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IMPACT OF CHINA'S INTEGRATION ON SELECTED OECD ECONOMIES *

Nora Dihel and Przemyslaw Kowalski**

with input from Ben Shepherd and Raphael Espinoza

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**) The authors are economists in the Trade Directorate, Organisation for Economic Co-operation and Development, 2 rue André-Pascal, 75775 Paris Cedex 16, France. The views expressed in the paper are not necessary those of the OECD or its Member countries.

SUMMARY

The trade reforms that China has embraced as a result of its WTO accession are a continuation of a long standing trend that saw sustained reduction in non-tariff barriers and in levels and dispersion of tariffs. However, in the area of services, China's commitments represent milestones. Plans include the opening of key services sectors to foreign participation, elimination of geographical limitations, forms of establishment, and scope of business activities among others. What are the implications of these reforms for China and OECD countries? The paper provides some estimates on the basis of a multi-country, multi-sector computable general equilibrium model of the world economy that features increasing returns to scale and large-group monopolistic competition. Importantly, the model includes a treatment of foreign direct investment on a bilateral basis which, given the importance of foreign presence in the Chinese economy, is essential for understanding the impacts of its liberalisation.

Our results show that China itself clearly stands to gain substantially from its liberalisation. Implementation of the WTO commitments by China in goods and services sectors is estimated to increase its real income by almost 2%, while a scenario with full liberalisation is expected to yield a 3% increase in its real income. A major part of these gains comes from the improved efficiency with which China uses its resources.

We find a limited impact on OECD economies as a result of China's implementation of WTO commitments and complete liberalisation in the area of tariffs and services barriers. The structure of bilateral trade flows between China and individual OECD economies reflect divergent patterns of comparative advantages as well as differences in structure of trade barriers and geographical location. The most direct impact is expected through improved export performance of OECD countries that are already trading with or investing intensively in China but still face significant market access barriers. The observed trade patterns suggest that the impact through the market access channel is likely to be more important for Korea, Japan, Australia, and New Zealand, while the impact on other OECD economies is likely to be limited.

The second channel through which China's liberalisation may affect OECD economies is increased competitiveness of Chinese exporters who would experience declining costs of intermediate products and services as a result of liberalisation. The non-negligible market shares of China in OECD countries' imports suggest that increased import competition is indeed an important outcome of China's liberalisation. However, these competitiveness effects felt in both domestic OECD markets and third country markets are almost always outweighed by the market access effects (through better access to China's market), resulting in the majority of cases in overall net gains for the OECD countries.

Finally, FDI-related effects are important as they dominate the modest welfare gains of most OECD countries in the services liberalisation scenarios. While China experiences losses from its outward FDI, most OECD countries benefit from increased incomes from their investments in China.

The scenarios in which China is assumed to fully remove its import duties and services barriers result in expansion of global gains by an additional one percentage point as compared to the WTO accession scenario. This suggests that China's WTO commitments in the area of both goods tariffs and services barriers are already quite ambitious and deliver the bulk of the gains that can be had from such reforms. Still, most OECD countries enjoy additional gains in both absolute and per capita terms from the fuller liberalisation scenario.

It is important to note that our results are conditional on production, consumption, trade and investment data reflecting the time of China's WTO accession and may hence be only approximate given

the pace of structural changes within the Chinese economy as well as the relationships between China and its OECD commercial partners.

Our results are also broadly in line with the existing literature and, more fundamentally, with the underlying trade data. On a per capita basis the biggest gainers from implementation of WTO commitments by China are Korea, Japan, EU15, Canada and US. All the gaining OECD countries benefit from allocative efficiency, substantial favourable terms of trade effects and increased income from services FDI to China. It should be noted however that our analysis has not accounted for the dynamic effects of China's openness and is therefore likely to provide lower bound estimates.

Impact of China's integration on selected OECD economies, a quantitative assessment

This paper aims to quantify the welfare impacts of China's integration into global goods and services trade. Given the investment-dominated profile of China's recent growth, it places special emphasis on China's foreign direct investment policies and inflows. It analyses in detail the impact of China's liberalisation strategies on the terms of trade, trade flows and welfare of the selected countries. The welfare effects and the decomposition of the contributing factors such as allocative effects, terms of trade effects, net capital endowment effects, product variety effects, and net FDI income effects, are explored at both the sectoral and economy-wide level.

OECD (2006) provides a review of the literature that examines the impact of China's integration on the global economy with a view to providing an overview of available estimates and the underlying models employed. The review shows that China's WTO accession or unilateral liberalisation generates overall welfare gains under all modelling assumptions. The results are difficult to compare given differences in the model structures, policy shocks and protection data employed in these simulations. Nonetheless some conclusions can be drawn.

An important finding to emerge is that China is the major winner under all modelling assumptions – China experiences substantive welfare gains ranging from 0.4 to 22.5% of its GDP. Larger gains are indicated in dynamic studies that take into account the additional investment-related effects as well as studies that consider the productivity improvements associated with China's liberalisation. By contrast, the impact on the rest of the world in general and on OECD countries in particular is limited in all analysed studies (almost always under 1% change in GDP).

Modelling the impact of China's integration on OECD economies

It is important to note at the outset that, while many general equilibrium studies on the quantification of economic impacts of policies affecting goods trade in China are available, relatively little work has been done to assess the potential gains from alternative liberalisation scenarios in services.[1] The difficulties arise from poor information on international services transactions and on prevailing barriers to trade in services, as well as from the need to develop a different modelling structure from that used for goods trade in order to incorporate the various modes of services supply (*i.e.* to account for the movement of factors of production).

Given the investment-dominated profile of China's recent growth, the model employed in this paper places special emphasis on China's foreign direct investment policies and inflows and puts a special emphasis on the examination of the additional implications of China's opening of services trade and lifting of obstacles to foreign investment. The model attempts to analyse in detail the services and investment-specific effects as well as their interactions with the impacts of goods trade liberalisation. Annex 1 describes in detail the

[1] A number of studies which assess the impact of services liberalisation include China in the sample of analysed countries. For example, using the FTAP, Dee and Hanslow (2000) Hanslow analyse various multilateral services liberalisation scenarios. They find welfare gains of about USD 130 billion (or 0.46% of world real income) from liberalising trade in services, with more than 90 billions going to China (representing about 14.6 % of real its GDP). Building on the same model structure and using the same estimates for barriers to trade in services as Dee and Hanslow, Verikios and Zhang (2000) extend the analysis by providing greater sectoral detail. This study simulates separately complete multilateral liberalisation of trade in communication services and financial services in a post-Uruguay Round environment and finds positive welfare effects for the world as a whole in both cases. When liberalising trade in communication services, the world as a whole is projected to gain about USD 13 billion or 0.05% in terms of real income with China capturing 4.4 billion; when liberalising trade in finance, insurance and business services, the expected gains are about USD 3.5 billion or a 0.01% rise in real income, with more than 2 billion going to China.

changes in trade restrictiveness indices in banking, insurance, telecom (fixed and mobile), professional (engineering) and distribution services that constitute the basis for defining the subsequent simulation scenarios that correspond to the implementation of China's commitments in these five services sectors. Annex 2 describes the methodology for computing tax equivalents in these services sectors and presents detailed results for China.

A brief description of the FTAP model employed in this exercise is presented below. The section describes the underling data and outlines the analytical framework for the liberalisation scenarios. The results of the analysis are then discussed. Annex 3 and 4 present in more detail the structure of China's trade with the OECD countries and the theoretical structure of the FTAP model. Annex 5 presents more detailed modelling results tables discussed in this paper.

In order to include the services and investment-related dimensions into the analysis and increase the reliability of results concerning the impact of China's integration on the world economy, this paper presents new estimates based on a multi-country, multi-sector computable general equilibrium model of the world economy that features increasing returns to scale and large-group monopolistic competition in all sectors, and includes a treatment of foreign direct investment on a bilateral basis (the Foreign Direct Investment and Trade Analysis Project (FTAP) model). As foreign direct investment is such an important element to the Chinese economy, accounting for FDI in a CGE model is vital for understanding the Chinese economy and impact of its liberalisation on the global economy. The FTAP model employed in this exercise was developed in stages from the GTAP model, with the addition of the structure necessary to support the analysis of services liberalisation and in particular the removal of barriers to FDI in the tertiary sector.[2]

Data

For the purpose of this study the FTAP model was adapted in several ways. Firstly, the current analysis is based on a more disaggregated sectoral database than existing studies employing FTAP, permitting a more detailed analysis of both goods and services trade liberalisation. The GTAP 6.1 Interim Release database and a new bilateral capital stocks database assembled in the context of this project are employed in this analysis.

The GTAP 6.1 database covers 57 broad economic sectors and 92 countries and fully integrates the information on bilateral *ad valorem* tariffs (both MFN and preferential), *ad valorem* equivalents of specific tariffs (MFN and preferential), as well as tariff rate quotas from CEPII/ITC Market Access Maps (MacMaps) database.[3]

To enable the analysis of services liberalisation through commercial presence, a bilateral capital stock matrix for 2001 was developed. Bilateral FDI stocks at the GTAP sectoral level were estimated from the new OECD FDI database, UNCTAD World Investment Directory, local government sources for China, Hong Kong, China, Russia, Singapore, Chile, Peru, and Brazil, and ASEAN (2004) for Malaysia, Philippines, Thailand and Vietnam. This information allowed construction of a consistent database of

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2 For more information, see K. Hanslow, T. Phamduc, and G. Verikios (1999) *The Structure of the FTAP Model, Research Memorandum MC-58, Productivity Commission,* Canberra, 1999. The FTAP model and its documentation are available at the Australian Productivity Commission web site at http://www.pc.gov.au

3 The dataset is documented in detail in A. Bouët, et al. (2002), *Market Access for GTAP: A Bilateral Measure of Merchandise Trade Protection* by GTAP Resource #1045, available at (confirmed on 8 January 2005): http://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=1045 .

bilateral FDI stocks by region and sector following the methodology employed for the construction of previous FTAP databases.[4]

The following investigation uses information from the GTAP-6 database and the new FTAP FDI database to include in the analysis 13 regions and 23 sectors. Ten of the thirteen regions refer to OECD country groupings. Of the 23 sectors, two represent agro-food product groups, seven sectors refer to manufacturing and eleven to services. The correspondence of the regions and sectors modelled and their GTAP-6 components is given in Tables A5.1 and A5.2. Annex 3 describes the patterns of China-OECD trade and FDI that underlie the simulation results discussed below.

Simulation scenarios

China's tariff profiles and the impact of WTO accession

The bilateral tariff data are from the GTAP version 6.1 database which is itself derived from the CEPII/ITC Market Access Maps (MacMaps) database[5] that includes bilateral *ad valorem* tariffs (both MFN and preferential), *ad valorem* equivalents of specific tariffs (MFN and preferential), as well as tariff rate quotas.[6] The resulting ad-valorem equivalent measures of applied protection are thus a comprehensive measure of protection that exhaustively cover tariff preferences in 2001 and are consistent across all bilateral trade flows. Data on impact of China's WTO commitments on applied rates come from a related version of GTAP database containing data on a variety of scenarios for tariff cuts including China's WTO commitments. The included tariff reduction scenarios were constructed by CEPII from the MAcMap-HS6 tariff Data Base (CEPII/ITC) and from bound tariffs from the WTO's Consolidated Tariff Schedules (CTS).

Upon accession to the WTO, China agreed to bind all its import tariffs. After implementing all commitments China's average bound tariff on agricultural products will decrease to 15% and for industrial goods this average will decrease to 8.9% (WTO, 2001). The two panels of Tables A5.3 present bilateral trade-weighted tariffs imposed by China in the baseline year 2001 and after implementation of its WTO commitments which were scheduled mostly for 2004 but in no case later than 2010 (WTO, 2001). Far right columns and bottom rows in each panel present respectively trade-weighted averages by product category and by partner country and the same information is presented graphically in Charts A5.1 and A5.2. In the baseline, the pattern of China's tariffs indicates absolutely and relatively high protection levels in agriculture and fishing (50% trade-weighted average tariff), motor vehicles and part (38%), textiles, clothing and leather (19%), food products and beverages (18%); chemicals and chemical products (13%) and machinery and equipment and other manufacturing (approximately 12%). Low average tariffs are imposed on imports of natural resources, oil and coal and a moderately low average tariff of 7.5% on imports of metal products.

While the level of commodity aggregation that is necessary for the CGE simulations certainly obscures any detailed analysis of tariff structure it is still quite clear that the portrayed China's tariff profile in 2001 reflected a deliberate policy of protection of the manufacturing sector especially in final consumption goods and capital-intensive manufactures while at the same time imposing relatively low duties on inputs necessary for the development of the exports sectors. Gaulier *et al.* (2005) point out that China's tariff policy is not essentially different from those seen in the economic history of other East Asian countries where protection of the domestic industries was achieved through relatively high customs tariffs, and

4 See Phamduc (2000)

5 See A. Bouët, et al. *op. cit.*

6 *Ibid.*

export promotion, through tariff exemptions on imported inputs for export production. More generally, the duties reported in Table A5.3 are likely to somewhat overstate China's protection in certain sectors because of the widespread incidence of differences between the nominal and collected tariff rates arising as a result of extensive import duty exemptions associated with processing trade (World Bank, 1994; Bach *et al.*, 1996). Based on 1997 data, Li and Zhai (2002) report that these differences were highest in the textile sector and relatively low in the medical and automobile products, with the general rule being that this discrepancy increased with the export orientation of the given sector.

The implementation of China's WTO commitments studied in this modelling exercise results in, on average, 40% reduction of tariff protection. Above-average percentage tariff reductions are expected in electronic equipment (approximately 81% reduction in average trade-weighted tariffs); agriculture and fishing (80%), motor vehicles and parts (60%), textiles, clothing and leather (50%) and machinery and equipment (45%). It is also clear that, because of variations in the composition of their trade with China as well as the pattern of negotiated concessions, implementation of the WTO accession commitments will not result in equally deep market access concessions for all OECD members. Based on average trade-weighted tariffs, above-average reductions in average trade weighted tariffs will benefit Mexico (73%), US (70%), Japan (54%), EU15 (51%), and New Zealand (45%).

Our scenarios include in addition to the lowering of China's imports tariffs the WTO accession scenario, the removal of ATC quotas on imports of textiles, clothing and leather by the US, EU15 and Canada. Following the current practice and the availability of relevant data, such a policy shift is implemented as a reduction in export tax equivalents on Chinese shipments of these products to the indicated economies (Walmsley and Hertel, 2000 and Ianchovichina and Walmsley, 2003).[7] Ad-valorem tax equivalents on exports of textiles, clothing and leather to the EU15, US and Canada in 2001 have been estimated at respectively 18, 11 and 10%.

China's WTO commitments in services

Initial barriers

In contrast to the majority of existing studies, this paper simulates the liberalisation of services according to China's actual commitments, rather than on the basis of various assumptions. For that purpose, the analysis employs a set of new estimates of services trade barriers that are based on improved restrictiveness indexes that are calculated separately for each mode of services supply and include additional regulatory aspects such as transparency of existing regulations and the status of national regulatory agencies. The methodology for estimating these tax equivalents is presented in detail in OECD (2005). The tax equivalents for barriers in telecommunication, banking, insurance, distribution, professional services (engineering), for China and the selected OECD countries that are employed in this exercise are presented in Table A5.4. It is important to note that these tax equivalents are estimated on the basis of statistical techniques and are therefore characterised by inherent uncertainties.

Simulation results are conditioned not only by the quality of the estimates of barriers, but also by the modelling of their removal. The approach to the modelling of protection has a strong influence on the overall results of liberalisation through income effects (when barriers are modelled as rent-creating measures) or through allocative efficiency effects (when barriers are modelled as cost-raising elements). In all studies, the decision as to how to model these barriers is to some extent arbitrary and often determined by the way in which the estimates of barriers are measured. Because the barriers to services trade appear to be significant, their impact on the simulation results will also be significant. Given the uncertainties related

[7] In such a framework the rents from quotas are assumed to accrue to exporters.

to the interpretation of the nature if services barriers,[8] no differentiation between rent-creating and cost-increasing barriers were considered in the incorporation of services barriers into the database given the difficulties related to the differentiation of the nature of services barrier. The services barriers were introduced into the database as taxes on outputs and import taxes.[9]

The services tax equivalents presented in Table A5.4 were introduced into GTAP using the "Altertax" option, which makes it possible to change various tax rates in the model database. This procedure is designed to incorporate additional information on policy variables into existing GTAP data aggregations (Malcolm, 1998). Taxes were incorporated, while maintaining the internal consistency of the database and minimising the impact of the tariff change on the value of commodity and financial flows. The updated database containing the services tax estimates forms the basis for the subsequent experiments.

WTO commitments

Before the phasing in of the liberalisation commitments specified in its GATS schedule, the number of sectors with a guarantee of full access was lower for China than for all other country groups (developed, developing and acceding countries).[10] This is consistent with the level of the trade restrictiveness index (TRIs) and tax equivalents computed in OECD (2005j). As noted in Mattoo (2003), the picture changes after the implementation of the liberalisation commitments. Overall, both the coverage and depth of market access commitments are much higher than the commitments offered in the Uruguay Round by any other group of countries (including high income countries). Also, China's commitments on national treatment are deeper and wider than those of all other country groups.

To define the simulation scenarios that correspond to the implementation of China's commitments in the five services sectors, the components of the trade restrictiveness index were scored on the basis of China's GATS commitments that reflect (i) the state of policy in 2001 (the date of accession) and (ii) the state of policy in 2008 (the date by which all liberalisation commitments will have been implemented).The sectoral analysis in Annex 1 describes the policy changes in China, while the changes in TRI estimates are graphically presented in Charts A1.11 to A1.6. The corresponding services tax equivalents reductions associated with the implementation of WTO commitments in these five services sectors are presented in Table A5.4.

Discussion of simulation results

Global effects

Tables 1, 2 and 3 below show the percentage changes in real income and economic welfare (as measured by the equivalent variation) as well as per capita welfare gains from China's implementation of WTO commitments and complete liberalisation in all goods and selected services sectors (banking, insurance, communication, other business services and distribution).

8 See OECD (2005) for a detailed discussion concerning this issue.

9 All barriers are introduced explicitly as "tax equivalents"

10 See Mattoo (2003)

Table 1. Impact on real income and welfare from China's implementation of WTO commitments in all goods and selected services sectors

	Real Income			Equivalent variation (EV)		
	Total %	Goods %	Services %	Total USD m	Goods USD m	Services USD m
Australia	-0.08	-0.08	0.01	-248	-227	20
New Zealand	0.03	0.04	-0.01	13	14	-2
China	1.95	1.51	0.35	17695	13761	2821
Hong Kong, China	0.81	0.67	0.14	1351	1072	278
Russia	-0.06	-0.05	-0.01	-177	-142	-27
Japan	0.07	0.06	0.00	2661	2451	63
Korea	0.19	0.20	0.01	617	647	26
Canada	-0.05	-0.04	0.00	-280	-232	3
United States	0.05	0.04	0.01	4717	4272	615
Mexico	-0.10	-0.09	0.00	-192	-164	19
EU15	0.08	0.07	0.01	4655	3899	389
Rest of Europe	0.01	0.01	0.00	-63	-36	-1
Rest of the World	-0.05	-0.04	0.01	-1175	-1149	282
Total				29575	24167	4486

Source: FTAP model projections

Table 2. Impact on real income and welfare from China's elimination of barriers in all goods and selected services sectors

	Real Income				Equivalent variation (EV)	
	Total %	Goods %	Services %	Total USD m	Goods USD m	Services USD m
Australia	-0.04	-0.01	-0.04	-131	-45	-99
New Zealand	0.19	0.16	-0.01	83	69	-3
China	2.99	1.71	1.34	27904	15952	11973
Hong Kong, China	1.22	1.00	0.37	2806	2009	719
Russia	0.19	0.17	-0.07	509	479	-191
Japan	0.20	0.15	0.04	7852	6280	1089
Korea	0.57	0.54	-0.01	2270	2179	-63
Canada	-0.05	-0.01	-0.07	-306	-78	-377
United States	0.05	0.05	0.00	5188	4614	575
Mexico	-0.10	-0.08	-0.05	-29	-30	-93
EU15	-0.02	0.01	0.00	-2272	-116	-96
Rest of Europe	0.10	0.08	0.01	712	522	66
Rest of the World	0.07	0.05	0.00	3680	2700	230
Total				48267	34535	13730

Source: FTAP model projections

The tables show that China's WTO commitments implemented in goods and five services sectors is estimated to increase its real income and per capita welfare by almost 2%, while its complete liberalisation in the analysed sectors is expected to increase its real income and per capita welfare by approximately 3%. In terms of welfare effects, China is expected to gain around USD 17.6 billion from implementing its WTO commitments in the analysed sectors. About USD 13.7 billion are estimated to come from implementing all agricultural and manufacturing WTO commitments[11] and additional USD 2.8 billion from implementing its commitments in the analysed services sectors. Total liberalisation would generate welfare gains of about USD 28 billion to China, with USD 15.9 billion coming from goods liberalisation and USD 11.9 billion from services liberalisation. These results are in line with most of the findings derived from the literature review.

