MANAGING TRADE POLICY REFORM AND THE REFORM OF THE CURRENT ACCOUNT SURPLUS: THE CASE OF CHINA

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Contents

1. OVERVIEW

The GLOBE regional CGE model is designed to assist in the analysis of economy wide and global issues. In this paper, we analyse in a standard way the unilateral and multilateral trade policy liberalisation for China, unilateral liberalisation in China of ad valorem equivalents of non-tariff barrier (aveNTBs), and the impact of on these reforms of a simultaneous lowering of China's current account surplus. The latter is imposed exogenously as a part of a hypothesised package of exogenous macro economic reforms. The organisation of this paper is as follows: Section 2.1 describes the GLOBE CGE model. In section 2.2 describes how a set of hypothesised exogenous macro economic reforms impact on the current account balance and real exchange rates in the model. The regions, sectors and factors specified in the model are described in section 2.3 and some structural characteristics of the global economy and China's place therein are described in section 2.4. In section 3, three sets of scenarios are developed - baseline, current account surplus reform, trade policy reform are described together with their interaction,. Section 4 discusses some key aspects of the macro and sector results from the 9 experiments reported. Some concluding remarks are made in the final section.

2. THE GLOBE MODEL

2.1 MODELLING TRADE POLICY REFORM

The GLOBE multi-country CGE (Computable General Equilibrium) model was developed by Scott McDonald, Sherman Robinson and Karen Thierfelder. The model has the following key characteristics. GLOBE models agents' micro economic behaviour in consumption and production in the economy, treating tradable goods as imperfect substitutes for domestic production. GLOBE allows for a choice of how key markets operate (closure rules), allowing for different assumptions about the behaviour of markets and actors to be examined. Given base data, key parameters, policy variables such as tariffs, GLOBE solves for real values of production, consumption, economic welfare, real exchange rates. Further scenarios will be developed to estimate a variety of social impacts and changes in CO2 and other emissions.

The GLOBE model is a member of the class of multi-country, computable general equilibrium (CGE) models that are descendants of the approach to CGE modelling described by Dervis *et al*., (1982). The model is a SAM-based CGE model, wherein the SAM serves to identify the agents in the economy and provides the database with which the model is calibrated. The SAM also serves an important organisational role since the groups of agents identified in the SAM structure are also used to define sub-matrices of the SAM for which behavioural relationships need to be defined. (Pyatt, 1987) The implementation of this model, using the GAMS (General Algebraic Modelling System) software, is a direct descendant and extension of the single-country and multi-country CGE models developed in the late 1980s and early 1990s. (See McDonald *et al.* 2007 for a more detailed description of the GLOBE model)

International Trade

Trade is modelled using a treatment derived from the Armington “insight”; namely domestically produced commodities are assumed to be imperfect substitutes for traded goods, both imports and exports. Import demand is modelled via a series of nested constant elasticity of substitution (CES) functions; imported commodities from different source regions to a destination region are assumed to be imperfect substitutes for each other and are aggregated to form composite import commodities that are assumed to be imperfect substitutes for their counterpart domestic commodities The composite imported commodities and their counterpart domestic commodities are then combined to produce composite consumption commodities, which are the commodities demanded by domestic agents as intermediate inputs and final demand (private consumption, government, and investment). The presumption of imperfect substitutability between imports from different sources is relaxed where the imports of a commodity from a source region account for a ‘small’ (value) share of imports of that commodity by the destination region. In such cases the destination region is assumed to import the commodity from the source region in fixed shares: this is a novel feature of the model introduced to ameliorate the terms of trade effects associated with small trade shares.

Export supply is modelled via a series of nested constant elasticity of transformation (CET) functions; the composite export commodities are assumed to be imperfect substitutes for domestically consumed commodities, while the exported commodities from a source region to different destination regions are assumed to be imperfect substitutes for each other. The composite exported commodities and their counterpart domestic commodities are then combined as composite production commodities; properties of models using the Armington insight are well known. (de Melo and Robinson 1989, Devarajan *et al*., 1990) The use of nested CET functions for export supply implies that domestic producers adjust their export supply decisions in response to changes in the relative prices of exports and domestic

commodities. This specification is desirable in a global model with a mix of developing and developed countries that produce different kinds of traded goods with the same aggregate commodity classification, and yields more realistic behaviour of international prices than models assuming perfect substitution on the export side.

Agents are assumed to determine their optimal demand for and supply of commodities as functions of relative prices, and the model simulates the operation of national commodity and factor markets and international commodity markets. Each source region exports commodities to destination regions at prices that are valued free on board (*fob*). Fixed quantities of trade services are incurred for each unit of a commodity exported between each and every source and destination, yielding import prices at each destination that include carriage, insurance and freight charges (*cif*). The *cif* prices are the 'landed' prices expressed in global currency units. To these are added any import duties and other taxes, and the resultant price converted into domestic currency units using the exchange rate to get the source region specific import price. The price of the composite import commodity is a weighted aggregate of the region-specific import prices, while the domestic supply price of the composite commodity is a weighted aggregate of the import commodity price and the price of domestically produced commodities sold on the domestic market.

The prices received by domestic producers for their output are weighted aggregates of the domestic price and the aggregate export prices, which are themselves weighted aggregates of the prices received for exports to each region in domestic currency units. The fob export prices are then the determined by the subtraction of any export taxes and converted into global currency units using the regional exchange rate.

There are two important features of the price system in this model that deserve special mention. First, each region has its own numéraire such that all prices within a region are defined relative to the region's numéraire. We specify a fixed aggregate consumer price index

to define the regional numéraire. For each region, the real exchange rate variable ensures that the regional trade-balance constraint is satisfied when the regional trade balances are fixed. Second, in addition, there is a global numéraire such that all exchange rates are expressed relative to this numéraire. The global numéraire is defined as a weighted average of the exchange rates for a user defined region or group of regions. In this implementation of GLOBE the basket of regions approximates the OECD economies.

Fixed country trade balances are specified in "real" terms defined by the global numéraire. If the global numéraire is the US exchange rate and it is fixed to one, then the trade balances are "real" variables defined in terms of the value of US exports. If global numéraire is a weighted exchange rate for a group of regions, as in this case, and it is fixed to one, then the trade balances are "claims" against the weighted average of exports by the group of regions in the numéraire.

