive which is typically the kind of goods in which South-East Asia is specialized. The other winner in the Consumer Goods sector is Japan - compared to the other OECD regions. This result can also be explained by the relative large breakdown of trade barriers, see Table 3.2. The combination of high import tariffs and already large imports from South-East Asia and Japan in the Energy-intensive sector explains the big increase in imports from these regions.

Table 4.2 Trade effects of trade liberalization (GTAP data) in 2020

deviations from baseline

	Consumer Goods		Energy-intensive Goods		Capital Goods	
billion US$	import	export	import	export	import	export
China	143.2	245.0	65.9	56.8	118.4	139.9
% of	import	export	import	export	import	export
United States	1.3	47.9	2.8	17.1	4.8	21.2
Japan	11.5	9.1	17.5	13.6	32.4	9.8
Western Europe	2.4	25.7	4.1	17.8	29.4	27.2
Pacific OECD	0.5	4.0	0.7	3.9	0.3	3.9
South-East Asia	80.0	7.5	66.0	34.5	29.9	23.4

source: WorldScan, prices are 1995 producer prices.

For the aggregated sector Capital Goods the picture is more diverse. Western-Europe faces high import tariffs in the base simulation and is relatively important. As a result the largest share of the increase of Capital Goods imports originates from Western Europe, Japan and South-East Asia. For South-East Asia the increasing exports in Capital Goods are relatively less important than for the OECD regions. South-East Asia also specializes in Consumer Goods.

Chinese exports in Energy-intensive Goods and Capital Goods rise nearly as much or even more than imports. This suggest that the loss in sales at the home market is offset by extra sales abroad. Most of these goods are exported to the OECD and South-East Asia. This reflects the specialization pattern. China is more specialized in Capital Goods than other Asian regions, but less than the OECD. In the same way the other Asian regions are more specialized in producing Consumer Goods than China is. The abolition of the MFA agreement boost exports in Consumer Goods to the OECD. Nearly half of the extra exports goes to the United States.

The differences between extra imports and exports for the various sectors due to trade liberalization explain the changes in production and value added. Table 4.3 shows that the production of Energy-intensive Goods and Capital Goods decrease substantially. The shrinking of the sector Capital Goods can be explained by the disappearance of the sector Motor Vehicles. The breakdown of the very high import tariff, (see Table 3.2) nearly wipes out the total industry. As a result most of the resources used in the motor Vehicle industry are reallocated to other manufacturing sectors like Electronic Equipment, Machines and Equipment and Wearing Apparel and Agriculture. The Consumer Goods sector thus boosts due to the expansion of Wearing Apparels. Here the end of the MFA compensates the breakdown of import tariffs in Consumer Goods. Table A1 shows the sectoral effects for China in more detail.

Table 4.3 Sectoral effects for China (GTAP data) in 2020

deviations from baseline

	Consumer Goods	Energy-int. goods	Capital goods
relative production	8.1	-2.7	-4.2
value added share	0.8	0.0	-0.7

source: WorldScan.

sensitivity analysis

The terms-of-trade losses for China in these simulations depend on the price-elasticities assumptions. For this reason we have run another set of simulations (a baseline and a policy simulation) with lower Armington elasticities. The Armington elasticities are reduced by about 50%. The differences with the previous simulation are modest however.

For China the effects on home markets are much larger than on export markets. Imports are reduced by about 50% while the reduction in exports is much lower. As a result the relative GDP gains are larger about 7% compared to 2% before. The main reason is that competition is less fierce now. So, the reduction of import tariffs induces now to a limited increase in imports. Moreover, the home bias

is larger because the actual market shares in 1995 are calibrated with lower Armington elasticities.[1] This `protects' also home sales of Chinese producers. Export prices are lowered less than before. As a result the terms-of-trade loss turns in to a gain of about 0.4%

The import and export pattern are not really affected. However, the extra exports remain relatively high, in particular for Consumer Goods. This is also reflected by the changes in production volumes per sector. The production volumes in all manufacturing sectors increase. This increase in production corresponds to the increase in the volume in GDP. For the trading partners of China the effects are similar in both sets of simulations. This is not surprising because the policy simulation assumes only changes in Chinese trade policy.