[11] Removal of ATC quotas on Chinese exports in the EU15, US and Canada is also taken into account.

While the world as a whole is projected to be better off by almost USD 30 billion under the first scenario and USD 48.2 billion under the second liberalisation scenario, the effects on individual OECD countries are estimated to be rather marginal in both scenarios.

Table 3. Per capita welfare gains: implementation of WTO commitments and full liberalisation

	WTO accession			Full liberalisation		
	Total %	Goods %	Services %	Total %	Goods %	Services %
Australia	-0.08	-0.07	0.01	-0.04	-0.01	-0.03
New Zealand	0.03	0.04	-0.01	0.20	0.16	-0.01
China	1.90	1.48	0.30	2.91	1.67	1.29
Hong Kong- China	0.84	0.67	0.17	1.41	1.01	0.45
Russia	-0.07	-0.06	-0.01	0.17	0.16	-0.08
Japan	0.08	0.07	0.00	0.21	0.17	0.03
Korea	0.20	0.21	0.01	0.59	0.57	-0.02
Canada	-0.05	-0.04	0.00	-0.05	-0.01	-0.07
United States	0.05	0.05	0.01	0.06	0.05	0.01
Mexico	-0.04	-0.03	0.00	-0.01	-0.01	-0.02
EU15	0.07	0.06	0.01	-0.04	0.00	0.00
Rest of Europe	-0.01	0.00	0.00	0.08	0.06	0.01
Rest of the World	-0.03	-0.03	0.01	0.09	0.07	0.01

Source: FTAP model projections

The separate welfare effects from goods and services liberalisation for China and the analysed OECD countries and regions with the detailed decomposition of the contributing factors are explored in the next section at both the sectoral and economy-wide level. The main factors that determine these welfare effects are:

1. Allocative efficiency effects which measure changes in resource allocation as a result of policy changes;
2. Income effects from expansion/contraction of capital stocks located in one region;
3. Product variety effects which refer to the benefits that the increased variety of a particular good or service may provide for consumers;
4. Terms of trade effects which measure the changes in the relative price of exports and imports for a country or a region; and
5. FDI-related effects:
   - Changes in normal rents earned on FDI: the normal rentals received by the owners of foreign capital from host regions and rentals paid to the owners of foreign capital in home regions;
   - Changes in barriers rents paid to the owners of foreign capital and affiliates in the home region: the barrier rents received by the owners of foreign capital and affiliates from host regions less the barrier rents paid to the owners of foreign capital and affiliates in home regions;
6. Foreign debt effect
   - Income received or paid on foreign credit or debit by a region; and
   - Interest income received or paid on foreign credit or debt by a region.

The income-generating factors (such as allocative effects, net capital endowments and product variety effects) are the most important ones for the world as a whole, but they need to be analysed in conjunction

with the income-redistributing factors (such as the FDI income effects) since in such cases what constitutes a gain for one region may be a loss for another one. The following section discusses these results, while Annex 5 presents the detailed results tables.

Goods liberalisation

Implementation of the WTO commitments by China is estimated to bring the global annual welfare gains of around USD 24 billion with almost USD 14 billion accruing to China itself (Table 1). The USD 14 billion accruing to China translate to a non-negligible annual 1.48% per capita gain (Table 3). The bulk of the gain comes from the improved efficiency with which China uses its resources. In fact, these so-called allocative efficiency gains are estimated to amount to around USD 21 billion but are neutralised by losses associated with terms of trade changes as well as negative effects associated with its FDI and, to a lesser extent, China's payments on foreign debt.

The substantial allocative efficiency gains in China are realised through a clear shift of resources away from some, so far heavily protected, sectors such as agriculture and fishing, motor vehicles and parts, chemicals and chemical products and machinery and equipment towards some relatively less protected, albeit also opening, sectors such as textiles, clothing and leather, electronic equipment and food products and beverages. The described pattern of resource reallocation applies equally to Chinese domestic producers and foreign producers located in China.

Such a shift in allocation of resources is tied in with quite dramatic changes in Chinese imports with most of the sectors experience significant increases in import volumes. The most pronounced expansions of China's imports are estimated for agriculture and fishing (116% change in the imported volumes); motor vehicles and parts (57%); textiles, clothing and leather (44%) and food products and beverages, machinery and equipment, electronic equipment all experiencing increase of more than 15%. While some of this increased import demand is attributed to final consumption, the bulk reflects increased demand for intermediate inputs by both domestic and foreign firms producing in China. Indeed, while the magnitudes are a bit smaller, the pattern of expanding imports is very much mimicked by the pattern of expanding exports: textiles, clothing and leather (36%); agriculture and fishing (24%), motor vehicles and parts (21%); food products and beverages(17%) and electronic equipment (15%). The interplay of import and export changes illustrates the impact of market opening on the costs of intermediate products of producers located in China and in turn on their export competitiveness. At the same time it suggests a mitigated impact on OECD economies, which despite being able to export more freely to the Chinese market face an increased competitiveness from producers located in China.

Associated with this significant structural change are the changes in the inward stocks of FDI (Table A5.9). In the FTAP model which accounts for the foreign presence of OECD producers in the Chinese market the impact of improved market access on OECD countries also depends on the extent of their presence in the Chinese economy as well as on the objective of this presence. If foreign presence is a means of jumping high initial market access barriers, liberalisation could result in divestment if supplying the Chinese market from abroad becomes more efficient. If, however, foreign presence is already a more efficient mode of supplying the Chinese market (or alternatively more efficient way of supplying other export markets from China), China's liberalisation may deepen foreign presence in China and benefit the investors that take advantage of yet cheaper intermediate inputs used in their production. In terms of actual simulation results, as far as all foreign investors are concerned, the largest increase of FDI stock is recorded in agriculture and fishing (0.4%) while the largest decrease is recorded in textiles, clothing and leather (-0.5%). While the changes are smaller in other manufacturing sectors, all sectors experience increases in FDI stocks (see Table A5.9).

The significant changes in the volume of China's trade are also strongly reflected in world prices of traded commodities—one of channels through which China's liberalisation impact upon production and employment patterns across the world economy. Here, it is important to note that the world export price index of agriculture and fishing increases by a substantial 3% while prices in most manufacturing sectors fall. For textiles, the clothing and leather the world price index falls by as much as 20% and for electronic equipment by 3.4%. In other manufacturing sectors price increases are less pronounced. These results suggest that China's integration into the world economy may benefit agricultural producers through increased demand while manufacturing suppliers may face falling export prices as a result of competition from the Chinese producers.

As already foreshadowed, the substantial gains associated with better allocation of productive resources across China's economy are counterbalanced by quite substantial terms of trade losses. That China loses from the terms of trade changes is not astonishing since the considered scenario is largely constrained to lowering of imports barriers in China and therefore implies a large boost to Chinese import demand which results in increasing prices of Chinese imports. Additionally, prices of Chinese exports are reduced as a result of reduction of production costs as well as the need to export more in order to finance the increase in import demand. The two effects result in a negative aggregate terms of trade effect for China of 1.8% indicating the percentage points difference between the increase in price of aggregate imports and the price of aggregate exports. The large size of the Chinese economy inevitably contributes to the magnitude of the negative terms of trade effect. On the flip side, in general China's trading partners benefit from improvements in their terms of trade.

Another factor that mitigates the extent of China's gains from its own opening is losses from its outward FDI (Table A5.5). These losses are associated with the impact that China's liberalisation has on the rates of return on FDI held outside China. At the same time China's implementation of the WTO commitments results in an expansion of China's capital endowment and the product variety which contribute positively to China's welfare gain.

The impact of China's implementation of its tariff commitments and the removal of ATC quotas has a rather limited impact on the OECD membership (Table A4.5). In absolute terms the biggest gainers are the US and EU15 with respectively around USD 4.2 and USD 3.9 billion annual gains. Other gaining OECD members include China's proximate trading partners Japan and Korea. Small losses are predicted for Australia, Canada and Mexico. In terms of per capita welfare gains (see Table 16) the biggest winner is Korea with 0.2% annual gain in per capita welfare, followed by Japan (0.07%), EU15 (0.06%) and United States (0.05%). All the gaining OECD countries benefit from allocative efficiency and substantial favourable terms of trade effects.

Three OECD economies, Australia, Canada and Mexico are predicted to be worse off by respectively 0.07, 0.04 and 0.03% of per capita welfare. These losses originate mainly from terms of trade losses (Mexico and Australia) and from increased payments associated with their foreign debt positions in the faced of raising world real interest rate (Australia, Canada and Mexico). The unfavourable terms of trade effects are due to losses in shares in the Chinese market that are implied by an unequal impact of China's WTO commitments on post-tax prices of imports from different OECD countries. Australia, for example, which exports to China substantial shares of their agricultural production (Table A3.1), does not seem to benefit from as large reductions of agricultural tariffs as the US or Rest of World do (Table A5.3), and hence has to accommodate the lowering of tariffs by reducing its export prices (hence the negative terms of trade effect) or otherwise risks losing market shares. Mexico also suffers from terms of trade losses but its total loss is dominated by the increased payments on its foreign debt.

The small impact of China's opening up on the OECD countries is broadly in line with the existing CGE literature and, more fundamentally, with underlying trade data. Indeed, an extensive analysis of OECD-

China trade structure presented in Annex 1 suggests that that apart from the OECD economies located in Asia and Oceania, dependence on China as a destination market for exports in 2001 was rather limited. Exports to China expressed as shares of respective GDPs are highest in Korea (6.7%), New Zealand (2.2%), Australia (1.5%), Japan (1.2%) and, again, tend to be lower in Canada (0.7%), United States (0.3%), EU15 (0.6%) and Mexico (0.2%). For comparison, the US exports to the EU15 accounted for 29% of its total exports and 2.7% of its GDP in 2001 and the EU15 exports to the US accounted for 11% of total EU15 exports[12] and around 3.7% of its GDP.

The scenario in which China is assumed to totally remove its import duties results in an expansion of global gains from USD 24 billion to USD 34 billion i.e. by one third (Table A5.6). First, this suggests that China's WTO commitments in the area of tariffs are already quite ambitious and deliver most of the gains that can be had from reforms in this particular domain of China's trade policy. Interestingly, full liberalisation scenario reduces marginally China's overall welfare gains: even though there is potential for gains from allocative efficiency from China's further liberalisation, negative terms of trade and foreign debt effects increase more than proportionally and keep the overall welfare gain on par with the results from WTO accession results.

The result for China contrasts with those for most of the OECD countries which apart from the EU15 tend to gain more (or lose less) in both absolute and per capita terms from this more ambitious liberalisation scenario. Korea remains on the top of the gains list but its gains amplify to 0.57% increase in per capita terms. Japan with 0.17% per capita welfare gain is next followed by New Zealand (0.16%) and United States (0.05%). While losses for Australia, Canada and Mexico are somewhat reduced, the EU15 is predicted to turn form a significant gainer to a marginal looser. The latter effect is associated with the fact that in the full liberalisation scenario the EU15 becomes a net seller of bonds which implies a significant increase in interest payments that follows an increase in interest rates.

The full liberalisation scenario is more favourable for Russia which turns to a significant net gainer (0.16% increase in per capita welfare) from being a net looser in the WTO accession scenario. The unfavourable terms of trade and allocative efficiency effects in Russia in the scenario of China's WTO accession are due to losses in shares in the Chinese market that are implied by an unequal impact of China's WTO commitments on post-tax prices of imports from different trading partner. This is rather expected given Russia's disadvantaged position in negotiating the terms of China's accession to the WTO as a non-member as well as the erosion of preferential access to the China's market enjoyed by Russia prior to 2001. Only the liberalisation that goes beyond China's WTO accession commitments delivers market access opportunities that benefit Russia.

Services liberalisation

Implementation of WTO commitments in the selected services sectors is estimated to generate benefits of almost USD 3 billion to China (see Table A5.7), while the total liberalisation of these sectors would more than triple these gains (see Table A5.8). This indicates that, despite extensive commitments in the area of services, significant services barriers still remain.

As is the case with the goods liberalisation scenario, the services liberalisation effects for China are dominated by improvements in allocative efficiency and negative terms of trade. As expected, the allocative efficiency gains are quite substantial (given high initial barriers). The allocative efficiency improvements are derived from changes in the size of production of all sectors and are driven mainly by the movement of capital from other countries/regions to China in the five analysed services sectors (see Table A5.10). Given the relatively high initial magnitude of the reduced/removed services barriers, China

[12] Including intra-EU15 trade

attracts substantive foreign capital in distribution, insurance and other business services. This enlarges its total capital endowment, so that the expansion of the five services sectors is not accompanied by reductions of outputs in other sectors (See Table A5.10 – no sectoral resource shifting). This capital reallocation from OECD regions and the Rest of the World to China (positive capital endowment effect) has an additional impact on product variety in China as it determines an increase in output which is associated with more varieties from more firms and more varieties for consumers to choose from. The product variety effects thus reinforce the gains from capital reallocation.

As opposed to allocative efficiency gains, terms of trade effects are negative for China. This worsening of terms of trade is in line with our expectations and discussion of goods liberalisation: the reduction/ removal of the relatively high services barriers in China determines a fall in the relative price of exports to imports.

Turning to FDI-related contributions, it is important to note that China experiences losses from its outward FDI. The contribution to Chinese welfare of stock changes for FDI assets is negative but small as the positive contribution of foreign capital change in China (determined by the reduction of mode 3 services barriers) is offset by losses on Chinese-owned capital abroad. The contribution to welfare in China from rate of return changes is similarly negative, driven by negative contributions abroad.

In terms of rents from services barriers (contributions to income of changes in the rents from barriers to services trade as these barriers are eliminated), net FDI rents (given by rents from output impediments) flow from the OECD investing regions to China (the recipient region). The net FDI rents represent a significant source of gains for China and losses for Hong Kong, China and the Rest of the World. Critical to determining the overall welfare impact of services liberalisation is the assumption about who receives the impediment rents. It is assumed in FTAP that for foreign-owned industries impediment rents accrue mostly to the owning region, with only an income tax contribution going to the region in which the industry is located. Therefore, in concordance with this assumption, the economies-regions investing in China register losses.

The impact on the OECD countries is estimated to be marginal under both services liberalisation scenarios. The allocative efficiency effect tends to be quite small (negative for Hong Kong, China, Russia, Japan and Rest of Europe, and positive for all other OECD countries/regions) depending on the size of the change in their capital stock (in general quite small, driven by the initial low shares of outward FDI to China). The net capital endowment effect is negative in most OECD countries/regions determined by increased outflows of capital due to changes (decreases) in the rates of return on capital located within these countries/regions. Similarly, product variety effects tend to be quite small and negative in the OECD countries. By contrast, most OECD countries experience small improvements in their terms of trade (except for Canada and Mexico and Russia, who experience negative terms of trade).

Turning to FDI-related contributions, it is important to note that they dominate the (small) welfare effects of almost all OECD countries. Also, while China experiences losses from its outward FDI, most OECD countries benefit from increased FDI income. The benefits from increased FDI income for OECD countries are mainly explained by the fact that, initially, all these countries were net suppliers of services FDI to China. By removing entry barriers, OECD countries increase their FDI to China and gain from return on FDI (increased rates of return on capital in China). In a few OECD countries/regions (New Zealand and Rest of Europe) the gains from increased FDI to China do not compensate the losses on FDI in other regions.

In summary, China gains mostly from allocative effects, product variety and net capital effects, while the OECD countries/regions gain from improvements in their terms of trade and increases in net FDI. Russia, Korea and Mexico, which are more protected initially, lose from terms of trade. Similarly China experiences a worsening of terms of trade but the overall welfare effects remain positive.

Conclusions

This paper examines China's emergence as a global player in international markets over the last few decades. It provides an overview of China's trade policy environment following the country's process of market opening and joining the WTO. It charts the country's climbing share of world trade noting that it is now the third largest trading nation after the US and Germany. As its share in world trade has grown so has the trade links with OECD countries. The country's top trading partners are the European Union, the United States and Japan. China is now the top trading partner of Japan and one of the top three trading partners for a majority of OECD economies.

The paper looks at China's potential impact on world markets. One way it is making a global impact is through its participation in international production networks. Fuelled by its trade and investment liberalisation, the engine of China's phenomenal growth in foreign trade over the past several decades has been international processing activities. The paper argues that China has been pursuing a two-pronged export growth strategy. The first part of the strategy is to capitalise on one of its greatest factor endowments – a surplus of labour – by promoting job-creating, labour-intensive manufactures. The second aspect of this strategy is to further its goal of economic development by upgrading its economy by producing and exporting higher-technology goods. It appears that the country is also moving up the value chain.

Another way China is making a global impact is on world prices. As China experiences rapid urbanisation, industrialisation and infrastructure construction, the country is importing ever greater amounts of raw materials and primary products leading to upward pressures on world prices of key commodities. At the same time, the lowering of trade barriers and rapid productivity growth in Chinese manufacturing and electronics sectors has led to a sudden surge of exports consequently pushing down China's export prices in the international market. Thus, as China pursues the "catch-up" process of development it is experiencing deterioration in its terms of trade. The sustainability of this trend is important not only for China but for the world economy. China's growth and trade policy directly affects its terms of trade but also those of other countries. One of the key challenges will be how China manages to continue economic growth and trade expansion while trying to cope with the deterioration in its terms of trade.

In order to quantify China's impact on the world economy, the latter part of this paper presents new estimates based on general equilibrium model, the FTAP. The model includes a treatment of foreign direct investment on a bilateral basis which, given the importance of foreign presence in the Chinese economy, is essential for understanding the impacts of its liberalisation.

The model finds substantial gains for China and a rather limited impact on OECD economies as a result of China's implementation of WTO commitments or completing liberalisation in the area of tariffs and services barriers. Given that the structure of bilateral trade flows between China and individual economies of the OECD reflect divergent patterns of comparative advantage as well as differences in structure of trade barriers and geographical location, implementation of China's WTO accession commitments as well any potential further liberalisation by China is predicted to result in a heterogeneous impact on the OECD membership. The most direct impact is expected through improved export performance of OECD countries that are already trading with or investing intensely in China but still face significant market access barriers. The observed trade patterns suggest that the impact through the market access channel is likely to be more important for Korea, Japan, Australia, and New Zealand.

The second channel through which China's liberalisation may affect OECD economies is through increased competitiveness of Chinese exporters for which the costs of intermediate products and services may decrease as a result of liberalisation. The non-negligible market shares of China in OECD countries' imports suggest that increased competition with Chinese imports is indeed a likely outcome of its

liberalisation. However, these competitiveness effects are almost always counterbalanced by the market access effects, resulting in the end in relatively small overall gains for the OECD countries. Additionally, it should be noted that the paper has not accounted for the dynamic effects of China's openness and is therefore likely to provide lower-bound estimates of China's integration into the world economy.

The modelling results are however conditional on production, consumption, trade and investment data reflecting the time of China's WTO accession and may hence be only approximate given the pace of structural changes within the Chinese economy as well as the relationships between China and its commercial partners. Additionally, it should be noted that the paper has not accounted for the dynamic effects of China's openness and is therefore likely to provide lower-bound estimates of China's integration into the world economy.

