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## Executive Summary

In this paper we use a global computable general equilibrium model to examine the economic effects of Russia's accession to the World Trade Organisation (WTO) on the Russian economy. We employ the comparative static GTAP model and the version 5.4 Data Base, modified to take account of increasing returns to scale in several vital sectors, such as oil and gas extraction, ferrous and non ferrous metals industries, and motor vehicles.

The extension to incorporate increasing returns to scale into the model was based on the importance of these oligopolistic sectors for Russia's export markets: 55% of Russia's exports are provided by these oligopolistic sectors. Data was collected on the number of firms which account for 80% of production and an estimate was obtained to measure the extent to which there are still unexploited economies of scale in these sectors. These unexploited economies of scale were largest in the motor vehicles and gas sectors, suggesting that large gains could accrue to these sectors if trade liberalisation resulted in an increase in production per firm and hence increased economies of scale.

Version 5.4 of the GTAP Data Base depicts the global economy in 1997. To better reflect the current situation in Russia, the 1997 tariff rates in the GTAP Data Base were adjusted to reflect Russia's most recent tariff rates prior to joining the WTO.

The paper examines the impact on the Russian of accession under a number of alternative scenarios. First, we examine the impact of both complete elimination of tariffs (the full trade liberalisation scenario) and compare this with the more modest tariff reductions proposed by Russia in its negotiations with WTO members in 2002 (the proposed WTO accession scenario). Second, we examine two alternative assumptions related to the oligopolistic sectors: a) the case where firms may not enter or exit the oligopolistic sectors; and b) where firms may enter or leave a sector in response to changes in profits in that sector. Thirdly, we examine both the short and long run impact of Russia's accession.

In addition to the removal of tariffs, the liberalisation of services is also expected to be an important factor in Russia's negotiations to the WTO. We therefore examine the impact of liberalising the communication; and business and financial services sectors. To do this we use estimates of the current levels of protection on commercial presence provided by Dee (2002). These effects are reported separately so that the importance of their impact on the Russian economy can be demonstrated. While protection is also levied on the cross border supply of services estimates of the extent of this protection are limited. In an appendix we use some estimates, provided by Francois (1999), to give a rough idea of the potential impact of eliminating these cross-border barriers to services.

The results obtained suggest that the Russian economy is likely to improve in terms of welfare and GDP under either the full trade liberalisation scenario or the proposed WTO accession scenario. Overall the proposed WTO accession scenario based on Russia's current offer and services liberalisation implies smaller structural changes in the economy but also smaller aggregate welfare gains. On the other hand the full trade liberalisation scenario leads to significant structural shifts in the economy and larger welfare gains. These results support the accession antagonists' point of view that the WTO accession can lead to a deep decline in some sectors. Hence Russia's desire to negotiate all aspects of the WTO accession carefully is somewhat justified.

The liberalisation of barriers on commercial presence plays a significant role in the benefits which accrue to Russia from its accession. Welfare and real GDP rise significantly as a result of this liberalisation of services. The services sectors also expand considerably – in fact under the proposed WTO accession scenario services are the primary beneficiaries from Russia's accession. In terms of the

oligopolistic sectors, output in the motor vehicles sector increases due to both the reduction of tariffs and the large unexploited economies of scale prevalent in that sector.

Under the full trade liberalisation scenario further gains are made from the further elimination of tariffs and as a result other sectors also experience larger gains in terms of output. However as stated above these come at the expense of substantial shifts in production and hence labour across sectors – a result which is not without some short to medium term costs.

In the long run, the higher rate of return on investment caused by Russia's accession to the WTO, causes investment and hence the availability of capital stocks to rise. The increased availability and hence lower cost of capital causes an expansion of output in most sectors in the long run.

The paper is organised as follows. It starts with brief description of the WTO accession negotiation process and quantitative results obtained by other researchers. Section 2 provides a brief background summary of the Russian economy, including an analysis of Russia's trade pattern. Section 3 outlines the model, including the modifications made and the data used to take account of increasing returns to scale. The experiments undertaken in this paper are then outlined in Section 4. In Section 5 we analyse the effects of both full trade liberalisation and a decrease in the import tariffs to the negotiated level on welfare, GDP, production, and trade. The paper is summarised and conclusions are drawn in section 6.

## 1. Introduction

1. Russia applied for membership in the World Trade Organisation (WTO) in 1993<sup>1</sup>, but active negotiations and discussions started only after 1999 when President Putin declared WTO accession as one of the primary goals of his presidency. Even though significant progress has been made in recent years, negotiations are still proceeding slowly. One of the reasons for the slow progress is the lack of certainty about the possible gains and losses from WTO accession.

2. Many Russian industrialists believe that WTO accession, which implies trade liberalisation, will lead to increased competition from foreign goods suppliers and hence to a decline in the market share of domestic producers (Yudaeva [2003], Zeldovich [2002] and CEFIR [2001]). Their concerns are partially based on previous experience. In the early to mid 1990s, Russia took its first steps towards trade liberalisation as a part of the IMF stabilisation program. Unfortunately this period also coincided with a deep economic decline. Therefore a large majority of the Russian public blame trade liberalisation for this decline, even though the economic decline was more likely due to structural changes resulting from Russia's transition to a market economy.

3. Another reason for the public's concern over the impact of Russia's accession is related to Russia's specific trade pattern. Zeldovich [2002] argues that most of Russia's exporters have little or nothing to gain from WTO accession since Russia's main exports include mostly intermediate commodities such as gas, oil, and aluminum. These goods have few imported intermediate inputs and hence prices of these export commodities are unlikely to fall with the elimination of tariffs. Furthermore the prices of these commodities are determined in the international commodity markets and tariffs on the importation of these commodities are relatively small.

4. It is also argued by steel producers that they may face a decline in domestic demand as a result of Russia's WTO accession agreement. This stems from the fact that the main domestic consumer of Russia's steel is the automotive industry, which is currently protected from foreign competition by high import tariffs. They argue that WTO accession will lead to a decline in the motor vehicle sector, causing a decrease in the domestic demand for steel. Yuri Chernikov, the head of research at Russia's largest steel plant, Severstal, states: "The resulting drop in demand on the part of the carmakers could outweigh all the potential benefits of [WTO] membership"<sup>2</sup>.

5. The situation in Russia's service sector is even more complicated. Most of the service sectors, especially financial services, were not properly established until the late 1980s<sup>3</sup>. Lobbying groups from these new sectors use the "infant industry" argument to support their requests for protection from foreign competition. As a result, there are a number of restrictions imposed on the type of operations foreign banks and in some cases new domestic entrants can conduct in Russia. For example, the right to attract personal deposits is only granted to banks (foreign and domestic) with at least two years of operation on the Russian market. Foreign banks are also prohibited from opening branches in Russia (Gaydar [2003]).

6. Hence, most of the arguments against WTO accession refer to possible negative sector level effects. Furthermore the arguments are based not on quantitative estimations, but rather on the arguments of existing producers or service providers who wish to protect themselves from foreign competition.

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<sup>1</sup> Russia applied for membership in the General Agreement on Tariffs and Trade (GATT) in June 1993 and the GATT Working Party was transformed into the World Trade Organisation (WTO) Working Party in 1995.

<sup>2</sup> Zeldovich [2002]

<sup>3</sup> The first commercial bank was established in 1988.

7. In turn, supporters of accession (*e.g.* GEFIR [2001]) argue that accession will provide benefits to Russian firms through improved access to the markets of WTO member countries. This they argue, would cover possible losses in the domestic market that come from increased foreign competition. They also argue that despite some sectoral declines, the accession will lead to an improvement for the economy as a whole. However, supporters' also rarely refer to quantitative estimates in support of their arguments. Obtaining estimates of the impact of Russia's accession to the WTO is therefore crucial for determining the true impact of Russia's accession and for assisting Russia in its negotiations.