5. Tariff exemptions and trade liberalization in China

The simulations in this section take account of the fact that the collection rate is 4.9% in China. The first simulation (reduced-tariff) assumes that all imports are partially exempted by a proportional rate such that the collection rate is 4.9%. This is based on the idea that the statutory imports rates are often exempted as is discussed by Worldbank (1994). Unfortunately we do not have information on exemptions per sector and trading partner, such that a proportional decrease of the import tariffs according to the GTAP data seems to be the only alternative. One of the main reasons for the low collection rates are the exemptions for imports used as intermediate and investment goods. The second simulation (exempted-imports) in this section assumes that only imports used for production are exempted. For import used for final consumption the full import tariff (according to the GTAP data) is imposed.

The main reason of introducing two set of simulations with lower initial import tariffs is a lack of data on the precise size of exemptions classified for the several destinations of imports and their origin. By introducing two extreme types of simulations - equal proportional reduction of the import tariffs over all sectors and allowing for exemptions on intermediate and investment goods - we get some idea on the different relative sectoral effects. As noted by McKibbin and Wilcoxen (1998) changes in relative tariffs across sectors could be of more importance than an across-the-board change of tariffs.

Because of introducing exemption rates, the baseline of this simulation deviates a bit from the baseline described in section 3. The differences originates in the different values of the effective tariffs. We assume that import tariffs and non-tariff barriers are lowered proportionally from 2000 onwards until they are halved in 2010 as before. We also assume that the MFA agreement phases out between 2000 and 2005 for China. We present the results of trade liberalization in deviation from the baseline for the year 2020. We focus here on the numerical differences with the previous simulations because we are interested the numerical effects of trade liberalization with different levels of import tariffs.

all imports exempted by a proportional rate (reduced-tariff simulation)

The pattern of the macroeconomic effects is the same as before but the effects are smaller. The welfare

[1]CPB (1999) deals more extensively with this issue.

gain of the main trade partners of China is lower compared to the high-tariff case. For the United States the benefits are a bit larger. South-East Asia is also in this case the big winner of unilateral trade liberalization by China, in particular in welfare terms.

For China the welfare gains are substantially lower. In GDP terms the reduction in gains is modest, but in terms of the equivalence criteria the reduction is substantial. On the other hand, people save more. Although the increase in welfare on a pure consumption basis is much lower, their inter-temporal welfare is much higher due to trade liberalization. The welfare effects of trade liberalization in 2020 are smaller than before because the reduction of import tariffs is smaller and so are the welfare gains due to lower consumer prices.

Table 5.1 Effects of trade liberalization with reduced GTAP import data in 2020
deviations from baseline

	volume of GDP(%)	volume of consumption (%)	EV measure (billion US$)	terms of trade (%)
China	1.4	0.5	9.5	-0.5
United States	0.1	0.2	19.3	0.1
Japan	0.1	0.2	13.4	0.0
Western Europe	0.1	0.2	20.2	0.1
Pacific OECD	0.2	0.3	5.3	0.2
South-East Asia	1.0	1.5	52.6	0.2

source: WorldScan.

These results are confirmed by analysing changes in the import and export value for manufacturing in Table 5.2. The imports of Consumer Goods and Energy-intensive Goods are mainly produced in South-East Asia. However, a smaller share of importing Energy-intensive Goods and Capital Goods originates from South-East Asia now. From the OECD imports Japan is the most important trading partner. For Capital Goods imports from Western Europe are also relatively important. Overall the increase in imports is reduced by about 50%.

Table 5.2 Trade effects of trade liberalization (reduced GTAP import tariffs) in 2020
deviations from baseline

	Consumer Goods		Energy-intensive Goods		Capital Goods	
billion US$	import	export	import	export	import	export
China	90.8	191.2	31.6	37.4	59.2	87.9
% of	import	export	import	export	import	export
United States	1.9	50.1	3.1	15.4	7.1	20.4
Japan	9.3	7.8	21.0	14.5	29.2	11.1
Western Europe	3.5	26.9	4.7	17.5	33.0	25.0
Pacific OECD	0.7	4.3	1.1	3.7	1.5	3.7
South-east Asia	79.1	5.9	53.5	35.2	23.5	25.3

source: WorldScan, prices are 1995 producer prices.

Chinese exports are much larger than the imports in all three manufacturing sectors. Exports are also reduced, but less than the imports. This suggest that the loss in sales at the home market is completely offset by extra sales abroad. The export pattern of these extra exports is similar as above: most of the Consumer Goods go to the United States, Japan and Western Europe. From the sectors Energy-intensive Goods and Capital Goods a relative large share is exported to South-East Asia.

