From 0 to 60 without a Hitch?

Regulated Efficiency, WTO Accession and the Motor Vehicle Sector in China

Paper prepared for the 6th Annual Conference on Global Economic Analysis June 12-14, 2003, The Hague

by

Joseph F. Francois
(francois@few.eur.nl)
Erasmus University, Rotterdam

Dean Spinanger
(dspinanger@ifw.uni-kiel.de)
Institute for World Economics, Kiel

April, 2003

Abstract: With China's automobile market rapidly expanding into the fourth largest in the world, the question arises about how it will come to grips with the massive restructuring problems it is facing. This paper is concerned with the interaction of regulated efficiency and WTO accession, and its impact on China's motor vehicle sector. The approach is general equilibrium using GTAP5 aggregated to 23 sectors and 25 regions. Regulatory reform and internal restructuring are seen as being critical to the impact on the sector. Such a restructuring is represented here by a cost reduction following from consolidation and rationalization. This involves movement of costs toward global norms. Without such restructuring, WTO accession would mean that imports of final vehicles would surge, though imports of parts could well fall as production moves offshore. However, with restructuring, it could be assumed that the final assembly industry can be made competitive by world standards. What hitches might be involved or rather how smooth will the ride be to 60mph? And will the ride get bumpy for other production locations?

Special thanks are due to Zhang Wenkui for help with data, and to Alan Winters and Will Martin for detailed comments on an earlier draft. Thanks are also due to the participants in a World Bank sponsored conference in Beijing for helpful discussion.

CONTENTS

Tables and Diagrams

1. Introduction

Automobile plants are a symbol of economic prestige in the developing world. Indonesia, Brazil, and China have all promoted the development of a domestic motor vehicle industry. As a result, almost every province in China has its own motor vehicle factory and satellite factories. This has been accomplished through a series of policy measures. Internal trade has been limited and even prohibited through local protectionism (analogous to former Canadian inter-provincial trade restrictions). Government has also set prices and limited competition through differential taxes that favor local suppliers. The limitation of trade has encouraged inefficient production and allowed for market segmentation.

The integration of Greater China into the WTO has important implications for the Chinese economy, including the motor vehicle sector. For example, the accession agreements promise important changes in tariffs and in rules regarding foreign investment. There will also be a change in the perception of the market by outside investors, as WTO-covered rules regarding treatment of foreign firms reduce uncertainty about the general economic climate. This paper is concerned with the impact of these broad changes on the Chinese motor vehicle sector. Emphasis is placed on the role of administratively imposed inefficiencies (*regulated efficiency*) within the sector, and the role of regulated efficiency in structural adjustment.

The industry itself anticipates significant change. In recent history, growth in the sector has been rapid, without output expanding at an annualized 13 percent in the five years ending in 2000. With new, modern plants coming on line in 2001 and 2002, a large, discrete change in production levels is expected. At the same time, WTO membership implies lower prices and steeper foreign competition in the sector. Response to this shift in the competitive landscape depends on continued problems with local government protection, lack of automobile infrastructure (roads, parking, etc.), and related factors that act as constraints on growth of the sector. Even so, the industry itself seems to expect continued strong growth. [1]

Notwithstanding industry expectations of its prospects, what can we really expect once the competitive landscape has changed in critical ways? The basic approach employed here to explore this question is general equilibrium, involving the application of a computational model. The next section (2) discusses some basic issues about the structure of the industry. Because of government intervention, the domestic motor vehicle industry is highly fragmented and inefficient. Motor vehicle plants operate on a small and inefficient scale by global standards, with resulting cost structures well within the global frontier. Following the overview of the auto sector is a brief discussion of the model framework (Section 3). This is followed by the experiments themselves in Section 4. Conclusions are offered in Section 5.

2. The Mainland China auto industry

As a result of national and regional policy, China's motor vehicle industry is highly inefficient by global standards. Plants operate well below global standards for efficient scale. This is illustrated in Table 2.1 for the sedan industry. China's entire sedan production in 1998 was 507,000 vehicles. These were made by 13 factories, implying fewer than 40,000 sedans per factory.

There is actually a great deal of variation in plant scale around this average. The leading producer, Shanghai Volkswagen, made only 248,000 sedans in 2001. Several plants had production runs of less than 20,000. In this sense, there are strong parallels to the situation in Mexico prior to NAFTA, (See

[1] See for example China Online (2001). As WTO membership approached, the opinions of the industry and related ministries, as reflected in the Chinese press, hinged critically on whether or not restructuring of the domestic industry would be allowed to proceed. Hence a report in *Touzi Yu Hezuo* (summarized in China Online op cit) stressed expected injury to the industry, while the industry itself was at the same time indicating optimism that they could realize significant cost reductions, allowing them to remain competitive with imports (Feenstra et al 2001).

Lopez de Silanes, Markusen, and Rutherford 1994) where protected, inefficient factories operated well within the global technology frontier. Overall, the industry is characterized by roughly 2,400 industrial enterprises. In 1998, these included 122 manufacturing plants, 520 auto-refitting factories, 130 motorcycle factories, 62 car-engine factories and 1,589 auto and motorcycle spare-parts factories. Annual production capacity exceeds 2 million motor vehicles, and 10 million motorcycles. Since 1995, the general pattern has been closure of the smaller plants (generally relegated to the "other" category in Table 2.1), and expansion of production runs in the larger plants. With foreign investment and the rapid growth in the industry, the number of plants producing at least 25,000 vehicles has risen from 3 in 1995 to11 in 2002.