8. One of the key issues currently being examined in the Russia-WTO negotiations is energy price setting in Russia. The EU argues that domestic prices of energy in Russia are much lower than the world prices and that this is unfair competition which should be eliminated under the WTO accession agreement. In response, Russia's President Putin told a Russia-German summit meeting in the Urals, 8 October 2003: "We cannot move to world energy prices in a single day. It will ruin the country's economy. Euro-bureaucrats either do not understand this or are trying to impose conditions which are unacceptable for Russia's entry to WTO". In reply Arancha Gonzalez, spokeswoman for European Trade Commissioner Pascal Lamy in Brussels, stated that: "We are not asking the Russians to make unreasonable concessions or to force obligations on the Russians other than those in the WTO". The problem is that the Russian government has a monopoly over the energy industries. According to the EU, the Russian government uses very high export taxes to support a domestic price of gas at a level below the market price, which it argues is inconsistent with WTO principles. Russia, on the other hand, argues that although Russia does impose export taxes on the Russian gas and oil industries, it does not use this to explicitly support the domestic markets. Hence Russia questions whether this issue should be covered by the WTO at all. In this paper we choose not to take into consideration the potential effects of price reform in the energy sectors as part of Russia's accession due to lack of information about possible adjustments in the price.

9. There have been a few attempts to provide quantitative estimates of Russia's accession in recent years. Jensen, Rutherford, and Tarr [2003] employed a CGE model to estimate the possible effects of Russia's WTO accession. To analyse the medium run effects they implemented 50% import tariff reduction and conducted two scenarios of liberalisation of FDI in service sectors. Their results suggest that the overall gains from the accession are as much as 3.4% of GDP, most of which come from FDI reform. The sectoral effects are rather ambiguous: in some industries output increases (gas, oil, non-ferrous metallurgy, maritime and air transportation) regardless of the scenario assumed, several sectors (light and food industries, mechanical engineering and metal-working) decline in both cases, and for some sectors the effects can be positive or negative depending on whether full or partial reform of FDI is implemented. On the other hand they argue that in the long run, WTO accession could lead to a welfare improvement of up to 12% of GDP with output growth occurring in most sectors. Other research conducted by Yudaeva [2002] concurs with Jensen, Rutherford, and Tarr [2003] on the importance of services liberalisation: according to Yudaeva [2002] services liberalisation reform can provide gains of up to 2.5% of GDP even in the short run.

10. In this paper a global computable general equilibrium model is used to examine the economic effects of Russia's accession to the WTO on the Russian economy. We employ the comparative static GTAP model and version 5.4 of the GTAP Data Base<sup>4</sup>, modified to take account of increasing returns to scale in several vital sectors, such as oil and gas extraction, ferrous and non ferrous metals industries, and motor vehicles. Unlike Jensen, Rutherford, and Tarr [2003], we implement 2002 accession offer made by

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<sup>4</sup> The data used here was obtained from the GTAP Data Base (Dimaranan and McDougall [2002]). The data was aggregated according to the aggregation scheme presented in Appendix A. All data are measured in USD 1997. This is the same data as is used in the modeling and analysis undertaken in the paper.

the Russian Federation during the negotiations<sup>5</sup>. Version 5.4 of the GTAP data base is based on 1997 data<sup>6</sup>, while the Jensen, Rutherford and Tarr [2003] analysis is based on 1995 data. The current accession offer is then compared to the alternative of complete elimination of tariffs. We find that the welfare effect of import tariffs' reduction to the accession offer level on Russia is relatively small, while complete elimination of tariffs provides larger welfare improvement. The latter scenario, however, requires significant labour movement, which may not be accessed at least in the short run.

11. The liberalisation of services is also expected to be an important factor in Russia's negotiations. We therefore also examine the impact of services liberalisation in communications, and business and finance services. Like Jensen, Rutherford, and Tarr [2003] and Yudaeva [2002], we find that services liberalisation provides a large proportion of the benefits from Russia's accession.

12. This report is organised as follows. Section 2 provides a brief background summary of the Russian economy, including an analysis of Russia's trade pattern. Section 3 outlines the model, including the modifications made and data used to take account of increasing returns to scale. Section 4 outlines the experiments undertaken in this report. In Section 5 we analyse the effects of both a decrease in the import tariffs to the negotiated level and full trade liberalisation on welfare, GDP, production, and Russia's trading patterns. The report is summarised and conclusions made in Section 6.

## 2. Background

13. Intensive negotiations between Russia and the WTO members continue. At present Russia has signed agreements with New Zealand, Israel, Hungary, Czech Republic, Latvia, Lithuania, Venezuela, Oman, and Paraguay. In May Russia also signed an agreement with the European Union<sup>7</sup>. Now Russia's accession ultimately depends on its negotiations with the USA, Japan, Canada and China.

14. Although much of the Russian Federation's current legislation is already harmonised with the requirements and rules of WTO the negotiations have highlighted several issues which need to be addressed. Firstly, the conditions for market access to the banking and insurance sectors. The key issues are:

- the ability or possibility of foreign banks to establish branches, currently prohibited by the Russian laws;
- share of foreign ownership of the banking and insurance sector in Russia. Russian legislation states that this share cannot exceed 25% of total capital (currently the share of foreign capital in Russia's banking sector is about 5%).

15. The second issue refers to the telecommunications sector, in particular to competition for long distance and international telephone services. All fixed line services are reserved for Rostelekom until 2010. Foreign operators can only provide telecommunications services in Russia at the local level, and may only have a 25% equity share when providing re-sale based services, and 49% when offering facilities-based services (Self [2002]).

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<sup>5</sup> The aggregate tariff data was provided by Sergey Kiselev and Roman Romashkin.

<sup>6</sup> Russia's Input-Output data, contributed by Sergey Kiselev and Roman Romashkin with support of the US International Trade Commission in 2002, are also 1997.

<sup>7</sup> The agreement with the EU was signed 21 May, 2004 just as a draft of this report was being finalised.



16. Finally there have also been some disagreements between Russia and other WTO members about the level of import duties in the automobile industry and the level of domestic support in agriculture<sup>8</sup>.

17. Russia is the largest economy in the world that is not a member of the World Trade Organisation. According to the GTAP Data Base Russia's GDP was USD 458.5 billion in 1997, which is approximately 1.6% of world GDP. Between 1990 and 1997 Russia experienced a deep economic decline. Russian GDP in real terms declined in 1998 by 4.9% as a result of the crisis in Russia's economy, however over the last five years it has grown at an average rate 5.4% per year. The growth of GDP for the first quarter of 2004 was 8% p.a. according to the Ministry of Economic Development and Trade of the Russian Federation. The Russian economy continues to develop dynamically with a high growth rate of investment and capital accumulation: for the first quarter of 2004 investment growth was 13% p.a. Following the impressive performance in the first quarter the Russian government adjusted the forecast of GDP growth from 6.4% p.a. to 7% p.a.

18. Further evidence of the improvement in the Russian economy can also be found. The government budget of the Russian Federation is in surplus providing added stability to Russia's financial system. In January–March of 2004 the budget surplus was 3.6 % of gross domestic product. The rate of inflation has been declining for last 5 years and is expected to be 10% p.a. in 2004. The trade balance is also in surplus and gold and foreign exchange reserves account for more than USD 83 billion. The real effective ruble exchange rate has grown by 4.7 % over the period December 2003 to March 2004 due to large foreign currency inflow caused by high world prices on Russia's main export goods, oil and gas.

19. Analysis of the composition of GDP by sectors, represented in Table 1, shows that the share of manufacturing and industry have declined over the last five years, while the share of services has increased. The structure of Russia's output, represented in Table 2, differs significantly from the world output structure. The share of non-government services is relatively small reflecting the fact that most of the services sectors were established only 15 years ago and are still developing. In turn, the share of resource extraction and agriculture in total output are much higher than in the rest of the world reflecting the fact that the economy is resource abundant.

20. Analysis of Russia's output disposition shows that about 90% of total output is consumed domestically and 10% is exported. However, a significant proportion (63%) of the output consumed domestically is used as intermediate inputs. The share of output exported varies significantly across sectors – there are several sectors which export more than 40% of output, while some sectors sell their output almost entirely to the domestic market. Table 3 shows the percentage of sales to the domestic and export markets for the non-services sectors and the tariff rates applied to imports of these goods. Not surprisingly import tariffs are highest in those sectors which produce primarily for the domestic market. Hence high tariff rates are used to provide domestically oriented sectors protection from foreign competition. Trade liberalisation should therefore affect these sectors relatively more.