Production and Demand

The production structure is a two stage nest. Intermediate inputs are used in fixed proportions per unit of output —Leontief technology. Primary inputs are combined as imperfect substitutes, according to a CES function, to produce value added. Producers are assumed to maximize profits, which determines product supply and factor demand. Product markets are assumed to be competitive, and the model solves for equilibrium prices that clear the markets. Factor markets in developed countries are also assume to have fixed labour supplies, and the model solves for equilibrium wages that clear the markets. In developing countries, however, we assume that the real wage of unskilled labour is fixed and that the supply of unskilled labour is infinitely elastic at that wage. So, labour supply clears the market, and aggregate unskilled employment is endogenous rather than the real wage. In this specification, any shock that would otherwise increase the equilibrium wage will instead lead to increased employment.

Final demand by the government and for investment is modelled under the assumption that the relative quantities of each commodity demand by these two institutions is fixed—this treatment reflects the absence of a clear theory that defines an appropriate behavioural response by these agents to changes in relative prices. For the household there is a well developed behavioural theory; and the model contains the assumption that households are utility maximisers who respond to changes in relative prices and incomes. In this version of the model, the utility functions for private households are assumed to be Stone Geary functions; for the OECD countries they are parameterised as Cobb Douglas functions, i.e., there are no subsistence expenditures.

Macro Closure

All economy wide models must incorporate the standard three macro balances: current account balance, savings-investment balance, and the government deficit/surplus. How equilibrium is achieved across these macro balances depends on the choice of macro "closure" of the model. The scenarios reported use this exercise a "neutral" or "balanced" set of macro closure rules. This macro closure ensures the model is focused on the effects of changes in relative prices on the structure of production, employment, and trade. Fuller analysis of the impact of trade liberalisation on, for example, asset markets and macro flows is better studied using macro-econometric models which incorporate asset markets rather than using a CGE model which focuses on changes in equilibrium relative prices in factor and product markets. The strength of the multi-country CGE model is that it elegantly incorporates the features of neoclassical general equilibrium and real international trade models in an empirical framework, but it also abstracts from macro impacts working through the operation of asset markets.

Current account balances are assumed to be fixed for each region (and must sum to zero for the world). Regional real exchange rates adjust to achieve equilibrium, as discussed earlier.

The underlying assumption is that any changes in aggregate trade balances are determined by macroeconomic forces working mostly in asset markets, which are not included in the model, and these balances are treated as exogenous. This assumption ensures that there are no changes in future 'claims' on exports across the regions in the model, i.e., the net asset positions are fixed.

In the scenarios reported, changes in aggregate absorption are assumed to be shared equally (to maintain the shares evident in the base data) among private consumption, government, and investment demands. The underlying assumption is that there is some mix of macro policies that ensures an equal sharing of the benefits of any increase in absorption or the burden of any decrease among the major macro "actors": households, government, and investment, i.e., final demand allocations are distribution ally neutral. To satisfy the savings-investment balance, the household savings rate adjusts to match changes in investment. Government savings are held constant; direct income tax rates on households adjust to ensure that government revenue equals government spending plus government savings. The tax replacement instrument, direct taxes on households, is likely to be less distorting than the trade taxes that it replaces but there are reasons to be sceptical about its appropriateness in the context of many least developed economies (see Greenaway and Milner, 1991). One potential consequence of this assumption is that the results for the least developed economies may be more positive than otherwise.

Factor Market Clearing

The implications of two alternative factor market clearing conditions were investigated. In the first, it was assumed that there was full employment and full factor mobility in all factor markets. This specification can be viewed as an archetypal free market model; but the presumption of full employment in all economies, used in the baseline scenario, is questionable. Hence the second alternative considered the case where there are excess

supplies of unskilled labour in developing regions (China, India, Other East Asia, Rest of South Asia, SACU, and Rest of sub-Saharan Africa). used in the current account adjustment scenario. When there is unemployment, the real wage is held constant and the supply of unskilled labour adjusts following a policy shock.

2.2 Exogenous Macro Policy Reform: Impact on Current Account and Real Exchange Rates

Economists agree that it is macro-economic preferences and policy, not trade policy that influences the pattern of global current account surpluses and deficits. The latter are determined by preferences for savings and investment over current spending, foreign capital flows, and other macro policies. Since any changes in aggregate trade balances are determined by macroeconomic forces working mostly in asset markets, which are not included in the Globe model, the question arises as to how best to introduce exogenous changes in current account balances or in real exchange rates and other macro variables can be explored in the Globe model when exogenous changes in current account balances or in real effective exchange rates are motivated by the scenarios developed in section 3.2.

One route developed by Liu, Robinson, Wang, and Noland (1998) used in an earlier version of the EU-China Globe modelling supposed China had an exogenous current account balance and an endogenous real effective exchange rate. On the other hand, China's trading partners were assumed to maintain a exogenous real effective exchange rates and endogenous current account balances. With this closure rule for the foreign exchange constraint, an exogenous lowering of China's current account surplus lead to an appreciation of China's real effective exchange rate against all of her trading partners. China's trading partners endogenous current account balances adjusted mainly according to the size of their bilateral trade flows with China and the Globe model constraint that total current account changes sum to zero.

In the foreign exchange closure used in this paper, the real effective exchange rates for all countries and regions were set exogenously, and the current account balances were set exogenously. For any exogenous change in China's current account balance, base year trade weights were used to estimate a vector of changes in current account balances of China's trading partners of equal to but of opposite sign to the change in China's current account balance thus maintaining the Globe model constraint that total current account changes sum to zero. Thus, the use of base year trade-weights to adjust current account balances in China's trading partners to exogenous changes in China's current account balances provides a simple but effective framework for the analysis of the impact of hypothesised macro economic reform in China on trade policy reform.

2.3 REGIONS, SECTORS, FACTORS AND HOUSEHOLDS IN THE GLOBE MODEL

For its base data the GLOBE model uses a global SAM derived from the GTAP 2001 dataset which contains 87 countries or regions, 57 sectors, 5 factors of production and one household. Each country or region is linked by bilateral trade flows. Regions and sectors can be aggregated in GLOBE as desired. For the China SIA there are 14 regions and 22 sectors, and a dummy regions globe that is the global supplier of trade and transport services for international trade. Details of which are shown in Table 1 below.

2.4 SOME STRUCTURAL CHARACTERISTICS OF CHINA'S PLACE IN THE GLOBAL ECONOMY

Some aspects of China's place in the global economy and the importance of China's trade are shown in Table 2. As can be seen from Table 2, China has one the highest trade dependence ratios. Although China's share of global GDP was just over 4 percent, the fact that its GDP growth is so high (about 10 percent pa) combined with a high trade dependence ratio means that China's impact on the global economy is very large. Equally, China's high trade dependence ratio and rapid growth means that the trade also interacts strongly with the Chinese economy. This report draws out some of the important aspects of this two-way

interaction in the discussion of trade policy reform and the impact of lowering China's current account surplus.