Import and domestic shipment data in value terms are summarized in Table 2.2 below. (These data are for 1997, which serves as our "pre-accession" reference point.) Import protection is summarized in Table 2.3. China's pre-accession average tariff on auto products (vehicles and parts) was 35%. The rate for vehicles averaged 70%, with sedans subject to tariffs of between 80% and 100%. Motor vehicle parts were subject to an average tariff of only 23% on average. Import shares were relatively low. Officially, only 20,000 sedans were imported (though 100,000 or more may have been smuggled). Official policy encouraged the use of domestic parts, and better still locally-produced parts. This is reflected, as well, in the low share of automotive parts imports in total production.

The tariff rates in the tables are scheduled to come down substantially. Tariffs are scheduled for a reduction to 25% for vehicles, and 10% for parts on an MFN basis as part of the WTO accession. In addition, quotas will be phased out, as will domestic content requirements. (Both violate basic WTO rules). Clearly, these changes in the structure of protection have significant implications for the structure of the automotive sector. Critically, other WTO obligations imply free movement of imported autos (free of import quotas) within the China market. This implies tremendous pressure for a breakdown of internal barriers for domestic production, and for a rationalization of the domestic industry. The internal barriers to trade simply cannot be sustained if China's new WTO obligations are to be taken seriously.

The government has itself realized this situation. Official and industry sources indicate an intention to support only a small number of domestic production groups, perhaps including: the Shanghai group (Volkswagen), China First Auto Works (Volkswagen), Shanghai GM (Buick), and the Dongfeng Group (Citroen). Such a sharp rationalization would undoubtedly be painful, but could allow the industry to consolidate production and work its way down the average cost curve for vehicle production.

3. The Modeling Framework

In the next section, we sketch a quantitative assessment of the possible impact of WTO accession. This involves the application of a computation-based economic model (known as a "computable general equilibrium" or CGE model) to assess the impact of the Greater China's accession to the WTO. We provide a brief overview of the model in this section. (More technical details and references are provided in Francois and Spinanger 2001, and in a technical annex available on request). For multi-sector policy initiatives (like WTO accession), the use of computable general equilibrium (CGE) models has become a relatively standard approach. (See Francois 2000). While the results of these exercises are hampered both by the assumptions and the quality of the data available, their utility in estimating the possible overall pattern of impact of broad policy changes – i.e. both of a direct and indirect nature – has proved to be helpful in policy formulation and the assessment of existing economic policies.

3.1 The Model Data

The data come from a number of sources. These have been organized into 23 sectors and 25 regions. (Note that we have included some detail on the value added chain linking fibers into textiles and clothing production, to better capture the initial impact of the ATC on our base scenario.) The sectors and regions for this 23x25 aggregation of the data are detailed in Table 3.1.

Data on production and trade are based on national accounting data linked through trade flows and drawn directly from the Global Trade Analysis Project (GTAP) version 5 dataset. (McDougall, 2001). The GTAP version 5 dataset is benchmarked to 1997, and includes detailed national input-output, trade, and final demand structures. Modifications have been made to the basic database. In particular, we have updated the dataset to better reflect actual import protection for goods and services.

Basic data on current tariff rates come from UNCTAD and WTO data on the schedules of applied and bound tariff rates. These are integrated into the core GTAP database. They are supplemented with data from the Office of the US Trade Representative and the US International Trade Commission on regional preference schemes in the Western Hemisphere. For agriculture, protection is based on OECD and USDA estimates of agricultural protection, as integrated into the GTAP core database. Tariff and non-tariff barrier estimates are further adjusted to reflect remaining Uruguay Round commitments, including the phase-out of remaining textile and clothing quotas under the Agreement on Textiles and Clothing (the ATC). Data on post-Uruguay Round tariffs are taken from recent estimates reported by Francois and Strutt (1999). These are taken primarily from the WTO's integrated database, with supplemental information from the World Bank's recent assessment of detailed pre- and post-Uruguay Round tariff schedules. All of this tariff information has been matched to the current model sectors. Services trade barriers are based on the estimates as described in the technical annex (available upon request), and shown in Table 3.2. (The basic GTAP database includes no information at all on trade barriers for services, for example).

While the basic GTAP dataset is benchmarked to 1997, and reflects applied tariffs actually in place in 1997, we of course want to work with a representation of a post-Uruguay Round world. To accomplish this, before conducting any policy experiments we first run a "pre-experiment" in which we implement the remaining Uruguay Round tariff cuts. Most of these cuts are already in place in the 1997-benchmark dataset. At the same time, the data are also adjusted to reflect regional preference schemes in Latin America (not represented in the core GTAP database). The dataset we work with for actual experiments is therefore a representation of a notional world economy (with values in 1997 dollars) wherein we have full Uruguay Round tariff cut implementation. We then examine both the ATC phase-out, and Greater China accession, with reference to this post-UR tariff benchmark.

3.2 Model Structure

We turn next to the basic analytical features of the model. Outside automobiles, we keep the basic GTAP structure. (Hertel 1996). On the production side, this means that in all sectors firms minimize costs, employing domestic production factors (capital, labor and land) and intermediate inputs from domestic and foreign sources to produce goods and services. These technologies are modeled as CES processes defined over primary inputs, and Leontief processes over intermediate inputs. Products from different regions are assumed to be imperfect substitutes in accordance with the so-called "Armington" assumption. Prices on goods and factors adjust until all markets are simultaneously in (general) equilibrium. This means that we solve for equilibria in which all markets clear. While we model changes in gross trade flows, we do not model changes in net international capital flows. (This does not by any means preclude changes the level of gross capital flows). Trade liberalization in the goods sectors involves the reduction of tariffs. Service sector liberalization is modeled as a reduction in trading costs, reflecting the barrier reductions reported in Table 3.2.