21. Over 60% of Russia's exports are provided by five sectors: natural gas, oil, ferrous metals, non-ferrous metals, and chemical products. Since each of these sectors exports more than 25% of its total output, it is useful to define these sectors as 'export oriented'. Similarly, we define 'final consumption goods' as those commodities where the share of final consumption (private and government consumption) in total production is higher than 20%. 'Intermediate goods' are likewise defined as commodities where the share of intermediate usage in total sales is greater than 80%. Classification of

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<sup>8</sup> The disagreement refers to size of domestic subsidies which Russia can potentially provide to its agricultural sector in the future.

goods based on the above definitions is represented in Appendix A<sup>9</sup>. It is clear from the data in Appendix A that most of the ‘Intermediate goods’ are also those commodities for which Russia has very high exports – natural gas, oil, ferrous metals, non-ferrous metals, and chemical products.

22. The commodity import structure is relatively more diversified. In most cases, the share of each commodity’s imports in total imports to Russia is less than 10%. The only exceptions are manufacturing goods (21% of total import), light industry products (13%), and other food products (10%). These commodities have large shares despite relatively high tariffs. Furthermore, about 70% of these imports are also defined as final consumption goods. This pattern of Russia’s comparative advantage – *i.e.* that Russia exports mostly intermediate goods while importing commodities for final consumption – is likely to be a significant factor when examining the gains and losses to the Russian economy of its accession to the WTO.

23. Russia’s trade pattern is also biased towards a few regions. About 85% of Russia’s exports are sold to four markets: Western Europe (39%), Former Soviet Union (17%), China and Asia (15%) and Eastern Europe (13%). In turn, Russia’s imports are dominated by Western Europe (48% of total import to Russia) with smaller proportions being obtained from China and Asia (14%), Former Soviet Union (12%), NAFTA (11%), Eastern Europe (8%) and other regions (7%). This means that the health of the Western European economies is very important for Russia’s economic welfare. Although Russia has a trade agreement with the EU<sup>10</sup>, the structure of Russia’s exports and imports have evolved over time as the Soviet Union and then Russia exported gas and oil to Western Europe. In exchange Russia has received goods that have not been produced in Russia or have been significantly different in quality (*e.g.* electronics, motor vehicles, equipment). This pattern has not altered significantly as Russia has opened up its economy to the rest of the world.

### **3. Model specification**

24. A modified version of a multi-region applied general equilibrium model, GTAP (Hertel, [1997]), is used. This modification allows for imperfect competition and scale economies and uses the approach suggested by Francois and Roland-Holst [1997], Francois [1998], and extended by Elbehri and Hertel [2003].

25. Version 5.4 of the GTAP Data Base (Dimaranan and McDougall [2002]) is used in conjunction with the modified model. The data was aggregated according to the aggregation scheme presented in Appendix A. In addition to the GTAP Data Base, some additional data was required for the imperfect competition components of the model. This additional data and its relationship to the modifications made to the model are described below in this section.

#### **3.1 Imperfect competition**

26. We assume an imperfectly competitive market structure for five sectors: natural gas, oil, ferrous metals, non-ferrous metals, and motor vehicles. These sectors are highly concentrated; as shown in Table

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<sup>9</sup> We also treat manufacturing commodity as a final consumption for the purpose of this analysis. This sector is highly aggregated and includes different types of goods, many of which can be used both as intermediate and final consumption goods (computers, electronics, etc.).

<sup>10</sup> An Agreement on Partnership and Cooperation established a partnership between the European Communities and their Member States, and the Russian Federation. The agreement was signed at Corfu on 24 June 1994. [http://europa.eu.int/comm/external\\_relations/russia/pca\\_legal/](http://europa.eu.int/comm/external_relations/russia/pca_legal/)

4 by the low number of firms and the existence of markups. Since at least the first four sectors produce relatively undifferentiated products, we have chosen to adopt an oligopolistic market structure<sup>11</sup>.

27. Firms in the oligopolistic sectors are assumed to interact differently with domestic rivals, which produce a homogenous good, than with foreign rivals, which produce a differentiated good (in the sense of Armington). With respect to domestic rivals, including foreign-owned firms producing domestically, each oligopolist is assumed to hold a Cournot conjecture – namely that rivals' outputs remain unchanged when the firm varies its own output. With respect to foreign rival firms, supplying differentiated imports, each oligopolist holds a Bertrand conjecture – that is foreign rivals' prices are assumed to remain unchanged in response to a change in the own price<sup>12</sup>. Following Francois and Roland-Holst [1997], the elasticity of substitution among imports is also assumed to equal that between domestic and imported goods (non-nested CES preferences).

28. The oligopolistic market structure used in this paper implies an increasing return to scale production function. These scale economies, in the existing modification of the GTAP model, are modeled by combining fixed costs with an average variable cost function that is independent of scale. That is, average variable costs (AVC) are constant as output increases and hence equal to marginal costs (MC). Average total costs therefore take the following form:

$$AC = \frac{FC}{x} + AVC = \frac{FC}{x} + MC \quad (1)$$

where: AC, AVC, MC, FC and x are average cost, average variable cost, marginal cost (also invariant to scale), fixed cost, and output per firm, respectively. It is common in the literature (Francois, [1998]) to calibrate fixed costs via the cost disadvantage ratio (CDR), which measures the extent to which average total costs exceed marginal cost:

$$CDR = \frac{AC(x) - MC(x)}{AC(x)} = \frac{FC}{TC(x)} \quad (2)$$

29. The CDR parameter is implemented into GTAP table code through the variable SCALE, which is defined as  $SCALE = \frac{CDR}{1 - CDR}$  and is initially read as a parameter of the model<sup>13</sup>, therefore it is necessary to estimate the CDR for each sector from external sources. The procedure used in this paper to determine the CDR is outlined in Appendix B. The resulting CDR parameters are depicted in Table 4. Note that with the exception of gas and motor vehicles there are few exploitable gains from scale economies, hence we expect that most of the gains from scale economies will accrue to these sectors.

30. The imperfect competition extension to the GTAP model affects the sector in two ways. First it results in a markup of price over average or marginal cost.

<sup>11</sup> An alternative approach to modeling imperfect competition could be the firm-level product differentiation approach of Dixit and Stiglitz (1977). However, the “love of variety” effect generated by this approach seems unrealistic for natural gas, oil, ferrous and non-ferrous metals sectors due to homogeneity of the product produced.

<sup>12</sup> The approach adopted in this analysis is that proposed by Francois and Roland-Holst (1997). It differs from other formulations of Cournot behavior (e.g. Smith and Venables 1988; Willenbockel, 1994) in which firms are assumed to hold Cournot conjectures about both domestic and foreign rivals.

<sup>13</sup> For more detail about implementation of imperfect competition based on CDR parameters into GTAP table code see Francois [1998].

$$M_A = \frac{n\mathcal{E}}{(1+SCALE)(n\mathcal{E}-1)} \quad (3)$$

31. Equation (3)<sup>14</sup> then defines the power of the markup over average cost, relating it to the number of firms (n), the CDR, and the elasticity of demand ( $\mathcal{E}$ ), which is computed by equation (4).

$$\varepsilon_i = \sigma + (1-\sigma) \sum_r \frac{X_{ir} S_{ir}}{X_i} \quad (4)$$

where  $\sigma$  is elasticity of substitution,  $X_{ir}$  is demand by region r for goods of origin i,  $X_i$  is total demand faced by oligopolists in region i,  $S_{ir}$  is the market share of goods from region i in region r within the commodity group under consideration.

32. As tariffs fall and the market shares fall the elasticity of demand rises (Equation 4) and the markups over marginal cost and average cost fall (equation 3).

33. In turn the markup over average cost affects prices determined in the equilibrium through equation<sup>15</sup> (5):

$$\Delta P_s = \Delta P_m + \Delta TO - \Delta M_A \quad (6)$$

where:  $\Delta$  is the change in,  $P_s$  is supply price,  $P_m$  is market price and TO is output tax.

34. Second is the affect of scale economies on the costs of production. As output per firm increases the firm can reduce its costs by exploiting scale economies and sliding down its average cost curve. In the imperfect competition extension to the model, the variable *ao* is used to incorporate these falling average costs. The variable *ao* is output augmenting technical change. In the standard GTAP model increases in *ao* reduce the quantity of inputs (intermediate and factors) required to produce a given amount of output – this is equivalent to a fall in the average cost curve. Equation (6) determines the value of *ao* endogenously for the oligopolistic sectors.

$$\frac{1}{CDR} * (qva - firms) = ao^{16} \quad (7)$$

where: *qva* is percentage change in real value-added demanded by the sector, *firms* is percentage change in the number of firms operating on the market, and *ao* is output augmenting technical change.

