

# **China and the WTO:**

## **the impact on China and the world economy**

*Arjan Lejour*

CPB, the Netherlands Bureau for Economic Policy Analysis  
PO box 80510  
2508 GM The Hague  
The Netherlands  
tel: +31.70.33.83.311  
fax: +31.70.33.83.350  
e mail: [aml@cpb.nl](mailto:aml@cpb.nl)

### 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. The accession would mainly benefit other countries in South-East Asia. Within China itself the sectors Wearing Apparel and Electronic Equipment would expand, while sectors as Motor Vehicles and Lumber and Wood will loose due the abolition of the high protective barriers in these sectors. The outcomes are however affected if tariff exemptions for intermediate and investment goods are modelled. 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 Products and Food Processing, which's output is 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 studied the impact of different measures of tariff reductions by China. Most studies make use of an applied general equilibrium model, such as the GTAP model ( Hertel, 1997), or the G-Cubed world model (McKibbin and Wilcoxon, 1998). Almost all simulation results show that both China and its major trading partners (the US, the European Union, Japan, and countries in South-East Asia) will benefit from China's participation in the WTO. Some results suggest that China (including Hong Kong) will be the biggest winner with a net welfare gain of about US\$ 30 billion (Bach *et al.*, 1997; Wang, 1997) annually.

At the sectoral level the picture is completely different. The overview of McKibbin and Wilcoxon (1998) shows a 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 loser. Yang (1996) picks Textile as the second winner behind Wearing Apparel.

An important reason for these differences is the lack of agreement on the size of tariff cut, in particular on relative cuts, across sectors. The underlying reason is the 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 import 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 export industries. Most models do not take account of these exemption rates, except for Bach *et al.* (1996), DRC (1998), and Ianchovichina *et al.* (2000). 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 on whether tariff exemptions are introduced and in which way these exemptions are modelled. First, we present a unilateral reduction of the import tariffs in China based 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 countries of origin by about 85% to mimic the collection rates of 2.6% 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 refraining from levying tariffs on imported goods used for production is one of the main reasons for a low overall 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 lower the import tariffs to the values agreed upon in the Sino-US and Sino-EU agreements (US (2000), and EU (2000)). We lower the current import tariffs proportionally from 2000 onwards, such that meet its obligations in 2005. The non-tariff barriers are halved between 2000 and 2005. Moreover we assume that the Multi Fibre Agreement (MFA)) is phased out between 2000 and 2005. 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 phasing out of the MFA agreement. Motor Vehicles, Lumber and Wood, and Raw Materials are hurt most by trade liberalization due to the high initial import tariffs and non-tariff barriers. If we compare the three simulations the sectors Electronic Equipment and Other Manufacturing are winners independently of modelling tariff exemptions.

However, modelling tariff exemptions matters. Textiles 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. On the contrary, it is even of the winners in the exempted tariff simulation. Also the mineral sectors loose from trade liberalization if full tariffs are assumed and expand slightly if exemptions on intermediate goods are assumed. For Chemicals, Rubber and Plastics, we see the same pattern. without exemptions the sector is hardly affected by China's access to the WTO. With tariff exemptions it is one of the winners. 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 gains in Electronic Equipment are also lower with tariffs exemptions.

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. South-East Asia benefits mainly from lower trade barriers in sectors as Textiles, Wearing Apparel, Leather Products, and Lumber and Wood. For the OECD regions the lower barriers in Motor Vehicles, Other Transport Equipment, Machinery and Equipment, and Other Manufacturing are beneficial. In analysing Chinese growth in the world economy also Arndt *et al.* (1997) conclude that countries in South-East Asia benefit most from China's growth.

Section 2 gives an overview of trade liberalization policies in China from 1978 onwards, including the new WTO deal. Section 3 discusses the current import tariffs and import structure in China. Section 4 presents the model, and the base scenario. Section 5 present the simulation results for the unilateral import tariff reductions by China. We present three simulations: the first one without exemptions, the second one with an overall exemption rate of about 85% and a third one in which imported intermediate and investment goods are exempted. Section 6 concludes.

## 2. Trade Liberalization in China (1992-1997)

Prior to 1978, China's trade system was centralized and its objective was pursued in a relatively non-transparent way through the decisions of planning and trade officers. The process of reform began in 1978 has involved the gradual development of instruments for indirect control and has resulted in a progressive restructuring of China's foreign trade system into one whose basic operation is more comparable to the foreign trade system of developing market economies. In particular, during the period 1992-1997, China has actively reformed its trade policies, bring its practices closer to international norms.

Since 1992, when the third "Import and Export Tariff Rule" by Harmonized System (HS) was promulgated, trade liberalization has accelerated and further tariff cuts have been undertaken in China for six times during 1992-1997. Table 2.1 summarizes the process of these reductions.

**Table 2.1 Six Times of Tariff Reductions in China (1992-1997) (%)**

| No. | Dates<br>Of Reductions | Adjusted Commodities<br>or Tariff Lines | Unweighted Average Tariff<br>Rates After Adjustment |
|-----|------------------------|-----------------------------------------|-----------------------------------------------------|
| 0   | Jan 1,1992             | The Third "Tariff Rates Rule"           | 42.5                                                |
| 1   | Dec 31,1992            | 3371 tariff lines                       | 39.3                                                |
| 2   | Dec 31,1993            | 2898 tariff lines                       | 36.4                                                |
| 3   | Jan 1,1994             | Car                                     | 35.9                                                |
| 4   | Jan 1,1995             | Tobacco,Liquor,Tape,Mobile              | 35.6                                                |
| 5   | Apr 1,1996             | 4997 tariff lines                       | 23.4                                                |
| 6   | Oct 1,1997             | 4874 tariff lines                       | 17.0                                                |

Source: Xuesong and Lejour (2000).