For the motor vehicle sector, we want to reflect the status quo in a stylized, though representative, way. One option is to implement imperfect competition in the model. However, this does not really

reflect the primary issue at hand. As a result of government policy, there is certainly market segmentation. There is also price setting and regulation. While it is ultimately something of a judgment call, we have chosen to focus on realized cost efficiency for the sector. The current cost structure of the industry reflects the net effect of a basket of policies. Like clothing in India, or automobiles in Mexico pre-NAFTA, the structure of the auto sector in China reflects *regulated efficiency*. By this term, we mean industry structure reflecting the impact of the general regulatory and administrative environment. The critical issue is actually these collective inefficiencies, which follow from the full set of industrial policies. At the same time, an implication of intended public policy seems to be restructuring and consolidation, leading to an improvement in regulated efficiency.

What shape will regulated efficiency gains take? The industry, through rationalization, may collectively move down relevant cost curves. A comparison of current plant scale (Table 2.1) with a global norm closer to 350,000 units per plant implies that average costs are roughly 20% higher simply because of inefficient scale.[2] Data from interviews with industry (Feenstra *et al* 2001) point to similar cost savings, with expectations in the range of 25% to 30% cost reductions. This net cost effect is stressed here, and sets the treatment of motor vehicles apart from other sectors in the model. In particular, we focus on potential cost savings in the final assembly of autos (due to consolidation and rationalization of policy, and yielding a higher regulated efficiency level for the industry). In addition, the differential treatment of parts and finished vehicles in the tariff schedule will also be tracked.

4. Experiments and Results

The experiments involve full accession for Greater China (Mainland China and Chinese Taipei). The basic accession package involves the changes in tariffs detailed in Table 3.2. For automobiles, we model the following effects:

- Tariffs on motor vehicles will decrease to 25%.
- Tariffs on auto parts will be phased down from an average of 23.4% to an average of 10%.
- Industry rationalization. Implicitly, this involves the elimination of internal, regional barriers. It allows for consolidation and rationalization within the domestic market. Small, inefficient factories will close. To quantify this effect, we take sedan production as representative. Given the typical scale of domestic production, we make the approximation that auto plants may realize a 20 percent cost savings in assembly if we move plants to efficient scale. (See footnote 2 and Section 3).

Overall sectoral impacts of the experiments are presented in Table 4.1. This table reports changes in the quantity of output under our alternative scenarios. (Hence, as expected, we see that the extension of the ATC phase out toChina and Chinese Taipei implies a rather dramatic expansion of the textile and clothing sectors. These sectors grow at 13.9 and 50.3 percent. There are important general equilibrium effects, as the resources needed for this experiment are drawn from other parts of the economy, including the motor vehicle sector.)

What is very important for the motor vehicle sector is the next set of results in Table 4.1, in columns B and C. These reflect the incremental impact of China's market access commitments made as part of accession. Column B is a "business as usual" scenario, without the restructuring discussed elsewhere in the paper. It reflects a domestic motor vehicle industry that continues to be fragmented, with favored producers in each region, small production runs, and high costs. Such an industry is simply

[2] The 20% figure is based on the distribution of current plants in Table 2.1. If we apply the formula $\Delta \ln(Average\ Cost) = CDR \cdot \Delta \ln(Quantity)$, where CDR is the inverse elasticity of scale, defined as $CDR = -\frac{Average\ Cost - Marginal\ Cost}{Average\ Cost}$, and where CDR is between .125 and .135 (the range of values found in engineering studies), we can calculate an average cost index for the industry. If such an index is 100 at 350,000 units per plant, current plant structure yields a cost index of roughly 120.

unable to compete with imports. It is hit very hard by imports, with domestic production falling 36.7 percent. Combined with the initial impact of the ATC phase out, we see a rather dramatic retrenchment of the uncompetitive domestic industry in the face of imports in Column D.

The contrast is offered in Column C, and the corresponding total in Column E. In Column C, we have the elimination of internal barriers, rationalization of plants (with smaller plants being closed) and a realized efficiency gain of roughly 20% as scale economies are realized. This industry is much different from the one in Column B. Production actually goes up slightly (3%) in total, and the industry emerges as a relatively competitive one, despite the loss of protection.

More information is provided on the differences between the two scenarios in Table 4.2 and Figure 4.1. The Table expands on the information originally provided in Table 22, with a comparable breakdown corresponding to Columns D and E in Table 4.1. The most striking difference between the two scenarios is the different impacts on intermediate parts production, and final auto production. This is illustrated in Figure 4.1. Under the first scenario, characterized by a domestic policy status quo, imports of parts rise slightly, while their share of the domestic parts market rises substantially. At the same time, there is a dramatic surge in imports of motor vehicles, which displace more than one-third of existing domestic production. There is a drop in the overall market for parts, because of the decline in domestic vehicle production. Recall that, under our second scenario, the final assembly sector is rationalized, allowing the sector to then compete more directly with imports. We then see a shift to imported intermediates (rising to a market share of over 50%), a fall in domestic parts production (as they are displaced by imports), but a steady overall demand for parts. For the industry overall, while ground is still lost to parts imports, sales of domestic vehicles remain relatively steady in the face of imports.

One last view on the effect of accession is presented in Tables 4.4, 4.5, and 4.6. These present the export impacts we observe under our various modeling scenarios. It is logical to expect some export response, both because of the general liberalization in trade, and because pressure from imports may force firms to seek other markets. China exports less that 4 percent of its production in the sector, based on 1997 values. Of $32 billion in production, only $1.3 billion is exported. To put this into perspective, Australia has a comparable level of exports, with an industry only one-third the size of the Chinese industry. The export share for Korea is 10 times as large. China's trade is therefore well below global integration standards, measured by exports.

Tables 4.4 and 4.5 compare export volume effects, as a percent of base exports, and in dollar terms. Clearly, restructuring accelerates the export orientation of the industry, with a rapid growth in exports. Exports rise by roughly 300% in percent terms, and $3.8 billion in value terms, reaching roughly 10% of production by value. While this seems dramatic, it needs to be kept in perspective. Export shares are shown in Table 4.6. Automobiles and parts are a small share of exports currently (0.6 percent in 1997), and remain small (up to 2 percent) even with the growth in automobile exports. In addition, most of the restructuring remains focused on the domestic market.