35. Equation (7) states that as *ao* rises or average costs fall the quantity of value added per firm (*qva - firms*) rises (or production increases and the firms move down their average cost curves). The rate of this increase depends on the inverse of the CDR (the extent to which average total costs exceed marginal cost). In turn, the variable *ao* affects welfare:

$$TC = 0.01 * \sum_i VOA_i * ao_i^{17} \quad (8)$$

<sup>14</sup> AC\_MARKUP(i,r) = (1/(1+SCALE(i,r)))/(1-(CV\_RATIO(i,r)/DELAST(i,r))) in GTAP tablo code notation.

<sup>15</sup> ps(i,r) = to (i,r) + pm(i,r) - p\_AC\_MARKUP(i,r) in GTAP tablo code notation. Notice that positive change in output tax (to>0) is equivalent to output tax decrease.

<sup>16</sup> OSCALE(i,r)=[SCALE(i,r)] \* [qva(i,r) - firms(i,r)] - ao(i,r) = 0 in GTAP tablo code notation, where OSCALE(i,r) is exogenous.

#### 4. The Experiments

36. We analyse the comparative static effects of two scenarios. The first scenario considers the affect of a reduction in Russia's import tariffs to the level currently being negotiated (hereafter the WTO accession scenario)<sup>18</sup>. The second scenario implies complete import tariffs elimination in Russia (hereafter the full trade liberalisation scenario). Service liberalisation is implemented under both scenarios. A summary of the assumptions made is provided in Table 5.

37. Table 6 depicts the current GTAP 1997 import tariffs in Russia, actual (2002) tariffs<sup>19</sup>, and the proposed import tariffs following the implementation of the WTO accession agreement. Using the Altax facility in RunGTAP we first update Russia's import tariffs to equal the actual tariff rates in 2002<sup>20</sup>. All experiments are then based on the updated data. Under the WTO accession scenario we reduce all import tariffs where the current rate in 2002 is above the proposed rate following WTO accession<sup>21</sup> to the proposed rate. Under the complete trade liberalisation scenario all of the 2002 import tariff rates are reduced to zero.

38. The services sectors in Russia are also expected to be liberalised as a result of Russia's accession to the WTO. Many of Russia's services sectors are protected from foreign competition through legislative restrictions, even though there are no formal import tariffs. Services barriers are often used to restrict:

- a) The cross-border supply of services. This occurs when restrictions are placed on the importation of services from abroad.
- b) Foreign direct investment (FDI) in the domestic market. These restrictions relate to those which prohibit a foreign company from having a physical presence in the country. They may include restrictions on numbers/location of branches in a country.
- c) Entry of new domestic firms into the domestic market. Restrictions are not always primarily against foreigners. In some cases excessive legislation may also restrict new domestic entrants from entering the domestic market.

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<sup>17</sup>  $CNTtech\_aor(r)=[0.01*EVSCALFACT(r)]*[sum(i,PROD\_COMM,VOA(i,r)*ao(i,r))]$  in GTAP tablo code notation.

<sup>18</sup> According to the agreement between Russia and EU the average tariff level that Russia will not exceed is 7.6% for industrial goods, and 13% for agricultural products. The WTO accession scenario implemented here implies that the average tariff level after the accession will be 9% for industrial goods and 13.5% for agricultural products. It is not surprising that the agreement signed with the EU provided for larger reductions in tariffs since in this paper we used the initial proposal put forward by Russia to the EU, which would have been reduced after bargaining between the two parties. The differences, particularly for industrial goods, are relatively small. The further reductions in tariffs on agriculture are likely to cause larger declines in agriculture (*e.g.* Meat, Dairy Products, Food Products, Agriculture, Animal Products, Wheat and Cereals and Plant Products) but may also cause larger gains in other sectors as prices of agriculture fall and these sectors export more.

<sup>19</sup> The current import tariffs level calculated by Sergey Kiselev and Roman Romashkin based on Russian Goskomstat and Russian Custom Committee data.

<sup>20</sup> The Altax facility in RunGTAP allows intelligent Database adjustments, which reflect recent policy changes in one or several regions after 1997 (*e.g.* tariff rates changes, tax rates changes, etc.). See Malcolm [1998].

<sup>21</sup> Sectors, where the actual import tariffs are above the proposed, are highlighted in the table 5.

39. Hence restrictions on the cross border supply of services are applied through the reduction of a tariff equivalent or technological shock (*tms* or *ams* in the GTAP code) which affects imports of services, while restrictions on FDI or domestic market access are implemented via an output tax equivalent or productivity shock (*to* or *ao*) which affects domestic production. In this paper we concentrate on the removal of restrictions on FDI and domestic market access<sup>22</sup>.

40. A further issue is whether the barriers are cost-escalating or rent-creating. If barriers are cost escalating they restrict entry through higher production costs and are implemented by shocking a productivity variable (*ao* or *ams*) for the corresponding sectors. On the other hand, if the barriers affect the ability of the sector to earn rents, then the shock should be implemented through a tax equivalent (*to* or *tms*). Dee [2004] argues that the barriers to the communication, and business and financial services sectors in Russia are rent-creating, and therefore should be represented as tax equivalents.

41. Dee [2004] estimated ad valorem tax equivalents of the barriers to the Russian financial sector and communication sector (Table 7). These estimates have two components: restrictions which apply to all firms (domestic and foreign) producing in the domestic market; and restrictions which apply to foreign firms only. Since foreign and domestic firms are not accounted for separately in the GTAP model, a weighted average of the estimated ad valorem equivalents is determined using the shares of foreign ownership in Russia's financial sector<sup>23</sup>. As for telecommunications sector, a weighted average of the estimated ad valorem tax equivalents is calculated using approximate shares of fixed and mobile lines<sup>24</sup>. In all scenarios we implement the liberalisation of the communication and financial sectors through a shock to the output tax<sup>25</sup>.

42. Under each scenario we also undertake two experiments, one which allows firms to enter/exit the oligopolistic sectors while the other does not allow for the possibility of entry/exit by firms. In the standard model/closure, there is no entry/exit of firms ( $n$  is exogenous and equal to zero). Firms take advantage of the possibility to manipulate prices by changing the power of the markups over average costs ( $M_A$  in equation (3)) and hence their profitability. Hence without entry/exit a positive shock caused by trade liberalisation might lead to a decrease in markups as the elasticity of demand rises and an increase in profitability and output per firm as any scale economies are exploited. In the case of entry/exit, the share of profit in total revenue earned by firms operating in the markets is assumed to be fixed. Thus, the power of the markup over average costs ( $M_A$  in equation (3)) remains fixed and each firm's output, but not prices, adjusts in response to the shocks. Firms enter/leave (*i.e.*  $n$  adjusts) until the markup ( $M_A$  in equation (3)) returns to its original level determined in the initial data base<sup>26</sup>. In the above example firms will leave the sector and there may be a rise in industry (but not necessarily firm) output.

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<sup>22</sup> However the impact on Russia of other type of liberalisation (cross-border supply of services) is provided in Appendix D.

<sup>23</sup> According to Bulletin of Banking Statistics, #4, 2004, ([http://www.cbr.ru/eng/BBS/bank\\_bulletin.asp](http://www.cbr.ru/eng/BBS/bank_bulletin.asp)) share of foreign banks in Russia is approximately 5%.

<sup>24</sup> Data on the proportion of foreign ownership in Russia's telecommunication sector was unavailable. Qualitative evidence however, suggested that most of the firms operating in Russia's telecommunication sector are partially owned by foreigners. Given insufficient information we assumed that the national treatment tax equivalent applied to the whole sector, hence providing an upper limit to the impact of removing this distortion.

<sup>25</sup> Moreover, since these barriers are not reflected in the original GTAP data, we use an altertax experiment to incorporate these barriers into the initial data base, and then eliminate them under both the WTO accession and full trade liberalisation scenarios.

<sup>26</sup> Since we do not assume zero profit in equilibrium, the markup is not eliminated but returns to its initial level in the database.

## 5. Quantitative Effects of Russia's WTO accession

### 5.1. Overall effects.

43. A summary of the impact of Russia's accession to the WTO under the two experiments the (WTO accession and full trade liberalisation) is provided in Table 8. This table illustrates the positive overall impact of Russia's accession to the WTO on welfare, real GDP, investment and trade.