The Globe model can be thought of as a multi sector multi commodity and multi region version of the Heckscher-Ohlin model. It is therefore important to see how well the GTAP dataset reflects the underlying factor endowments of the regional trading partners. These are shown in Table 3 below. In the GTAP dataset, factors are measured in constant $US using the Atlas method so that factor shares across different countries and regions reflect the underlying measurement of factor endowments. As expected, China shows a higher share of unskilled labour compared with other Asian economies and NAFTA and the EU. Since the informal sector is not captured in the GTAP dataset, the shares of unskilled labour in China and India are lower than they would be if a more adequate measure of unskilled labour were available. More generally, the lack of differentiation of the countries/regions shown by factor endowments should be borne in mind when interpreting the reported results of experiments.

Table 4 and 5 show the shares on total output for selected world regions. China's high shares of output and value added is no surprise, but the high shares of output and value added in traditional sectors such as textiles and apparel, and in heavy industry sectors such as basic metals and machinery, when combined with extremely low shares of services reflect in part the heritage of state planning.

China's accession to the WTO has meant that trade policy has been a major area of economic policy reform. This can be seen in Table 6. Overall levels of tariff protection weighted by 2001 imports have fallen by more than half over a 6 year period. The remaining sectors with modestly high tariffs are in agriculture, food products and motor vehicles. The frequent observation that NTBs remain high is also borne out by Table 6. Here, the ad valorem equivalents measured by Kee et al 2004 at the World Bank at the HS 6 digit level centred around 2002 were aggregated to the Globe sectors using 2004 trade weights. The average

height of the NTBs at 7.8% for agriculture and industry is similar to the average height of the tariffs in 2001. Interestingly, the peaks of the NTBs do not generally coincide with the tariff peaks in 2006.

It is well known that using ad valorem equivalents of NTBs are not independent of the structure of output and trade at the time of estimation. In the case of China, it was found that some of the World Bank NTB estimates were at variance with observations of sector experts. The use of the ad valorem equivalents of the NTBs in this study is not meant to be definitive, but providing a useful first estimate of the height of NTBs.

3. SCENARIOS

3.1 BASELINE

The baseline scenario is designed to update the model base year from 2001 to 2007. This was done by first projecting GDP and factor growth over this period and estimating Total Factor Productivity growth as the difference between GDP growth and factor growth. The second step entailed combining the TFP and factor growth projections with an estimate of tariffs on traded goods in 2007 and running the model with the Baseline Scenario for the year 2007. The model solution for 2007 was then used as a new base for the subsequent scenarios. Total factor productivity or TFP is estimated for each region by first estimating a weighted average of the annual factor growth and subtracting this from the estimated average growth rate of GDP over the period 2001-6. The annual average estimates of factor growth and TFP are then used to update the 2001 base factor supply and TFP to 2007, the new base year for the Globe model. The final step in the baseline scenario is to apply the tariffs for China obtained from TRAINS for 2006. The methodology behind the baseline scenario extends the analysis of growth differences between rapidly growing South and East Asian countries and their trading partners in the global economy used by (McDonald *et al.* 2007). The results of GDP, factor and TFP estimates used in the baseline scenario 2001-2007 are shown in Table 7 below.

The baseline growth projections used are the average growth for the period 2002-2006 from the IMF World Economic Outlook, where the country estimates of GDP grow in current $US PPP are deflated using a $US GDP deflator. The advantage of using the $USPPP data is that aggregation into regional groups is much easier. A slight inconsistency is involved in the $US GDP deflator used for constant price estimates is based on the Atlas method. Also, the PPP estimates have a higher weight for non-traded goods, but these should not matter much over a 4 year time period. In all, the disadvantages of using the PPP data were judged to be of lesser importance than the accessibility of the PPP data. The changes in China's tariffs and NTBs to 2007 are in Table 6. The incorporation of the ad valorem NTBs into the baseline scenario requires some justification.

Ordinary tariffs can be readily modelled because they are recorded in the national accounts that form the basis of the measurement of the difference between domestic and world prices. The Table 6 shows the measure of the height of the NTBs but there is no corresponding accounting entry of the rents generated. By putting the NTBs into the baseline scenario, a distortion occurs because the NTBs induce some import substitution and there is no re-distribution of the rents generated in the model at present. The advantage of proceeding in this manner is that in subsequent experiments, the impact of changing the NTBs can be estimated by the model. A series of sensitivity tests of model results on currency reform and tariff policy reform will be carried out. The details of the model closures used in the baseline scenario are set out in Table 8.

3.2 CURRENT ACCOUNT REFORM

For some time now it has been argued that the Chinese yuan is undervalued, even though in recent years China's real effective exchange rate has appreciated (see Figure 1). The other side of the coin has been China's large accumulation of foreign exchange reserves, much of which is held in US Treasury bonds. In US and European policy circles, their respective

bilateral current account deficits with China have been seen as a policy problem and various trade policy instruments have been suggested as an appropriate remedy. As was made clear in section 2.2, it is macro policy and not trade policy that must adjust if the current account balances are to change. The scenarios developed dealing with current account reform provide a back-ground to trade policy reform in China (including lowering NTBs), generating an appreciating real effective exchange rate in response to an exogenous lowering of China's current account surplus. In the currency reform scenarios reported, it is assumed that China's current account surplus declines by $B30.

3.3 Trade Policy and NTB Reform

Medium and long run trade policy scenarios are described in detail in Table 9. The medium run context for trade policy reform was modelled by making capital sector specific and immobile, and in the long run fully capital mobility was assumed. As with the currency scenarios, the unskilled wage was fixed and the employment of unskilled labour was endogenous in the developing countries including China. Alternative unilateral tariff cuts of 25% and 50% were considered. The same was done for experiments with cuts to NTBs. The final set of experiments combine multilateral currency reform with multilateral trade policy reform.

3.4 Interaction Between Trade Policy and Current Account Change

The traditional comparative static Swan-Solow context for the analysis of trade policy reform treats the current account surplus or deficit as exogenous and unchanging and the real effective exchange rate as endogenous. A lowering of tariffs or NTBs generates at the initial set of prices and exchange rate a negative change in the current account balance. In the final equilibrium normally includes a devaluation of the real effective exchange rate. In this story, the devaluation of the real effective exchange rate is important because it provides a stimulus to exports which, together with the stimulus to import competing production, work together

to restore the current account balance. The normal efficiency and welfare implications follow, even if CGE models typically show a small % increase in welfare.