5. Summary and Conclusions

This paper is concerned with the interaction of regulated efficiency and the WTO accession of China, and its impact on China's motor vehicle sector. The approach is general equilibrium, involving the application of a global general equilibrium model. It is argued that regulatory reform and internal restructuring are critical to any realized impact on the sector. Such a restructuring is represented here by a cost reduction following from consolidation and rationalization. This representation is supported by a comparison of scale in a typical auto plant in China to one in North America or Europe, and also by firm survey responses. The net result involves movement of costs toward global norms. Without such restructuring, the domestic industry remains uncompetitive, and WTO accession means that imports of final vehicles will surge, though imports of parts will fall as production moves offshore. However, with restructuring, the final assembly industry can be made competitive by world standards,

while the parts industry further integrates with the global industry through exports (and through higher imports of parts).

Viewed in total, what do our results tell us? The model results highlight the importance of the impact of regulatory regimes on costs for the impact of trade policy changes. In the present context, restructuring within the domestic market means a qualitatively different impact from tariff reductions. Without such restructuring, the industry fails to compete and contracts dramatically. However, with restructuring, the final assembly industry can be made competitive by world standards. In addition, with restructuring, the basic character of the industry shifts to local assembly, with high import content for domestic vehicles

The shortcomings of the analysis also need to be highlighted. We have worked with a very stylized model. While restructuring has positive overall implications for the industry, there will clearly be adjustment costs not pointed to the in the model. Even if value added is preserved within the sector, there will most likely be dramatic relocation of jobs toward a limited number of plants, with job losses in the other, smaller plants. The current regional scattering of final auto production will be replaced by a more geographically concentrated pattern. At the same time, parts production will also tend to concentrate. To the extent parts suppliers are able to supply regional markets, this is likely to mean clustering in the coastal regions, with parts shipments to Japan, Korea, and other regional centers of production. Overall, a relatively large share of value added is kept intact with restructuring. *However*, the structure of plants needs to be rationalized.

And will the ride for others get bumpy? A glance at the provincial location of automobile production in China shows that roughly two thirds of the factories producing for foreign firms are located near the coast. Given the start of the art of the factories being expanded or newly set up, the thrust is obvious. As the capacities are expanded they will not only be geared to providing cars for the domestic market. Japanese producers have already been producing for the Japanese market and questions early on about the quality of the final product already dissipated. We thus will no doubt be seeing a growing of foreign production facilities exporting to the region. This may also well imply that auto component producers may be able to run facilities with capacities more in line with the size of those in industrialized countries and hence at competitive price levels. This would significantly change the current situation. While this would imply greater competition for other countries in the region trying to enter global markets, it will probably not change already effected investments since companies are try to ensure that not all eggs are in one basket (e.g. Thailand). Hence the immediate impact will not be as severe as could have been imagined. However, should currents trends continue China will surely become all the more attractive as a production location and hence a definite danger for those countries also wanting to become major producers. The road could become bumpier for them.

REFERENCES

ChinaOnLine (2001), "How WTO membership could affect China's auto industry," http://www.chinaonline.com/issues/wto/NewsArchive/secure/2000/january/b2000103 19-3-SS.asp.

Feenstra, R., D. Sperling, L. Branstetter, E. Harwitt and W. Hai (2001), "China's entry to the WTO: a view from the auto industry," mimeo.

Francois, J.F. and A. Strutt (1999), "Post Uruguay Round Tariff Vectors For GTAP Version 4," Erasmus University manuscript.

Francois, J.F. (2000) " Assessing the results of general equilibrium studies of multilateral trade negotiations," UNCTAD/ITCD/TAB/4, UNCTAD Policy Issues in International Trade and Commodities Study Series, UNCTAD:Geneva, October.

Francois, J.F. and D. Spinanger (2001), "Greater China's Accession to the WTO: Implications for International Trade/Production and for Hong Kong," paper prepared for the Hong Kong Trade Development Council, December.

Hein, C. (2003). "Die internationale Automobile Industrie sieht ihre Zukunft in China", Frankfurter Allgemeine Zeitung, 16 April: 15

Hertel, T. ed (1996), *Global Trade Analysis*, Cambridge University Press: Cambridge.

Lopez de Silanes, F., J. Markusen, and T.F. Rutherford (1994), "Complementarity and increasing returns in intermediate inputs," *Journal of Development Economics*, 45: 133-151.

McDougall, R., ed. (2001). The GTAP database – version 5, Global Trade Analysis Center: Purdue University.