Table 5.3 shows that production volume in Consumer Goods increases substantially in China. The increase is even more pronounced than in the high-tariff simulation. The reason is that the sector Textiles increases (see table A1),while it was severely hurt by the reduction of the high import tariffs before (see Table 3.1). The production volumes of the other manufacturing sectors do not change significantly as a response to trade liberalization. In the high-tariff simulation, production volumes in these sectors decreased. At the detailed level production shifts occur within these sectors. Because the reduction of the import tariffs is much lower now, sectors are also less hurt by cheaper imports. The clearest examples are the sectors Textiles and Motor Vehicles. The latter sector shrinks now by 30% instead of 60% as before. This explains the modest change in Capital Goods. However, other sectors do not expand as much compared to the high-tariff simulation. Examples are Food Processing, Leather and Electronic Equipment. There are several reasons for these results. First the change in tariff reduction is not proportional over all sectors because the size of the sectoral non-trade barriers differs. Second, depending on production technologies sectors, benefit to a different extent from lower prices of their intermediate inputs.

Table 5.3 Sectoral effects for China (reduced GTAP import tariffs) in 2020
deviations from baseline

	Consumer Goods	Energy-intensive goods	Capital goods
relative production	10.8	0.0	-0.7
value added share	1.0	0.2	-0.1

source: WorldScan.

intermediate and investment goods exempted from import tariffs (exempted-imports simulation)
This simulation assumes that intermediate and investment goods are exempted from import tariffs to a large extent. For imports used for final consumption China levies the full statutory GTAP tariffs, see Table 3.3. The exemptions for paying import tariffs are assumed to be 88% for all investment and intermediate deliveries of manufacturing goods. The exemption rate is 88% such that the collection rate is still 4.9% as in the previous simulation.[1] Because the tariffs are lower, the baseline of this simulation deviates a bit from the baseline described in section 3.The differences originates in the exemption rates

[1]The GTAP data base does not split up bilateral trade at a sectoral level for destination categories. So, it is not possible to discriminate between imports between used for consumption and intermediate inputs at a bilateral base. GTAP provides information on the destination of total import within a sector. We assume that this division is valid at a bilateral level. In fact, it will not be the case. It seems more likely that imports from countries which face a relatively high (low) tariff are relatively much used as intermediate (consumption) goods which are exempted from import levies.

for the import of intermediate goods. We assume that trade barriers are lowered proportionally from 2000 onwards until they are halved in 2010 as before and that the MFA phases out in 2005. We focus here on the numerical differences with the reduced-tariff simulation because we are interested in the effects the elimination of high import tariffs for consumption goods compared to the elimination of low tariffs of imports used for consumption and intermediate goods.

Table 5.4 Economic effects of trade liberalization with tariff exemptions in 2020 compared to reduced-tariff simulation

	volume of GDP(%)	volume of consumption (%)	EV measure (billion US$)	terms of trade (%)
China	0.3	-0.1	-1.3	-0.1
United States	0.0	0.0	-0.2	0.0
Japan	0.0	0.0	-1.1	0.0
Western Europe	0.0	0.0	0.1	0.0
Pacific OECD	0.0	0.0	-0.1	0.0
South-East Asia	-0.1	-0.1	-3.1	0.0

source: WorldScan

Table 5.4 shows the difference of macroeconomic effects in eliminating import tariffs taking account of exemptions and in eliminating reduced imports tariffs. Table 5.4 shows that these results are nearly similar. On the one hand, this is not surprising. The total shock, that is to say the size of the elimination of trade barriers is the same in both sets of simulations. On the other hand, the distortionary effects deviate. For that reason the volume of GDP is a bit higher in China, although the welfare gains are lower. The reason is that people save more in response to the higher real interest rate. With respect to the trading partners, only South-East Asia is slightly affected..

The sectoral effects are larger. Table 5.5 shows the differences in import and export changes of manufacturing goods in China in deviation from the baseline. The comparison with Table 5.2 shows that relatively less Energy-intensive and Capital Goods are imported due to trade liberalization because the initial imports tariffs are less distortionary in these sectors than in Consumer Goods. As a consequence, the effects of trade liberalization are lower for the former two sectors. The reason is that Consumer Goods are for a much larger part used for consumption and Capital Goods and Energy-intensive Goods are mainly used as input in production (see Table 3.1). These inputs are exempted from import tariffs, so tariff elimination has nearly no effect in these sectors. However, imports in Consumer Goods are also lower because Textiles expand. This sector delivers much inputs to Wearing Apparel.