44. The aggregate welfare effects of the WTO accession and full trade liberalisation experiments are reported in Table 9. In all cases Russia gains additional welfare as a result of the liberalisation of trade restrictions however, the size of the improvement is relatively small and varies across experiments. Welfare varies from USD 499 million (0.1% of Russia's GDP) under the WTO accession entry/exit scenario to USD 1 364 million (0.4% of Russia's GDP) under the full trade liberalisation entry/exit scenario. Since the liberalisation of the communication, and business and financial services sectors is implemented under both scenarios, the relative effects of the services barriers in services are stronger when the import tariff reductions are smaller (WTO accession). In the WTO accession scenario approximately 67% of welfare improvement is due to services liberalisation, while under the trade liberalisation scenario the services liberalisation accounts for only 20% of the welfare gain (Table 9).

45. Russia's main trading partners (Western Europe, Former Soviet Union, Eastern Europe, Asia) also gain in terms of welfare as a result of Russia's accession under all of the scenarios examined (Table 9), while countries with lower intensities to trade with Russia lose regardless of which scenario is assumed. The only region which gains under the full trade liberalisation scenario but loses under the WTO accession scenario (though the loss is negligible – USD 20-40 million) is NAFTA. This is due to the fact that NAFTA exports manufacturing goods, meat, and business and financial services to Russia. Under the WTO accession scenario export of manufacturing goods and meat from NAFTA to Russia increases, while service liberalisation causes export of business and financial services to decline. The latter effect dominates and as a result it eliminates the gains from trade liberalisation under the WTO accession scenario.

46. Table 8 shows that real investment, exports, imports, and GDP rise regardless of the scenario and entry/exit assumption. Russia's real GDP increases by only 0.2% as a result of Russia's accession to the WTO. This gain could be as large as 0.9% if Russia chooses to reduce its tariffs across the board (full trade liberalisation scenario). The gains to real GDP from the liberalisation of services are minimal – only 0.1% of real GDP.

47. Even though the rise in real GDP is small, rates of return in Russia rise due to a rise in the rental price of capital, causing a large increase in real investment of 4%. In the long-run this large increase in investment would have further positive effects on real GDP and welfare in Russia<sup>27</sup>. This increased real investment is partially funded by foreigners, inducing foreign capital inflows, which results in a decline in Russia's trade surplus.

48. Imports rise both in quantity and in dollar terms. As import tariffs are eliminated imports become cheaper. Since the elasticities of demand are greater than 1 in absolute terms, a decrease in the price of imports relative to domestic goods leads to substitution towards imports. Russia's exports must also increase, but to a lesser extent due to the overall fall in the trade balance. This drives down export prices and the terms of trade, since other regions do not reduce their tariffs on goods from Russia. The trade balance decreases by USD 3.6 billion under the accession scenario (or almost USD 7.8 billion in the case of full trade liberalisation).

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<sup>27</sup> See Appendix C.

## 5.2. *Welfare*

49. Table 10 decomposes the welfare effects into a number of components – the allocative efficiency, scale economies<sup>28</sup>, terms of trade and the investment saving effects. The expansion of imports and exports affects the terms of trade and has a negative effect on welfare under both scenarios. The terms of trade effect is negative because export prices decrease substantially relative to imports. This is due to a fall in the real exchange rate required to maintain equilibrium in the balance of payments. The effect is larger (in absolute terms) in the full trade liberalisation scenario due to the fact that full trade liberalisation has a larger effect on imports which therefore requires a larger fall in the real exchange rate/ terms of trade to restore balance of payments equilibrium.

50. The negative terms of trade effects are dominated by welfare gains from resource reallocation (allocative efficiency). The main source of this welfare improvement is the increase in imports. The allocative efficiency term measures the extent to which resources are better allocated. An improvement in allocative efficiency arises when a country increases its imports of goods which have high tariffs or increase (reduce) production of goods which have high taxes (subsidies). In this case, Russia is increasing its imports of high tariff commodities and hence better allocating its resources. Furthermore Russia is re-allocating resources towards commodities which it exports (export tax and production effect in Table 10). Russia is also increasing production of services which were previously restricted, however this effect is relatively small (production effect in Table 10).

51. The scale economies effect, which relates only to the imperfectly competitive sectors, also has a positive effect on Russia's welfare as output per firm rises in the motor vehicles sector. Notice these effects are larger in cases where entry/exit of firms is allowed. These results are driven by equations (7) and (8) outlined in section 3.1. If firms are not allowed to enter/exit the market, the variable "*firms*" is exogenous and zero and hence output per firm rises/falls significantly more. Average costs (or *ao*) therefore fall/rise further as the firm moves along its AC curve, causing the welfare effect to be larger in absolute terms. A decomposition of the technical change term based on equations (7) and (8) is provided in table 11.

52. With entry/exit the WTO accession scenario leads to firms exiting all five oligopolistic markets. Output per firm and hence average costs (*ao*) change by less in absolute terms, *i.e.* the losses due to the decline in the four resources sectors are reduced and welfare rises (Equation 8). We provide more detailed analysis of changes in oligopolistic sectors in the following sub-sections.

## 5.3. *Sectoral effects*

53. Under the WTO accession scenario output declines in 19 out of 27 sectors (Table 12<sup>29</sup>). These results are divided into two components, the proportion due to tariff reductions and the total due to tariff and services liberalisation. The reduction in import tariffs has a positive effect on output in most of the sectors, particularly the export orientated sectors such as ferrous and non-ferrous metals where exports of these commodities increase relatively more. Exports of all commodities rise as a result of the reduction in tariffs (Table 13).

54. These positive effects from the liberalisation of trade are offset by a decline in output caused by the service liberalisation; this is the case in all sectors except construction and the sectors directly affected by the service liberalisation shocks (communication, and business and financial sectors). Service

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<sup>28</sup> Related to imperfect competition.

<sup>29</sup> Table 8 provides a summary of those sectors most affected (either positively or negatively) by Russia's accession to the WTO.



liberisation also has a positive effect on investment (capital goods sector output increases 3.9% in Table 12) due to the fact that the price of capital goods falls further and the rental prices rise due to the services liberisation. As a result the construction sector's output (a primary input into the capital goods sector) increases. Moreover the increased investment allows the current account surplus to fall. Since the liberisation of services does little to change imports (Table 14) exports are no longer required to increase as far to maintain equilibrium in the balance of payments and hence exports change by less in absolute terms (Table 13). The real exchange rate and terms of trade also declines by less, raising welfare.

55. Even though output declines in many sectors, only in three of them – manufacturing (-8.9%), light industry (-3.9%), and chemical products (-2.5%) – does output decrease by more than 1%. Such small negatives do not continue in the long run (Table 15) because of the large increase in investment. In the long run that investment transforms into additional capital, causing the capital stock in Russia to increase. This drives down the price of capital and hence the costs of production. As a result market prices in Russia fall across all sectors, and output grows in most of the sectors due to the additional capital<sup>30</sup>. In particular there are now increases in the output of the Ferrous Metals and Non Ferrous Metals sectors.

56. The alternative scenario – full trade liberisation scenario – implies much more significant sectoral adjustments and partially supports the WTO accession antagonists' point of view that trade liberisation can cause significant structural adjustments leading to a deep decline in some sectors most notably in agriculture, food production, manufacturing, and light industry. However despite some sectoral declines aggregate welfare rises further in the full trade liberisation scenario. The positive aggregate welfare effect of the full trade liberisation however, implies significant movements of labour (Table 16). It is especially important to notice that under the full trade liberisation scenario unskilled labour moves from the agricultural (Animal products, Plant Products, Wheat and Cereals) and agriculture-related (Meat, Dairy Products, Other Food Products) sectors, which are concentrated in rural areas, towards industry and transportation sectors, most of which are concentrated in urban areas. Moreover, some of the industries which increase their demand for labour, such as Non Ferrous Metals, Ferrous Metals, Gas, and Oil, are highly concentrated in specific regions. Therefore, to attain welfare gain significant movement of the population across regions is required. Such movement does not seem possible at least in short run. Hence, the positive welfare effects of the trade liberisation may not be attained if this leads to unemployment in some regions. Hence Russia's desire to negotiate all aspects of the WTO accession carefully is somewhat justified.