Scenarios for macro economic reform that include a lowering of the current account surplus as in the case of China, do not have the same efficiency and welfare implications as trade policy reform. Typically, lowering the current account surplus leads to a large improvement in economic welfare as measured in the Globe model. This is because the switch in asset holding implied by the change in current account balances is not included in the welfare function in a comparative static model. However, in the results for China reported in the next section, it was found that the impact of changes in the current account balance on the real effective exchange rate had negative interactive effects on trade policy reform. That is, the measured welfare effects of trade policy reform of the current account balance (and implied change in asset holding) were less when carried out together rather than the sum of the components of the reforms when carried out singly. The extent of this interaction effect and the reasons for it are discussed in section 4. below.

4. KEY RESULTS

4.1 TRADE POLICY AND NTB REFORM

In all, 9 experiments were performed with the 2007 baseline estimated by the model used as the new base year described in Table 11 below. Experiment 9 is the combination of experiments 1 and 8. “Experiment” 10 is the sum of the independently run results of experiments 1 and 9.

The experiments fall into four groups:

- Experiments involving the reform of China’s current account surplus in a multilateral context.

- Experiments involving unilateral tariff reform in the medium and long run of 25% and 50%.
- Experiments involving unilateral NTB reform in the long run 25% and 50%.
- Multilateral reform of China's current account surplus and multilateral trade policy reform.

Table 12 shows the macro results of all of the experiments.

Experiment 1, China's current account is reduced by $US30B, with compensating global adjustment by the same amount in her trading partners. This amount for each partner was estimated using partner trade weights with China. The change in absorption of over 2% (domestically produced and imported commodities for private and government consumption plus investment) is large for a comparative static calculation involving trade policy reform. It is accompanied by a surge in imports and large fall in exports and a real exchange appreciation of over 3%. These results are in line with expectations and are likely to be robust when sensitivity tests are carried out. However, the return to factors are not so easily explained in the context of the anti-trade bias of this experiment and may also be sensitive to some of the assumptions made in the baseline projects and should therefore be viewed with caution. The terms of trade also improve very slightly but only in the 3rd decimal place.

Unilateral tariff reductions are shown in experiments 2,3 and 5. Taking the long-run results in experiments 3 and 5, it is striking that the impact on absorption is very low - .02% and .03%. The effects on exports, imports and the real exchange rate are also very low. This makes the point, that by 2007, the average height of tariffs was less than 4% and the impact on the economy of reduction is minimal. Notice however, the tariff cuts in experiments 2, 4, 5 and 6 induced an adverse terms of trade response of 1% or more from the expansion of exports and imports, a reminder that China is big enough to affect her terms of trade. The largest terms of trade loss of 2% was found for experiment 6 were tariffs and aveNTBs were cut unilaterally

by 50% and absorption increased by 0.24%. The results of experiment 2 aimed to capture short run impacts where tariffs are unilaterally by 25% but with capital fixed in each sector. In this case, the impact on absorption at 0.48% is markedly higher than in the long run experiments. The reason for this apparent paradox is that the lack of capital mobility is highly constraining when tariffs are cut. But the tariff cut induces an increase in imports that has to be financed by export expansion requiring a much larger real exchange rate depreciation than in the long run cases. As can be seen by the strong increase in the employment of unskilled labour, the constraints on capital mobility induce export expansion using unemployed unskilled labour resulting in the increase in absorption and welfare.

Experiments 4 and 6 show the long run impacts of reducing NTBs by 25% and 50%. Given the higher levels of estimated NTB protection, the response of all the macro variables is relatively large including a strong expansion of unskilled labour employment. The 50% cut in NTBs induces a 2% decline the terms of trade. To achieve the 0.24% increase in absorption in the face of such a terms of trade loss underlines the point that the reduction in estimated ad valorem equivalents of the NTBs have a powerful expansionary effect on exports and imports.

The importance of multilateral vs unilateral tariff reduction for China is illustrated in experiments 7 and 8. When China joints multi-lateral trade, here a “super” Doha Round with up to 50% global tariff cuts, the welfare response in China is strong because of improved market access fro her exports into partner markets.

4.2 Other Results

The final experiment 9 links multilateral tariff reduction with a reduction in China’s current account surplus balance with off-setting changes in partner country current account balances. For comparative purposes, experiment 10 adds the results of experiments 1 and 9. The

absorption increase in this experiment is only marginally smaller than for the tariff and currency reforms considered separately, suggesting a non-linear response. Given that experiments 1 and 9 considered separately show substantial real exchange rate appreciation, a larger reduction in the combined responses including absorption effects might have been expected. In effect, the efficiency gains from multilateral tariff reductions were blunted when carried out in the context of currency appreciation due to lowering China's current account balance.

It is difficult to tease out pattern in the sector results of experiments 1-9 because the peaks in the estimated tariff and non-tariff barriers do not usually coincide.

5.CONCLUDING REMARKS

The findings of the analysis to date centre mainly on the macro results of the experiments. The following points can be made:

- Further unilateral tariff cuts in China are unlikely to have strong economic welfare benefits..
- Multilateral tariff cuts combined with cuts in China's current account surplus may provide a way forward and away from beggar-thy neighbour responses to China's current account surplus.
- The most import area of unilateral tariff reform probably lies in NTBs. However, there are serious problems in measuring and analysing these barriers to trade.

FIGURES AND TABLES

Table 1: Sectors, factors and regions in the GLOBE model

Sectors		Regions
Crop agriculture	Electronic equipment	China
Animal agriculture	Machinery and equipment	Advanced East Asia
Coal	Other manufacturing	Middle East Asia
Oil and gas	Utilities	Other East Asia
Other minerals	Construction	India
Meat products	Trade and transport	Rest of South Asia
Other foods	Business services	NAFTA
Textiles	Other services	MERCOSUR plus
Wearing apparel		Rest of the Americas
Wood and paper products	**Factors**	European Union
Petroleum and coal products	Land	Middle East and North Africa (MENA)
Chemical rubber and plastic products	Unskilled labour	Southern Africa Customs Union (SACU)
Basic metal and mineral products	Skilled Labour	Rest of sub-Saharan Africa
Motor vehicles and parts	Capital	Rest of the World
Other transport equipment	Natural resources	

Model dataset, based on GTAP v.6.