Table 5.5 also shows that South-East Asia is affected by less exports in Consumer Goods and Energy-intensive Goods to China. To a large extent the Rest of the World including South Asia benefit from this. The table shows clearly that the OECD does not benefit.

Table 5.5 Trade effects of trade liberalization with tariff exemptions in 2020

difference from policy simulation with proportionally reduced tariffs

	Consumer Goods		Energy-intensive Goods		Capital Goods	
billion US$	import	export	import	export	import	export
China	-6.4	-3.8	-6.0	-2.8	-9.2	-8.2
% of	import	export	import	export	import	export
United States	0.4	0.4	-0.0	-0.1	0.0	-0.0
Japan	-0.6	-0.2	0.6	0.0	-1.1	-0.1
Western Europe	0.3	0.1	-0.0	-0.1	1.0	-0.0
Pacific OECD	0.1	0.0	0.2	-0.0	0.1	0.0
South-East Asia	-1.7	-0.3	-3.2	0.1	-0.0	0.0

source: WorldScan, prices are 1995 producer prices

These effects on trade in manufacturing are also depicted in Table 5.6. This table shows the differences in the relative changes in production volume and absolute changes in value added shares of the three manufacturing sectors between the exempted-import and reduced-tariff simulation. It is clear that all sectors grow, which was also apparent from the lower import in Table 5.5. The reason is that sectors which are often used for intermediate deliveries and investment does not face much extra competition now. The trade barriers were already low due to exemptions such that the negative effects of more competition at home are limited. So these sectors grow relatively. Examples are Textiles, all kind of minerals, and Motor Vehicles. Because just sectors which produce a lot of intermediate and investment goods perform well, other sectors can obtain relatively cheap intermediate goods. This reduces the relatively negative effects for the sectors often used for final consumption. Although these sectors are more hurt by the initial reduction of import tariffs low input prices compensate to some extent.

Table 5.6 Sectoral effects for China (other data) in 2020

deviations from reduced-tariff simulation

	Consumer Goods	Energy-intensive goods	Capital goods
relative production	0.8	0.7	0.4
value added share	0.0	0.0	0.0

source: WorldScan.

The our trade-liberalization simulations in the cases in which all imports are exempted to a proportional rate and in which intermediate goods are exempted from import tariffs show that modelling of exemptions is important. This importance appears at the sectoral level because the imports of the various manufacturing goods are used to a different extent for final consumption and inputs in production and investment. If exemptions are only used to lower proportionally all tariff levels, the sectors Textiles, minerals and Motor Vehicles are relatively worse off, because these are used to a large extent as production inputs. However, if inputs for production are exempted from paying import tariffs and goods

for consumption not, Leather, Food processing, Lumber and Wood, Electronic Equipment, and other Transport Industries in China will be worse off.

6. Global trade liberalization

So far the policy simulations have shown welfare effects of reducing unilaterally imports tariffs in order to enter the WTO. One of the gains of entering the WTO is, except for the phases out of the MFA, to participate in new rounds of trade liberalization. A new round such as the Millennium round could reduce trade barriers substantially throughout the whole world. China as an significant exporter of manufacturing goods could benefit significantly from such an agreement. Therefore we simulate here the case that all import and export taxes and non-tariff barriers in all regions are proportionably reduced by 50% between 2000 and 2010. The value of the import tariffs are derived from the GTAP database, but for China we assume the same exemptions for intermediate and investment goods as in the exempted-import simulation. We focus on the results for China and its main trading partners for the comparison with the exempted-import simulation.

The elimination of import tariffs stimulates trade, in particular in manufacturing. Trade and tariffs in services are relatively small, such that trade liberalization has nearly no effect in spite of the large non-tariff barriers. China gains from a world-wide trade liberalization. The volume of production rises with about 5% and of consumption with 6%. China experiences a small terms-of-trade loss.

Table 6.1 Macro economic effects of global trade liberalization in 2020
deviations from baseline

	volume of GDP(%)	volume of consumption (%)	EV measure (billion US$)	terms of trade (%)
China	5.0	5.7	111.5	-0.1
United States	0.3	0.4	55.7	0.4
Japan	1.0	1.4	97.0	0.0
Western Europe	0.4	0.4	56.7	0.3
Pacific OECD	1.5	1.6	24.9	1.0
South-East Asia	4.7	6.2	218.9	0.3

source: WorldScan.