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ANNEX 1: ANALYSIS OF SECTORAL BARRIERS IN SERVICES

This Annex describes in detail China's liberalisation commitments as specified in its GATS schedule. We calculate indices of trade restrictiveness to describe the implementation of China's commitments in five services sectors (banking, insurance, telecommunication, distribution and engineering services).[13] The main components of these sectoral trade restrictiveness indices (TRI) as well as the policy changes induced by WTO commitments are described below. The components of the TRI were scored on the basis of China's GATS commitments that reflect (i) the state of policy in 2001 (the date of accession), and (ii) the state of policy in 2008 (the date by which all liberalisation commitments will have been implemented). The sectoral analysis below describes the policy changes in China, while the TRIs (Charts A1.1 to A1.6) graphically reflect these changes. The graphs show that implementation of WTO commitments in banking would lower the restrictiveness of this sector below the OECD average; by contrast, in all other sectors, despite significant liberalisation measures, the restrictiveness indices remain above the OECD average (but lower than in most developing countries covered in this exercise). The corresponding services tax equivalents associated with the implementation of WTO commitments in these five services sectors are presented in Table A5.4. The reduction in the tax equivalents in Table A5.4 is employed in the simulation exercise to model services liberalisation in modes 1 and 3.

Banking and Insurance

Components of the TRI

- *Modes 1 and 2*: restrictions on cross-border borrowing and lending, restrictions on cross-border insurance transactions, establishment or residency/recognition requirements to provide cross-border financial services, requirement to co-operate with local organisations, geographical limitations, limitations related to the scope of business, authorisation requirements, restrictions on purchasing financial services abroad;
- *Mode 3*: foreign equity limits, limitations on the form of establishment, including joint venture requirements, screening and approval, limitations on the scope of business activities; limitations concerning the expansion of banking and insurance outlets, and
- *Mode 4*: limits on the duration of stay, on number of work permits, issues related to licensing/recognition requirements, limitations on the board of directors.

Policy changes in banking

- Banking: the 2001 policy environment

China ranks among the countries that have a restrictiveness index standing above the average. Here, the restrictiveness stems partly from Modes 1 and 3. In Mode 1, cross-border borrowing requires application and approval and there are limitations on the amount of foreign exchange funding that foreign banks can acquire from overseas through the imposition of a quota system. With respect to Mode 3, the foreign equity limit has to be underlined since it induces a very high level of restrictiveness. The percentage that an individual foreign financial institution can invest in the shares of a China-funded financial institution shall not exceed 20 percent. In addition, the percentage of the sum of several foreign financial institutions investing in shares of a China-funded financial institution is in practice limited to 25 percent. Furthermore, restrictions on the geographical coverage of banking activities (especially lending) have to be mentioned.

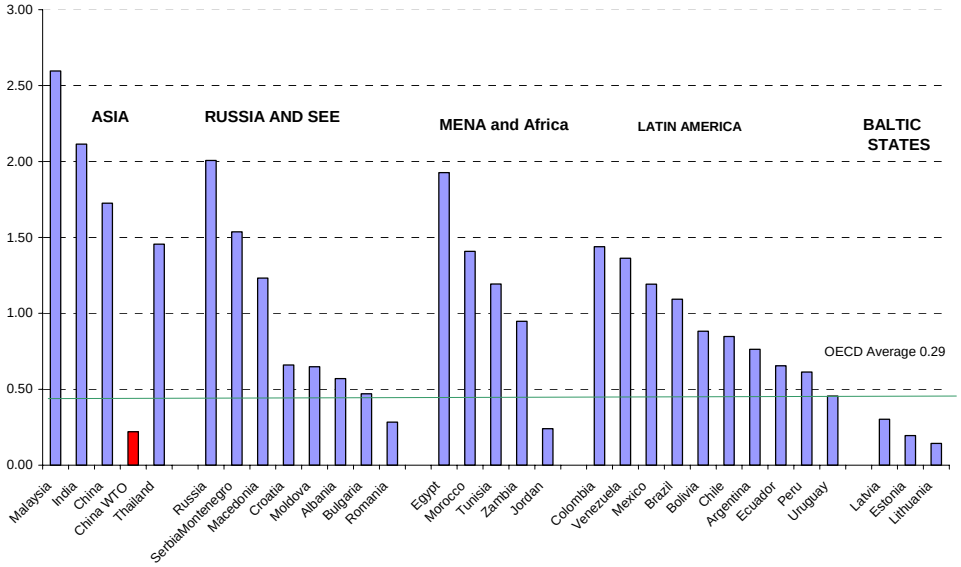
[13] The approach is described in detail in OECD (2005j) "Modal Estimates of Services Barriers", TD/TC/WP(2005)36, 8 November 2005.

While the geographic and client limitations related to foreign currency operations were eliminated in 2001, foreign banks could only operate in specified regions and accept deposits only from non-residents and only in foreign currencies, and make no loans to Chinese citizens. In terms of licensing, while the schedules indicate that they have to be awarded solely on the basis of prudential regulations, the rules governing foreign funded financial institutions stated that each foreign bank can not open more than one branch within one year, and that any foreign-funded financial institution with its application being rejected has to wait at least one year to submit another application (this requirement was repealed in 2004 by the revised *Rules for Implementing the Regulation of the People's Republic of China Governing Foreign-funded Financial Institutions* (see below) issued by China's Banking Regulatory Commission. Finally, the process of screening and approval also represents a significant obstacle.

- Banking: WTO implementation (2008)

According to China's GATS commitments, the banking sector will be fully liberalised by 2006. The geographic limitations on the scope of business will be phased out gradually by 2006. Local currency business with Chinese enterprises will be allowed by 2003 and with all clients in 2006. With respect to licensing, on July 26 of 2004, China's Banking Regulatory Commission issued the revised *Rules for Implementing the Regulation of the People's Republic of China Governing Foreign-funded Financial Institutions (*hereinafter referred to as the new Rules*)*, which took effect as of September 1, 2004. In a bid to lower the market entry thresholds for foreign banks, the new Rules have repealed such requirements provided in the previous Rules as that each foreign bank can not open more than one branch within one year, and that any foreign-funded financial institution with its application being rejected has to wait at least one year to submit another application. The new Rules have also significantly relaxed operating capital requirements for the Chinese branches of foreign banks to provide local currency (Renminbi) services to the Chinese enterprises and individuals, reduced the layers of capital requirements imposed on the Chinese branches of the wholly foreign-owned banks and the Sino-foreign joint-venture banks, and lowered their minimum capital requirements as well.

Chart A1.1. Banking TRI



Source: Authors calculations based on the methodology described in OECD (2005j) and the sectoral policy changes presented in Annex 1.

Policy changes in insurance

- Insurance: the 2001 policy environment

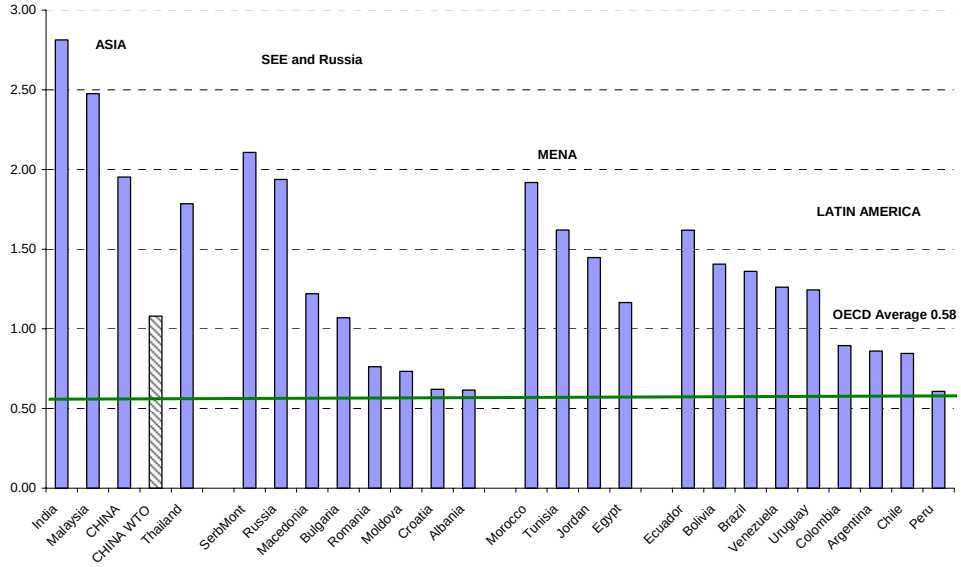
China's high restrictiveness index in insurance services can be explained mainly by its FDI ceilings (limit of 50% for foreign equity holdings in life and 51% for non-life insurance joint ventures), restrictions on the form of commercial presence (only branches and joint-ventures are allowed), geographic limitations (at the time of its WTO accession, China has allowed foreign life and non-life insurance firms to establish business in five cities only), restrictions on the scope of business (foreign non-life insurance companies are allowed to provide only selected forms of non-life activities and life insurance only to individuals, not to groups) and licensing requirements (while according to China's GATS commitments, licensing will be carried out based on prudential criteria alone, without numerical restrictions or discretionary economic needs tests, there are additional requirements that have to be met to obtain a licence: There are three requirements for foreign insurance companies applying for licenses[14]: Foreign funded insurers (i) Must have more than 30 years of establishment in a WTO member country; (ii) Must have had representative office in China for at least 2 years and (iii) Shall have total assets of more than RMB500 million at the end of the year prior to application. National firms applying for licenses do not need to fulfil these requirements. In addition, there are also restrictions related to modes 1 and 2: restrictions on cross-border supply, except international maritime, aviation and transport (MAT) insurance and reinsurance and brokerage related to international MAT insurance and large-scale commercial risk insurance and reinsurance, restrictions on consumption abroad of brokerage, requirement for reinsurance cessions. Also, the list of legal entities permitted to write insurance and reinsurance does not include "an association of underwriters".

- Insurance: WTO implementation (2008)

According to China's GATS commitments, by 2004, the insurance sector will be liberalised except for the 50% foreign ownership limit in life insurance. The sequence of liberalisation measures is as follows: the establishment restrictions in the non-life segment should be lifted in 2003, the geographic restrictions and restrictions on business scope in 2004, with cession requirements to be abolished in 2005. Nevertheless, as opposed to the banking sector, where foreign equity limits are totally eliminated, a 50 % foreign ownership limit will be kept on the life insurance segment. In both banking and insurance licenses are to be awarded solely on the basis of prudential regulations.

[14] According to Article 8 of the *Rules on the Regulation for the Administration of foreign invested insurance companies* effective from 1 February 2002 on www.circ.gov.cn.

Chart A1.2. Insurance TRI



Source: Authors calculations based on the methodology described in OECD (2005j) and the sectoral policy changes presented in Annex 1.

Telecommunication (fixed and mobile)

Components of the TRI

- *Mode 1*: restrictions on leased line or network provision, restrictions on connections of leased lines and private networks to the public switched telephone network (PSTN), restrictions on international simple resale and IP telephony.
- *Mode2*: restrictions on call back services.
- *Mode 3*: foreign equity limits, level of competition, including joint venture requirements, screening and approval, limitations on business activities, licensing restrictions.
- *Mode 4*: limits on the duration of stay, on number of work permits, issues related to licensing/recognition requirements, limitations on the board of directors.

Policy changes in telecommunication

- Telecommunication: the 2001 policy environment

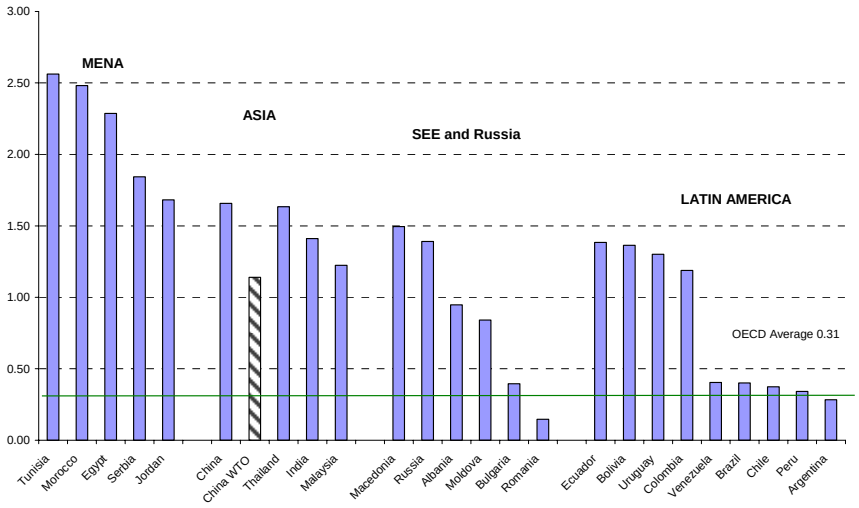
China's telecom sector is characterised by significant entry controls (limits on foreign ownership 30 % in value added telecommunications, 25 percent in mobile voice and data), joint venture requirements to enter the market, geographical restrictions and restrictions on the business scope of telecom companies. Furthermore, there are significant restrictions related to leased line or network provision and connections of leased lines and private networks to the PSTN.

- Telecommunication: WTO implementation (2008)

Important changes occurred in this sector since 2001. Most geographical restrictions were eliminated in 2002 and 2003. Also, foreign investment limits were raised to 49 % in value added telecommunications and mobile voice and data. According to China's GATS commitments, by 2007 all geographic restrictions

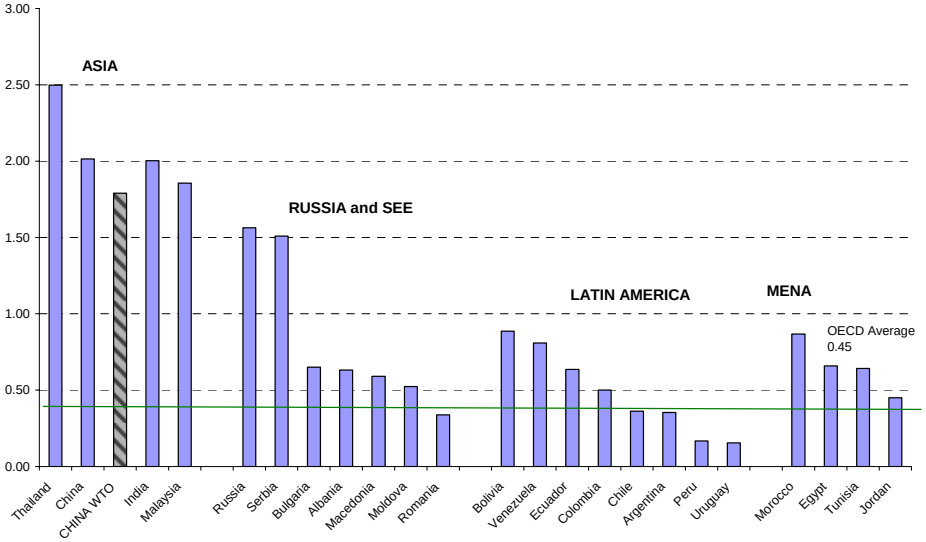
will be eliminated and foreign investment limit in fixed telecom will be relaxed. Majority foreign ownership will not be allowed. There is no commitment to allow cross border delivery of telecom services.

Chart A1.3. Fixed Telecom TRI



Source: Authors calculations based on the methodology described in OECD (2005j) and the sectoral policy changes presented in Annex 1.

Chart A1.4. Mobile telecom TRI



Source: Authors calculations based on the methodology described in OECD (2005j) and the sectoral policy changes presented in Annex 1.

Professional services (engineering)

Components of the TRI

- *Mode 1*: restrictions on servicing the market on a cross-border basis (*i.e.* establishment requirements).
- *Mode 2*: restrictions on consumers purchasing business services abroad.

- *Mode 3*: foreign equity limits, Foreign partnership/joint venture/association, Investment and ownership by foreign professionals, Multidisciplinary practices level of competition, including joint venture requirements, screening and approval, limitations on business activities, licensing restrictions.
- *Mode 4*: limits on the duration of stay, on number of work permits, limitations on the board of directors, licensing and accreditation of foreign professionals, residency and local presence.

Policy changes in engineering

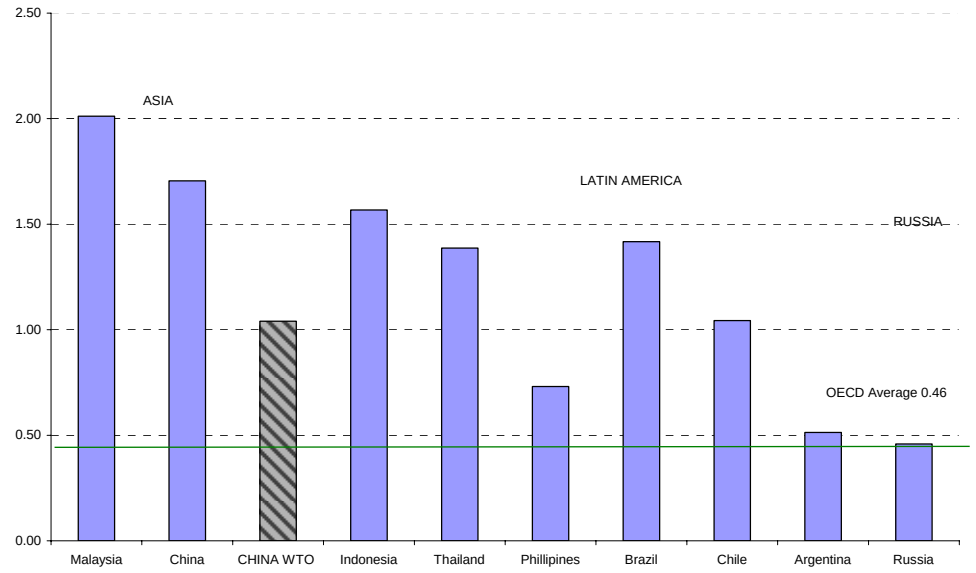
- Engineering: the 2001 policy environment

The magnitude of the engineering restrictiveness index is explained by restrictions related to the form of establishment and joint venture requirements (in terms of mode 3) and entry, licensing and accreditation requirements for foreign professionals and management as well as quotas/economic tests on the number of foreign professionals and firms (in terms of mode 4). With respect to mode 1, while there are no barriers for scheme design, co-operation with Chinese professional organisations is required for all other segments.

- Engineering: WTO implementation (2008)

According to China's GATS commitments, by 2006, the sector will be fully liberalised (except for the above-mentioned mode 1 restrictions). The restrictions on the form of establishments are to be lifted in 2006.

Chart A1.5. Professional services (Engineering)



Source: Authors calculations based on the methodology described in OECD (2005j) and the sectoral policy changes presented in Annex 1.

Distribution

Components of the TRI

- *Mode 1*: restrictions on servicing the market on a cross-border basis (*i.e.* establishment requirements).
- *Mode 2*: restrictions on consumers purchasing distribution services abroad.

- *Mode 3:* foreign equity limits, restrictions on commercial land, restrictions on large scale stores, wholesale importing licensing, promotion of retail products, state monopolies – product exclusions, protection of intellectual property rights.
- *Mode 4*: limits on the duration of stay, on number of work permits, licensing requirements on management.