Table 2.1

Auto plants in China

Rank 2002/1995	plant	1995	1996	1997	1998	1999	2000	2001	2002 *
1/1	Shanghai-VW	160,070	200,222	230,443	235,000	230,946	221,524	230,378	248,000
2/4	FAW-VW	24,553	44,825	46,405	66,000	81,464	94,147	101,622	131,000
3/NA	Shanghai-GM	-	-	-	-	-	30,024	58,548	106,000
4/2	Tianjin Xiali (Daihatsu)	65,258	88,232	95,155	100,021	101,828	81,951	41,703	93,000
5/5	FAW-Audi-Hongqi	19,350	-	-	15,000	15,731	31,225	52,667	78,000
6/9	Shenlong (Citro'n)	3,797	9,228	30,035	36,240	40,200	53,900	52,850	68,000
7/6	Chang'an (Suzuki)	17,770	16,420	35,160	36,239	44,583	48,235	50,573	64,000
8/NA	Guangzhou-Honda	-	-	-	2,246	10,008	32,228	51,153	60,000
9/NA	Shanghai-Qirui	-	-	-	-	-	2,767	30,085	47,000
10/NA	Geely Group	-	-	-	-	-	14,594	21,702	38,000
11/NA	Dongfeng Fengshen	-	-	-	-	-	3,159	8,000	32,000
12/NA	Haima (Hainan-Mazda)	-	-	-	-	-	3,059	7,800	20,000
13/NA	Yuedo-KIA	-	-	-	-	-	2,423	6,210	16,000
14/NA	Qinchuan	-	-	-	-	-	5,380	5,686	16,000
15/NA	Nanya	-	-	-	-	-	1,000	8,000	13,500
16/3	Beijing (Jeep)	25,127	26,051	19,377	8,344	9,294	4,867	4,653	4,400
17/7	Guizhou Yunque (Subaru)	7,105	798	1,000	-	-	859	1,253	2,100
18/NA	Tianjin-Toyota	-	-	-	-	-	-	-	2,000
NA/8	Guangzhou-Peugot	6,698	2,416	1,557	-	-	-	-	-
	Other	22,570	-	22,479	8,013	31,312	17,930	-	1,900
	Total	352,298	388,192	481,611	507,103	565,366	649,272	732,883	1,040,900
	Number of plants >25,000	3	4	5	5	5	8	9	11
	Number of plants >50,000	2	2	2	3	3	4	7	8
	Number of plants >100,000	1	1	1	2	2	1	2	3

sources: F. Bessum, Global Car Production Statistics, March 2002, http://www.geocities.com/MotorCity/Speedway/4939/carprod.htr
Chinese Motor Vehicle Documentation Center, CATALOGUE OF THE PRESENT CHINESE MOTOR CAR PRODUCTION
2nd edition, October 2002, Aldeboarn: Netherlands.
* 2002 values are based on company projections.

Table 2.2
The Mainland China Motor Vehicle Industry, 1997
values in millions of 1997 US dollars

Imported motor vehicles and parts, world prices	3,607.71
Imported motor vehicles and parts, internal prices	4,849.31
imported parts, internal prices	3,239.45
imported motor vehicles, internal prices	1,609.86
Domestic intermediates and parts	32,812.46
domestic intermediate parts	10,896.15
industry consumption of motor vehicles	21,625.5
final consumption of motor vehicles	290.81

source: GTAP version 5 database

Table 2.3
Tariffs on Motor Vehicles

	current rates	final rates
finished motor vehicles	70.50%	25%
motor vehicle parts	23.40%	10%
electronic parts	12.00%	10%
AVERAGE vehicles and parts	34.70%	15%

source: China WTO accession schedule, GTAP data, and Office of the US Trade Representative

Table 3.1 — The Sectoring Scheme of the Model

Model Regions/Economies		**Model Sectors**	
Economies	***Description***	***Sectors***	***Description***
Hong Kong	Hong Kong	Wool	Wool
China (PRC)	People's Republic of China	Other natural fibers	Natural fibers (cotton etc.)
Chinese Taipei	Chinese Taipei	Primary food	Primary food production
Japan	Japan	Other prim. prod.	Other primary production
Korea	Korea	Sugar	Sugar
ASEAN5	ASEAN5 member states[a]	Processed food	Processed food, tobacco, and beverages
Vietnam	Vietnam		
India	India	Textiles	Textiles
Bangladesh	Bangladesh	Clothing	Wearing apparel
Other South Asia	Other South Asian economies[b]	Leather goods	Leather products
Australia	Australia	Chem/rubber/refine	Chemicals, refinery products, rubber, plastics
New Zealand	New Zealand	Primary steel	Steel refinery products
Canada	Canada	Primary NF-metals	Non-ferrous metal products
United States	United States of America	M.vehicles, parts	Motor vehicles and parts
Mexico	Mexico	Electronics	Electronic machinery and equipment
Brazil	Brazil	Other mach/equip	Other machinery and equipment
MERCOSUR, other	MERCOSUR[c]	Other manufactur	Other manufactured goods
CBI	Caribbean Basin Initiative economies		
ATP	Andean Trade Pact economies	W-sale/ret. Trade	Wholesale and retail trade services
Chile	Chile[d]	Transport services	Transportation services (land, water, air)
OtherLatAm	Other Latin America	Communications	Communications services
European Union(15)	European Union, 15 economies.	Construction	Construction
Turkey	Turkey	Fin/ins/r. estate	Finance, insurance, and real estate services
Africa, MidEast	Africa and the Middle East	Comm. Services	Other commercial services
Rest of world	Rest of World	Other services	Other services (public, health, etc.)

[a] ASEAN5 includes Philippines, Thailand, Indonesia, Singapore, and Malaysia. – [b] Pakistan, Sri Lanka, Nepal. – [c] MERCUSOR includes Argentina, Paraguay, Uruguay. Brazil is represented separately. –.

Table 3.2

Mainland China's Pre- and Post-WTO Accession Tariff Rates (as Modeled)

sector	Model base rates	Accession rates	New bound rates
merchandise			
Wool	14.76	42.00	38.00
Natural fibers (cotton etc.)	3.14	17.38	13.58
Primary food production	58.80	58.13	46.83
Other primary production	0.48	6.94	5.08
Sugar	29.49	30.00	20.00
Processed food, tobacco, and beverages	37.65	40.66	23.18
Textiles	25.09	25.43	10.21
Wearing apparel	31.75	32.80	16.05
Leather products	12.10	20.94	17.02
Chemicals, refinery products, rubber, plastics	12.62	14.85	7.17
Steel refinery products	9.68	8.92	5.10
Non-ferrous metal products	7.83	8.20	5.52
Motor vehicles and parts	34.42	38.65	15.41
motor vehicles	70.50	70.50	25.00
parts	23.40	23.40	10.00
Electronic machinery and equipment	11.93	16.90	9.62
Other machinery and equipment	12.83	15.37	10.14
Other manufactured goods	14.51	21.99	16.29
services			
Wholesale and retail trade services	0.00	NA	0.00
Transportation services (land, water, air)	3.97	NA	1.99
Communications services	9.18	NA	4.59
Construction	13.68	NA	6.84
Finance, insurance, and real estate services	8.08	NA	4.04
Other commercial services	47.92	NA	23.96
Other services (public, health, etc.)	25.74	NA	12.87

Note: services barriers are based on gravity equation estimates. Accession rates reflect an assumed 50% drop in cross-border trading cost estimates.

source: China WTO accession schedule, GTAP data, and Office of the US Trade Representative. Gravity estimates are based on trade and macroeconomic data and cross-country regressions. See Francois and Spinanger (2001).