The net welfare gain is about 100 billion US dollar, see Table 6.1. The OECD regions benefit also in absolute terms, but the gains are smaller in GDP terms. The welfare gains for South-East Asia are large.

A global elimination of trade barriers has a large impact on specialization patterns. China exports much more Consumer Goods but less Energy-intensive Goods and Capital Goods compared to the baseline. The imports are increased for all three sectors. The import pattern itself is not changed. Most of the imports come from South-East Asia and from the OECD imports Japan is the most important producer. Exports of Consumer Goods mainly go to Western Europe and the United States.

Table 6.2 Trade effects of global trade liberalization in 2020

deviations from baseline

	Consumer Goods		Energy-intensive Goods		Capital Goods	
billion US$	import	export	import	export	import	export
China	133.1	220.7	75.8	47.2	136.1	63.6
% of	import	export	import	export	import	export
United States	2.3	41.8	3.6	20.1	5.9	18.5
Japan	7.9	5.7	17.7	5.0	23.8	0.2
Western Europe	4.5	20.0	6.9	11.2	25.0	17.0
Pacific OECD	0.8	3.7	1.3	4.7	1.3	4.8
South-East Asia	73.9	12.6	53.8	36.4	39.0	30.6

source: WorldScan, prices are 1995 producer prices.

These numbers suggest that the sectoral effects are stronger than in the previous simulations. This is confirmed by Table 6.3. The volume of production of Consumer Goods rises with about 15% while production of Capital Goods decreases. Endowments are shifted from the latter sector to Consumer Goods. Its share in value added increase with about 1% points at the expense of Energy-intensive and Capital goods.

Table 6.3 Sectoral effects for China of global trade liberalization in 2020

deviations from baseline

	Consumer goods	Energy int. goods	Capital goods
relative production	14.8	1.0	-3.7
value added share	0.9	-0.1	-1.4

source: WorldScan.

China specialises in Wearing Apparel and Food processing and Textiles also expand. For these reasons the sector Consumer Goods is very important for China. Its position in Motor Vehicles, Electronic Equipment and Machines and Equipment is seriously worsened. This explains the fall of the Capital Goods sector.

7. Conclusions

China's entrance to the WTO and the accompanied opening up of China's markets is still a major theme in the relations between China and the industrial countries. This paper shows the effects a trade liberalization by China at a unilateral level and as a part or a world-wide reduction of trade barriers. Our analysis shows that the main trading partners of China will benefit from an unilateral trade liberalization by China. In particular, the countries in South-East Asia gain because their labour-intensive exports to China will increase.

China itself does also experience a welfare gain. Mainly the fast expanding sector Wearing Apparel contributes to the GDP and welfare gain due to the abolition of the MFA. The sectors Motor Vehicles and Lumber and Wood decline heavily because of the large cuts in import barriers.

The effects on the other sectors depend to a large extent on the modelling of the tariffs barriers. It is clear that the tax incidence from import taxes is much lower than the statutory tax rates would suggest. One of the main reasons is the exemption of tariffs for imports used for investment and production. To mimic the collection rates we have modelled exemptions in two ways beside the case that we did not introduce exemptions rates at all. The first was an overall proportional reduction of the import tariffs. The second way was to exempt all imports used for investment and production and to use the statutory tax rates for final consumption.

The sector Textile expands if unilateral trade liberalization takes place given that imported intermediate goods are exempted from paying tariffs. If initial tariffs are high, trade liberalization hurts Textiles heavily, because foreign producers penetrate at the Chinese markets. Similar results apply for minerals. Also the sector Chemicals, Rubbers and Plastics performs much better if the trade-liberalization analysis takes account of exemptions. For sectors like Leather and Food Processing the opposite result holds. These products are often used as consumption good such that the import tariffs are still high even if exemptions for intermediate goods are introduced in the model.

These results suggest that modelling of tariffs and exemptions is very important in the analysis of China's entry to the WTO. In particular the analysis of a sector like Textiles depends on the way exemptions are modelled, but also for other sectors the shifts in production and inputs are substantial. For that reason it would be very interesting to obtain bilateral trade data on on the destination of imports for China.