Table 2: Structure of Trade and GDP 2001

	Share of Total			
	Imports	**Exports**	**GDP**	**Trade Dependence**
China	5.80	6.85	4.14	0.71
Adv East Asia	12.80	14.28	17.21	0.37
Middle East Asia	2.25	3.08	0.76	1.64
Other East Asia	1.72	1.84	1.04	0.80
India	1.03	0.88	1.49	0.30
Rest of S Asia	0.50	0.40	0.46	0.46
NAFTA	23.37	18.86	36.69	0.27
MERCOSUR	1.97	1.94	2.93	0.31
Rest of the Americas	1.98	1.57	1.45	0.57
EU	39.87	41.53	28.00	0.68
MENA	4.59	4.54	3.23	0.66
SACU	0.51	0.65	0.39	0.69
Rest of SSA	1.10	0.89	0.61	0.76
Row	2.51	2.70	1.61	0.76
Total	100.00	100.00	100.00	

Model dataset, based on GTAP v.6.

Table 3: Factor Shares in Selected World Regions

	China	Advanced East Asia	India	NAFTA	European Union
Land	4.04	0.51	9.97	0.52	0.62
Unskilled Labour	42.55	35.48	35.71	34.51	28.70
Skilled Labour	12.06	21.87	10.80	23.69	19.74
Capital	39.76	41.87	42.56	40.91	50.53
Natural Resources	1.59	0.27	0.96	0.36	0.41
Total	100.00	100.00	100.00	100.00	100.00

Table 4: Value Added Shares by Sector for Selected World Regions

	China	Advanced East Asia	India	NAFTA	European Union
Crop agriculture	10.8	1.6	18.5	1.3	1.6
Animal agriculture	5.8	0.6	6.8	0.4	1.1
Coal	0.5	0.2	0.5	0.2	0.1
Oil and gas	1.0	0.1	1.2	0.5	0.5
Other minerals	1.6	0.3	0.5	0.2	0.1
Meat products	0.3	0.3	0.2	0.7	1.0
Other foods	2.6	1.9	3.6	2.2	2.4
Textiles	3.0	0.5	2.1	0.6	0.5
Wearing apparel	3.0	0.6	0.7	0.5	0.7
Wood and paper products	2.3	1.9	0.9	2.8	2.3
Petroleum and coal products	0.6	0.3	0.2	0.1	0.1
Chemicals, rubber and plastics	4.0	2.7	2.6	2.9	3.2
Basic metal and mineral products	5.4	2.3	2.0	1.6	2.1
Motor vehicles and parts	0.9	1.7	0.7	1.1	1.8
Other transport equipment	0.7	0.5	0.7	0.8	0.5
Electronic equipment	2.2	3.2	0.4	1.4	1.7
Machinery and equipment	6.1	3.1	1.7	3.8	3.3
Other manufacturing	4.3	1.9	2.3	1.5	2.6
Utilities	2.4	3.0	3.6	2.2	2.3
Construction	7.3	6.9	5.5	6.0	5.9
Trade and transport	18.9	22.0	20.6	20.8	20.0
Business services	5.4	14.8	7.2	20.4	16.8
Other services	10.6	29.5	17.7	28.1	29.4
Total	100.0	100.0	100.0	100.0	100.0

Table 5: Output Shares by Sector for Selected World Regions

	China	Advanced East Asia	India	NAFTA	European Union
Crop agriculture	5.6	1.1	12.1	0.9	1.0
Animal agriculture	3.7	0.7	5.0	0.6	1.0
Coal	0.4	0.1	0.4	0.2	0.1
Oil and gas	0.6	0.1	0.7	0.5	0.3
Other minerals	1.7	0.3	0.4	0.2	0.1
Meat products	0.6	0.8	0.6	1.5	1.9
Other foods	4.4	3.5	5.2	3.0	3.4
Textiles	4.6	0.8	4.0	0.9	0.9
Wearing apparel	3.7	0.9	1.2	0.8	1.0
Wood and paper products	2.8	2.5	1.5	3.6	3.3
Petroleum and coal products	1.8	1.2	2.3	0.9	0.9
Chemicals, rubber and plastics	6.3	4.6	5.8	4.1	5.2
Basic metal and mineral products	8.0	4.0	4.4	2.3	3.6
Motor vehicles and parts	1.4	3.7	1.2	2.9	3.4
Other transport equipment	1.0	0.7	1.0	1.1	0.7
Electronic equipment	3.6	5.7	0.8	2.1	2.5
Machinery and equipment	7.9	4.4	3.3	4.4	4.9
Other manufacturing	4.9	2.5	4.1	2.0	3.5
Utilities	2.0	2.7	4.4	2.1	2.0
Construction	8.6	7.9	7.1	7.4	7.0
Trade and transport	15.3	19.3	18.3	19.8	17.6
Business services	3.8	12.2	5.1	17.9	14.1
Other services	7.3	20.3	11.1	21.1	21.4
Total	100.0	100.0	100.0	100.0	100.0

Table 6: China Tariffs and Non-Tariff Barriers by Sector

	GTAP6 2001 Tariffs	TRAINS 2006 Tariffs	Non-tariff Barriers
Crop agriculture	43.5%	9.3%	14.2%
Animal agriculture	4.1%	11.8%	15.0%
Coal	0.9%	1.1%	83.7%
Oil and gas	0.0%	0.0%	0.0%
Other minerals	0.6%	0.3%	20.3%
Meat products	8.5%	3.3%	0.1%
Other foods	10.5%	7.9%	16.4%
Textiles	15.0%	5.1%	14.8%
Wearing apparel	3.9%	1.6%	0.5%
Wood and paper products	6.9%	1.7%	17.5%
Petroleum and coal products	6.2%	3.9%	8.8%
Chemicals, rubber and plastics	11.0%	5.8%	6.8%
Basic metal and mineral products	6.3%	3.1%	26.8%
Motor vehicles and parts	11.0%	14.1%	4.3%
Other transport equipment	30.2%	2.1%	0.3%
Electronic equipment	4.7%	0.3%	3.3%
Machinery and equipment	7.3%	4.6%	3.8%
Other manufacturing	8.7%	3.3%	1.0%
Utilities	0.0%	0.0%	0.0%
Construction	0.0%	0.0%	0.0%
Trade and transport	0.0%	0.0%	0.0%
Business services	0.0%	0.0%	0.0%
Other services	0.0%	0.0%	0.0%
Total all	7.5%	3.0%	6.5%
Total excluding services	8.9%	3.6%	7.8%