Policy changes in distribution

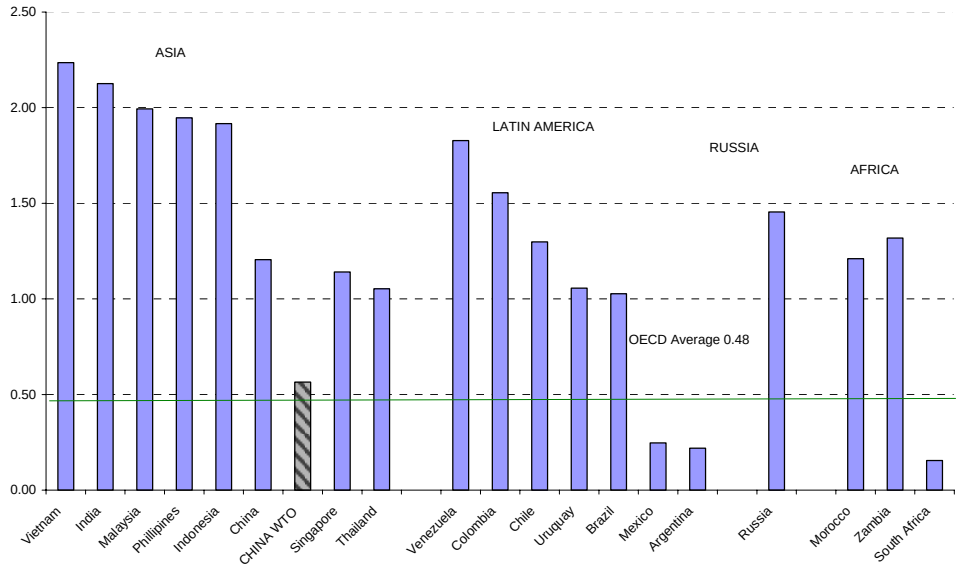
- Distribution: the 2001 policy environment

The relatively high restrictiveness index is explained by restrictions related to the form of establishment (entry is allowed only through joint ventures), geographical restrictions and product exclusions (books, newspapers, pharmaceuticals, pesticides, chemical fertilizers, processed and crude oil are excluded).

- Distribution: WTO implementation (2008)

According to China's GATS commitments, by 2006, the sector will be largely open. Foreign majority ownership will be permitted and no geographic or quantitative restrictions will apply. The only remaining restrictions relate to cross border trade and the delivery of two products. In addition, China has committed to open permit foreign invested enterprises to distribute their products manufactured in China, and provide subordinate services. Also, foreign services suppliers will be permitted to provide the full range of related subordinate services, including after sales services for the products they distribute. These deep commitments determine the level of the new TRI that is very close to the OECD average.

Chart A1.6. Distribution TRI



Source: Authors calculations based on the methodology described in OECD (2005j) and the sectoral policy changes presented in Annex 1.

ANNEX 3: CALCULATING TAX EQUIVALENTS

Estimation strategy

To calculate the effects of existing barriers on the performance of the selected services sectors, as measured by price-cost margins (net interest margins for banks), a two-stage method is applied:

- In the first stage, price-cost margins are "corrected" for the influence of key firm-level factors. In other words, we use a firm-level regression to "explain" price-cost margins using detailed data on the determinants of individual firm performance.
- In the second stage, we examine the influence on corrected price-cost margins of the relevant trade restrictions at the aggregate and modal levels, controlling for regulatory measures and other cross-country differences. In other words, we use a country-level regression to "explain" each country's corrected price cost margin in terms of detailed data on the determinants of sectoral performance.

The method is described in detail below.

General Principles

Following the general direction taken by the Australian Productivity Commission, one possible approach to measuring the economic impact of barriers to services trade is to use econometric techniques to estimate an equation of the following form:

$$(1) \quad PCM_{ij} = c + B\left[controls_{ij}\right] + X.TRI_{j} + \varepsilon_{ij}$$

The price-cost margin for firms (subscript i) in a given sector across countries (subscript j) is "explained" by a constant, a set of country and firm level control variables, the aggregate TRI calculated as set out in the text and a white noise error term. The particular implementation of this base specification depends primarily on two additional choices: the variables to be included in the control set, and the type of TRI to be used (aggregate or modal).

The substantive interest of this formulation comes from the interpretation that can be given to X, the coefficient on the TRI. The greater its magnitude, the greater the economic impact of the trade barriers captured by the TRI. By making appropriate conversions, it is possible to derive a tax equivalent directly from the estimate of X.

The sign of the X coefficient is also important. If it is positive—meaning that a higher TRI is associated with bigger margins—it is interpreted as indicating the presence of "rent-creating" barriers that tend to increase prices but do not affect costs. On the other hand, a negative X—meaning that a higher TRI is associated with smaller margins—is interpreted as indicating the presence of "cost-creating" barriers that tend to increase costs for firms, but do not affect prices. It is important to stress that both interpretations rely on a very strong assumption to the effect that trade barriers impact either on prices or on costs, but not on both simultaneously. This is a significant limitation to the methodology, but one that arises primarily from data restrictions: while information on firm-level margins is relatively freely available, data on prices and costs is not.

Two-Stage Approach

One way of implementing the above approach would be to conduct a single-stage Ordinary Least Squares (OLS) regression in the above form. While examples of this can be found in the literature on barriers to services trade (e.g., Copenhagen Economics, 2005; Nguyen-Hong, 2000), there are also examples of a different approach (Kalirajan et al., 2000; Dee 2004a & 2004b). Following Saunders & Schumacher (2000) for the banking sector, this second group of papers has conducted their regressions in two stages. The following equations illustrate the general specifications.

Firstly, "adjusted" price-cost margins are estimated as country-level fixed effects (c_j), after controlling for firm level differences:

$$(2)\quad \log\left(PCM_{ij}\right) = \sum_{p=1}^{N} c_j + B\left[firm - controls_{ij}\right] + \varepsilon_{ij}$$

The second stage regression seeks to explain the adjusted margins from the first stage in terms of the TRI and a selection of country-level control variables.

$$(3)\quad \hat{c}_j = a + D\left[country - controls_j\right] + X.TRI_j + \varepsilon_{ij}$$

The motivation for the two-stage approach is that the combined presence of firm- and country-level variables can, in some cases, lead to incorrect statistical inferences being drawn on the basis of a one-stage model (see e.g., Moulton, 1990). But ultimately, choosing between the one- and two-stage approaches is an empirical question that relies both on the analyst's judgment and on the characteristics of the particular dataset being used. In the present case, we found strong evidence in favour of the existence of the country-level fixed effects postulated by the two-stage model. We have therefore systematically preferred the two-stage approach.

The major disadvantage of the two-stage approach is that it tends to produce an extremely small effective sample for the second-stage regressions (i.e., one observation per country). As a result, our results need to be treated with caution, in particular before being generalised to other countries, sectors and/or time periods. It must be kept in mind that the inferences we draw regarding trade barriers are, in reality, based on a very small number of observations. Nonetheless, they represent our best attempt at drawing appropriate conclusions given the current state of the data.

Tax Equivalents and Confidence Intervals

Tax equivalents can be calculated directly from equation (3). For the aggregate TRI, the formula is:

$$(4)\quad t \equiv 100\left(\frac{PCM_{ij} - PCM_{0j}}{PCM_{0j}}\right) = 100\left(e^{\hat{X}.TRI_j} - 1\right),$$ where PCM_{0j} refers to the price-cost margin that would pertain in country j if it were to have a TRI of zero, but all other factors were to remain the

same. To make the same calculation for the modal TRIs, all that is necessary is to substitute (one by one) the relevant modal coefficients for the estimated aggregate coefficient.[15]

The APC has made extensive use of the above approach (see e.g., Warren, 2000). One of the novel elements of this paper by comparison with the APC's work is the inclusion of estimated 70% confidence intervals for the tax equivalents (cf. Copenhagen Economics, 2005). We build up an approximate distribution of the tax equivalent for each country and sector by repeatedly re-estimating the second-stage regressions after "shuffling" the residuals and adjusting them for OLS bias, then using them to create synthetic left-hand side values. The process is repeated 2000 times, with each set of results recorded and used to produce approximate quantiles. This technique is known as "bootstrapping" (for reviews, see Horowitz, 2001; and Brownstone & Valletta, 2001). We modify the standard bootstrap methodology by imposing a strong prior to the effect that TRI coefficient estimates from the synthetic regressions cannot have a different sign from that of the "real" regression. When this occurs, a zero is entered. This reflects the strong interpretation that we are required to put on the sign of the TRI coefficient due to the fact that we are using price-cost margin data.

Regression Specifications

It now remains to specify the firm- and country-level control variables that will be included in the regression models. Tables 2.1 to 2.6 describe these variables in detail.

[15] In calculating tax equivalents, we focus exclusively on the impact of the trade barriers captured by the various TRIs. We abstract from any additional effects due to MFN exemptions or RTAs.

Table A2.1 : Banking sector dataset

Variable	Description	Year	Source
C5	Five-firm concentration ratio = Fraction of deposits held by the 5 largest banks	2001 (year-end)	World Bank, Bank Regulation & Supervision Database, 2003
CAP	Capital Ratio = Total share capital and reserves / Total assets	2002-2004 (average)	Datastream, Banker's Almanac and own calculations
GNII	Recent growth of net interest income = ((NII04-NII02)/NII02)*100	2002-2004	Datastream, Banker's Almanac and own calculations
INTVAR	Interest rate variation = Variance of annualised quarterly deposit rates	2002q1-2004q4	IMF, International Financial Statistics; Central Bank websites
LIQ	Liquidity Ratio = Total cash & equivalent / Total assets	2002-2004 (average)	Datastream, Banker's Almanac and own calculations
MFE	Dummy variable = 1 if a country has at least one MFN exemption for the banking sector, else 0		GATS
NIE	Net non-interest expenses = NIM - Pre-tax profits/Total assets	2002-2004 (average)	Datastream, Banker's Almanac and own calculations
NIM	Net interest margin = Net interest income / Total assets	2002-2004 (average)	Datastream, Banker's Almanac and own calculations
PRUDVARSPC1	Proxy for prudential regulations, calculated as the first principal component of the following set of indicators: capital adequacy (3.1), existence of explicit diversification requirements (7.1), liquidity reserves (7.3.1), compulsory deposit insurance (8.10) and a formal definition of non-performing loan (9.1).	2001	World Bank survey (question numbers indicated in brackets) and own calculations
REGVARSPC1	Proxy for sectoral regulations, calculated as the first principal component of the following indicators: signature of the Understanding on Commitments in Financial Services, independence and single/multiple supervisors.		GATS, Sectoral questionnaires, World Bank, Bank Regulation & Supervision Database, 2003 and Own calculations
RTA	Dummy variable = 1 if a country has signed at least one RTA covering the banking sector, else 0	2002-2004	GATS /RTAs
SHARE	Market Share = Total assets / Total sector assets	2002-2004 (average)	Datastream, Banker's Almanac and own calculations
TRI_Agg, TRI_M1, TRI_M2, TRI_M3, TRI_M4	Aggregate and modal trade restrictiveness indices	See Para 19 main text	Own calculations

Table A2.2: Insurance sector dataset

Variable	Description	Year	Source
CAPAVE0203	Capital Ratio = Total capital / Total assets	2002-2003 (average)	Datastream and own calculations
DENSITY	Non-life premiums / Population	2003	International Insurance Factbook and own calculations
EXPAVE0203	Expenses ratio = General, selling & administrative expenses / Total assets	2002-2003 (average)	Datastream and own calculations
GIND0203	Recent growth in industry premiums earned = (Industry premiums 2003 – Industry premiums 2002) / Industry Premiums 2002		Datastream and own calculations
GPREM0203	Recent growth of premiums earned = (Prem03-Prem02)/Prem02	2002-2003	Datastream and own calculations
LIQAVE0203	Liquidity Ratio = Total cash / Total assets	2002-2003 (average)	Datastream and own calculations
MFE	Dummy variable = 1 if a country has at least one MFN exemption for the insurance sector, else 0		GATS and own calculations
PCMAVE0203	Price-cost margin = EBIT / Net Sales	2002-2003 (average)	Datastream and own calculations
PENETRATION	Non-life premiums / GDP	2003	International Insurance Factbook and own calculations
PRUDVARSPC1	Proxy for prudential regulations, calculated as the first principal component of the following set of indicators: existence of an insolvency guarantee fund, liquidity reserve requirements and minimum capital requirements. (1 = does not exist, else 0.)		OECD and own calculations.
REGVARSPC1	Proxy for sectoral regulations, calculated as the first principal component of the following indicators: signature of the Understanding on Commitments in Financial Services, and single/multiple supervisors. (1 = not signed / multiple supervisor, else 0.)		GATS, Sectoral questionnaires, OECD (2001) "Insurance Regulation and Supervision in Asia and Latin America", and own calculations.
RTA	Dummy variable = 1 if a country has signed at least one RTA covering the insurance sector, else 0	2002-2004	GATS /RTAs
SHAREAVE0203	Market Share = Total assets / Total sector assets	2002-2003 (average)	Datastream and own calculations
TRI_Agg, TRI_M1, TRI_M2, TRI_M3, TRI_M4	Aggregate and modal trade restrictiveness indices	See Para 19 main text	Own calculations

Table A2.3: Fixed telecom sector dataset

Variable	Description	Year	Source
CAPINT0204	Capital intensity of production = Total capital / Net Sales	2002-2004 (average)	Datastream and own calculations
DSHARE0203	Percentage of digital mainlines	2002-2003 (average)	ITU World Telecommunication Indicators and own calculations
GREV0203	Recent growth in industry revenue = (Industry revenue 2003 – Industry revenue 2002) / Industry revenue 2002		ITU World Telecommunication Indicators and own calculations
GROWTH0204	Recent growth of firm sales = (Net Sales04 – Net Sales02)/Net Sales02	2002-2004	Datastream and own calculations
MFE	Dummy variable = 1 if a country has at least one MFN exemption for the fixed-line telecommunications sector, else 0		GATS and own calculations
MLINES0203	No. of mainlines	2002-2003 (average)	ITU World Telecommunication Indicators and own calculations
MLINESPOP0203	Teledensity = No. of mainlines / Population	2002-2003 average	ITU World Telecommunication Indicators and own calculations
PCM0204	Price-cost margin = (EBIT + Depreciation) / Net Sales	2002-2004 (average)	Datastream and own calculations
REGVARSPC1	Proxy for sectoral regulations, calculated as the first principal component of the following indicators: existence of a universal service obligation, independence of the regulator, interconnection agreements made public, interconnection prices made public, licensing agreements made public, regulation of network interconnection and end user tariff.	2002-2004	GATS, Sectoral questionnaires, ITU World Telecommunication Indicators and own calculations.
RTA	Dummy variable = 1 if a country has signed at least one RTA covering the fixed-line telecommunications sector, else 0	2002-2004	GATS /RTAs
SALESUSD0204	Net Sales	2002-2004 (average)	Datastream and own calculations
SALESUSDEMP0204	Labour productivity = Net sales / No. of employees	2002-2004 (average)	Datastream and own calculations
SHARE0204	Market Share = Net sales / Total sector net sales	2002-2004 (average)	Datastream and own calculations
TRI_Agg, TRI_M1, TRI_M2, TRI_M3, TRI_M4	Aggregate and modal trade restrictiveness indices	See Para 19 main text	Own calculations

Table A2.4: Mobile telecom sector dataset

Variable	Description	Year	Source
CAPINT0204	Capital intensity of production = Total capital / Net Sales	2002-2004 (average)	Datastream and own calculations
GREV0203	Recent growth in industry revenue = (Industry revenue 2003 – Industry revenue 2002) / Industry revenue 2002		ITU World Telecommunication Indicators and own calculations
GROWTH0204	Recent growth of firm sales = (Net Sales04 – Net Sales02)/Net Sales02	2002-2004	Datastream and own calculations
MFE	Dummy variable = 1 if a country has at least one MFN exemption for the mobile telecommunications sector, else 0		GATS and own calculations
SUBS0203	No. of cellular phone subscribers	2002-2003 (average)	ITU World Telecommunication Indicators and own calculations
SUBSPOP0203	Teledensity = No. of cellular phone subscribers / Population	2002-2003 average	ITU World Telecommunication Indicators and own calculations
PCM0204	Price-cost margin = (EBIT + Depreciation) / Net Sales	2002-2004 (average)	Datastream and own calculations
REGVARSPC1	Proxy for sectoral regulations, calculated as the first principal component of the following indicators: existence of a universal service obligation, independence of the regulator, interconnection agreements made public, interconnection prices made public, licensing agreements made public, regulation of network interconnection and end user tariff.	2002-2004	GATS, Sectoral questionnaires, ITU World Telecommunication Indicators and own calculations.
RTA	Dummy variable = 1 if a country has signed at least one RTA covering the mobile telecommunications sector, else 0	2002-2004	GATS and RTAs
SALESUSD0204	Net Sales	2002-2004 (average)	Datastream and own calculations
SALESUSDEMP0204	Labour productivity = Net sales / No. of employees	2002-2004 (average)	Datastream and own calculations
SHARE0204	Market Share = Net sales / Total sector net sales	2002-2004 (average)	Datastream and own calculations
TRI_Agg, TRI_M1, TRI_M2, TRI_M3, TRI_M4	Aggregate and modal trade restrictiveness indices	See Para 19 main text	Own calculations

Table A2.5: Engineering sector dataset

Variable	Description	Year	Source
CAPINT0203	Capital intensity of production = Total capital / Net sales	2002-2003 (average)	Datastream and own calculations
SOLV0203	Solvency ratio = (Total debt / (Total capital + short-term debt))*100	2002-2003 (average)	Datastream and own calculations
INVSALES0203	Efficiency of supply = Total inventories / Net sales	2002-2003 (average)	Datastream and own calculations
GINDSALES0203	Recent growth in industry sales = (Industry net sales03 – Industry net sales02) / Industry net sales02		Datastream and own calculations
GROWTH0203	Recent growth of firm sales = (Net Sales03 – Net Sales02)/Net Sales02	2002-2003 (average)	Datastream and own calculations
SALESUSDEMP0203	Labour productivity = Net sales / No. of employees	2002-2003 (average)	Datastream and own calculations
MFE	Dummy variable = 1 if a country has at least one MFN exemption for the engineering sector, else 0		GATS and own calculations
PCMAVE0203	Price-cost margin = (EBIT + Depreciation) / Net Sales	2002-2003 (average)	Datastream and own calculations
RD0203	Research & development / Net sales	2002-2003 (average)	Datastream and own calculations
INDGDP0203	(Industry value-added / GDP)*100	2002-2003 (average)	World Development Indicators and own calculations
HITECH0203	(High technology exports / Total merchandise exports)*100	2002-2003 (average)	World Development Indicators and own calculations
SALESUSD0203	Net sales	2002-2003 (average)	Datastream and own calculations
REGVARSPC1	Proxy for sectoral regulations, calculated as the first principal component of the following indicators: multidisciplinary practices, additional categories, activities reserved by law, fee setting and advertising/marketing.	2000-2004	ECO Product Market Regulations Database, database employed in TD/TC/WP(2005)7
RTA	Dummy variable = 1 if a country has signed at least one RTA covering the engineering sector, else 0		GATS and RTAs
SHARE0203	Market Share = Net Sales / Total sector net sales	2002-2003 (average)	Datastream and own calculations
TRI_Agg, TRI_M1, TRI_M2, TRI_M3, TRI_M4	Aggregate and modal trade restrictiveness indices (aggregate index includes multidisciplinary practices, additional categories, activities reserved by law, fee setting and advertising/marketing.)	See Para 19 main text	Own calculations

Table A2.6: Distribution sector dataset

Variable	Description	Year	Source
CAPINT0204	Capital intensity of production = Total capital / Net sales	2002-2004 (average)	Datastream and own calculations
GINDSALES0204	Recent growth in industry sales = (Industry net sales03 – Industry net sales02) / Industry net sales02		Datastream and own calculations
GROWTH0204	Recent growth of firm sales = (Net Sales03 – Net Sales02)/Net Sales02	2002-2004 (average)	Datastream and own calculations
INVSALES0204	Efficiency of supply = Total inventories / Net sales	2002-2004 (average)	Datastream and own calculations
MFE	Dummy variable = 1 if a country has at least one MFN exemption for the distribution sector, else 0		GATS and own calculations
PCMAVE0204	Price-cost margin = (EBIT + Depreciation) / Net Sales	2002-2004 (average)	Datastream and own calculations
RTA	Dummy variable = 1 if a country has signed at least one RTA covering the distribution sector, else 0		GATS/RTAs and own calculations
SALES0204	Net sales	2002-2004 (average)	Datastream and own calculations
SALESEMP0204	Labour productivity = Net sales / No. of employees	2002-2004 (average)	Datastream and own calculations
SHARE0204	Market Share = Net Sales / Total sector net sales	2002-2004 (average)	Datastream and own calculations
SOLV0204	Solvency ratio = (Total debt / (Total capital + short-term debt))*100	2002-2004 (average)	Datastream and own calculations
TRI_Agg, TRI_M1, TRI_M2, TRI_M3, TRI_M4	Aggregate and modal trade restrictiveness indices	See Para 19 main text	Own calculations

RESULTS (FOR CHINA)

Table A 2.7 Tax equivalents for China

Country - China	Estd. Tax Equivalent	Bootstrap 70% Confidence Interval	
		Lower Bound	*Upper Bound*
Banking - Aggregate	21.577	0.093	45.904
Banking Mode 1	1.990	0.000	17.870
Banking Mode 2	4.770	0.000	21.027
Banking Mode 3	21.461	0.000	68.401
Banking Mode 4	0.587	0.000	5.167
Insurance - Aggregate	68.98	0.00	298.31
Insurance Mode 1	130.29	38.24	303.23
Insurance Mode 2	9.26	0.74	19.33
Insurance Mode 3	88.19	0.00	456.98
Insurance Mode 4	77.94	12.96	183.70
Telecom Fixed - Aggregate	6.70	0.00	111.34
Telecom Fixed Mode 1	18.03	0.00	74.70
Telecom Fixed Mode 2	36.11	7.77	71.69
Telecom Fixed Mode 3	64.45	19.60	130.51
Telecom Fixed Mode 4	33.11	7.38	66.17
Telecom Mobile - Aggregate	18.56	0.00	134.48
Telecom Mobile Mode 1	13.43	0.00	39.14
Telecom Mobile Mode 2	0.00	0.00	0.00
Telecom Mobile Mode 3	12.12	0.00	46.08
Telecom Mobile Mode 4	32.19	9.27	58.08
Engineering - Aggregate	3.14	0.00	66.74
Engineering Mode 1	107.11	11.67	231.21
Engineering Mode 2	0.00	0.00	0.00
Engineering Mode 3	10.3	0.00	65.45
Engineering Mode 4	5.96	0.00	71.21
Distribution - Aggregate	38.43	8.18	69.31

Distribution Mode 1			
	13.68	5.61	22.81
Distribution Mode 2			
	0.00	0.00	0.00
Distribution Mode 3			
	7.24	0.00	25.47
Distribution Mode 4			
	12.14	3.46	20.90

Source: OECD (2005)

ANNEX 3: STRUCTURE OF CHINA-OECD TRADE AND FOREIGN DIRECT INVESTMENT

China-OECD trade flows

The purpose of this section is to describe the structure of China's merchandise trade with major OECD economies and the associated tariff barriers in 2001. This is also useful in interpreting the simulation results of China's implementation of its WTO commitments as well as the scenario of full liberalisation of China's tariff barriers.