Table 4.1

Impact of Greater China Accession on Output (percent change)

	A	B	C	D=A+B	E=A+C
	Elimination of ATC Quotas for WTO Members, Mainland China, and Chinese Taipei	Mainland China and Chinese Taipei Accession, without auto sector restructuring	Mainland China and Chinese Taipei Accession, with auto sector restructuring	Total Impact without auto sector restructuring	Total Impact with auto sector restructuring
Wool	12.80	18.26	16.84	33.40	31.79
Other natural fibers	12.11	17.86	16.41	32.13	30.51
Primary Food	-0.43	-1.03	-0.92	-1.46	-1.34
Other Primary Production	-2.60	-3.57	-3.33	-6.07	-5.84
Sugar	-2.26	-7.93	-8.48	-10.01	-10.55
Processed Foods	-1.02	-4.66	-4.74	-5.63	-5.71
Textiles	13.93	32.00	30.57	50.39	48.75
Clothing	50.26	75.46	73.03	163.65	159.98
Leather Goods	-7.18	5.36	3.51	-2.20	-3.92
Chemicals, Rubber, & Refineries	-2.03	-4.53	-4.27	-6.46	-6.21
Primary Steel	-3.99	-9.13	-7.86	-12.76	-11.54
Primary Nonferrous metals	-5.42	-9.24	-8.94	-14.16	-13.87
Motor Vehicles and Parts	**-4.11**	**-36.68**	**7.99**	**-39.28**	**3.54**
Electronics	-5.06	-3.91	-4.43	-8.77	-9.26
Other Machinery & Equipment	-3.80	-5.39	-4.84	-8.98	-8.46
Other Manufactures	-2.16	-0.34	0.14	-2.49	-2.02
Wholesale & Retail Trade	-0.25	1.39	1.93	1.14	1.68
Transport Services	-1.94	-1.95	-1.39	-3.85	-3.31
Communications	-0.51	0.06	0.99	-0.45	0.47
Construction	0.75	2.81	4.17	3.58	4.95
Finance, Insurance, & Real Estate	-0.65	-0.40	0.22	-1.05	-0.44
Commercial Services	-0.78	-5.85	-5.41	-6.58	-6.15
Other Services	0.00	0.46	1.23	0.46	1.23

source: Model estimates.

Table 4.2

The Mainland China Motor Vehicle Market

values in millions of 1997 US dollars

	1997 benchmark	Mainland China and Chinese Taipei Accession, without auto sector restructuring	Mainland China and Chinese Taipei Accession, with auto sector restructuring
values			
Imported motor vehicles and parts, world prices	3,607.71	10,595.68	6,967.97
Imported motor vehicles and parts, internal prices	4,806.39	12,080.71	7,995.72
imported parts, internal prices	1,609.86	2,827.93	5,535.24
imported motor vehicles, internal prices	3,196.53	9,252.78	2,460.48
Domestic autos, intermediates and parts	32,812.46	19,401.89	24,249.56
domestic intermediate parts	10,896.15	4,493.95	5,189.12
industry consumption of motor vehicles	21,625.50	14,698.79	18,785.03
final consumption of motor vehicles	290.81	209.15	275.41
indexes and shares			
Import share of total auto parts (percent of value)	12.87	38.62	51.61
Index of vehicle production	100.00	67.98	102.78
Index of parts production	100.00	41.22	56.28

Figure 4.1

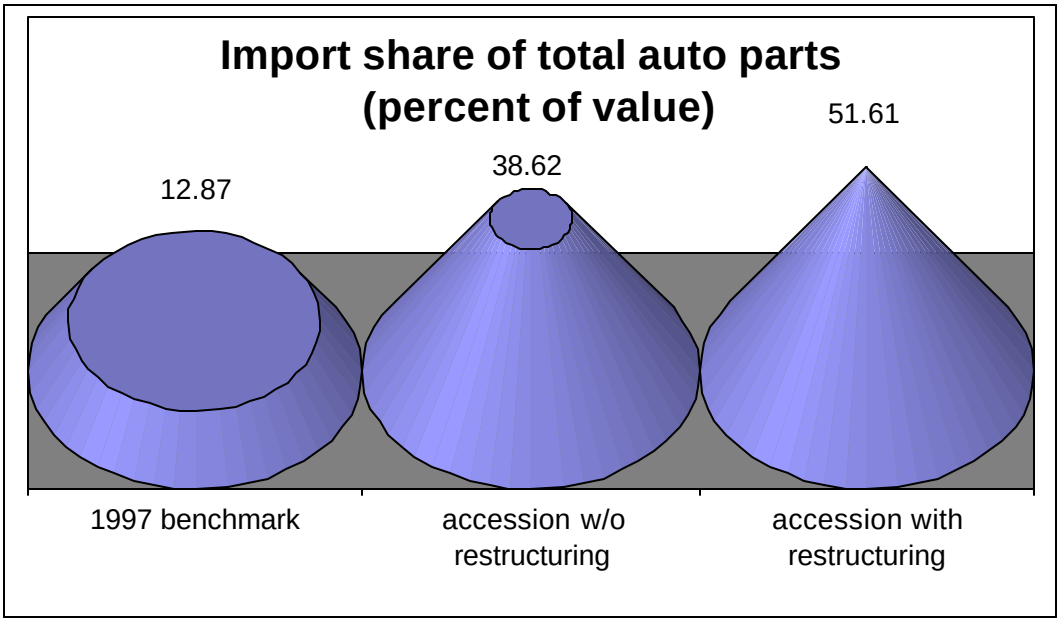
Import share of total auto parts
(percent of value)
12.87
38.62
51.61
1997 benchmark
accession w/o restructuring
accession with restructuring