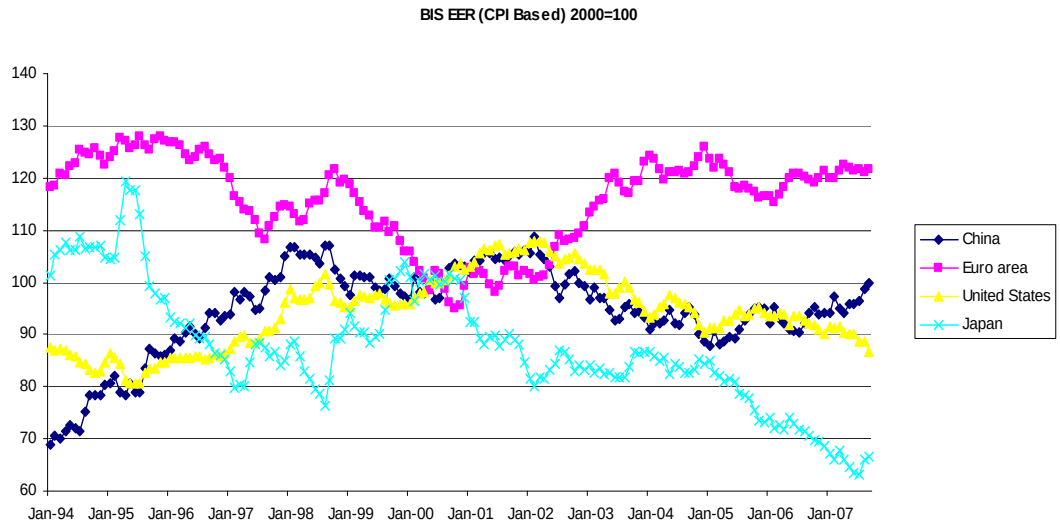
Table 7: Baseline Projections GDP, Factors and TFP 2001-7

	Average Growth GDP % pa	Average Growth Factor Supply % pa	Average Growth Total Factor Productivity % pa
China	8.89	4.38	4.51
Adv East Asia	2.38	1.57	0.81
Middle East Asia	4.83	3.64	1.19
Other East Asia	5.08	3.63	1.45
India	6.70	4.06	2.65
Rest of S Asia	5.04	3.33	1.70
NAFTA	2.25	1.83	0.42
MERCOSUR	3.44	2.53	0.90
Rest of the Americas	4.10	3.13	0.98
EU	1.90	1.39	0.51
MENA	4.71	3.73	0.98
SACU	3.78	5.05	-1.27
Rest of SSA	4.71	3.60	1.11
Row	5.97	2.51	3.46

Table 8: Baseline Scenarios

Exogenous Variables and Policy Variables	**Baseline 2007 Scenario**	**Baseline Sensitivity Tests**
Model Specification	*Update in long-run mode 2001-2007*	*Test sensitivity of experiments based on 2007 to:*
Model Closure		
Factor Markets	Update in long-run mode 2001-2007 all factors supply fixed returns endogenous, mobile between sectors	- size of non-tariff relative to tariff barriers - elasticities of substitution used in Globe model - estimates of aggregate factor growth and GDP projections
Macro closure - *private consumption*	balanced and investment led closure for China, other countries/regions balanced closure	- balanced and investment led closure for China, other countries/regions balanced closure
- *govt consumption*	balanced and investment led closure for China, other countries/regions balanced closure	-balanced and investment led closure for China, other countries/regions balanced closure
- *investment*	balanced and investment led closure for China, rest balanced closure	- balanced and investment led closure for China, rest balanced closure
Foreign exchange - *current account* - *real exchange rate*	current account exogenous real exchange rate endogenous	current account exogenous real exchange rate endogenous
Tariffs *Effective Tariffs on Trade (overall)* *Non tariff barriers*	TRAINS effectively applied tariffs 2006 applied to 2007 Included in baseline scenario from World Bank estimates at HS6 level centred on 2002 and applied to baseline 2007	
Technical Change assumptions	GDP projected for all regions for 2001 to 2007 together with total factor supply. TFP estimated as a residual from GDP growth less factor supply growth	GDP projections simulated as neutral technical change with no factor change. Factor growth estimated and residual neutral TFP estimated.

Figure 1: Real Exchange Rates of Key Trading Partners



Source: Bank of International Settlements.

Table 9: Current Account Adjustment Scenarios

Exogenous Variables and Policy Variables	**Current Account Adjustment**	**Current Account Adjustment and multilateral tariff reform combined**	**Remarks**
Model Specification	*Long run adjustment*	*Long run adjustment*	*Key assumptions:*
Model Closure			
Factor Markets	Long run adjustment		Key assumptions:
- *land*	Supply fixed returns endogenous, mobile between sectors		All factors in fixed supply with market clearing returns.
- *unskilled labour*	Wage fixed supply endogenous, Developing countries. Supply fixed and wage endogenous Developed economies, mobile between sectors.		
- *skilled labour*	Supply fixed returns endogenous, mobile between sectors.		
- *capital*	Supply fixed returns endogenous, mobile between sectors		
- *natural resources*	Supply fixed returns endogenous		
Macro closure			
- *private consumption*	Balanced closure		Balanced closure used in currency scenarios.
- *govt consumption*	Balanced closure		
- *investment*	Balanced closure		

Table 8 (cont.)

Foreign exchange			
- current account	Reduction of China's current account surplus balanced by estimate of partner country changes in current account such that global change in current account surpluses and deficits adds to zero ie the global economy is close and changes in the current account surplus or deficits must add to zero. Estimated changes in partner country current account surplus or deficits base on 2001 total trade shares with China. countries/regions endogenous	Current account exogenous with balanced change estimate by 2001 trade weights	As in the previous version of the current account adjustment model, China's current account surplus is exogenous. However, whereas in the previous version, China's current account surpluses were endogenous, here they are exogenous, estimated by the total trade shares of China with her trading partners.
- real exchange rate	Endogenous China, other countries/regions exogenous		
Tariffs			
Effective Tariffs on Trade (overall)	No change on baseline 2007	Multilateral change in tariffs combined with multilateral current account adjustment	The currency reform is associate with a real exchange rate appreciation whilst the tariff reform is associate with a real exchange rate devaluation. The outcome in the combine experiment an empirical matter.
Non-tariff Trade Barriers reduction	No change	No change	
Technical Change assumptions	Baseline 2007 the base year of the currency experiments with no technical change.	No change	