In early 1992, the average unweighted tariff rate was 42.5 percent, by the end of 1992, it had been down to 39.3 percent due to the adjustment for 3371 duty codes by an average of 7.3 percent. In December 1993, China again reduced import tariffs, this time for 2898 duty codes by an average of 8.8 percent and which brought the average unweighted tariff level down to 36.4 percent. In January 1994, the import tariff rates for cars were declined and then the average tariff level was lowered to 35.9 percent. At beginning of 1995, the rates for tobacco and liquor, magnetic tapes, middle automobiles, etc. were reduced and therefore the tariff level lowered to 35.6 percent.

Besides these, another two times of significant reductions on tariff levels was implemented on April 1, 1996, and October 1, 1997, respectively. The broad range of tariff reductions in 1996 involved 4997 duty codes, i.e. 76.3 percent of the total tariff lines (6554), and the tariff rates were lowered by a big margin of 35 percent on average. After the adjustment, the

average tariff rates declined significantly to 23.4 percent in comparison with 35.6 percent in 1995. The reduction in October, 1997 also involved lots of tariff lines and cut the rate level by a big margin, after that time, the average unweighted tariff rate has been brought down to 17.0 percent.

Besides tariff reductions described above, China has also gradually moved toward to eliminate non-tariff barriers. Many import and export licenses are eliminated and the number of import quota's were significantly reduced. Xuesong and Lejour (2000) discuss this issue more extensively.

A distinctive feature of China's tariff regime is its relatively minor contribution to revenue generation. Compared to most other developing countries, China's import duties account for a very small proportion of total government revenues. In 1992, China collected only 4.9 percent of the c.i.f. value of imports in duties. In large part, it is China's extensive import duty exemptions and rebate system that accounts for such low collection rates.

For comparison purposes, data on import values and the corresponding tariff revenues since 1991 are presented in Table 2.2. The tariff revenue collection rate has declined from 4.9 percent in 1992 to 2.6 percent of the value of imports in 1997.

There are several reasons bring out such low actual tariff collection rates and such high exemption rates in China. First, the broad exemptions are allowed for export production, there are about half of total imports belonging to the processing trade at present. Second, duty concessions of 50 percent are also provided for border trade and materials used by foreign funded enterprises in their production for the domestic market, and duty exemptions are also provided for compensation trade, see also the Worldbank (1997), Ianchovichina *et al.* (2000), and Van Leeuwin (2000).

**Table 2.2 Actual Tariff Collection Rates & Exemption Rates in China (1992-1997)**

| [1]<br>Year | [2]<br>Nominal<br>Tariff Rates | [3]<br>Import<br>Values (\$bn) | [4]<br>Tariff<br>Revenues (\$bn) | [5]<br>Actual<br>Collection Rates | [6]<br>Exemption<br>Rates |
|-------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------------|---------------------------|
| 1992        | 42.5                           | 80.6                           | 4.0                              | 4.9                               | 88.5                      |
| 1993        | 39.3                           | 104.0                          | 4.5                              | 4.3                               | 89.0                      |
| 1994        | 35.9                           | 115.6                          | 3.3                              | 2.9                               | 92.0                      |
| 1995        | 35.6                           | 132.1                          | 3.5                              | 2.6                               | 92.6                      |
| 1996        | 23.4                           | 138.8                          | 4.1                              | 2.9                               | 87.4                      |
| 1997        | 17.0                           | 150.1                          | 3.9                              | 2.6                               | 84.7                      |

Source: SSBC (1998).

Notes: The nominal tariff rates in column [1] are unweighted, the actual collection rates in column [4] are weighted. We do not really use these exemption rates in the model, here they are shown for illustrative purposes.

The exemptions for imported intermediate goods used in export-processing industries have stimulated these industries substantially. However, the high import tariffs with broad exemptions discriminate against industries which produce mainly for the domestic market and export-processing industries which buy their intermediates goods at the domestic market. Moreover it raises the price of non-traded goods.

The expected entry of China to the WTO covers a wide range of areas. Most of them are hard to quantify. China has to bring its trade rules in accordance with the WTO principles. This implies that China is not permitted to discriminate against foreign suppliers and has to abolish most of its non-tariff barriers. Moreover, it has to accept WTO agreements on standards and phytosanitary restrictions on imports and on customs valuation. Besides its intellectual property regime has to be consistent with the TRIPS agreement.

In agriculture China has agreed with the US and the EU to reduce overall tariffs from 31.5 to 14.5 in 2004. The tariffs and access for US and EU priority products will be reduced even further, see US (1999) and EU (2000). Furthermore China agreed to eliminate its subsidies on agricultural exports.

In many service markets foreign access will be expanded. Examples are telecommunications, banking, securities, distributions, tourism, audio visual and professional service sectors. Foreign investment in telecommunications will be allowed for 50% in about three years. Moreover EU and US insures get immediately new licenses. In many sectors the possibilities for joint ventures are improved and extended for more regions and cities. These improved access and or agreements - US (1999) and EU (2000) provide more details - at the

Chinese service markets could have big effects in these sectors. It is hard to estimate these effects.

In this paper we focus on the effects in the manufacturing sectors. The overall tariffs will decrease from 24.6% in 1997 to 9.4% in 2005. On US priority products such as wood, paper, chemicals, capital and medical equipment, tariffs will fall to 7.1%. The EU also succeeded in lower import tariffs for their priority products such as in machinery and appliances, ceramics and glass, footwear, leather, cosmetics, and spirits. The levels of these tariffs will be in the range of 8% to 10%. In information technology, tariffs will even be eliminated. In the auto sector, China will reduce its prohibitive tariffs from about 80% to 100% to 25% in 2005, with the largest cuts made in the first years after the accession. China's textile and wearing apparel industries will benefit from the phase out of the MFA agreement. In the WTO, it is agreed that these quotas will be vanishing in 2005.

### **3. Trade and Tariffs**

Section 2 presented some general characteristics of trade reform policies in China in the last decades. Given the overall picture, this section focusses on trade and the import tariffs, in particular those of China. The trade relations and the height of the tariffs drive for the greater part the results for the various sectors and regions. The numbers on the import tariffs and trade are from the GTAP database version 4 (McDougall *et al.* (1998)).