### 5.3.1. *Export Oriented Sectors*

57. Under the WTO accession scenario, output rises in all the export oriented sectors except chemical products industry (Table 12) as a result of the reduction of trade barriers under WTO accession, however overall output falls with services liberisation. Generally exports rise for these commodities, particularly as a result of the liberisation of trade. The direction of changes in imports (Table 14) varies across sectors.

58. Domestic production of gas and oil decline due to a decrease in domestic intermediate demand for these commodities, for example 82% of gas sold on the domestic market is purchased by the electricity sector. As output of electricity falls, demand for gas also decreases. A similar situation occurs in the oil sector, where 98% of domestic sales are to the chemical product sector, where production also falls. Notice that imports of gas and oil decrease, however such changes have only a very small effect on total output of these sectors, since the shares of imports in domestic sales of gas and oil respectively are negligible. While exports of gas and oil increase they are not sufficient to offset the decline in domestic intermediate demand, particularly after the service liberisation shocks have been taken into account.

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<sup>30</sup> For more detail about the long run effects of Russia's WTO accession, see Appendix C.

59. Since four of the export oriented sectors are assumed to be oligopolistic, it is important to analyse the influence of the oligopolistic market structure on these sectors. Under the no entry/exit assumption markups over average costs and hence profitability declines in all four sectors: as imports become cheaper the elasticity of demand rises and average costs decrease causing the CDR and hence SCALE to increase, these lead to decrease in the markup over average costs by equation (3). Under the entry/exit assumption however, the number of firms declines in all four of the export oriented sectors to keep the markups over average costs constant. This implies an increase in monopolistic power of the remaining firms and output per firm increases relative to the no entry/exit case (Table 11).

60. The direction of changes in imports (Table 14) varies across sectors. For most of these commodities imports and initial tariff rates are small and hence the impact on imports is minimal. The exception is chemical products where the increase in imports is large in comparison to the other sectors. Although the initial tariff rates are relatively low (9.5%) compared to other commodities these tariffs are reduced to 6% as a result of the accession agreement. This is the largest percentage reduction in tariffs agreed upon under the accession agreement.

### 5.3.2. *Intermediate Goods*

61. Under the WTO accession scenario, output of the construction and other minerals sectors increases, while sectoral output of trade, electricity and other utilities declines. Growth in construction is caused by the investment expansion: 90% of this sector's production is consumed by the capital goods sector. It induces an increase in the other minerals sector since 35% of the latter sectors production is used in construction. Imports of construction and capital goods also rise for the same reason – increased demand for the production of investment goods.

62. The decline in the trade sector is due to a decrease in production in the oil and gas industries, which consume 25% of trade services sold in the domestic market. A similar situation occurs in the electricity sector which is primarily (25%) consumed by both the metallurgy and manufacturing sectors. The decrease in output of these sectors leads to a fall in electricity production.

### 5.3.3. *Final Consumption Goods*

63. Since the motor vehicles industry is the only sector among other final consumption goods and services producers where oligopolistic market structure is assumed, we consider this sector first. Output of the motor vehicles sector increases under the WTO accession scenario, as well as both exports and imports. The rise in imports is due to the decline in tariffs on foreign motor vehicles. The domestic motor vehicles sector also gains as a result of lower tariffs on its intermediate inputs, namely ferrous metals (14% of the cost of motor vehicles) and motor vehicle parts<sup>31</sup> (12%). Under the no entry/exit assumption firms within the sector experience a decrease in their markups over marginal costs due to the increased elasticity of demand caused by increased competition from imports. Demand for this sectors output rises as prices fall due to both the lower markups and the lower cost of intermediate inputs. Expansion of output per firm also causes costs to fall further as large unexploited scale economies (illustrated by the high CDR in Table 4) are exploited. Under the entry/exit assumption the decreased markups cause some firms to leave the industry, output per firm still increases.

64. The liberalisation of services was implemented in two services sectors – communication, and business and financial services. In both cases output increased. Imports of these commodities fell by 8% and 5% respectively, while exports increased by 10% and 14%. These increases are the direct result of the liberalisation of these sectors. This liberalisation involved reducing the barriers to entry for domestic

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<sup>31</sup> Motor vehicle parts are included in motor vehicles in the GTAP aggregation

and foreign firms. As a result, the liberalisation of the sectors resulted in a shift from importing these services towards increased production in the Russian market<sup>32</sup>.

65. Output in all other final consumption sectors decrease; especially in the manufacturing sector where output falls significantly. This is caused by import expansion: import tariffs in this sector decrease from 11.7% to 8.4%, a considerable decline, second only to chemical products. This decline in tariffs induces an increase in imports of 13.8%. As a result, domestic demand on manufacturing goods shifts towards imports and the domestic manufacturing sector declines significantly.

## 6. Conclusions and Policy Implications

66. The comparative static GTAP model and version 5.4 of the GTAP Data Base, modified to take account of increasing returns to scale in several vital sectors was used to examine the economic effects of Russia's accession to the WTO on the Russian economy. The 2002 accession offer made by the Russian Federation during the negotiations was used to implement the WTO accession scenario. This current accession offer was then compared to the alternative of complete elimination of tariffs.

67. One of the major results of all the scenarios considered in this paper was that accession of the Russian Federation to the WTO has a minimal impact on the macroeconomic variables. Even with full liberalisation of the national economy the increase in gross domestic product was negligible. For example, in the various scenarios of liberalisation considered in the paper welfare increased from 0.1% to 0.4 % of GDP. It could therefore be concluded that trade policy reforms are of little importance to the successful development of the Russian economy. However this conclusion fails to appreciate the fact that the insignificant influence of accession to the WTO and liberalisation of trade on the economy of Russia is primarily the result of inadequate domestic institutional factors; including the lack of infrastructure, low factor mobility, and high level of corruption.

68. Hence, the most important task for Russia is the removal of various administrative and institutional barriers that are the main obstacles for the development of business. In particular those affecting small to medium size businesses which find it more difficult to overcome the barriers imposed by corruption and the absence of market infrastructure.

69. The positive effects obtained from the liberalisation of the financing services and telecommunications sectors further demonstrates the necessity of actively reforming the banking services sector in the Russian Federation and carrying out the privatisation of the telecommunication sector. The fragility of the banking sector became most apparent in the summer of 2004 during the Russian bank crisis. It is very important, that reforms in the financial services sector promote investment – vital for the modernisation of the Russian economy. Increased investment is the major factor required to maintain high steady economic growth in the long-term.

70. Furthermore the analysis has shown the vulnerability of many other sectors of the Russian economy to WTO accession and liberalisation of trade policy in general. Russia's manufacturing, light and chemicals industries all experienced downturns as a result of WTO accession. Regardless of the fact that in the long run the slump in production in these sectors is offset by growth in investment, the Russian government should actively examine methods which will assist these industries to adapt to the short run implications of accession to the WTO. Of special importance is the modernisation of the

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<sup>32</sup> Prior to liberalisation of the business and financial, and communication markets it may have been the case that foreign firms located in Russia preferred to use services provided by firms located outside of Russia (*i.e.* import services). After accession these foreign service providers can establish commercial presence, hence imports decline.

manufacturing industry, which will require significant investment, increased efficiency and the maintenance of competitiveness. The agriculture and food industry, among the most sensitive sectors of for the Russian economy, also experience declines as a result of accession to the WTO. The government should also examine ways in which the competitiveness of these sectors could be improved over the long run.

71. Slumps in production in the bulk of sectors, according to model, will be offset by increases in the fuel and energy sectors. However growth in exports of some sectors does not compensate for the resulting recession in domestic manufacturing. The results clearly dictate the necessity of reforms in the gas, petroleum and electricity industries. Reforms in these sectors should be directed towards the reduction of expenditure, and increasing the productivity of capital and labour.

72. In summary, Russia needs to pay special attention to the most vulnerable sectors of economy, creating conditions for attracting investments to agriculture, manufacturing, food and light industry to assist in the modernisation of those industries. Although it is tempting for Russia to try and negotiate all aspects of the accession agreement and hence minimise the negative effects of accession on these vulnerable sectors, Russia needs to acknowledge that it is unrealistic to obtain concessions in all areas of the agreement and as such it needs to set priorities in the negotiating process. Moreover, the use of domestic policies may be a more appropriate way of easing the effects of these short run recessions if the efficiency gains, which often accompany trade liberalisation, are to be achieved in the long run.