Table 4.3

Impact of Greater China Accession on Value Added (percent change)

	A	B	C	D=A+B	E=A+C
	Elimination of ATC Quotas for WTO Members, Mainland China, and Chinese Taipei	Mainland China and Chinese Taipei Accession, without auto sector restructuring	Mainland China and Chinese Taipei Accession, with auto sector restructuring	Total Impact without auto sector restructuring	Total Impact with auto sector restructuring
Wool	11.55	12.97	10.62	26.02	23.40
Other natural fibers	10.87	12.58	10.21	24.82	22.20
Primary Food	-1.53	-5.46	-6.19	-6.91	-7.63
Other Primary Production	-3.68	-7.88	-8.47	-11.27	-11.84
Sugar	-3.34	-12.05	-13.36	-14.99	-16.25
Processed Foods	-2.11	-8.92	-9.81	-10.85	-11.72
Textiles	12.67	26.09	23.62	42.07	39.28
Clothing	48.60	67.61	63.81	149.06	143.42
Leather Goods	-8.20	0.64	-2.00	-7.61	-10.04
Chemicals, Rubber, & Refineries	-3.11	-8.80	-9.37	-11.64	-12.19
Primary Steel	-5.06	-13.20	-12.76	-17.59	-17.17
Primary Nonferrous metals	-6.46	-13.31	-13.79	-18.91	-19.36
Motor Vehicles and Parts	-5.17	-39.51	2.24	-42.64	-3.05
Electronics	-6.11	-8.21	-9.52	-13.82	-15.04
Other Machinery & Equipment	-4.86	-9.62	-9.91	-14.02	-14.29
Other Manufactures	-3.24	-4.80	-5.19	-7.88	-8.26
Wholesale & Retail Trade	-1.35	-3.15	-3.50	-4.46	-4.80
Transport Services	-3.03	-6.34	-6.64	-9.17	-9.47
Communications	-1.61	-4.42	-4.39	-5.96	-5.93
Construction	-0.36	-1.79	-1.38	-2.15	-1.73
Finance, Insurance, & Real Estate	-1.75	-4.86	-5.12	-6.53	-6.78
Commercial Services	-1.87	-10.07	-10.45	-11.75	-12.13
Other Services	-1.10	-4.04	-4.16	-5.10	-5.22

source: Model estimates.

Table 4.4

Impact of Greater China Accession on Value of Exports (percent change)

	A	B	C	D=A+B	E=A+C
	Elimination of ATC Quotas for WTO Members, Mainland China, and Chinese Taipei	Mainland China and Chinese Taipei Accession, without auto sector restructuring	Mainland China and Chinese Taipei Accession, with auto sector restructuring	Total Impact without auto sector restructuring	Total Impact with auto sector restructuring
Wool	-9.52	-18.73	-20.14	-26.47	-27.75
Other natural fibers	-4.67	-16.12	-16.67	-20.04	-20.56
Primary Food	-4.16	-5.05	-7.29	-9.00	-11.14
Other Primary Production	-3.33	-2.98	-4.23	-6.21	-7.42
Sugar	-3.29	-5.19	-7.05	-8.31	-10.11
Processed Foods	-4.99	-4.15	-5.96	-8.93	-10.65
Textiles	6.18	32.74	32.01	40.93	40.16
Clothing	87.81	80.03	77.48	238.11	233.33
Leather Goods	-7.66	3.85	1.76	-4.11	-6.04
Chemicals, Rubber, & Refineries	-3.29	-0.30	-1.01	-3.59	-4.27
Primary Steel	-5.56	-3.00	-3.99	-8.39	-9.33
Primary Nonferrous metals	-5.87	-4.05	-5.36	-9.69	-10.92
Motor Vehicles and Parts	**-12.33**	**16.17**	**392.33**	**1.85**	**331.64**
Electronics	-4.56	-0.86	-1.75	-5.39	-6.24
Other Machinery & Equipment	-6.69	-3.69	-4.52	-10.13	-10.91
Other Manufactures	-5.74	-2.57	-3.69	-8.16	-9.22
Wholesale & Retail Trade	-4.79	-5.19	-5.82	-9.73	-10.34
Transport Services	-3.31	-2.28	-2.44	-5.52	-5.67
Communications	-5.05	-4.38	-4.90	-9.20	-9.70
Construction	-4.92	-4.34	-5.62	-9.05	-10.26
Finance, Insurance, & Real Estate	-5.33	-6.01	-7.10	-11.01	-12.05
Commercial Services	-5.17	-3.00	-4.17	-8.02	-9.13
Other Services	-5.59	-5.98	-7.04	-11.24	-12.24

source: Model estimates.