**Table 3.1 Tariffs levied and faced by China**

| Sector                      | import tariff |      | MFA <sup>1</sup> | non-tariff barriers | consump-<br>tion <sup>2</sup> |
|-----------------------------|---------------|------|------------------|---------------------|-------------------------------|
|                             | 1995          | 2005 |                  |                     |                               |
| Agriculture                 | 5.2           | 5.2  |                  | 0.0                 | 60.4                          |
| Raw Materials               | 2.3           | 2.3  |                  | 45.7                | 6.1                           |
| Food Processing             | 9.1           | 9.1  |                  | 2.7                 | 70.7                          |
| Textiles                    | 43.1          | 7    | 2.7              | 24.3                | 29.8                          |
| Wearing Apparel             | 15.4          | 15.4 | 7.7              | 18.4                | 84.3                          |
| Leather Products            | 21.0          | 10   |                  | 18.4                | 50.8                          |
| Lumber and Wood             | 18.9          | 8    |                  | 32.5                | 32.7                          |
| Publishing, Paper           | 12.4          | 8    |                  | 0.0                 | 26.4                          |
| Petrol and Coal Refinery    | 3.3           | 2.5  |                  | 15.0                | 5.6                           |
| Chemicals, Rubber, Plastics | 15.5          | 6    |                  | 3.3                 | 18.4                          |
| Nonmetallic Minerals        | 20.4          | 10   |                  | 0.0                 | 5.3                           |
| Ferrous Minerals            | 9.5           | 7    |                  | 15.9                | 0.4                           |
| Nonferrous Minerals         | 10.2          | 7    |                  | 15.9                | 4.5                           |
| Fabricated Metal Products   | 24.6          | 11   |                  | 0.0                 | 22.7                          |
| Motor Vehicles              | 71.7          | 20   |                  | 26.3                | 0.5                           |
| Other Transport Industries  | 8.0           | 8    |                  | 0.0                 | 10.3                          |
| Electronic Equipment        | 11.8          | 5    |                  | 6.2                 | 32.0                          |
| Machinery and Equipment     | 13.0          | 9    |                  | 5.1                 | 10.0                          |
| Other Manufacturing         | 25.0          | 11   |                  | 0.0                 | 15.5                          |
| Services                    | 0.9           | 0.9  |                  | 15.8                | 31.6                          |
| Trade and Transport         | 0.0           | 0.0  |                  | 50.5                | 29.8                          |

source: McDougall *et al.* (1998). Data on non-tariff barriers are from DRC (1998), and Hoekman (1995). Data on import tariffs in 2005 are based on US (1999), EU (2000) and Ianchovichina *et al.* (2000) and own calculations.

<sup>1</sup>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.

<sup>2</sup>Consumption as share of total demand (including intermediate and investment demand).

From the first column in 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 goods such as Food Processing, Textile, Wearing Apparel, Leather Products and Other Manufacturing are higher than for other sectors.

The second column presents the expected tariffs in 2005. This information is based on US (1999) and EU (2000) and Ianchovichina *et al.* (2000). We concentrate on the tariff reduction in manufacturing. Overall we lowered the average tariff rate in manufacturing to 9.4%. We took some special attention to sectors dealt with the China-EU and China-US deal separately. Therefore we lowered tariffs in Textiles, Leather Products, Nonmetallic Minerals, Lumber and Wood, Fabricated Metal Products, Electronic Equipment and Other Manufacturing more than proportionally. A special case is Motor Vehicles. The prohibitive high tariffs in these sector fall dramatically. These tariffs are in line with Ianchovichina *et al.* (2000).

The third column presents the tariffication of the MFA export constraints in Textiles and Wearing Apparel. The fourth column presents some tariffication of non-tariff barriers. In the simulations we will reduce these by 50%. This is a very crude measure. However, we do not have the information to quantify this in a more sophisticated way. Here the breakdown of trade barriers in the service sectors is very important. The last column presents the share of final consumption in total use to these goods according to the GTAP data in 1995. We use this information to approximate the tariff exemption rates for importing intermediates and investment goods.

**Table 3.2 Import tariffs in manufacturing by region of origin**

| sectors                        | Western       |        | South -East |      |
|--------------------------------|---------------|--------|-------------|------|
|                                | United States | Europe | Japan       | Asia |
| Food Processing                | 8.5           | 8.1    | 11.3        | 5.4  |
| Textile                        | 12.6          | 26.9   | 56.2        | 45.9 |
| Wearing Apparel                | 10.7          | 2.5    | 42.4        | 29.0 |
| Leather Products               | 23.9          | 11.5   | 18.3        | 26.4 |
| Lumber and Wood                | 16.7          | 14.6   | 28.2        | 20.0 |
| Publishing, Paper, Pulp        | 8.7           | 11.7   | 12.3        | 17.8 |
| Petrol and Coal Refinery       | 8.1           | 5.7    | 5.9         | 1.6  |
| Chemicals, Rubber and Plastics | 10.5          | 10.0   | 15.8        | 21.3 |
| Nonmetallic Minerals           | 30.4          | 17.5   | 15.9        | 27.2 |
| Ferrous Minerals               | 9.5           | 9.1    | 10.6        | 9.7  |
| Nonferrous Minerals            | 6.2           | 4.9    | 14.2        | 14.5 |
| Fabricated Metal Products      | 17.7          | 15.6   | 23.9        | 34.7 |
| Motor Vehicles                 | 36.8          | 107.5  | 66.3        | 68.6 |
| Other Transport Industries     | 4.6           | 4.3    | 10.0        | 20.9 |
| Electronic Equipment           | 7.3           | 8.4    | 22.5        | 8.2  |
| Machinery and Equipment        | 10.1          | 14.1   | 15.3        | 10.7 |
| Other Manufacturing            | 14.7          | 12.0   | 20.1        | 36.0 |
| average                        | 10.8          | 18.4   | 21.2        | 21.6 |

source: McDougall *et al.* (1998) and own calculations.