In 2001, China accounted for 6% of world exports and 4% of world imports. However, these shares masked considerable differences in China's importance for individual OECD economies as well as in specific international goods and services markets. As far as the importance of China as a destination market for OECD exports is concerned (Table A2.1), regional factors appear to play an important role with OECD countries located in closer proximity to China tending to export to this market higher shares of their overall exports (*e.g.* Australia 7%, New Zealand 6%, Japan 11%, Korea 16%) as compared to the United States (3%), Canada (4%) or the EU (2%)).

Exports to China expressed as shares of respective GDPs are highest in Korea (6.7%), New Zealand (2.2%), Australia (1.5%), Japan (1.2%) and, again, tend to be lower in Canada (0.7%), United States (0.3%), EU15 (0.6%) and Mexico (0.2%). Overall, these shares suggest that apart from the OECD economies located in Asia and Oceania, dependence on China as a destination market for exports in 2001 was rather limited. For comparison, the US exports to the EU15 accounted for 29% of its total exports and 2.7% of its GDP in 2001 and the EU15 exports to the US accounted for 11% of total EU15 exports[16] and around 3.7% of its GDP.

Sectoral divergences are even more pronounced than cross-country ones with China accounting for significant shares of exports of *agricultural and fishing products* of a number of OECD countries (Australia 15%, New Zealand 12%, Canada and United States each 7%, Korea 6%, Japan 5%) and yet even higher shares of exports of *natural resources* in Japan (43%), Australia (16%), Korea (15%), New Zealand (11%) and Mexico (7%). Remarkably high shares are recorded for many industrial sectors, including *textiles, clothing and leather*–sector that is thought to be China's leading export sector. Indeed, China accounts for 56, 27, 8 and 7% of exports of textiles, clothing and leather of respectively Japan, Korea, Australia and New Zealand. Alike situation is observed in *chemicals and chemical products* where China absorbs 35 , 15, 7 and 5% of exports in this product category of respectively Korea, Japan, Australia and New Zealand. In the EU15, United States, Canada, Mexico these share are typically one-digit, even though they are not negligible. For example, China accounts for 5% of the US exports of *metal products* and *electronic equipment*.

As compared with exports to China, generally somewhat higher figures are observed for China's shares in imports of individual OECD economies (Australia 8%, New Zealand 5%, Japan 14%, Korea (9%), United States (9%), Canada (4%), EU15 (3%)). This suggests that China's further liberalisation may impact upon import-competing industries of the OECD economies (as well as third countries that compete with China in the OECD markets) through improvements in the competitiveness of Chinese exporters. Ratios of imports from China to respective GDPs are highest for Korea (3.3%), Australia and New Zealand (1.6%), Japan

[16] Including intra-EU15 trade.

(1.4%), Canada (1.2%) while they tend to be lower for the US (1.1%), EU15 (0.9%) and Mexico (0.5%). While there are differences across OECD membership, sectors particularly heavily dominated by imports from China include *textiles, clothing and wearing apparel* (with import shares of between 5 and 65%); *other manufacturing* (6 to 24%); *machinery and equipment* (2 to 18%); *electronic equipment* (4 to 16%) and to a lesser extent *metal products* (1 to 12%) and *motor vehicles and parts* (0 to 14%).

Outside the OECD area, Hong Kong-China relies on the Chinese market to a great extent in sectors such as *chemicals and chemical products* (61% of Hong Kong-China's exports); *machinery and equipment* (51%); *electronic equipment* (33%); *metal products* (39%); *other manufacturing* (26%); *textiles, clothing and wearing apparel* (24%) and *food products and beverages* (11%). In fact, a similar pattern is observed in shares of imports from China which suggest a large extent of two-way trade, most likely a result of trade in products and components at different stages of their processing. For Russia, China is an important export destination for *machinery and equipment* (28%); *chemicals and chemical products* (14%); *other manufacturing* (10%) and *metal products* (9%). Imports from China constitute 31% of Russia's total imports in *textiles, clothing and leather,* 7% in *other manufacturing* and 6% in *agriculture and fishing.*

Tables A3.3 and A3.4 present refined information on the two-way trade in China's trade with its partners. Aggregate sectoral indices calculated across all trading partners in Table A2.4 suggest that trade in *agricultural products*(index of intra-industry trade of 0.3) and *natural resources* (0.2) including *coal* (0.0) and *oil* (0.1) is mostly one way as is trade in *textiles, clothing and leather*(0.3) but also in *motor vehicles and parts* (0.4) and *other manufacturing* (0.4). Two-way trade seems to be relatively important in *chemicals and chemical products* (0.7), *metal products* (0.7)*; machinery and equipment* (0.7) and *electronic equipment* (0.6).

Interesting divergences in the nature of China's bilateral trade flows are suggested by the indices of intra-industry trade calculated for each of the bilateral trade flows, and the coefficients of variation in these indices calculated at the product and country levels. At the relatively high level of product aggregation that these indices are computed in our study, the high shares of intra-industry trade reflect both trade in different varieties of the same products as well as 'vertical trade' involving cross-border exchanges of the same good at different levels of processing or an exchange of components and final products. Nevertheless, data show a tendency for China's trade with the most neighbouring OECD economies (*i.e.* Japan, Korea, Australia and New Zealand) to be more of the two-way type as compared to bilateral trade with North American or European OECD economies. However, considerable differences can be observed even within the same industries and regions. For example, in *motor vehicles and parts*, China's trade with Korea displays a high share of intra-industry trade while its trade with Japan displays a low share of intra-industry trade. Trade in *textiles, clothing and leather* with Japan and Korea tends to be two way while trade in this product category with the United States and EU15 is mostly one way. The latter case highlights the possibility that regional trade is likely to contain higher shares of trade along various stages of production chain of the same products. For some other bilateral trade flows such as China's trade with the EU15 in food products and beverages, high shares of intra-industry trade are more likely to be more reflective of an exchange of different varieties of food and beverages that are produced by the trading partners.

The current bilateral services trade data in the GTAP database do not reflect the pattern of services trade among countries; the dissagregation of services flows is based on various assumptions and extrapolations of trade in goods by partner countries.[17] However, given that this database constitutes the basis for analysing cross-border services trade, a brief summary of services trade patterns is presented below.

[17] Lejour and van Leuwen (2005): This is the first paper that attempts to introduce bilateral services trade data based on reported statistics into the GTAP database[17]. The authors use data of total imports and exports of services from the IMF Balance of Payments statistics, while the bilateral trade matrix comes from the OECD database on services trade by partner countries. The exercise covers 28 OECD countries (which equals

Wholesale trade represents the most important sector with respect to China's imports from and exports to OECD countries (the share of China's imports in OECD countries exports is above 7 percent in Japan, Korea, EU 15 and Canada, while the share of OECD countries imports from China is above 7 percent for Japan, Mexico and EU15). All other sectors record lower values (in general between 1 and 3 percent) in terms of both shares of China's imports in OECD countries' exports and shares of China's exports in OECD countries' imports.

Overall, trade statistics presented in Tables A3.1 through A3.5 suggest that scenarios considering improvements in access to the Chinese market considered in this paper are likely to have disproportionate effects on individual OECD countries.

China-OECD investment patterns based on the new FTAP-FDI database

The new FTAP - FDI database was constructed following the procedure described in Phamduc (2000). In order to be consistent with the GTAP version 6 database employed in our simulations, the base year for the new FTAP-FDI database is 2001. The database was constructed using the following sources of information: the OECD database[18] on FDI stocks by industry and partner country for all OECD countries, the UNCTAD World Investment Directory[19] for most non-OECD countries, local government sources for China, Hong Kong-China, Russia, Singapore, Chile, Peru, Brazil, and Statistics of Foreign Direct Investment in ASEAN(2004)[20] for Malaysia, Philippines, Thailand, and Viet-Nam.

General investment patterns

At first glance, the main destination for FDI among the analysed economies/country-groups is the EU15; however, two thirds of EU15 FDI is internal FDI, *i.e.* FDI from one EU15 country to another EU15 country. In fact, the EU15 receives only USD 900 billion from abroad, around one third less than the USA. In the EU15, the major recipients are the UK (7.7% of world FDI), Germany (6.6%), while Belgium, France and the Netherlands all receive more than 4% of world FDI. The Rest Of the World region is the third largest inward stock recipient, with several countries receiving comparable amounts of FDI (Singapore, Brazil, Middle-East countries), and with Latin American countries holding preponderant places. Hong Kong-China is the next largest recipient, with a large part of FDI coming from China (29%). But in fact, most FDI to Hong Kong-China transits through tax havens, with British Virgin Islands, Bermuda and Cayman Islands accounting for 42% of FDI to Hong Kong-China. Finally, China receives around USD 203 billion, a figure comparable to Canada, but twice larger than FDI to Australia or Mexico. Japan and Russia each receives USD 55 billion, Korea USD 45 billion, New Zealand and Turkey both

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approximately 75% of services trade exports in the GTAP database). While limited in coverage, this paper represents an important step in improving the datasets employed in modelling services liberalisation.

18 The OECD database on FDI stocks by industry and partner countries was provided by OECD DAF.

19 The UNCTAD World Investment Directory provides detail information about foreign direct investment in a country, comprising detail statistics on flows, stocks and TNC operations, disaggregated by components, industry and investor/recipient country. Since 2002, all country profiles are posted on the following web site before they are published in hard copy or CD-Roms: http://www.unctad.org/Templates/Page.asp?intItemID=3198&lang=1.

20 See ASEAN (2004) Statistics of Foreign Direct Investment in ASEAN , Sixth edition, available at http://www.aseansec.org/17215.htm.

around USD 20 billion. (See Chart A3.3).[21]

In terms of outward FDI, the EU15 group is again the largest source of FDI, although around 50% of FDI is again intra-EU15 FDI, with stocks mainly coming from the UK (11.5% of world FDI), the Netherlands (10.5%), France and Germany (both 7.5%). The main EU15 partner is the USA (18% of EU15-originated FDI). As a single country, the USA is the largest source of FDI (17% of word FDI), with stocks going mainly to the UK (16% of USA-originated FDI), Canada (11%), Mexico (7%), several EU15 and Latin American countries, while China receives only 1,6% of US FDI. (see Chart A3.4).

The importance of the services sector in driving FDI flows is obvious from Chart A3.5. The four main sectors for FDI are all in services (Business Services, Trade, Banking, and Other services) and services sectors account overall for 61% of world FDI, while the manufacturing sector represents 31% and the primary sector 8%.

Investment patterns for China

FDI data on China is constructed from UNCTAD (USD 203 billion in 2001) and have been distributed according to sectoral inflow shares, since no stock data is reported at the disaggregated level. Hong Kong-China is the major investor in China, accounting for 45% of China inward FDI stock. The Rest of the World region is the second largest investor, with this performance mostly driven by Chinese Taipei, Singapore and tax havens (essentially British Virgin Islands). The US is the third largest investor in China followed closely by the EU15 and Japan. While these three OECD regions record each around 10 percent of China's inward stock, their investments in China represent low share in their total FDI outflows (1,7% for the US, 5% for Japan and around 1% for the EU15). (See Chart A3.6).

It is worth noting that, in terms of the sectoral disaggregation, although China's economic structure is more oriented towards manufacturing, the business services sector is still the second recipient of FDI to China (13% of China's inward stock), slightly lower than a group of manufacturing sectors (OMF, a group of industries including mineral products, wood products, paper products). But the manufacturing sector still holds the lion's share when counted as a whole (63%), with the main sectors being the Metallic industry (MET 12%), the electronic equipment industry (ELE 9%), food processing (FOOD 9%) and Chemical industry (CHM 8%).

Apart from the business sector, other important services sectors are the distribution networks in electricity (ELY 6%), followed by the trade sector (TRD 3%). The construction industry, together with the gas, water, recreational, government and social services form the OSV sector (12%). Foreign presence is small in communication (CMN), water and air transports (WTP, ATP) and almost inexistent in financial services (OFI) and insurances (ISR), (Chart A3.7).

[21] See Table A5.1 for the correspondence between the sectoral codes employed in Charts A3.3 to A3.7 and their full names. See Table A5.2 for the correspondence between the economies/ country group codes employed in Charts A3.3 to A3.7 and their full names.

Table A3.1. China's imports as share of individual countries' exports, by product category (%)

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	All countries
Agriculture and fishing	15	12	0	11	5	5	6	7	7	0	1	1	5	4
Natural resources	16	11	0	5	3	43	15	1	3	7	2	1	8	6
Coal	0	12	0	0	0	13	0	0	0	0	1	0	0	0
Oil	4	3	0	0	1	9	0	0	3	0	1	1	4	3
Food products and beverages	4	4	0	11	7	10	7	2	2	1	1	1	3	2
Textiles, clothing and leather	8	7	0	24	2	56	27	4	3	0	1	0	4	5
Chemicals and chemical products	7	5	0	61	14	15	35	3	3	1	1	1	9	5
Other manufacturing	4	11	0	26	10	10	22	1	3	0	1	0	5	3
Metal products	11	2	0	39	9	18	20	1	5	1	2	1	5	5
Motor vehicles and parts	0	0	0	11	1	2	2	0	1	0	1	0	2	1
Machinery and equipment	5	3	0	51	28	10	12	2	4	0	3	2	6	4
Electronic equipment	5	2	0	33	30	13	12	3	5	2	4	1	7	6
Electricity, gas and water	2	0	0	46	0	2	3	0	1	0	0	0	0	1
Construction	3	3	0	4	4	5	4	4	4	4	5	4	4	4
Wholesale trade	4	3	0	33	2	11	7	5	3	3	7	6	7	13
Land transport	3	2	0	2	2	2	2	3	3	2	2	2	2	2
Water transport	3	1	0	1	0	0	1	0	3	2	1	1	1	1
Air transport	1	2	0	1	1	0	1	1	2	2	1	1	2	1
Post and communications	1	1	0	1	1	1	1	1	1	1	1	1	1	1
Finance	2	2	0	1	1	1	1	1	1	1	1	1	2	1
Insurance	3	3	0	4	3	1	3	4	4	4	4	4	4	4
Business activities	1	1	0	0	0	1	0	1	1	1	1	1	1	1
Other services	2	2	0	2	2	1	2	1	2	2	2	2	2	2
Total exports	7	6	0	23	8	11	16	2	3	1	2	1	5	4
Total exports as % of GDP	1.5	2.2	0.0	14.1	2.7	1.2	6.7	0.7	0.3	0.2	0.6	0.5	1.7	0.9

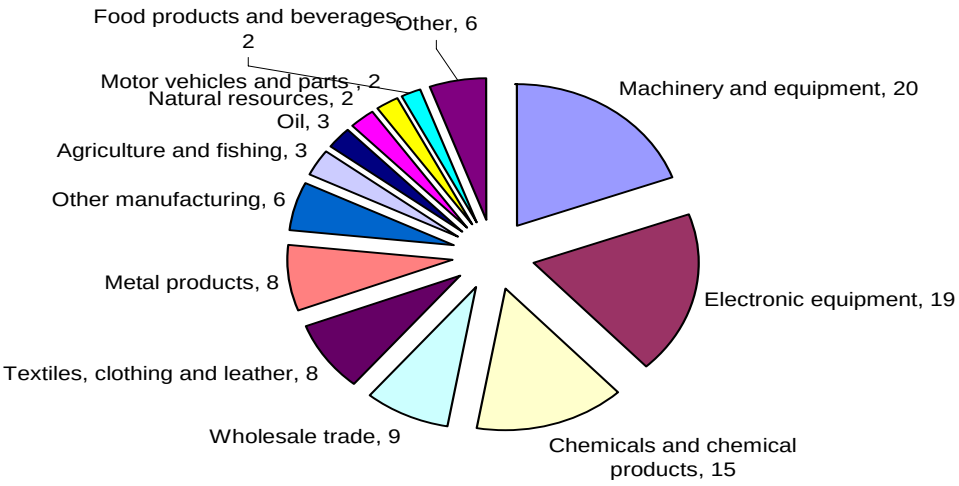
Source: GTAP version 6

Table A3.2. Imports from China as share of individual countries imports, by product category

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	All countries
Agriculture and fishing	6	3	0	25	6	12	18	2	3	1	2	2	5	4
Natural resources	10	19	0	26	0	2	2	1	1	1	1	0	2	1
Coal	0	0	0	44	3	17	41	2	4	4	3	1	17	14
Oil	1	0	0	0	1	1	0	0	0	7	0	0	1	0
Food products and beverages	4	2	0	22	2	13	15	1	2	0	1	1	2	3
Textiles, clothing and leather	49	38	0	74	31	65	45	21	21	5	9	10	17	21
Chemicals and chemical products	7	3	0	23	2	8	8	2	5	1	2	1	5	3
Other manufacturing	15	10	0	51	7	24	15	9	23	6	6	3	6	12
Metal products	9	4	0	26	1	12	9	3	8	1	2	1	5	4
Motor vehicles and parts	0	0	0	7	0	4	14	0	0	0	0	0	1	1
Machinery and equipment	5	3	0	40	2	18	6	3	9	2	3	2	5	5
Electronic equipment	9	9	0	33	4	16	10	7	12	4	5	5	6	8
Electricity, gas and water	3	3	0	46	1	1	1	0	1	1	0	0	0	1
Construction	1	2	0	3	2	3	1	2	1	1	3	2	3	3
Wholesale trade	3	3	0	7	3	6	4	3	2	5	7	5	5	5
Land transport	3	3	0	3	3	3	2	3	5	3	3	2	3	3
Water transport	1	1	0	1	2	0	0	2	4	5	1	0	1	1
Air transport	1	1	0	1	1	1	0	1	1	1	1	1	1	1
Post and communications	1	1	0	1	2	1	1	1	1	1	1	1	2	1
Finance	2	2	0	1	4	1	2	1	2	1	1	1	2	1
Insurance	1	1	0	1	1	1	1	1	1	1	1	1	1	1
Business activities	1	1	0	1	1	1	0	1	1	1	1	1	1	1
Other services	2	2	0	1	2	2	2	1	2	2	2	2	1	2
Total imports	8	5	0	35	5	14	9	4	9	2	3	2	5	6
Total imports as % of GDP	1.6	1.6	0.0	23.7	1.1	1.4	3.3	1.2	1.1	0.5	0.9	0.9	1.4	1.2