73. There are a number of areas in this paper where further work is required to improve the analysis of Russia's accession to the WTO. Firstly, significant changes in the structure of the Russian economy have taken place for the last five years which are not reflected in the data used. Second, even though service liberalisation was implemented in the analysis, it is not clear whether all non-tariff barriers were captured and which of them will be eliminated under the accession. Although our estimates of liberalisation of the commercial presence were based on empirical work undertaken on the Russian economy, more empirical work needs to be undertaken to estimate cross-border services liberalisation.

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Table 1: Russian Federation: Composition of GDP by Sector, 1995 - 2002<sup>1</sup>

	1995	1996	1997	1998	1999	2000	2001	2002
	(In % of GDP)							
Agriculture <sup>2</sup>	7.2	7.3	6.5	5.7	7.7	6.7	6.8	6.1
Industry	29.0	29.5	28.3	29.9	30.8	31.4	28.1	26.5
Construction	8.5	8.4	7.9	7.1	6.1	6.6	7.5	7.3
Wholesale, retail, foreign trade, public catering, procurement	19.6	18.3	17.6	19.5	23.2	23.7	22.5	22.8
Transportation and communications <sup>3</sup>	11.9	12.4	12.1	10.9	9.7	9.1	9.4	10.0
Finance, credit, insurance, real estate operations, science and research, housing, geology, subsoil resources, exploration, meteorology, computer service, others	9.5	8.6	9.6	9.2	11.2	11.7	13.9	14.5
State administration and defense	4.7	4.6	5.5	5.9	4.4	4.3	4.6	4.5
Education, culture and art, health care, physical education and social security, utilities, non-production activities services to households, people's associations	9.6	10.9	12.5	11.8	6.9	6.7	6.8	8.1

1. GDP share of gross value added by economic sectors, in basic prices -- excludes taxes, includes subsidies; not adjusted for imputed financial services.

2. Agriculture, including companies servicing agriculture and forestry.

3. Transport, communications, road and infrastructure.

Source: Russian Federation: Statistical Appendix, May 2003. IMF Country Report # 03/145, <http://www.imf.org/external/pubs/cat/longres.cfm?sk=16575.0>

Table 2: Structure of Output

	Russia	Rest of World	Sectors Included <sup>a</sup>
	%	%	
Agricultural Sector	9	3	<i>grow, agp, aga, frfs,</i>
Resource Extraction	12	3	<i>gas, oil, omn</i>
Food Products	6	5	<i>meat, dp, ofp</i>
Metallurgy	4	4	<i>fmet, nfm</i>
Manufacturing Sector	14	24	<i>cem, mnf, mvh, lin</i>
Utilities	7	2	<i>ely, uty</i>
Transportation Services	7	5	<i>otr, atp, wtp</i>
Construction	8	7	<i>cns</i>
Non-Government Services	13	27	<i>trd, bfs, cmm</i>
Government Services	16	15	<i>Osg</i>
Dwellings	3	3	<i>dwe</i>

a. Sectors' abbreviations are provided in the Appendix A.  
Source: GTAP Data Base, Dimaranan and McDougall [2002].

Table 3: Russia's Output disposition and current import tariffs

	Domestic sales	Export sales	Import tariffs <sup>a</sup>
	%	%	%
Nonferrous Metals	32	68	9.6
Natural Gas	58	42	5.0
Oil	59	41	5.0
Ferrous Metals and Metal	63	37	7.4
Chemical Products	73	27	9.5
Manufactures	82	18	11.7
Light Industry Products	84	16	15.1
Forestry-Fishing	84	16	8.5
Other Minerals	92	8	5.0
Other Food Products	94	6	17.9
Motor Vehicles	98	2	18.4
Dairy Products	98	2	14.9
Plant Products	98	2	10.6
Wheat and Cereals	99	1	5.0
Animal Products	99	1	10.4
Meat Products	100	0	17.1

a. Import tariffs provided by Sergey Kiselev and Roman Romashkin  
Source: GTAP Data Base, Dimaranan and McDougall [2002].



**Table 4: Concentration in Oligopolistic sectors and CDR Parameters**

	<b>Number of Firms<sup>a</sup></b>	<b>Marginal Cost Markup</b>	<b>Accepted CDR</b>
Gas	1	1.527	0.192
Oil	10	1.025	0.020
Ferrous Metals	12	1.022	0.020
Non-Ferrous Metals	12	1.013	0.020
Motor vehicles	3	1.250	0.162

a. Data for number of firms that cover more than 80% of each sector's output and profitability provided by Sergey Kiselev and Roman Romashkin.

Source: Authors' calculations.

**Table 5: Assumptions of the Liberalisation Scenarios and Model**

	<b>The WTO Accession Scenario</b>	<b>The Trade Liberalisation Scenario</b>
<b>Import tariffs (tms shock)</b>	Import tariffs are reduced to the levels that are being negotiated (see table 5 for the list of sectors where import tariffs are being reduced).	Import tariffs are eliminated
<b>Non-tariff barriers in services (to shock)</b>	Non-tariff barriers in communications, and business and financial services sectors are represented as output taxes, since they appear to be rent-creating rather than cost-escalating. Estimated non-tariff barriers are taken from Dee (2004). For business and financial services sector barriers applied to foreign firms weighted by share of foreign ownership (5%). For communication sector it is assumed that share of fixed line is 80%, while share of mobile lines is 20%. Therefore, these shares are used as weights to calculate total non-tariff barrier (see p. 15 for details). Under both scenarios the barriers are eliminated.	
<b>Assumptions of the Model</b>		
Preferences	Non-nested Armington; elasticities of substitution for sectors are taken from Hertel et al (2003)	
Imperfect competition	Imperfect competition is assumed in five sectors: Gas, Oil, Non Ferrous Metals, Ferrous Metals, and Motor Vehicles. In each sector oligopolistic market structure is assumed. We consider two possible scenario: first when firms are not allowed to enter/leave the market (No Entry/Exit), and second when firms can enter/exit the market (Entry/Exit)	
	<b>No Entry/Exit</b>	<b>Entry/Exit</b>
	number of firms is fixed; firms vary markups (hence profitability) in response to shocks (trade liberalisation)	number of firms varies; profitability of firms (markup over average cost) is fixed

**Table 6: Import tariffs in Russia**

	GTAP Data Base Rate <sup>a</sup> %	Actual Rate <sup>b</sup> %	Proposed the WTO Accession Rate <sup>b</sup> %
Wheat and Cereals	5.0	5.0	16.5
Agriculture, plant products	6.7	10.6	10.4
Agriculture, animal products	7.4	10.4	12.9
Forestry-Fishing	9.3	8.5	6.6
Natural gas	5.0	5.0	5.0
Oil	4.8	5.0	5.0
Meat	16.5	17.1	26.3
Dairy Products	15.0	14.9	18.3
Other Food Products	11.4	17.9	17.2
Light industry products	17.0	15.1	13.3
Chemical products	9.3	9.5	6.0
Ferrous Metals and metal products	14.4	7.4	7.2
Nonferrous Metals	6.1	9.6	9.2
Other minerals	11.0	5.0	5.0
Motor Vehicles	21.4	18.4	17.2
Manufactures	9.7	11.7	8.4
Electricity	1.6	5.0	5.0
Other Utilities	0.0	0.0	0.0
Construction	0.0	0.0	0.0
Trade	0.0	0.0	0.0
Other Transport	0.0	0.0	0.0
Air Transport	0.0	0.0	0.0
Water Transport	0.0	0.0	0.0
Communications	0.0	0.0	0.0
Business and financial services	0.0	0.0	0.0
Public Administration, Defense, Education, Health, Recreational and other services	0.0	0.0	0.0
Dwellings	0.0	0.0	0.0

a. Source: GTAP Data Base, Dimaranan and McDougall [2002].

b Source: Data provided by Sergey Kiselev and Roman Romashkin

**Table 7: Ad valorem tax equivalents of non-tariff barriers in Russia's Services sectors**

	Initial estimation	Weight <sup>a</sup>	Average ad valorem equivalent
<b>Telecommunication</b>			
Fixed Lines	5.2	0.8	4.72
Mobile Lines	2.8	0.2	
<b>Financial services</b>			
Market access <sup>b</sup>	6.18	1	6.23
National Treatment <sup>c</sup>	1.09	0.05	

a. For telecommunication sector weight is defined as a share of fixed (mobile) lines in the sector. Note that it was assumed that National treatment was of equal importance to market access.

b. Market access barriers apply to both domestic and foreign firms (e.g. licenses, regulation rules, etc.)

c. National treatment barriers apply to foreign firms only (e.g. share of foreign firms in total capital, etc.)