Table 3.2 shows that China discriminates to the origin of its imports. Of course these numbers are also influenced by the content of the imports per sector. Overall the import tariff for the United States is much lower than for Western Europe, Japan and South-East Asia. The average rates for the latter three regions is more or less comparable and twice as high as for the United States. In particular in sectors as Textiles, Motor vehicles and Other Manufacturing the differences are large. On the other hand the tariffs in Leather Products and Nonmetallic Minerals are relatively high for products from the US. The EU faces relatively low tariffs in Wearing Apparel, Leather Products, Lumber and Wood, Nonferrous Minerals and Other Manufacturing. On the other hand the tariffs in Motor Vehicles exceed even the 100%. Japan faces in nearly every sector higher tariffs than the EU and US. One of the exemptions is Nonmetallic Minerals.

South-East Asia faces the highest tariffs. Only in Food Processing and Petrol and Coal Refinery the tariffs are relatively low. In spite of the high tariffs South-East Asia is the most important region for China in terms of imports. Table 3.3 shows that the imports are nearly 70 Million US dollar in 1995. Important sectors are Textiles, Chemicals, Rubber and Plastics, Electronic Equipment and Machinery and Equipment. China imports also relatively much in these sectors from the OECD regions. These products are responsible for about 60% of all exports from the OECD to China. It imports also relatively much Textiles and Ferrous Metals from Japan while the import of motor vehicles and other transport equipment from the EU is important.

**Table 3.3 Import values in manufacturing in billion US dollar**

| sectors                        | United States | Western | Japan | South -East |
|--------------------------------|---------------|---------|-------|-------------|
|                                |               | Europe  |       | Asia        |
| Food Processing                | 1.45          | 1.31    | 0.32  | 3.55        |
| Textile                        | 0.63          | 1.14    | 3.28  | 13.11       |
| Wearing Apparel                | 0.07          | 0.72    | 0.14  | 0.33        |
| Leather Products               | 0.27          | 1.15    | 0.20  | 2.51        |
| Lumber and Wood                | 0.18          | 0.26    | 0.05  | 1.72        |
| Publishing, Paper, Pulp        | 0.88          | 0.92    | 0.72  | 1.94        |
| Petrol and Coal Refinery       | 0.07          | 0.07    | 0.40  | 1.24        |
| Chemicals, Rubber and Plastics | 3.84          | 3.94    | 4.56  | 11.78       |
| Nonmetallic Minerals           | 0.16          | 0.70    | 0.49  | 0.43        |
| Ferrous Minerals               | 0.29          | 1.06    | 3.64  | 1.96        |
| Nonferrous Minerals            | 0.29          | 0.44    | 0.72  | 1.72        |
| Fabricated Metal Products      | 0.57          | 0.71    | 0.77  | 1.22        |
| Motor Vehicles                 | 0.70          | 2.56    | 1.92  | 0.40        |
| Other Transport Industries     | 1.49          | 2.84    | 0.83  | 1.11        |
| Electronic Equipment           | 3.11          | 3.82    | 4.80  | 5.99        |
| Machinery and Equipment        | 6.30          | 14.69   | 19.44 | 18.01       |
| Other Manufacturing            | 0.54          | 0.63    | 2.62  | 2.48        |
| total                          | 20.85         | 36.95   | 44.89 | 69.51       |

source: McDougall *et al.* (1998) and own calculations.

From this analysis we draw the following conclusions. If import tariffs in China are slashed down South-East Asia will benefit most compared to the other regions. The reasons are that the import tariffs it faces are relatively high and that China's imports mainly come from South-East Asia. The large reductions in Textiles and Motor Vehicles will benefit South-East Asia and Western Europe, respectively.. These sectors are probably most hurt in China.

#### 4. 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 the 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 5 are permutations within one scenario. They are not necessarily independent of the characteristics of this scenario. Therefore, we discuss the main characteristics briefly.<sup>1</sup>

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 scenario. 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

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<sup>1</sup>CPB (1999) discusses this scenario more extensively.

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 4.1.

**Table 4.1 Assumptions on exogenous variables in the Globalization scenario**

| annual growth 1995 -2020                | OECD | China | South-East<br>Asia | South<br>Asia | Rest of the<br>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<br>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.

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 by 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 4.2).

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 is invested in the home country this stimulates capital accumulation to a large extent. High economic growth stimulates also changes in the consumption pattern. If per capita income rises consumers 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 4.2 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 |

Source: WorldScan results.

## 5. Trade liberalization

If China wants to enter the WTO it has to lower its import tariffs and non-tariff barriers. This section analyses the effects of lowering the import tariffs according to the values mentioned in Table 3.1 and the 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 (full-tariff simulation). The second and third simulation reveal the results if the tariff rates are substantially lower such that the collection rate (is the value of import tariffs to the value of imports) is 2.6% as was in 1995 the case, see Table 2.2. Using the GTAP data on import tariffs, the collection rate would be substantially higher.

The second and third simulation thus take account of the fact that the collection rate for import duties is 2.6%. The second simulation (reduced-tariff) assumes that all imports are partially exempted by a proportional rate such that the collection rate is 2.6%. This is based on the idea that imports are often exempted from statutory rates 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. However, one of the main reasons for the low collection rates are the

exemptions for imports used as intermediate and investment goods. The third simulation (exempted-tariff) takes explicitly account of this information by assuming 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 sets 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 - a 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 Wilcoxon (1998) changes in relative tariffs across sectors could be of more importance than an across-the-board change of tariffs.

Because of the introduction of exemption rates, the baseline of this simulation deviates somewhat from the baseline described in section 4. The differences originate in the different values of the effective tariffs. We assume that import tariffs and non-tariff barriers are lowered proportionally from 2000 onwards until 2005. We also assume that the MFA agreement phases out between 2000 and 2005 for China. We present the results of trade liberalization in deviations from the baseline for the year 2020, in particular for the sectoral structure in China and the macroeconomic effects for the most important trade partners, the United States, Japan, Western Europe, and South-East Asia.