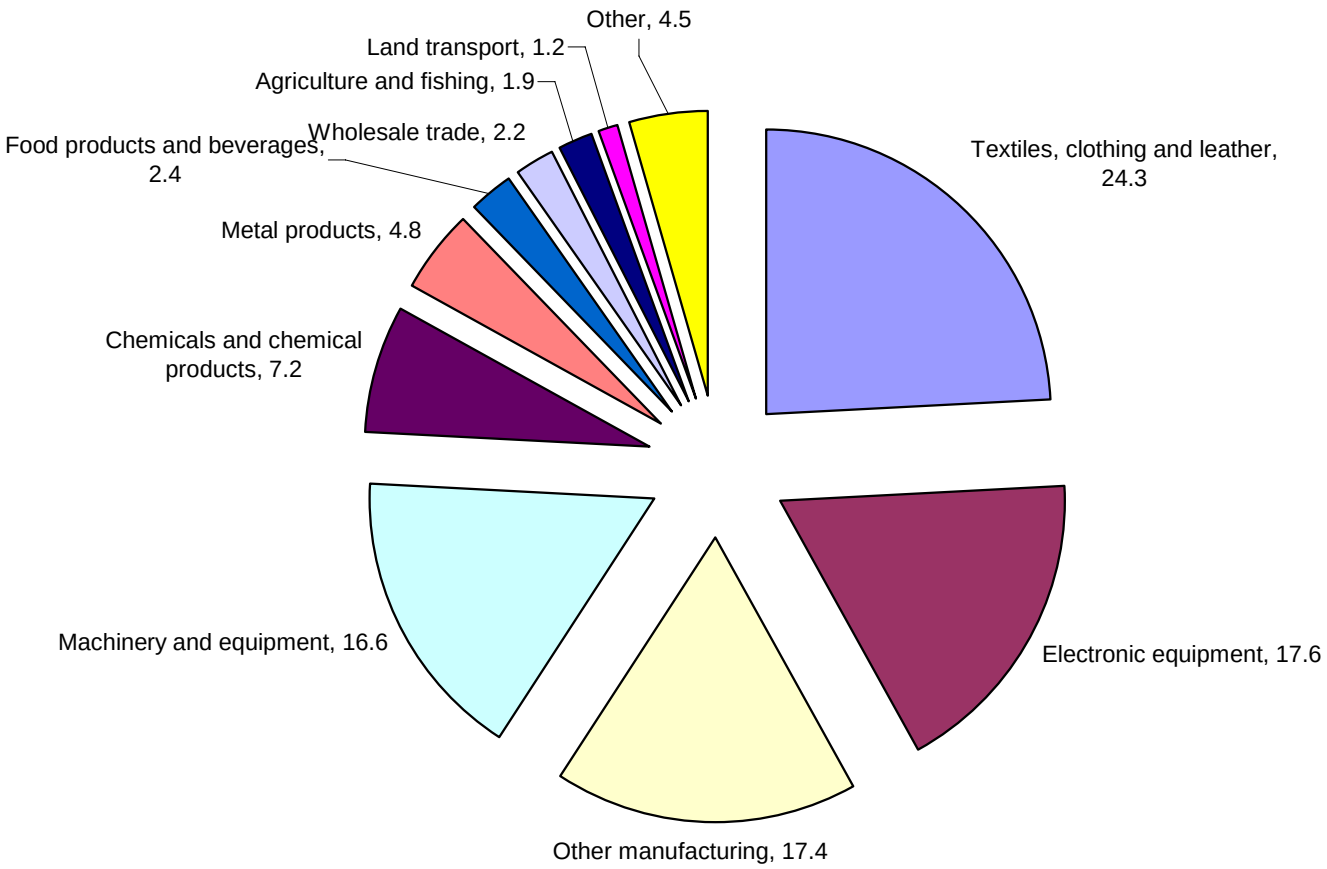
Source: GTAP version 6

Chart A3.1. Structure of China's imports



Source: GTAP version 6

Chart A3.2. Structure of China's exports



Source: GTAP version 6

Table A3.3. Country shares in China's imports

	Australia	New Zealand	Japan	Korea	Canada	USA	Mexico	EU15	Rest of Europe
Agriculture and fishing	15	3	1	1	9	26	0	4	1
Natural resources	18	1	1	0	3	2	1	4	1
Coal	39	13	0	0	1	10	0	0	1
Oil	1	0	0	0	0	0	0	1	2
Food products and beverages	7	5	4	2	4	13	1	13	3
Textiles, clothing and leather	0	0	26	24	1	3	0	7	0
Chemicals and chemical products	1	0	16	20	2	9	0	10	1
Other manufacturing	1	2	13	11	4	12	0	17	1
Metal products	6	0	24	12	1	8	0	12	2
Motor vehicles and parts	0	0	30	5	3	5	0	47	2
Machinery and equipment	0	0	26	7	1	16	0	29	3
Electronic equipment	0	0	25	12	1	11	1	15	0
Electricity, gas and water	1	0	0	0	2	9	0	26	9
Construction	0	0	17	0	1	9	1	55	5
Wholesale trade	0	0	3	0	0	2	0	18	2
Land transport	1	0	1	1	4	22	2	33	9
Water transport	3	1	1	2	2	18	1	34	8
Air transport	3	1	2	1	4	25	2	29	4
Post and communications	2	1	2	2	3	20	1	39	6
Finance	1	0	2	1	1	32	1	36	9
Insurance	1	0	0	0	7	12	4	50	6
Business activities	1	0	2	1	2	16	0	47	4
Other services	2	0	1	2	1	38	1	35	5
All products	2	0	18	10	2	11	0	17	2

Source: GTAP version 6

Table A3.4. Bilateral indices of intra-industry trade with China

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	coeff. of variation
Agriculture and fishing	0.1	0.1	-	0.0	0.5	0.1	0.0	0.2	0.3	0.1	0.5	0.5	0.6	0.9
Natural resources	0.0	0.4	-	0.0	0.0	0.4	0.1	0.1	0.8	0.3	0.8	0.5	0.2	0.9
Coal	0.0	0.0	-	0.0	0.2	0.0	0.0	0.1	0.5	0.0	0.0	0.1	0.1	1.9
Oil	0.3	0.7	-	-	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.1	0.1	1.4
Food products and beverages	0.4	0.1	-	0.1	0.8	0.1	0.3	0.7	1.0	0.8	0.9	1.0	0.8	0.6
Textiles, clothing and leather	0.1	0.2	-	0.3	0.0	0.5	0.7	0.1	0.1	0.1	0.2	0.1	0.6	0.9
Chemicals and chemical products	0.6	1.0	-	0.5	0.1	0.6	0.3	0.8	0.8	0.3	0.9	0.9	0.8	0.4
Other manufacturing	0.2	0.7	-	0.2	0.8	0.5	0.8	0.5	0.1	0.0	0.3	0.2	0.9	0.7
Metal products	0.4	0.9	-	0.5	0.1	0.6	0.6	0.4	0.5	0.7	0.9	1.0	1.0	0.4
Motor vehicles and parts	0.4	0.3	-	0.0	0.5	0.2	1.0	0.4	0.7	0.8	0.1	0.4	0.8	0.6
Machinery and equipment	0.4	0.5	-	0.5	0.2	0.7	0.6	0.7	0.6	0.2	0.9	1.0	0.7	0.4
Electronic equipment	0.2	0.1	-	0.2	0.8	0.8	0.6	0.5	0.5	0.7	0.8	0.3	0.8	0.5
Electricity, gas and water	0.6	0.0	-	0.4	0.6	0.1	0.8	1.0	1.0	0.3	0.9	0.6	0.9	0.6
Construction	0.2	0.7	-	0.6	0.6	0.8	0.3	0.5	0.2	0.0	0.7	0.6	1.0	0.6
Wholesale trade	0.8	0.7	-	0.0	0.0	0.9	1.0	0.8	1.0	0.4	1.0	0.8	0.9	0.5
Land transport	0.8	0.5	-	0.6	0.4	0.3	0.8	0.9	0.7	0.7	0.8	0.8	0.9	0.3
Water transport	0.8	0.8	-	0.6	0.2	0.2	0.9	0.7	0.9	0.9	0.8	0.9	1.0	0.4
Air transport	0.7	0.4	-	0.4	0.5	0.4	0.9	0.7	1.0	0.6	0.9	0.7	0.7	0.3
Post and communications	0.9	0.8	-	0.7	0.7	0.5	0.9	0.9	1.0	0.9	0.9	1.0	0.9	0.2
Finance	0.9	0.8	-	0.9	0.1	0.4	0.8	0.4	0.8	0.6	0.8	0.8	0.8	0.4
Insurance	0.2	0.5	-	0.5	0.8	0.4	0.3	0.3	0.3	0.7	0.2	0.2	0.5	0.5
Business activities	1.0	1.0	-	0.9	0.3	0.6	0.7	1.0	0.8	0.9	0.9	0.8	1.0	0.2
Other services	0.8	0.8	-	0.5	0.6	0.3	0.9	0.7	0.7	0.8	1.0	0.8	0.9	0.3
coeff. of variation	0.7	0.6	-	0.7	0.7	0.6	0.6	0.5	0.5	0.7	0.4	0.5	0.4	

Source: authors' calculations based on GTAP version 6 database

Table A3.5. Indices of intra-industry trade by product and partner country

by sector		by country	
Agriculture and fishing	0.3	Australia	0.3
Natural resources	0.2	New Zealand	0.4
Coal	0.0	China	-
Oil	0.1	Hong Kong-China	0.3
Food products and beverages	0.5	Russia	0.2
Textiles, clothing and leather	0.3	Japan	0.6
Chemicals and chemical products	0.7	Korea	0.5
Other manufacturing	0.4	Canada	0.5
Metal products	0.7	United States	0.4
Motor vehicles and parts	0.4	Mexico	0.4
Machinery and equipment	0.7	EU15	0.7
Electronic equipment	0.6	Rest of Western Europe	0.6
Electricity, gas and water	0.6	Rest of World	0.7
Construction	0.7		
Wholesale trade	0.5		
Land transport	0.8		
Water transport	0.8		
Air transport	0.8		
Post and communications	0.9		
Finance	0.8		
Insurance	0.3		
Business activities	0.9		
Other services	0.8		

Source: authors' calculations based on GTAP version 6 database

Chart A3.3. FDI destination, % of world FDI

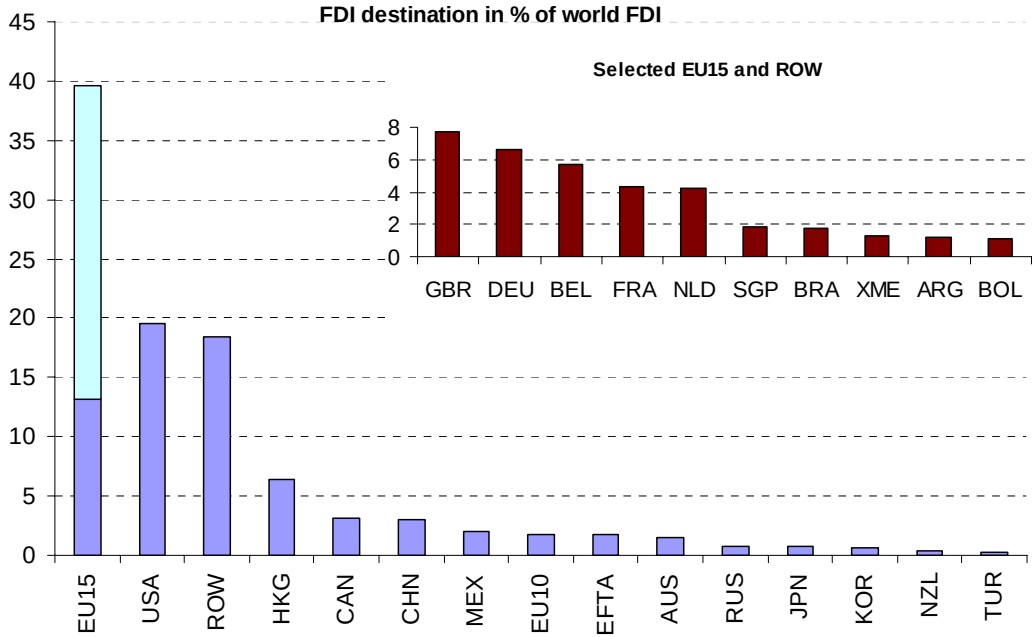
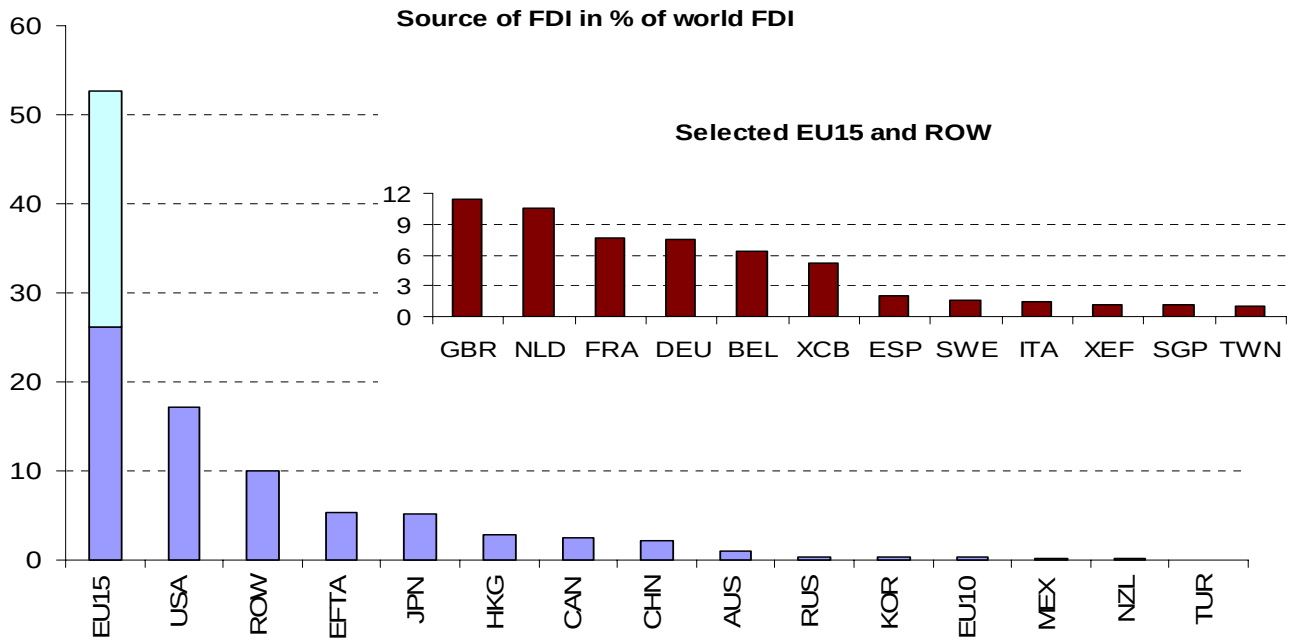
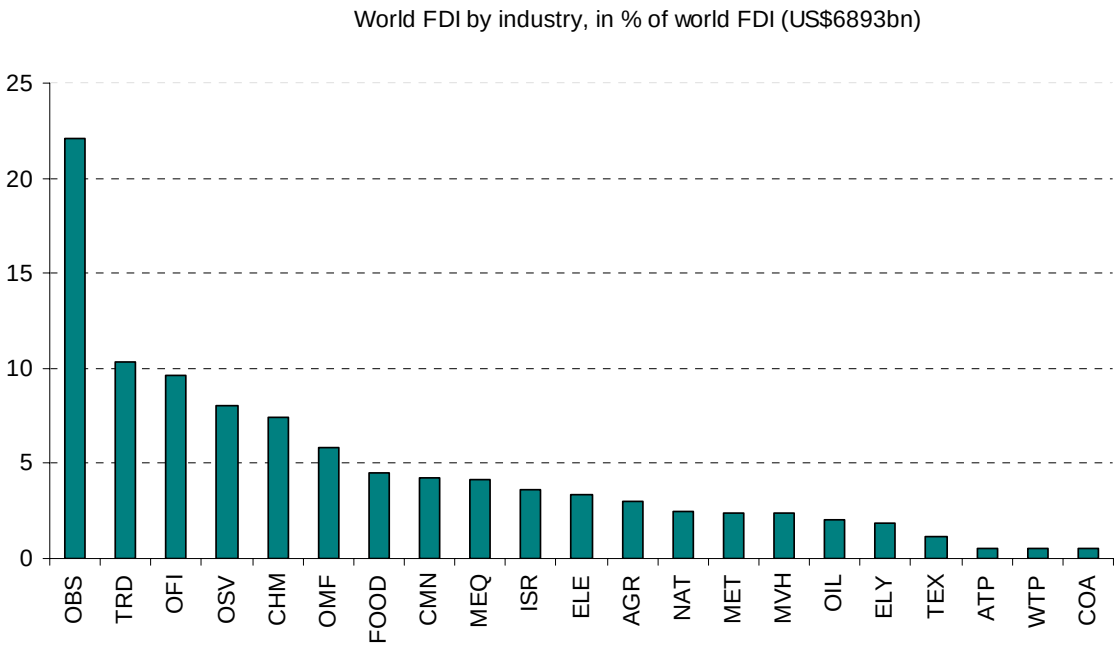


Chart A3.4. Sources of FDI, % of world FDI



Source: authors calculations (FTAP 2001 database)

Chart A3.5. World FDI by industry, % of world FDI



Source: authors calculations (FTAP 2001 database)