Table 4.5: Impact of Greater China Accession on Value of Exports (Mill. U.S.$)

	A	B	C	D=A+B	E=A+C
	Elimination of ATC Quotas for WTO Members, Mainland China, and Chinese Taipei	Mainland China and Chinese Taipei Accession, without auto sector restructuring	Mainland China and Chinese Taipei Accession, with auto sector restructuring	Total Impact without auto sector restructuring	Total Impact with auto sector restructuring
Wool	-4.95	-9.74	-10.47	-13.76	-14.42
Other natural fibers	-0.18	-0.63	-0.65	-0.78	-0.80
Primary Food	-237.46	-288.39	-416.09	-513.86	-636.25
Other Primary Production	-153.94	-138.02	-195.70	-287.36	-343.13
Sugar	-4.58	-7.22	-9.82	-11.57	-14.08
Processed Foods	-360.07	-299.33	-430.38	-644.47	-768.99
Textiles	1356.02	7186.55	7026.81	8986.47	8816.86
Clothing	43997.88	40096.19	38820.21	119303.97	116907.51
Leather Goods	-1503.44	755.88	345.26	-805.49	-1184.64
Chemicals, Rubber, & Refineries	-560.97	-51.79	-171.59	-611.06	-726.91
Primary Steel	-225.93	-121.72	-162.30	-340.88	-379.21
Primary Nonferrous metals	-130.28	-89.89	-118.97	-214.90	-242.26
Motor Vehicles and Parts	**-141.58**	**185.76**	**4505.86**	**21.28**	**3808.80**
Electronics	-1365.27	-257.74	-524.98	-1611.25	-1866.29
Other Machinery & Equipment	-2145.66	-1183.94	-1450.56	-3250.42	-3499.21
Other Manufactures	-2183.35	-977.14	-1403.76	-3104.39	-3506.52
Wholesale & Retail Trade	-338.09	-365.87	-410.81	-686.43	-729.21
Transport Services	-278.13	-191.84	-205.06	-463.62	-476.40
Communications	-19.84	-17.22	-19.27	-36.20	-38.14
Construction	-25.88	-22.84	-29.53	-47.59	-53.96
Finance, Insurance, & Real Estate	-26.63	-30.02	-35.49	-55.05	-60.23
Commercial Services	-62.46	-36.25	-50.40	-96.84	-110.26
Other Services	-78.30	-83.81	-98.61	-157.43	-171.40

source: Model estimates.

Table 4.6: China Export Shares– Baseline and Scenario

Export Shares		1997 baseline	Total Impact without auto sector restructuring	Total Impact with auto sector restructuring
Primary		0.046	0.033	0.033
Textile		0.084	0.098	0.097
Clothing		0.102	0.303	0.298
Motor Vehicles and Parts		0.006	0.004	0.019
Electronics		0.133	0.100	0.099
Other Machinery & Equipment		0.146	0.104	0.103
Other Manufactures		0.397	0.294	0.290
Services		0.087	0.062	0.062

Figure 2: Automobile Production in China by Provinces

Location of Foreign Production

	Producers	Foreign Producers	Capacity cars/yr	Production 2002
1	SAIC VW	VW	450 000	278 890
2	SAIC GM	GM	100 000	111 623
3	FAW VW	VW	270 000	158 654
4	FAW Toyota	Toyota/Mazda	70 000	30 165
5	Dongfeng PSA	PSA/Citroen	150 000	84 378
6	Dongfeng Honda	Honda	60 000	59 024
7	Dongfeng Yulong	Nissan/Yulong	60 000	38 897
8	Tianjing Toyota	Toyota	30 000	2 147
9	JIangsu Nanya	Fiat	100 000	23 393
10	SAIC Chery	Daewoo	60 000	49 397
11	Zehjiang Jili	Daewoo (geplant)	150 000	47 443
12	Chongqing Chang'an Suzuki	Suzuki/Yanjin	150 000	67 846
13	Chang'an Ford	Ford	50 000	n.a.
14	Dengfeng Yueda Kia	Kia	50 000	20 080
15	FAW Hainan	Mazda	50 000	11 989
16	Beijing Hyundai	Hyundai	30 000	1 356
17	China Guizhou Aviation Ind.	Wanhong/Chenchang	10 000	1 831
18	Shenyang Brilliant Junbei	BMW (".Halbjahr 2003)	200 000	n.a.
19	Harbin Hafei	Mitsubishi	30 000	14 577
20	Shangdong Yantei	GM	50 000	n.a.
21	Southeast	Zhonghua	60 000	16 935
22	Beijing Jeep	Daimler-Chrysler	85 000	9 052
23	Jinbei GM	GM	30 000	3 751
24	Hunan Changfeng	Mitsubishi	30 000	15 067
25	Zhengzhou Nissan	Nissan	30 000	n.a.
26	Rongcheng Huatai	Hyundai	20 000	n.a.
27	Jiangxi Fuqi	Golden Lion	20 000	n.a.
28	Tianjing Huali	Golden Lion	20 000	n.a.
29	SAIC GM Wuling	GM	150 000	n.a.
30	Sanjiang Renault	Renault	30 000	n.a.
31	Chengdu FAW	Toyota	5 000	n.a.
32	Yizhong	SAIC/RDS	10 000	n.a.

Production capacities in Provinces

	Capacity cars/yr	Production 2002
Anhui	60 000	49 397
Bejing	115 000	10 408
Fujian	80 000	NV
Guandong	120 000	97 921
Guangxi Zhuang	150 000	NV
Guizhou	10 000	1 831
Hainan	50 000	11 989
Heilongjang	30 000	14 577
Henan	30 000	NV
Hubei	180 000	NV
Jiangsu	130 000	38 460
Jilin	340 000	188 819
Liaoming	230 000	NV
Shandong	80 000	NV
Shanghai	550 000	390 513
Shanxi	50 000	20 080
Sichuan	205 000	NV
Tianjing	50 000	NV
Zehjiang	150 000	47 443
Total	2380 000	520 438

Other for. firms	# emp.	# plants
Bosch	3 600	6
Kolbenschmidt	1 500	2
Michelin	4 000	2
ZF/Sachs	2 100	2
Total	11 200	12

Source: Hein, C (2003)