### *GDP effects*

First, we present the effects of trade liberalisation on GDP in China and its major trading partners. Most trading partners of China, like the United States, Japan, Western Europe, and South-East Asia will benefit. Table 5.1 shows that the GDP gains depend on the type of simulation.

**Table 5.1 GDP effects of trade liberalization in 2020**  
relative deviations from baseline (%)

|                 | full tariffs | reduced tariffs | exempted tariffs |
|-----------------|--------------|-----------------|------------------|
| China           | 0.08         | 1.33            | 1.66             |
| United States   | 0.07         | 0.02            | 0.03             |
| Japan           | 0.16         | 0.05            | 0.02             |
| Western Europe  | 0.16         | 0.09            | 0.08             |
| South-East Asia | 1.88         | 1.11            | 0.91             |

source: WorldScan results.

In the full tariffs case, if the trade liberalization shock is the largest, the gains for China are relatively low. China's home markets are most hurt by the increased competition. The trading

partners benefit most in this case, in particular South-East Asia. However, given the current tariffs revenues this simulation is probably not the most realistic one. Therefore we carry out the other simulations with exemptions. Then the gains for China are substantially larger, while those for the trading partners are lower. South-East Asia the most important trading partner benefits the most. From the OECD regions, Western Europe seems to be the winner, although the gains for those regions are very modest.

### *sectoral trade and production*

Table 5.2 shows that in all simulations the increase in total exports is larger than the increase in total imports. This overall result does not apply to all sectors. The increase in imports consists mainly of Raw Materials, Textiles, Motor Vehicles and Trade and Transport. Given the high import tariffs in Textiles and Motor Vehicles and the high non-tariff barriers in Raw Materials and Trade and Transport, these results are not surprising. Wearing Apparel benefits most from China's accession to the WTO. This is caused by the abolition of the MFA agreement. Other sectors which contribute to the increase in exports are Raw Materials, Textiles, Electronic equipment, Machinery and Equipment and Trade and Transport.

**Table 5.2 Trade effects of trade liberalization for China in 2020**  
deviations from baseline in billion US dollar (1995 producer prices)

| type of simulation          | full tariffs  |               | reduced tariffs |               | exempted tariffs |               |
|-----------------------------|---------------|---------------|-----------------|---------------|------------------|---------------|
|                             | import        | export        | import          | export        | import           | export        |
| Agriculture                 | -3.04         | 8.79          | -0.71           | 3.57          | -0.51            | 3.15          |
| Raw Materials               | 44.16         | 22.62         | 52.70           | 21.57         | 51.83            | 21.03         |
| Food Processing             | 2.61          | 7.27          | 0.25            | 3.20          | 2.92             | 2.78          |
| Textiles                    | 112.82        | 38.51         | 60.52           | 24.25         | 47.63            | 22.13         |
| Wearing Apparel             | 2.31          | 142.17        | 1.34            | 120.31        | 2.90             | 114.88        |
| Leather Products            | 9.12          | 21.06         | 5.25            | 10.79         | 5.75             | 9.24          |
| Lumber and Wood             | 11.08         | 9.47          | 8.18            | 4.40          | 8.82             | 3.78          |
| Publishing, Paper           | 3.69          | 5.03          | -1.06           | 2.30          | -0.89            | 1.94          |
| Petrol and Coal Refinery    | 0.27          | 0.65          | 1.25            | 0.48          | 1.76             | 0.44          |
| Chemicals, Rubber, Plastics | 30.63         | 30.38         | 3.85            | 14.18         | 0.22             | 11.64         |
| Nonmetallic Minerals        | 2.76          | 8.37          | -0.67           | 4.61          | -1.40            | 4.02          |
| Ferrous Minerals            | 18.18         | 12.87         | 14.41           | 7.17          | 12.13            | 6.25          |
| Nonferrous Minerals         | 8.62          | 4.96          | 6.39            | 2.88          | 5.38             | 2.51          |
| Fabricated Metal Products   | 8.95          | 12.96         | -0.50           | 6.63          | -1.51            | 5.69          |
| Motor Vehicles              | 65.31         | 0.59          | 30.93           | 0.37          | 27.26            | 0.35          |
| Other Transport Industries  | 1.81          | 9.92          | -2.81           | 4.60          | -0.30            | 3.87          |
| Electronic Equipment        | 14.57         | 44.29         | 6.50            | 19.95         | 6.57             | 16.04         |
| Machinery and Equipment     | 44.00         | 91.18         | 10.96           | 43.70         | 1.03             | 36.64         |
| Other Manufacturing         | 16.87         | 25.54         | 0.60            | 12.14         | -0.16            | 10.12         |
| Services                    | 8.55          | 16.39         | 18.84           | 8.79          | 19.79            | 7.73          |
| Trade and Transport         | 44.53         | 52.16         | 51.07           | 25.49         | 51.32            | 22.24         |
| <b>Total</b>                | <b>447.81</b> | <b>565.18</b> | <b>267.29</b>   | <b>341.37</b> | <b>240.53</b>    | <b>306.45</b> |

source: WorldScan results.

The changes in Agriculture are very modest. The reason is that according to the GTAP data the weighted import tariff in Agriculture is relatively low and we have not modelled non-tariff barriers in this sector. Although the WTO agreement focusses on manufacturing and services, the agreement contains several measures in Agriculture. Those measures, such as the SPS agreements, fall in import tariffs on US and EU priority products and the lifting of quantity restrictions will have probably larger effects than those mentioned in our simulations. This is also the case for Food Processing. The changes in the sector Services are also modest given the size of that sector. The reasons are that the tariffication of the barriers leads to relatively low values and that many services are hardly tradable.