Table 10: Trade Policy Scenarios

Exogenous Variables and Policy Variables	**Modest Trade Liberalization**	**Highly Ambitious Trade Liberalization**	**Remarks**
Model Specification	*Medium Run Adjustment*	*Long Run Adjustment*	*Key assumptions:*
Model Closure			
Factor Markets			Key assumptions:
- *land*	Supply fixed returns endogenous, mobile between sectors	Supply fixed returns endogenous, mobile between sectors	Medium and long-run simulated by varying the degree of capital mobility
- *unskilled labour*	Wage fixed supply endogenous, Developing countries. Supply fixed and wage endogenous Developed economies, mobile between sectors.	Wage fixed supply endogenous, Developing countries. Supply fixed and wage endogenous Developed economies, mobile between sectors.	Unemployed unskilled labour in developing countries only in longer run scenarios
- *skilled labour*	Supply fixed returns endogenous, mobile between sectors.	Supply fixed returns endogenous, mobile between sectors.	
- *capital*	Supply fixed returns endogenous, immobile between sectors.	Supply fixed returns endogenous	
- *natural resources*	supply fixed returns endogenous, mobile between sectors.	Supply fixed returns endogenous, mobile between sectors.	
Macro closure			
- *private consumption*	Balanced and investment led closures for China, other countries/regions balanced closure	Balanced and investment led closures for China, other countries/regions balanced closure	China has balanced and investment led closures. All other countries/regions have balanced closure.
- *govt consumption*	Balanced and investment led closures for China, other countries/regions balanced closure	Balanced and investment led closures for China, other countries/regions balanced closure	

Table 10 (cont.)

- *investment*	Balanced and investment led closures for China, other countries/regions balanced closure	Balanced and investment led closures for China, other countries/regions balanced closure	
Foreign exchange			
- *current account*	Current account exogenous	Current account exogenous	
- *real exchange rate*	Real exchange rate endogenous	Real exchange rate endogenous	
Tariffs			
Effective Tariffs on Trade (overall)	DOHA Development Round Commitments or reduce 25 % (if unclear)	Reduce 75 per cent across all sectors	All tariffs variation from Baseline 2010.
Non-tariff Trade Barriers reduction	Modest reduction 25 %	Major reduction 50 per cent	
Non-tariff Trade Barriers reduction in selected sectors of interest to EU	Modest reduction 25 %	Major reduction 50 per cent	Sensitivity Analysis for EU – interest : not necessarily identical to US –Japan or ASEAN
Technical Change assumptions	No change	No change	Scenarios with and without TFP change will be required

Table 11: Key to experiments

Note: all experiments have mobile factors and unskilled wage fixed in developing countries except in 2 and 3 (see corresponding notes below).

Description of experiments:

1: China Current Account Surplus Reduced $30B with compensating global adjustment.

2: China tariffs reduced 25% -capital immobile but other factors mobile: unskilled wage is fixed in developing countries

3: China tariffs reduced 25% -mobile factors in China; unskilled wage is fixed developing countries

4: China tariffs and non-tariff barriers are reduced 25%.

5: China tariffs reduced 50%.

6: China tariffs and non-tariff barriers reduced 50%.

7: Global tariffs reduced 25%.

8: Global tariffs reduced 50%.

9: Global tariffs reduced 50% and China's current account surplus reduced $30B with global adjustment.

10 Experiment **1** plus experiment **9**

Table 12: Macro Results for China from Experiments - Percentage Changes on Baseline 2007

	1	2	3	4	5	6	7	8	9	10
Absorption	2.25	0.48	0.02	0.13	0.03	0.24	0.35	0.72	2.93	2.97
Import Demand	2.56	0.91	0.38	1.32	0.76	2.72	1.01	2.09	4.63	4.65
Export Supply	-3.49	1.29	0.60	1.85	1.21	3.86	0.63	1.28	-2.16	-2.21
GDP from expenditure	0.00	0.64	0.11	0.37	0.22	0.74	0.23	0.46	0.45	0.46
Real Exchange Rate	-3.13	1.68	0.51	1.30	1.03	2.68	-0.34	-0.73	-3.73	-3.86
Returns to:										
- Land	1.23	2.27	0.12	0.53	0.24	1.07	1.68	3.67	4.79	4.90
- Skilled Labour	0.64	1.83	0.22	0.75	0.45	1.53	0.46	0.94	1.57	1.58
- Capital	-0.04	na	0.26	0.85	0.52	1.76	0.44	0.89	0.85	0.85
- Natural resources	-2.17	1.15	0.77	1.67	1.57	3.43	0.60	1.23	-0.90	-0.94
Change in Unskilled Labour Employment	0.16	1.60	0.26	0.88	0.54	1.81	0.56	1.15	1.30	1.31
Terms of Trade index	1.0035	0.9945	0.9969	0.9914	0.9938	0.9823	1.0007	1.0017	1.0051	1.0052

Table 13: Sector Results for China from Experiments - Percentage Changes on Baseline 2007 - Domestic production by commodity

Sector	1	2	3	4	5	6	7	8	9
Crop agriculture	0.19	1.25	-0.01	-0.02	-0.03	-0.05	0.28	0.63	0.79
Animal agriculture	0.37	1.31	0.05	0.23	0.11	0.47	0.30	0.62	0.96
Coal	-0.48	-0.16	0.13	0.02	0.26	0.01	0.06	0.12	-0.33
Oil and gas	-1.75	-2.40	0.19	0.50	0.40	1.04	-0.41	-0.85	-2.54
Other minerals	0.00	0.16	0.11	0.03	0.23	0.06	0.09	0.18	0.20
Meat products	-0.49	1.96	0.15	0.73	0.31	1.51	0.72	1.50	0.94
Other foods	0.76	1.57	0.02	0.08	0.04	0.16	0.27	0.57	1.31
Textiles	-2.38	1.10	0.19	0.45	0.38	0.94	0.80	1.65	-0.80
Wearing apparel	-2.00	1.73	0.47	1.53	0.95	3.17	1.85	3.86	1.70
Wood and paper products	-0.72	0.72	0.22	0.22	0.45	0.47	0.09	0.17	-0.52
Petroleum and coal products	0.08	0.19	0.02	0.05	0.05	0.10	0.07	0.14	0.23
Chemicals, rubber and plastics	-1.56	0.62	-0.02	0.23	-0.04	0.50	-0.16	-0.34	-1.85
Basic metal and mineral products	-0.05	0.27	0.12	0.01	0.23	0.01	0.10	0.20	0.16
Motor vehicles and parts	0.12	0.00	-0.46	-0.21	-0.94	-0.42	-0.54	-1.11	-0.98
Other transport equipment	-0.03	0.56	0.24	0.94	0.48	1.93	0.40	0.85	0.80
Electronic equipment	-5.14	2.37	1.00	2.89	2.04	6.04	-0.02	-0.12	-5.07
Machinery and equipment	-1.11	0.48	0.07	0.65	0.14	1.36	-0.16	-0.35	-1.43
Other manufacturing	-1.28	0.88	0.26	0.93	0.53	1.93	0.17	0.32	-0.93
Utilities	0.04	0.34	0.07	0.19	0.14	0.39	0.12	0.25	0.29
Construction	2.26	0.11	0.04	0.23	0.08	0.44	0.38	0.78	3.01
Trade and transport	0.40	0.62	0.14	0.39	0.27	0.80	0.22	0.45	0.85
Business services	0.36	0.34	0.13	0.38	0.25	0.77	0.15	0.31	0.67
Other services	2.01	0.00	-0.01	0.02	-0.02	0.02	0.25	0.51	2.48