Chart A3.6. FDI to China, % of overall inward stock

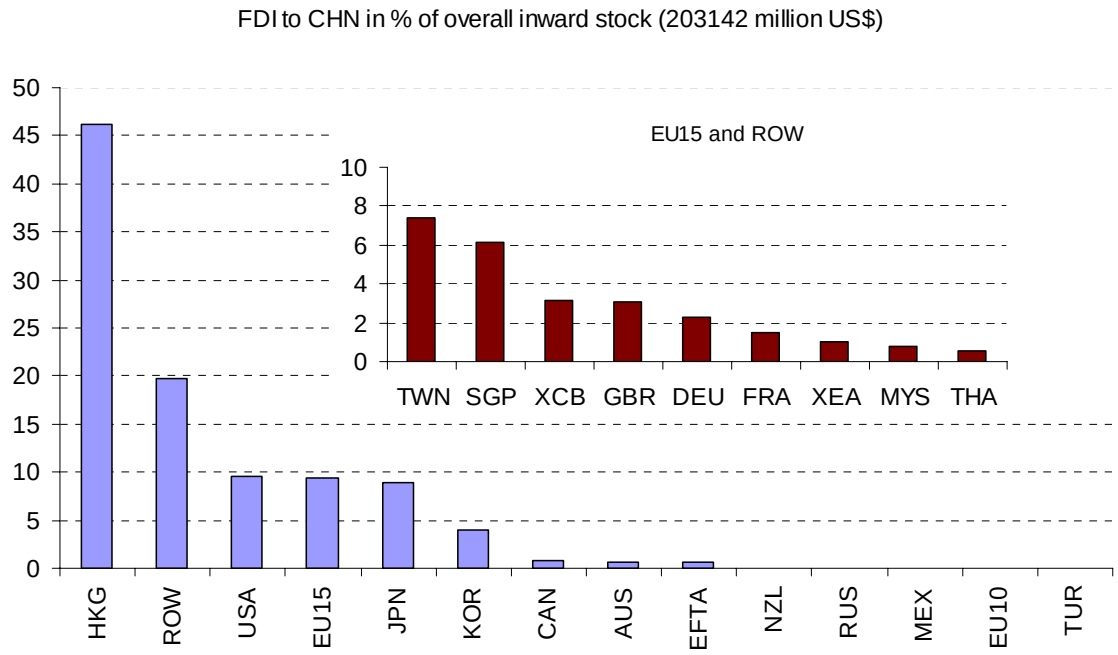
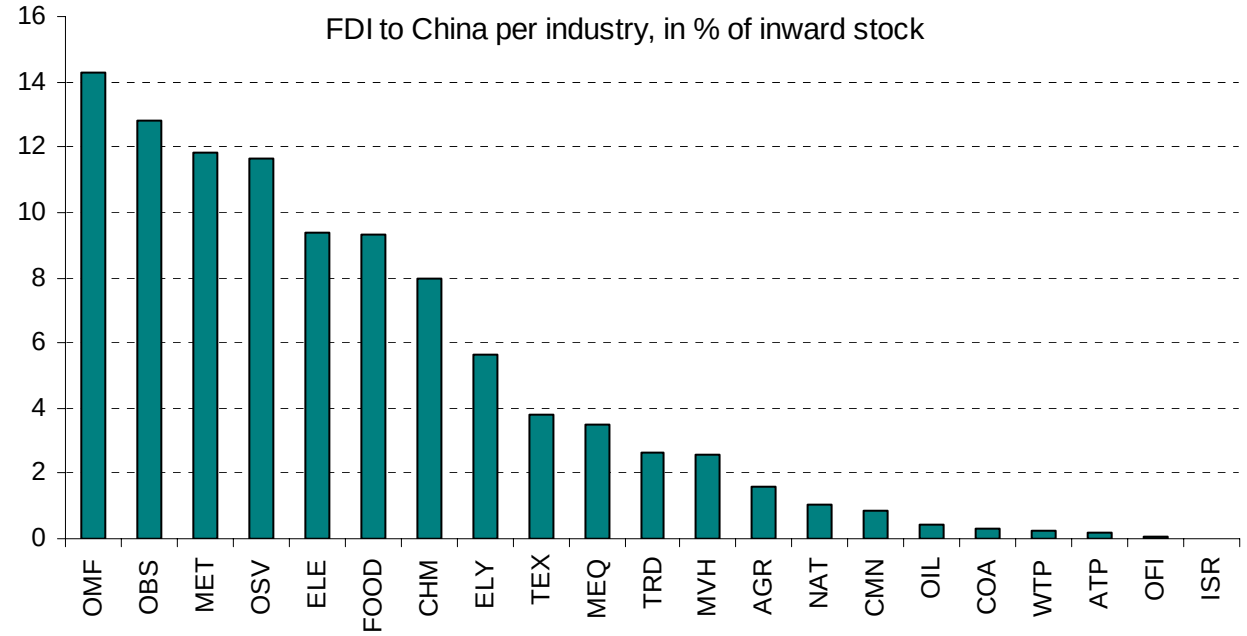


Chart A3.7. FDI to China by industry, % of total inward stock



Source: authors calculations (FTAP 2001 database)

ANNEX 4: THE ECONOMICS OF FTAP

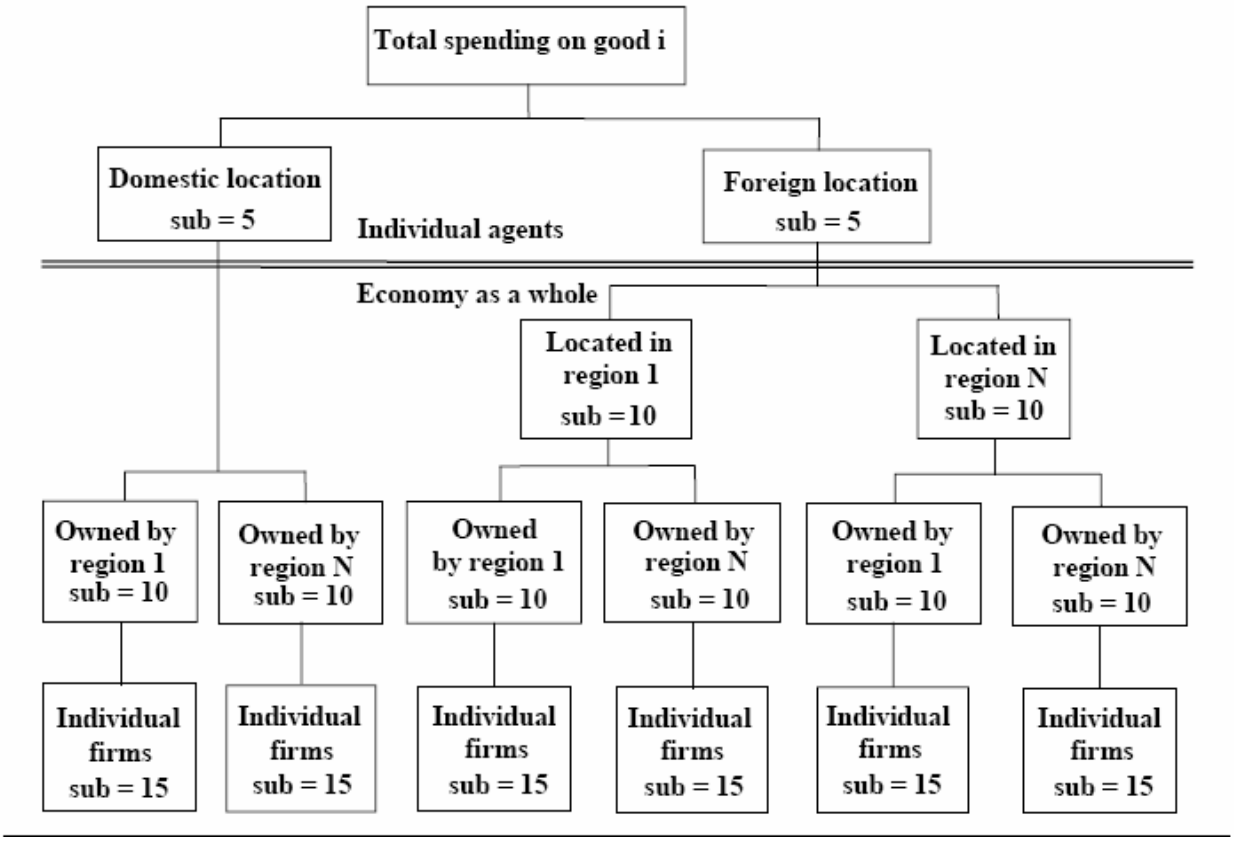
This Annex presents a brief description of the FTAP (Foreign Direct Investment and Trade Analysis Project) model employed in the modelling exercise presented in Section III of the paper. FTAP models the activities of three economic 'agents' in each region: firms, government and a representative household (that is, private citizens). The model takes the standard GTAP framework of Hertel (1997) as a description of the *location* of economic activity, and then disaggregates this by *ownership*. For example, each industry located in China comprises Chinese-owned firms, along with foreign multinationals from various parent countries. Each of these firm ownership types is assumed to be making its own independent choice of inputs to production, according to standard GTAP theory. And each firm type has its own sales structure.

On the purchasing side, agents make choices among the products or services of each firm type, distinguished by both ownership and location, and then among the individual (and symmetric) firms of a given type — the model recognises the firm-level product differentiation associated with monopolistic competition. Firms choose among intermediate inputs and investment goods, while households and governments choose among final goods and services.

Agents are assumed to choose first among products or services from domestic or foreign locations, with a CES elasticity of substitution of 5. They then choose among particular foreign locations, and among ownership categories in a particular location, both with a CES elasticity of substitution of 10. Finally, they choose among the individual firms of a particular ownership and location, with a CES elasticity of substitution of 15. With firm-level product differentiation, agents benefit from having more firms to choose among, because it is more likely that they can find a product or service suited to their particular needs[22]. (see Figure A4.1).

[22] The first two choices, among domestic and foreign locations, are identical to the choices in the original GTAP model. They have been parameterised using values, 5 and 10, that are roughly twice the standard GTAP Armington elasticities. Two reasons can be given for doubling the standard elasticities. One is that only with such elasticities can GTAP successfully reproduce historical changes in trade patterns (Gehlhar, 1997). The other is that higher elasticities accord better with notions of firm level product differentiation

Figure A4.1. Structure of demand in FTAP



Source: Hanslow et al (1999), "The Structure of the FTAP model"

On the demand side, from a host region's perspective, each host region has two types of firms in each sector: domestic firms (the parent firm of the local multinational) and various foreign affiliates. Firms are identifiable by location (sector of the host region) and by ownership (home region). Foreign affiliates combine their home region's capital with the host region's labour, land and natural resources to produce goods and services for the host region's consumers and exports. Within each sector, domestic firms and foreign affiliates produce differentiated products.

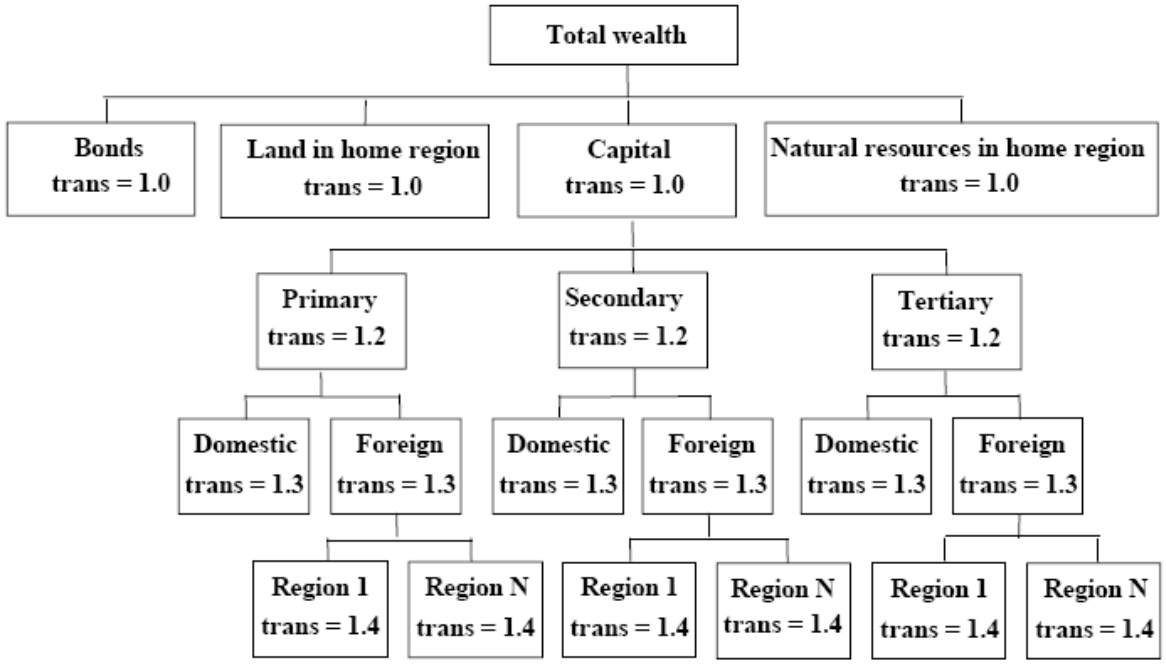
Consumers in the host region are assumed to allocate a fixed nominal share of their income among goods and services. Consumers' utility is assumed to increase with the number of varieties available for a product as well as with the quantities of different products. Foreign produced goods and services can be delivered via cross-border supply or by foreign affiliates in the host region. Most imported goods and services are assumed to be imperfect substitutes with their domestically produced equivalents.

Given these characteristics, an increase in the quantity demanded of services provided by foreign affiliates in a host region increases the commercial presence of these affiliates. An increase in the quantity demanded can be triggered by a fall in their output prices and production costs (that is, an increase in supply).

Supply: The representative household is assumed to own all primary factors of production: land, natural resources, capital and labour. The supplies of land, natural resources and labour are given in each region. Land and natural resources are used only by the primary industries sector and in fixed quantities. Labour is assumed to be mobile among sectors within each region, but not between regions. Capital is mobile among

sectors within each region and between regions. With respect to capital allocation across regions and sectors, FTAP follows the imperfect transformation among types of wealth developed by Petri (1997).

Figure A4.2. FTAP asset supply function



Source: Hanslow et al (1999),"The Structure of the FTAP model"

Investors in each economy first divide their wealth between 'bonds' (which can be thought of as any instrument of portfolio investment), real physical capital, and land and natural resources in their country of residence. This choice is governed by a CET semi-elasticity of 1, meaning that a one percentage point increase in the rate of return on real physical capital, for example, would increase the ratio of real physical capital to bond holdings by one per cent. A bond is a bond, irrespective of who issues it, implying perfect international arbitrage of rates of return on bonds. However, capital in different locations is seen as different things. Investors next choose the industry sector in which they invest (with a CET semi-elasticity of 1.2). They next choose whether to invest at home or overseas in their chosen sector (with a CET semi-elasticity of 1.3). Finally, they choose a particular overseas region in which to invest (with a CET semi-elasticity of 1.4).

Two levels of direct capital investment are observed. The multinational firm in a given sector makes the decision to invest in its own operations within a given sector across regions, while the regional investor makes the decision to invest in the region's own firms across sectors. The regional investor can only invest its capital overseas through its investment in the region's multinational firms.

Both levels of direct investment are driven by the same return maximization behaviour. At the firm level, for each multinational firm, the return can only be maximised if its home parent firm and all its overseas affiliates generate an equal rate of return on every unit of capital they use. At the regional level, the return to total regional capital can only be maximised if locally originated multinational firms across all sectors generate an equal rate of return on every unit of capital they use.

ANNEX 5: MODELLING RESULTS

TABLE AND FIGURE ANNEX

Table A5.1. Product groups defined by reference to the GTAP Sectoral Classification

Product group	Product code	GTAP sectoral classification	GTAP code
Agriculture and fishing	AGR	Paddy rice, Wheat, Cereal grains nec, Vegetables and fruits, Oil seeds Sugar cane sugar beet, Plant-based fibers, Crops nec, Cattle sheep goats horses, Animal products nec, Raw milk, Wool silk-worm cocoons, Fishing	pdr, wht, gro, v_f, nuts,osd, c_b, pfb, ocr, ctl, oap, rmk wol, fsh
Natural resources	NAT	Forestry, Gas, Minerals nec	frs, gas, omn
Coal	COA	Coal	coa
Oil	OIL	Oil	oil
Food products and beverages	FOOD	Meat: cattle sheep goats horse, Meat products nec, Vegetable oils and fats, Dairy products, Processed rice, Sugar, Food products nec , Beverages and tobacco products	Cmt, omt, vol, mil, pcr, sgr ,ofd b_t
Textiles, clothing and leather	TEX	Textiles, Wearing apparel, Leather products	tex, wap lea
Chemicals and chemical products	CHM	Petroleum coal products, Chemical rubber plastic prods	p_c, crp
Chemicals and chemical products	OMF	Wood products, Paper products publishing Mineral products nec Manufactures nec	lum, ppp,nmm, omf
Metal products	MET	Ferrous metals, Metals nec, Metal products	i_s, nfm, fmp
Motor vehicles	MVH	Motor vehicles and parts	mvh
Machinery and equipment	MEQ	Transport equipment nec Machinery and equipment nec	otn ome
Electronic equipment	ELE	Electronic equipment	ele
Electricity das and water	EGW	Electricity, Gas manufacture distribution, Water	Ely, gdt ,wtr
Construction	CNS	Construction	cns
Wholesale trade	TRD	Trade	trd
Land transport	OTP	Transport nec	otp
Water transport	WTP	Sea transport	wtp
Air transport	ATP	Air transport	atp
Post and communications	CMN	Communication	cmn
Banking	OFI	Financial services nec	ofi
Insurance	ISR	Insurance	isr
Business activities	OBS	Business services nec	obs
Other services	OSV	Recreation and other services, PubAdmin/Defence/Health/Educat Dwellings	Ros, osg ,dwe

Source: GTAP 6

Table A5.2. Regions defined by reference to the GTAP-5 regions

Region	GTAP code	Country
Australia	AUS	Australia
New Zealand	NZL	New Zealand
Canada	CAN	Canada
China		
Hong Kong–China		
EU15	AUT	Austria
	BEL	Belgium
	DNK	Denmark
	FIN	Finland
	FRA	France
	DEU	Germany
	GRC	Greece
	IRL	Ireland
	ITA	Italy
	LUX	Luxembourg
	NLD	Netherlands
	PRT	Portugal
	ESP	Spain
	SWE	Sweden
	GBR	United Kingdom
WEU	HUN	Hungary
	POL	Poland
	CHE	Switzerland
	TUR	Turkey
	LTV	Latvia
	LTU	Lithuania
	EST	Estonia
	CZE	Czech Republic
	SVK	Slovak Republic
	SLV	Slovenia
	XEF	Rest of EFTA including Iceland, Lichtenstein, Norway
JPN	JPN	Japan
KOR	KOR	Korea
MEX	MEX	Mexico
USA	USA	United States of America
Russia	RUS	Russia
ROW	Rest of the World	All countries/regions not mentioned above
List of countries from the ROW group presented in the Charts A3.3 A3.3 to A3.7	ARG	Argentina
	BOL	Bolivia
	BRA	Brazil
	MYS	Malaysia
	SGP	Singapore
	THA	Thailand
	TWN	Chinese Taipei
	XCB	Rest of Caribbean including Anguilla, Aruba, Cayman Islands, Cuba, Guadalupe, Martinique, British Virgin Islands
	XEA	Rest of Asia including Macao, Mongolia and the Democratic People's Republic of Korea
	XME	Rest of Middle East including Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen

Source: GTAP 6

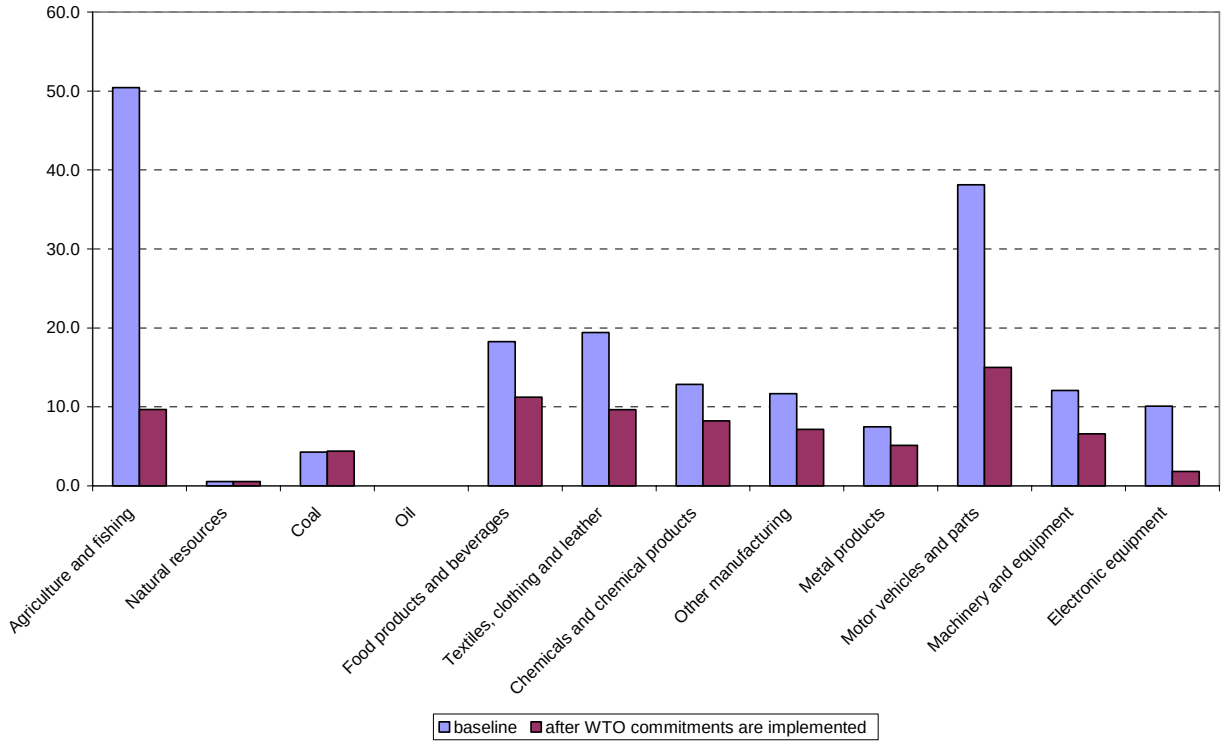
Table A5.3. China's average trade-weighted tariffs by trading partner and product in the baseline, year 2001