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Appendix Regional and sectoral concordances for WorldScan

1	United States
2	Japan
3	Western Europe United Kingdom, Germany, Denmark, Sweden, Finland, Rest of European Union, EFTA
4	Pacific OECD Australia, New Zealand, Canada
5	China China, Hong Kong
6	South-East Asia Republic of Korea, Indonesia, Malaysia, Philippines, Singapore, Thailand, Taiwan, Vietnam
7	South Asia & Rest India, Sri Lanka, Rest of South Asia, Rest of the World
8	Rest of the World Eastern Europe, Former Soviet Union, Turkey, Rest of Middle East, Morocco, Rest of North Africa, South African Customs Union, Rest of Southern Africa, Rest of Sub-Saharan Africa, Central America and Carribean, Mexico, Argentina, Brazil, Chile, Uruguay, Venezuela, Colombia, Rest of South America

Aggregate sector	consists of sectors
Consumer Goods:	3 to 8
energy-intensive Goods:	9 to 14
Gapital Goods:	15 to 19

1	Agriculture Paddy rice, Wheat, Grains, Cereal Grains, Non grain crops, Vegetables, Oil seeds, Sugar cane Plant-based fibres, Crops, Bovine cattle, Animal products, Raw milk,, Wool, Forestry, Fisheries,
2	Raw Materials Oil, Gas, Coal, Minerals
3	Food production Processed rice, Meat products, Vegetable Oils, Dairy products, Sugar, Other food products, Beverages and tobacco
4	Textiles
5	Wearing Apparels
6	Leather etc.
7	Wood products
8	Rest of Manufacturing
9	Pulp and paper
10	Petroleum and coal
11	Nonmetallic minerals
12	Ferrous minerals
13	Nonferrous minerals
14	Chemicals, Rubbers and Plastics
15	Fabricated Metal Products
16	Transport industries
17	Machinery and equipment
18	Electronic equipment
19	Motor vehicles and parts
20	Services Electricity, Gas manufacture and distribution, Water, Construction, Financial, business and recreational services, Public administration, education and health, Dwellings
21	Trade and Transport

Data and substitution elasticities

WorldScan has been calibrated on the GTAP database, see McDougall et al. (1998). The calibration year is 1995. From this data set we derive not only demand, production and trade patterns, but also labour and capital intensity of the various sectors.

The results of the model depend on substitution possibilities in production and consumption. Production technology is described by a nested CES function. The upper level distinguishes between value added and intermediate goods. The substitution elasticity between these two broad categories is 0.4. At the lower level value added is described by Cobb-Douglas function of the primary productive factors -- capital, low-skilled labour and high-skilled labour -- whereas intermediate goods are combined according to a CES function with again a substitution elasticity of 0.8. The utility function, from which demand for different consumption categories is derived, has been given a Cobb-Douglas specification. The substitution elasticity between any pair of consumption categories is therefore unity.

The substitution between goods from different origins is not perfect. WorldScan employs an Armington-type assumption. However, the price elasticities of demand considerably increase over time, and depend on the market share. When the market share is virtually nil, the elasticity is highest and equal to the substitution elasticity between goods of different origin. The long-run substitution elasticities are 17, 11, 8 and 6 for raw materials, agriculture, manufacturing and services, respectively.

Table A1 Relative sectoral changes in the volume of production in China in 2020 (all simulations)

	full tariffs	reduced tariffs	exempted imports	global reduction
Agriculture	3.4	3.2	2.9	2.4
Raw materials	-17.1	-18.8	-19.6	-25.3
Food Processing	3.6	1.9	1.0	9.9
Textiles	-16.3	1.0	5.8	2.8
Wearing Apparel	59.8	54.7	54.8	56.7
Leather products	9.2	6.6	5.3	1.0
Lumber and wood	-8.3	-8.2	-9.7	-17.7
Publishing, paper	3.4	4.3	4.2	4.7
Petrol and coal refinery	3.1	2.0	2.1	5.9
Chemicals, rubbers and plastics	1.1	6.3	6.9	3.8
Nonmetallic minerals	3.2	2.8	3.0	6.3
Ferrous minerals	-2.9	-0.8	0.1	-5.7
Nonferrous minerals	-4.5	-0.4	1.2	-10.3
Fabricated Metal Products	3.8	6.2	6.4	6.8
Motor Vehicles	-61.7	-31.0	-30.2	-33.3
Other transport industries	8.1	8.4	6.3	7.2
Electronic equipment	18.3	13.0	11.2	4.7
Machinery and equipment	4.2	5.2	5.9	-0.5
Other Manufacturing	7.1	10.1	9.8	6.6
Services	1.4	0.4	0.6	4.5
Trade and Transport	2.1	-0.1	-0.1	13.0