The changes in the full-tariff simulation are larger than in the other simulations. This results from the larger trade shock in the first simulation. The changes in total imports and exports are about 40% lower. This overall result does not apply to all sectors. In sectors as Raw Materials, Food Processing, and Wearing Apparel imports and exports do not change significantly, and in Trade and Transport only exports change due to the overall reduction in exports. In services the import and export pattern changes, however this is very modest given the size of that sector. The underlying reason for these relatively stable outcomes in the simulations is the unchanged import tariff for these sectors in all simulations. For that reason the trade shock applied to these sectors does not vary in the three sets of simulations.

For the other (manufacturing) sectors the changes are much larger. If we take account of exemptions or lower initial tariffs the trade-liberalization shock in Textiles, Motor Vehicles, Chemicals, Rubber and Plastics, Leather Products, Electronic Equipments, Machinery and Equipment and Other manufacturing is much lower. In all these sectors the increase in imports is much lower as is the increase in exports. In particular in Chemicals, Rubber and Plastics and Machinery and Equipment the changes are stunning: the increase in imports due to trade liberalization is about 80% lower in the reduced tariff case and nearly 100% in the exempted tariff case. In Textiles and Motor Vehicles - sectors with high initial import tariffs - the increase in import is about 50% lower.

These differences between on the one hand the full-tariff simulation and on the other hand the other two simulations are confirmed if we analyse the relative changes in sectoral production due to trade liberalization. Table 5.3 shows that the relative changes in the production of Agriculture, Raw Materials, Wearing Apparel, Services and Trade and Transport are relatively stable for the type of simulation. In the services sectors the signs of the relative changes alter, but these changes are very modest. The changes in Textiles, Chemicals, Rubber and Plastics, Minerals, Motor Vehicles, and Other Manufacturing are much larger. In these sectors production increases or decreases less substantial if we take account of lower initial tariffs or exemptions. In particular the changes in Textiles are remarkable. In the full-tariff simulations, this sector is

one of the biggest losers after Motor Vehicles, and in the exempted tariff simulation it is the second winner, after Wearing Apparel.

The sector Chemicals, Rubber and Plastics is a winner if we take account of exemptions, while this is not the case in the first simulation. The sector Machinery and Equipment and Other Manufacturing perform better in production terms if the trade liberalization shock is lower. That is not the case for Electronic Equipment. The limited increase in exports hurts that sector more than the limited increase in imports. Still this sector benefits substantially from China's accession to the WTO.

The winning top 5 consists of Wearing Apparel, Textiles, other Manufacturing, Electronic Equipment and Chemicals, Rubber and Plastics - based on the exempted tariff simulation. The sectors Raw Materials, Lumber and Wood, and Motor Vehicles are seriously hurt by trade liberalization. For the sector Raw Materials and Motor Vehicles we have already explained this by the high non-tariff barriers and high import tariffs respectively. Table 3.1 shows that for the sector Lumber and Wood the combination of reasonably high import tariffs and high non-tariff barriers is very protective at this moment.

**Table 5.3 Sectoral production effects for China in 2020**

deviations from baseline in %

| type of simulation          | full tariff | reduced tariff | exempted tariff |
|-----------------------------|-------------|----------------|-----------------|
| Agriculture                 | 3.6         | 3.2            | 3.0             |
| Raw Materials               | -15.8       | -19.4          | -19.6           |
| Food Processing             | 2.5         | 1.2            | 0.0             |
| Textiles                    | -20.2       | 4.7            | 9.7             |
| Wearing Apparel             | 44.6        | 50.0           | 50.8            |
| Leather Products            | 10.7        | 6.0            | 3.9             |
| Lumber and Wood             | -7.4        | -8.0           | -10.4           |
| Publishing, Paper           | 1.7         | 4.1            | 3.8             |
| Petrol and Coal Refinery    | 3.2         | 2.3            | 1.6             |
| Chemicals, Rubber, Plastics | 0.0         | 7.0            | 7.2             |
| Nonmetallic Minerals        | 1.7         | 2.6            | 2.8             |
| Ferrous Minerals            | -3.0        | -0.4           | 0.2             |
| Nonferrous Minerals         | -3.6        | 0.6            | 1.8             |
| Fabricated Metal Products   | 2.5         | 6.3            | 6.2             |
| Motor Vehicles              | -64.7       | -22.9          | -23.5           |
| Other Transport Industries  | 7.3         | 8.5            | 5.4             |
| Electronic Equipment        | 21.6        | 11.5           | 8.7             |
| Machinery and Equipment     | 3.7         | 5.4            | 5.9             |
| Other Manufacturing         | 6.2         | 9.9            | 8.9             |
| Services                    | -0.2        | 0.4            | 0.6             |
| Trade and Transport         | 0.4         | -1.0           | -1.1            |

source: WorldScan results.

So far we have concentrated on the differences between the full-tariff simulations and the other simulations. Given the low collection rates for import levies we think that the latter two

simulations are more realistic. The sectoral effects of these simulations differ to some extent because the reduced-tariff simulation lowers all sectoral import tariffs proportionally, while the exempted-tariff simulation takes explicitly account of exemptions for imported intermediate and investment goods. We will discuss the different sectoral effects below.

Textiles benefits in the exempted-tariff simulation compared to reduced-tariff simulation. The reason is that Textiles is often used as an intermediate good in the sector wearing Apparel. In the reduced-tariff simulations importing Textiles used as intermediate goods becomes cheaper at the (relative) expense of that sector in China itself. In the exempted-tariff simulation this is not the case. Goods used as intermediates were already exempted from paying import tariffs.

The sectors Leather Products, Lumber and Wood, Other Transport Industries, and Electronic Equipment are worse off in the exempted tariff simulation compared to the reduced-tariff case. In the latter simulation these sectors benefit relatively from the reduction of import tariffs on their intermediates. This is not the case in the former simulation, because the intermediates were already exempted from import tariffs.