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	Average for product category
Agriculture and fishing	19.3	12.9	0.0	27.1	23.9	9.0	14.5	20.7	68.4	4.5	21.0	11.9	65.1	50.4
Natural resources	0.0	0.0	0.0	3.0	0.3	2.9	2.8	1.2	2.3	0.1	1.5	2.8	0.5	0.6
Coal	4.5	4.5	0.0	0.0	4.3	3.5	0.0	0.0	4.5	0.0	3.6	0.0	4.1	4.3
Oil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Food products and beverages	17.1	20.3	0.0	33.5	16.7	24.3	22.2	19.5	18.5	9.6	24.5	17.4	15.4	18.3
Textiles, clothing and leather	18.6	10.8	0.0	21.7	19.3	21.7	18.8	10.5	17.0	13.0	16.7	17.5	18.0	19.4
Chemicals and chemical products	15.6	10.6	0.0	14.5	9.1	12.6	11.6	8.7	10.9	14.2	11.4	10.1	15.7	12.9
Other manufacturing	14.7	8.0	0.0	14.1	3.3	14.6	16.0	2.3	10.4	18.5	14.5	14.3	9.9	11.7
Metal products	11.4	7.2	0.0	4.7	5.5	8.0	9.4	4.2	5.3	7.1	9.0	4.2	6.4	7.5
Motor vehicles and parts	22.5	14.9	0.0	17.8	17.6	42.3	47.7	32.5	30.3	23.9	36.2	43.9	35.4	38.1
Machinery and equipment	13.4	12.4	0.0	13.8	6.0	13.0	12.9	8.0	10.3	14.5	12.1	12.8	13.5	12.1
Electronic equipment	11.6	10.9	0.0	10.0	12.8	10.5	11.3	11.4	10.2	9.2	10.8	11.3	8.9	10.1
Average for partner country	10.8	11.9	0.0	4.7	6.3	13.6	13.4	10.0	13.6	7.6	10.9	8.4	12.2	

After implementation of WTO accession commitments

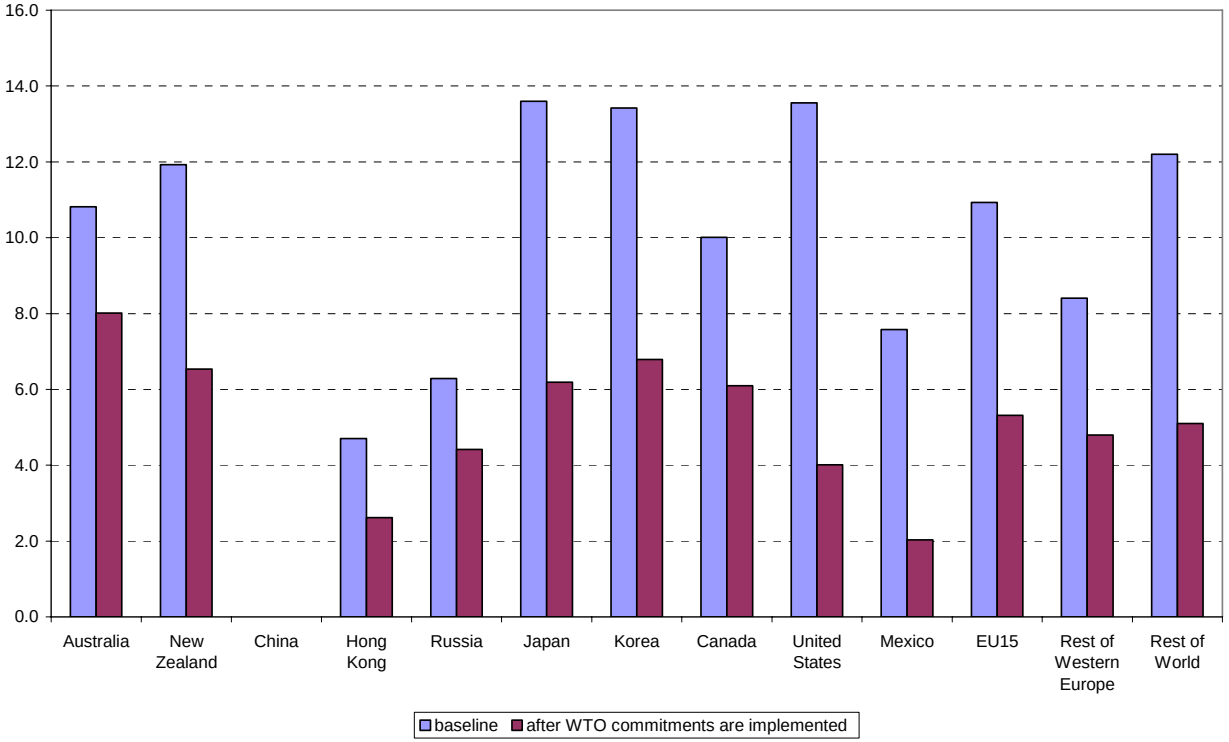
	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	Average for product category
Agriculture and fishing	18.9	8.3	0.0	10.0	15.3	8.1	10.8	19.6	4.7	6.3	20.2	9.3	6.3	9.7
Natural resources	0.0	0.0	0.0	3.0	0.2	2.9	2.8	1.2	2.2	0.1	1.5	2.7	0.6	0.5
Coal	4.5	4.5	0.0	3.5	4.3	3.5	4.1	5.0	4.5	3.7	4.8	4.4	4.2	4.4
Oil	0.0	0.0	0.0	0.0	0.0	3.0	0.0	6.0	0.2	3.0	0.1	0.0	0.0	0.0
Food products and beverages	11.5	10.0	0.0	17.5	9.8	13.8	14.8	9.6	11.2	5.3	12.0	11.1	10.9	11.2
Textiles, clothing and leather	16.0	10.1	0.0	13.7	12.0	9.2	9.4	5.3	8.9	6.8	9.5	9.4	8.6	9.6
Chemicals and chemical products	8.6	6.9	0.0	7.2	6.0	7.2	6.4	5.1	6.6	7.7	7.1	6.7	11.4	8.2
Other manufacturing	7.2	3.5	0.0	7.5	1.4	10.9	9.8	0.8	6.2	9.9	8.6	8.7	5.9	7.2
Metal products	6.0	3.8	0.0	3.7	4.4	5.4	6.0	3.1	3.6	4.3	5.9	3.6	4.9	5.1
Motor vehicles and parts	12.2	10.3	0.0	9.2	11.9	15.9	18.3	11.4	13.8	8.9	14.6	16.3	13.9	15.0
Machinery and equipment	6.9	6.4	0.0	7.5	5.0	6.7	6.7	4.9	5.2	7.8	6.9	7.7	7.4	6.6
Electronic equipment	1.1	0.8	0.0	2.0	4.0	2.4	4.2	1.0	0.6	0.9	1.4	1.9	1.2	1.8
Average for partner country	8.0	6.5	0.0	2.6	4.4	6.2	6.8	6.1	4.0	2.0	5.3	4.8	5.1	

Chart A5.1. China's average trade-weighted tariffs by trading partner (baseline, year 2001)



Source: Authors calculations based on GTAP 6

Chart A5.2. China's average trade-weighted tariffs by product category (baseline, year 2001)



Source: Authors calculations based on GTAP 6

Table A5.4. Services tax equivalents in China (before and after the implementation of its GATS commitments)

	China	China WTO
Banking mode 1	2.0	0.06
Banking mode 3	21.5	8.17
Insurance mode 1	130.3	67.89
Insurance mode 3	88.2	34.80
Telecommunication mode 1	15.7	7.06
Telecommunication mode 3	38.3	25.95
Trade mode 1	13.7	6.61
Trade mode 3	7.2	2.06
Professional services mode 1	107.3	43.91
Professional services mode 3	10.3	4.78

Source: Authors calculations based on the methodology presented in OECD(2005j) [TD/TC/WP(2005)36]

Table A5.5. Welfare decomposition of results of implementation of China's WTO commitments in the area of goods (USD million)

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	Total
Total welfare change	-227	14	13,761	1,072	-142	2,451	647	-232	4,272	-164	3,899	-36	-1,149	24,167
Main components of welfare change														
Allocative efficiency	-1	-1	20,804	-39	-25	224	102	91	1,090	-67	1,978	-34	-556	23,566
Net capital endowment	-3	-2	839	31	-1	41	17	-7	-114	-4	-40	-34	-284	438
Terms of trade	-116	-5	-7,098	309	-53	1,179	439	48	3,646	-240	2,425	-157	-377	0
Foreign debt effects	-141	-5	-76	77	-94	1,037	-1	-422	200	-290	266	184	-735	0
FDI effects	8	21	-1,559	696	26	-16	78	35	-224	378	-593	48	1,102	0
FDI-related rents	2	0	19	-9	1	-9	-4	13	-63	59	-32	-4	26	0
Product variety	26	6	832	7	4	-1	19	10	-277	-5	-182	-47	-325	68
Other	-2	0	0	0	0	-4	-2	-1	14	6	78	7	0	95

Table A5.6. Welfare decomposition of results of full liberalisation by China in the area of goods (USD million)

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	Total
Total welfare change	-45	69	15,952	2,009	479	6,280	2,179	-78	4,614	-30	-116	522	2,700	34,535
Main components of welfare change														
Allocative efficiency	41	12	29,086	-43	51	835	740	111	1,219	-103	1,884	35	363	34,229
Net capital endowment	-5	-3	958	15	0	84	37	-8	-332	-10	-66	-43	-384	244
Terms of trade	132	24	-12,711	934	77	2,474	1,052	148	4,533	-278	2,698	-5	923	0
Foreign debt effects	-241	38	-377	267	378	3,082	388	-448	-452	-327	-2,770	574	889	0
FDI effects	14	-2	-2,480	1,139	-14	-23	33	83	222	570	-720	9	1,169	0
FDI-related rents	-3	-4	711	-323	-11	-104	-77	40	-235	121	-201	8	79	0
Product variety	17	4	704	21	-1	-65	10	-4	-358	-7	-109	-69	-332	-191
Other	0	0	61	1	-1	-3	-4	1	16	5	168	14	-6	253

Source: FTAP model projections

Table A5.7. Welfare decomposition of results of implementation of China's WTO commitments in the area of services (USD million)

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Europe	Rest of World	Total
Total welfare change	20.47	-2.37	2820.99	278.19	-26.51	62.90	26.25	2.74	614.97	19.38	388.65	-1.28	281.69	4486.06
Main components of welfare change														
Allocative efficiency	8.70	0.49	3903.15	-4.96	-3.40	-7.37	12.73	13.77	73.78	6.59	104.16	-4.04	36.62	4140.23
Net capital endowment	-1.30	0.16	139.87	15.69	-0.12	5.29	2.27	-0.98	-26.93	-6.33	20.49	-0.27	-5.17	142.68
Terms of trade	16.82	1.86	-1595.20	449.84	-28.85	80.85	6.90	-6.12	478.91	-16.12	446.83	48.39	115.90	0.00
Foreign debt effects	4.52	0.28	-137.79	5.84	5.34	-12.19	0.33	12.68	31.40	8.77	70.47	-6.03	16.38	0.00
FDI effects	4.21	-3.44	-1103.80	229.22	2.07	100.02	55.07	8.20	236.64	30.94	23.60	-10.20	427.49	0.00
FDI-related rents	-6.90	-1.03	934.20	-426.90	-0.11	-80.82	-38.33	-10.22	-79.48	-0.21	-85.92	-5.43	-198.85	0.00
Product variety	-5.57	-0.68	550.47	9.40	-1.47	-23.08	-12.75	-14.61	-99.28	-4.24	-184.53	-23.01	-109.54	81.11

Source: FTAP model projections

Table A5.8. Welfare decomposition of results of full liberalisation by China in the area of services (USD million)

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Europe	Rest of World	Total
Total welfare change	-99	-3	11,973	719	-191	1,089	-63	-377	575	-93	-96	66	230	13,730
Main components of welfare change														
Allocative efficiency	-3	-1	13,186	-17	-29	-54	-30	-20	-3	-15	22	-20	-94	12,922
Net capital endowment	-5	-1	477	19	-3	-8	3	-12	-239	-14	-26	-16	-176	-1
Terms of trade	35	6	-2,181	992	-81	-4	-47	-26	610	-49	503	36	205	0
Foreign debt effects	-129	-6	-249	80	-85	1,225	-13	-385	58	-228	256	169	-694	0
FDI effects	24	1	-2,984	620	14	212	132	90	503	188	-350	-57	1,607	0
FDI-related rents	-13	-1	2,193	-1,006	2	-194	-89	-4	-232	28	-247	-13	-423	0
Product variety	-7	-1	1,275	30	-10	-91	-21	-20	-124	-3	-289	-36	-194	509

Source: FTAP model projections

Table A5.9. Implementation of WTO commitments by China in the area of goods: percentage changes in stocks of FDI held in China investing region and sector

	Australia	New Zealand	China	Hong Kong-China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World	All countries
Agriculture and fishing	-1.27	-1.34	0.27	-1.27	-1.32	-1.31	-1.32	-1.31	-1.34	-1.3	-1.32	-1.33	-1.32	0.4
Natural resources	-0.42	-0.46	0.22	-0.39	-0.44	-0.42	-0.45	-0.43	-0.44	-0.42	-0.44	-0.45	-0.44	0.21
Coal	-0.07	-0.1	0.19	-0.03	-0.08	-0.07	-0.09	-0.08	-0.08	-0.06	-0.08	-0.09	-0.08	0.15
Oil	-0.21	-0.25	0.2	-0.17	-0.23	-0.21	-0.23	-0.22	-0.22	-0.2	-0.22	-0.23	-0.23	0.15
Food products and beverages	0.69	0.63	0.13	0.74	0.68	0.7	0.66	0.69	0.69	0.72	0.69	0.68	0.67	0.11
Textiles, clothing and leather	2.8	2.76	0.03	2.71	2.8	2.75	2.69	2.83	2.8	2.83	2.82	2.82	2.72	-0.51
Chemicals and chemical products	-0.22	-0.27	0.19	-0.16	-0.25	-0.23	-0.27	-0.23	-0.24	-0.21	-0.24	-0.25	-0.25	0.24
Other manufacturing	0.11	0.06	0.17	0.16	0.09	0.11	0.07	0.1	0.09	0.12	0.09	0.08	0.08	0.22
Metal products	-0.13	-0.17	0.19	-0.05	-0.15	-0.12	-0.15	-0.13	-0.14	-0.11	-0.14	-0.15	-0.14	0.2
Motor vehicles and parts	-2.23	-2.27	0.29	-2.02	-2.26	-2.23	-2.19	-2.25	-2.25	-2.23	-2.25	-2.27	-2.2	0.29
Machinery and equipment	-0.21	-0.26	0.19	-0.14	-0.24	-0.22	-0.24	-0.23	-0.24	-0.2	-0.23	-0.25	-0.24	0.3
Electronic equipment	1.18	1.13	0.2	1.14	1.17	1.18	1.11	1.18	1.17	1.2	1.17	1.16	1.11	0.23
Electricity	0.14	0.08	0.17	0.19	0.12	0.13	0.09	0.13	0.12	0.15	0.12	0.11	0.11	0.17
Wholesale trade	0.47	0.42	0.16	0.51	0.44	0.46	0.43	0.46	0.45	0.48	0.45	0.44	0.44	0.17
Water transport	0.41	0.36	0.15	0.45	0.38	0.4	0.36	0.39	0.38	0.42	0.38	0.37	0.38	0.25
Air transport	0.46	0.41	0.17	0.51	0.43	0.45	0.42	0.45	0.44	0.47	0.44	0.43	0.43	0.16
Post and communications	0.41	0.36	0.16	0.46	0.38	0.4	0.37	0.4	0.39	0.42	0.39	0.38	0.38	0.16
Finance	0.41	0.36	0.16	0.47	0.39	0.4	0.37	0.4	0.39	0.42	0.39	0.38	0.38	0.14
Insurance	0.35	0.29	0.17	0.4	0.32	0.34	0.31	0.33	0.32	0.35	0.33	0.31	0.32	0.13
Business activities	0.34	0.29	0.17	0.36	0.31	0.33	0.29	0.32	0.32	0.35	0.32	0.3	0.31	0.16
Other services	0.5	0.45	0.15	0.54	0.48	0.49	0.46	0.49	0.48	0.51	0.48	0.47	0.47	0.17

Source: FTAP model projections

Table A5.10. China's WTO accession in the area of services: percentage changes in stocks of FDI held in China investing region and sector

	Australia	New Zealand	China	Hong Kong China	Russia	Japan	Korea	Canada	United States	Mexico	EU15	Rest of Western Europe	Rest of World
Agriculture	0.20	0.20	-0.07	0.28	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Natural resources	0.41	0.41	-0.09	0.50	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
Coal	0.26	0.26	-0.08	0.32	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Oil	0.21	0.22	-0.07	0.29	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.22	0.21
Food products and beaverages	0.11	0.11	-0.06	0.20	0.11	0.11	0.10	0.11	0.10	0.11	0.10	0.11	0.10
Textiles, clothing and leather	0.30	0.31	-0.06	0.38	0.30	0.30	0.29	0.30	0.30	0.30	0.30	0.31	0.30
Chemicals and chemical products	0.25	0.25	-0.07	0.34	0.25	0.25	0.24	0.25	0.25	0.25	0.25	0.25	0.25
Other manufacturing	0.20	0.20	-0.07	0.28	0.20	0.19	0.18	0.20	0.19	0.19	0.19	0.20	0.19
Metal products	0.27	0.27	-0.07	0.34	0.27	0.27	0.25	0.27	0.27	0.27	0.27	0.27	0.26
Motor vehicles and parts	0.21	0.21	-0.07	0.29	0.21	0.20	0.19	0.20	0.20	0.21	0.20	0.21	0.20
Machinery and equipment	0.32	0.32	-0.08	0.39	0.32	0.31	0.31	0.31	0.31	0.32	0.31	0.32	0.31
Electronic equipment	0.38	0.38	0.06	0.44	0.38	0.37	0.35	0.38	0.37	0.38	0.37	0.38	0.36
Electricity	0.20	0.20	-0.07	0.29	0.20	0.20	0.19	0.20	0.19	0.20	0.20	0.20	0.19
Wholesale trade	3.45	3.45	-0.04	3.46	3.46	3.45	3.42	3.45	3.45	3.46	3.45	3.46	3.44
Water transport	0.17	0.17	-0.06	0.26	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Air transport	0.23	0.23	-0.06	0.32	0.23	0.23	0.22	0.23	0.23	0.23	0.23	0.23	0.23
Post and communications	3.81	3.81	-0.05	3.89	3.81	3.81	3.77	3.81	3.81	3.81	3.81	3.81	3.80
Finance	7.14	7.14	-0.06	7.27	7.14	7.14	7.13	7.14	7.13	7.14	7.13	7.14	7.14
Insurance	21.74	21.74	0.28	22.00	21.74	21.74	21.73	21.74	21.74	21.74	21.74	21.75	21.74
Business activities	1.02	1.02	0.04	1.02	1.02	1.02	0.99	1.02	1.02	1.02	1.02	1.02	1.02
Other services	-0.10	-0.10	-0.06	0.00	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10

Source: FTAP model projections