Table 14: Sector Results for China from Experiments - Percentage Changes on Baseline 2007 - Domestic output exported by commodity

	1	2	3	4	5	6	7	8	9
Crop agriculture	-2.21	1.97	0.36	0.98	0.72	2.01	4.90	11.22	8.84
Animal agriculture	-1.18	2.14	0.17	0.80	0.35	1.65	0.30	0.58	-0.58
Coal	-2.22	-1.81	0.35	0.98	0.72	2.07	-0.09	-0.20	-2.33
Oil and gas	-5.26	-7.54	0.53	1.41	1.08	2.94	-1.39	-2.86	-7.76
Other minerals	-0.69	-0.98	0.18	0.37	0.35	0.77	-0.01	-0.02	-0.68
Meat products	-3.85	4.11	0.62	1.88	1.27	3.92	1.86	3.95	-0.02
Other foods	-1.08	2.61	0.24	0.82	0.49	1.67	1.78	3.71	2.61
Textiles	-4.29	1.10	0.53	2.01	1.09	4.18	1.71	3.47	-0.90
Wearing apparel	-3.64	2.00	0.70	2.15	1.42	4.47	2.68	5.58	1.72
Wood and paper products	-3.28	0.99	0.58	1.59	1.17	3.30	-0.04	-0.12	-3.28
Petroleum and coal products	-1.54	-1.17	0.22	0.61	0.44	1.25	0.48	0.97	-0.52
Chemicals, rubber and plastics	-3.84	0.86	0.45	1.49	0.91	3.09	0.19	0.34	-3.41
Basic metal and mineral products	-2.81	-0.15	0.50	1.60	1.01	3.33	0.49	0.95	-1.79
Motor vehicles and parts	-2.43	0.97	0.25	1.15	0.50	2.37	-0.34	-0.74	-3.07
Other transport equipment	-3.88	1.03	0.82	2.30	1.66	4.78	1.55	3.27	-0.58
Electronic equipment	-6.23	2.58	1.14	3.53	2.32	7.37	-0.02	-0.13	-6.14
Machinery and equipment	-4.19	1.04	0.57	2.03	1.17	4.23	-0.08	-0.21	-4.27
Other manufacturing	-4.03	1.43	0.64	1.93	1.29	4.02	0.32	0.58	-3.35
Utilities	-1.35	0.01	0.24	0.60	0.48	1.25	-0.14	-0.29	-1.57
Construction	-0.20	0.50	0.30	0.93	0.61	1.91	0.08	0.15	-0.02
Trade and transport	-1.12	0.64	0.29	0.76	0.59	1.56	0.03	0.06	-1.02
Business services	-1.61	0.11	0.31	0.80	0.63	1.65	-0.18	-0.40	-1.94
Other services	-0.51	0.09	0.24	0.62	0.48	1.25	-0.13	-0.28	-0.75

Table 15: Sector Results for China from Experiments - Percentage Changes on Baseline 2007 - Imports of commodities

	1	2	3	4	5	6	7	8	9
Crop agriculture	2.91	1.48	1.00	2.90	2.04	6.05	1.52	3.05	5.95
Animal agriculture	1.88	0.48	0.89	2.35	1.82	4.91	1.61	3.36	5.22
Coal	2.50	2.66	-0.10	12.88	-0.21	29.59	0.60	1.25	3.69
Oil and gas	4.00	5.99	-0.35	-0.92	-0.70	-1.90	1.11	2.31	6.23
Other minerals	0.89	1.29	-0.03	1.02	-0.06	2.10	0.28	0.58	1.45
Meat products	4.13	-0.18	0.53	-0.04	1.06	-0.14	1.14	2.32	6.37
Other foods	2.46	1.04	0.68	2.36	1.38	4.88	1.08	2.22	4.67
Textiles	1.92	1.42	0.86	3.85	1.74	8.02	2.14	4.48	6.37
Wearing apparel	2.61	1.01	0.21	0.21	0.43	0.39	0.71	1.47	4.05
Wood and paper products	3.12	0.13	-0.01	2.92	-0.03	6.03	0.70	1.44	4.50
Petroleum and coal products	1.90	2.51	0.42	1.53	0.84	3.10	1.01	2.06	3.93
Chemicals, rubber and plastics	2.34	1.21	0.79	1.70	1.59	3.47	1.45	3.00	5.33
Basic metal and mineral products	3.29	1.18	0.20	5.01	0.39	10.59	0.91	1.89	5.15
Motor vehicles and parts	2.97	1.58	1.85	2.14	3.79	4.40	2.57	5.33	8.36
Other transport equipment	5.30	0.26	0.00	-0.68	0.00	-1.44	1.24	2.56	7.83
Electronic equipment	1.01	0.56	0.11	0.77	0.22	1.58	0.30	0.61	1.62
Machinery and equipment	4.09	0.72	0.67	0.93	1.34	1.83	1.53	3.17	7.26
Other manufacturing	3.69	0.46	0.49	0.15	0.99	0.26	1.29	2.69	6.38
Utilities	1.85	0.70	-0.17	-0.38	-0.33	-0.79	0.42	0.87	2.68
Construction	3.32	-0.38	-0.24	-0.60	-0.49	-1.26	0.46	0.98	4.23
Trade and transport	2.00	0.40	-0.09	-0.15	-0.18	-0.32	0.38	0.79	2.74
Business services	2.51	0.36	-0.17	-0.36	-0.35	-0.74	0.45	0.93	3.39
Other services	3.31	-0.18	-0.25	-0.58	-0.51	-1.22	0.44	0.92	4.17

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