#### *sectoral effects for the trading partners*

So far we have concentrated on the sectoral effects for China. Now we focus on the sectoral effects for the main trading partners. Table 5.1 already presented the GDP effects. Below we analyse the origin of the extra imports in China from China's accession to the WTO. We present the results of the exempted-tariff simulation. The reason is that the shares in extra imports of the various trading partners are relatively robust for the type of simulation. Moreover, we are convinced that this simulation is the most realistic one of the three presented in this paper.

Table 5.4 thus presents the shares of the United States, Western Europe, Japan and South-East Asia in the extra sectoral imports in China. Overall these 4 regions are the most important trading partners for China, although this does not apply to sectors as Agriculture. Raw Materials and Food processing.

In many sectors South-East Asia delivers most of the extra imports. Examples are Textiles, Wearing Apparel, Leather Products, Lumber and Wood, Paper and Publishing, Chemicals, Rubber and Plastics and Fabricated Metal Products. China imports these goods from South-East Asia, because that region is the most important trading partner, and goods, like Textiles, Lumber and Wood, Leather Products and Wearing Apparel are fairly low-skilled labour-intensive. South-East Asia is specialised in these goods compared to the OECD.

The extra imports in sectors like Motor Vehicles, and Other Transport Equipment, Machinery and Equipment and Other Manufacturing come mainly from the OECD regions. These sectors are relatively high-skilled intensive. The differences between the OECD regions can be traced back to the historical trade pattern in 1995. This pattern is presented in Table 3.3. Western Europe exports - relatively to other OECD regions - Motor Vehicles, Nonmetallic

Minerals, Other Transport Equipment and Wearing Apparel. Japan exports relatively a lot of Ferrous and Nonferrous Minerals, Electronic Equipment and Other Manufacturing. These trade patterns appear also in Table 5.4

**Table 5.4 shares of China's trading partners in increasing sectoral imports in 2020 due to trade liberalization with exempted tariffs**

|                             | United<br>States | Western<br>Europe | Japan | South-East<br>Asia |
|-----------------------------|------------------|-------------------|-------|--------------------|
| Agriculture                 | 22.1             | 13.0              | 3.5   | 13.6               |
| Raw Materials               | 5.4              | 10.2              | 4.5   | 19.8               |
| Food Processing             | 13.5             | 12.4              | 4.1   | 18.8               |
| Textiles                    | 2.0              | 3.0               | 8.7   | 77.5               |
| Wearing Apparel             | 3.6              | 16.4              | 14.1  | 54.0               |
| Leather Products            | 4.6              | 9.8               | 2.0   | 71.5               |
| Lumber and Wood             | 5.8              | 6.7               | 1.6   | 80.6               |
| Publishing, Paper           | 14.1             | 10.4              | 8.5   | 47.3               |
| Petrol and Coal Refinery    | 2.2              | 3.8               | 32.6  | 48.2               |
| Chemicals, Rubber, Plastics | 25.1             | -20.6             | -6.5  | 216.7              |
| Nonmetallic Minerals        | 7.5              | 27.6              | 19.2  | 38.1               |
| Ferrous Minerals            | 2.7              | 7.5               | 26.8  | 33.2               |
| Nonferrous Minerals         | 6.1              | 7.0               | 11.1  | 44.1               |
| Fabricated Metal Products   | 12.6             | 13.7              | 13.6  | 46.7               |
| Motor Vehicles              | 7.4              | 46.6              | 22.4  | 11.9               |
| Other Transport Industries  | 202.2            | 352.2             | 31.3  | -532.6             |
| Electronic Equipment        | 13.4             | 12.1              | 32.5  | 39.6               |
| Machinery and Equipment     | 45.2             | 35.7              | 24.2  | -8.4               |
| Other Manufacturing         | 67.0             | 80.7              | 221.7 | -302.2             |
| Services                    | 10.1             | 25.2              | 6.6   | 25.4               |
| Trade and Transport         | 6.1              | 13.8              | 12.4  | 41.9               |

source: WorldScan results. Ratios do not add up to 100% per row because we do not present the imports from the other three regions: Pacific OECD, South Asia and Rest of the World. A '-' sign implies that the imports from a particular region decrease. Such a result is not surprising, because of the differences in import tariffs for the various sectors and countries of origin regions have the incentive to change their content of exports to China. This implies that the increase in imports from the other regions has to exceed 100%.

Most of the extra Chinese exports in low-skilled labour-intensive sectors, such as Textiles, Wearing Apparel, Leather Products, Lumber and Wood, Electronic Equipment and Other Manufacturing are directed to the OECD, in particular United States and Western Europe. In the metal sectors, Petrol and Coal Refinery, Other Transport Equipment, and Machinery and Equipment, South-East Asia is the most important destination. This patterns reflects the comparative advantages of China. It is relatively low-skilled labour-intensive towards the OECD, but relatively high-skilled labour-intensive towards South-East Asia. China exports also relatively much agricultural and food products and Raw Materials towards South-East Asia.

**Table 5.5 shares of China's trading partners in increasing sectoral exports in 2020  
due to trade liberalization with exempted tariffs**

|                             | United<br>States | Western<br>Europe | Japan | South -East<br>Asia |
|-----------------------------|------------------|-------------------|-------|---------------------|
| Agriculture                 | 4.62             | 10.25             | 15.79 | 54.34               |
| Raw Materials               | 8.25             | 10.30             | 21.57 | 40.70               |
| Food Processing             | 9.51             | 8.92              | 32.95 | 34.14               |
| Textiles                    | 37.18            | 29.88             | 5.84  | 14.64               |
| Wearing Apparel             | 59.55            | 27.08             | 5.40  | 1.22                |
| Leather Products            | 27.64            | 25.86             | 17.33 | 9.59                |
| Lumber and Wood             | 23.49            | 14.85             | 34.88 | 18.74               |
| Publishing, Paper           | 20.69            | 22.52             | 9.84  | 24.78               |
| Petrol and Coal Refinery    | 1.60             | 1.81              | 4.85  | 64.71               |
| Chemicals, Rubber, Plastics | 18.22            | 24.09             | 13.26 | 23.94               |
| Nonmetallic Minerals        | 18.99            | 13.73             | 21.34 | 22.48               |
| Ferrous Minerals            | 4.23             | 4.82              | 18.32 | 65.96               |
| Nonferrous Minerals         | 5.53             | 9.88              | 23.47 | 51.63               |
| Fabricated Metal Products   | 22.38            | 23.99             | 11.81 | 17.52               |
| Motor Vehicles              | 28.24            | 3.23              | 11.04 | 22.43               |
| Other Transport Industries  | 16.01            | 12.49             | 9.60  | 30.75               |
| Electronic Equipment        | 23.21            | 31.82             | 10.73 | 17.42               |
| Machinery and Equipment     | 19.09            | 20.82             | 12.60 | 31.25               |
| Other Manufacturing         | 28.03            | 29.64             | 13.15 | 11.47               |
| Services                    | 10.99            | 28.71             | 12.66 | 24.64               |
| Trade and Transport         | 21.94            | 26.30             | 16.92 | 17.37               |

source: WorldScan results. Ratios do not add up to 100% per row because we do not present the imports from the other three regions: Pacific OECD, South Asia and Rest of the World.

Based on the origin of the imports and destination of the exports in tables 5.4 and 5.5 we draw the following conclusions. In the OECD regions the relatively high-skilled and capital-intensive sectors gain. Examples are Motor Vehicles, Other Transport Equipment, and Machinery and Equipment and Minerals. The low-skilled labour-intensive sectors are hurt because of fierce competition from Chinese producers. In South-East Asia sectors like Petrol and Coal Refinery, the metal sectors, Other Transport Industries and Machinery and Equipment are hurt. However, South-East Asia benefits most of China's accession to the WTO because the low-skilled labour-intensive sectors gain substantially. These sectors are Textiles, Wearing Apparel, Leather Products, Wood and Lumber and Electronic Products.

## 6. Conclusions

China's entrance to the WTO and the accompanying opening up of China's markets is still a major topic in the relations between China and the industrial countries. This paper shows the effects at a sectoral level for China itself and its main trading partners. Our analysis shows that

the main trading partners of China will benefit. 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. Especially the fast expanding sector Wearing Apparel contributes to the GDP and welfare gain due to the abolition of the MFA. The sectors Motor Vehicles, Lumber and Wood and Raw Materials decline heavily because of the large cuts in import barriers. These consists of import tariffs and other regulations.

The effects on the other sectors depend to a large extent on the structure of tariff barriers. It is clear that the tax incidence from import taxes is much lower than the levels of the statutory import tariffs suggest. One of the main reasons is the exemption of import duties for goods 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 exemption 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 rapidly if imported intermediate goods are exempted from paying levies. If initial tariffs are high, trade liberalization hurts Textiles heavily, because foreign producers penetrate in the Chinese markets. Similar results apply for Minerals. Also the sector Chemicals, Rubber and Plastics performs much better if the trade-liberalization analysis takes account of exemptions. To al lesser extent this is also the case for Machinery and Equipment and Other Manufacturing. For sectors like Leather Products, Food Processing, Lumber and Wood and Electronic Equipment the opposite result holds. If their intermediates in the production processes are already exempted from paying tariffs, these sectors gain less (or loose more heavily) from trade liberalization.

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 Textile 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 the origin of imports for China.

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## Appendix Regional and sectoral concordances for WorldScan

|   |                                                         |    |                                                              |
|---|---------------------------------------------------------|----|--------------------------------------------------------------|
| 1 | United States                                           | 1  | Agriculture                                                  |
| 2 | Japan                                                   |    | Paddy rice, Wheat, Grains, Cereal Grains, Non grain crops,   |
| 3 | Western Europe                                          |    | Vegetables, Oil seeds, Sugar cane Plant-based fibres,        |
|   | United Kingdom, Germany, Denmark, Sweden, Finland,      |    | Crops, Bovine cattle, Animal products, Raw milk,, Wool,      |
|   | Rest of European Union, EFTA                            |    | Forestry, Fisheries,                                         |
| 4 | Pacific OECD                                            | 2  | Raw Materials                                                |
|   | Australia, New Zealand, Canada                          |    | Oil, Gas, Coal, Minerals                                     |
| 5 | China                                                   | 3  | Food Processing                                              |
|   | China, Hong Kong                                        |    | Processed rice, Meat products, Vegetable Oils, Dairy         |
| 6 | South-East Asia                                         |    | products, Sugar, Other food products, Beverages and          |
|   | Republic of Korea, Indonesia, Malaysia, Philippines,    |    | tobacco                                                      |
|   | Singapore, Thailand, Taiwan, Vietnam                    | 4  | Textile                                                      |
| 7 | South Asia & Rest                                       | 5  | Wearing Apparel                                              |
|   | India, Sri Lanka, Rest of South Asia, Rest of the World | 6  | Leather Products                                             |
| 8 | Rest of the World                                       | 7  | Lumber and Wood                                              |
|   | Eastern Europe, Former Soviet Union, Turkey, Rest of    | 8  | Other Manufacturing                                          |
|   | Middle East, Morocco, Rest of North Africa, South       | 9  | Pulp, Paper and Publishing                                   |
|   | African Customs Union, Rest of Southern Africa, Rest of | 10 | Petrol and Coal Refinery                                     |
|   | Sub-Saharan Africa, Central America and Caribbean,      | 11 | Nonmetallic Minerals                                         |
|   | Mexico, Argentina, Brazil, Chile, Uruguay, Venezuela,   | 12 | Ferrous Minerals                                             |
|   | Colombia, Rest of South America                         | 13 | Nonferrous Minerals                                          |
|   |                                                         | 14 | Chemicals, Rubber and Plastics                               |
|   |                                                         | 15 | Fabricated Metal Products                                    |
|   |                                                         | 16 | Other 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 a 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.