Source: Dee [2004]

**Table 8: The Short Run Effects of Russia's WTO Accession and Trade Liberalisation**

	The WTO Accession Scenario <sup>a</sup>				The Trade Liberalisation Scenario <sup>b</sup>			
	No entry/exit		Entry/exit		No entry/exit		Entry/exit	
<b>Welfare effects</b> (USD millions)	586		499		1325		1364	
<b>Part of which is due to:</b>								
Import tariff reduction	182		170		1019		1124	
Services liberalisation	404		329		306		220	
<b>Macroeconomic effects</b> (% change)	Overall effect <sup>c</sup>	Due to tariff reduction	Overall effect <sup>c</sup>	Due to tariff reduction	Overall effect <sup>c</sup>	Due to tariff reduction	Overall effect <sup>c</sup>	Due to tariff reduction
Real GDP <sup>d</sup>	0.2	0.1	0.2	0.1	0.9	0.8	0.9	0.9
Real Investment <sup>e</sup>	3.9	0.8	3.8	0.7	8.1	5.0	6.8	3.8
Real Exports <sup>f</sup>	0.8	2.2	1.1	2.3	16.0	17.4	17.4	18.6
Real Imports <sup>g</sup>	5.1	3.1	4.6	3.0	25.1	23.1	23.6	22.2
Terms of Trade	-0.3	-0.5	-0.4	-0.5	-3.2	-3.3	-3.4	-3.5
<b>Sectoral effects: % change in Real Output</b>								
Best Sectors <sup>h</sup>	Business and Financial Services (+3.5) Construction (+3.3) Communication (+2.6)				Non-Ferrous Metals (+22) Construction (+7) Ferrous Metals (+7) Mineral Products (+5) Business and Financial Services (+5) Communication (+3) Air Transportation (+3) Maritime Transportation (+3)			
Worst Sectors <sup>i</sup>	Manufacture (-8.9) Light Industry (-3.9) Chemical Products (-2.5)				Meat (-26) Dairy Products (-13) Light Industry (-13) Manufacture (-11) Food Products (-9) Animal Products (-5) Wheat and Cereals (-3) Plant Products (-3)			

a WTO agreement; see Table 5 for new tariff rates

b Complete removal of tariffs

c Overall effect includes tariff reduction (elimination) and service liberalisation

d GDP: quantity of GDP (qgdp)

e Investment: output of capital goods sector (qcgds)

f Export: volume of merchandise export (qxwreg)

g Import: volume of merchandise imports (qiwreg)

h. Best sectors are the ones where output expands by more than 2%

i. Worst sectors are the ones where output declines by more than 2%

Source: Authors' calculations

Table 9: Aggregate Welfare Effects of Russia's Trade Liberalisation and the WTO Accession by Regions, USD Million

	The WTO accession <u>no</u> entry/exit <sup>a</sup>		The WTO accession entry/exit <sup>a</sup>		Trade liberalisation <u>no</u> entry/exit <sup>b</sup>		Trade liberalisation entry/exit <sup>b</sup>	
	Overall effect <sup>c</sup>	Due to tariff reduction	Overall effect <sup>c</sup>	Due to tariff reduction	Overall effect <sup>c</sup>	Due to tariff elimination	Overall effect <sup>c</sup>	Due to tariff elimination
Russia	585.9	181.7	498.5	170.3	1325.1	1019.1	1363.5	1124.8
Former Soviet Union	96.2	85.9	99.3	87.9	799.1	787.5	793.1	780.0
Eastern Europe	154.0	145.8	159.4	148.9	947.5	934.2	970.4	955.1
Western Europe	268.6	335.3	305.6	351.3	1474.3	1535.1	1632.5	1672.0
NAFTA	-38.4	1.6	-17.2	9.3	74.7	113.6	172.2	197.0
China	26.3	28.6	28.1	29.9	203.2	206.3	216.4	218.8
Asia & Australia	53.1	112.4	85.9	121.7	247.7	305.4	387.8	420.5
South America	-53.3	-38.3	-51.1	-38.1	-177.7	-162.1	-163.5	-150.1
Africa	-48.2	-71.0	-57.7	-72.6	-262.1	-280.1	-282.0	-292.0
Rest of the World	-172.3	-164.0	-181.0	-166.5	-512.0	-499.2	-521.8	-503.2

a. WTO agreement; see Table 5 for new tariff rates

b. Complete removal of tariffs

c. Overall effect includes tariffs reduction (elimination) and service liberalisation

Source: Authors' calculations

Table 10: Static Welfare Effects of Trade Liberalisation on Russia (USD 1997 Million)

	The WTO accession <u>no</u> entry/exit	The WTO accession entry/exit	Trade liberalisation <u>no</u> entry/exit	Trade liberalisation entry/exit
Total Welfare	585.9	498.5	1325.0	1363.5
Allocative Efficiency <sup>a</sup>	869.2	813.4	3950.5	3776.8
<i>Production tax</i>	16.8	17.1	594.6	586.9
<i>Input tax</i>	220.0	208.9	843.4	769.5
<i>Consumption tax</i>	108.8	100.3	388.4	326.0
<i>Export tax</i>	43.9	53.1	576.1	606.5
<i>Import tax</i>	479.7	434.0	1547.9	1487.8
Scale Economies <sup>b</sup>	30.2	53.0	61.1	456.5
Terms of Trade <sup>c</sup>	-318.5	-384.1	-3368.2	-3611.9
Investment-Savings Term <sup>d</sup>	5.0	16.1	681.6	742.1

a. The allocative efficiency effect arises when the allocation of resources changes relative to the initial allocation.

b. The scale economy effect captures the effect of unrealised economies of scale.

c. The terms of trade contributions to national welfare arise from changes in export prices relative to import prices.

d. Investment-Saving term relates to the change in the price of saving relative to the price of capital goods.

Source: Authors' calculations

Table 11: Decomposition of Scale Economies Effects Under the Russia's WTO Accession Scenario

	WTO accession, no entry/exit				WTO accession, entry/exit			
	Real Value Added (qva)	# of firms change (%)	Output Augmenting tech change	Scale Economies Effect	Real Value Added (qva)	# of firms change (%)	Output Augmenting tech change	Scale Economies Effect
Gas	-0.30	0	-0.070	-21.4	-0.35	-0.27	-0.020	-6.1
Oil	-0.40	0	-0.010	-2.8	-0.38	-1.10	0.010	2.8
Ferrous Metals	-1.11	0	-0.010	-2.2	-0.89	-0.40	0.000	0.0
Non-ferrous Metals	-0.77	0	-0.020	-2.8	-0.29	-0.30	0.000	0.0
Motor Vehicles	1.09	0	0.210	58.9	0.85	-0.20	0.200	56.1
<b>Total Effect<sup>a</sup></b>				<b>30.2</b>				<b>53.0</b>

a. Total effect is equal the scale economy effect in the Table 9.

Source: Authors' calculations

Table 12: Sectoral Effects of Trade Liberalisation and the WTO Accession on Russia: Quantity of Output % Changes

	The WTO accession <u>no</u> entry/exit		The WTO accession entry/exit		Trade liberalisation <u>no</u> entry/exit		Trade liberalisation entry/exit	
	Overall effect	<i>Due to tariff elimination</i>	Overall effect	<i>Due to tariff elimination</i>	Overall effect	<i>Due to tariff elimination</i>	Overall effect	<i>Due to tariff elimination</i>
<b>Export Oriented Sectors</b>								
Nonferrous Metals	-0.8	2.4	-0.3	2.6	18.6	21.8	22.0	25.0
Natural Gas	-0.4	0.2	-0.4	0.2	1.3	1.8	1.4	2.0
Oil	-0.4	0.1	-0.4	0.1	1.1	1.6	1.4	1.8
Ferrous Metals and Metal Products	-1.1	1.3	-0.9	1.4	6.7	9.2	7.2	9.5
Chemical Products	-2.5	-1.5	-2.5	-1.5	-1.7	-0.8	-1.4	-0.4
<b>Intermediate Goods</b>								
Construction	3.3	0.7	3.2	0.7	7.1	4.5	6.0	3.5
Other Minerals	0.4	0.8	0.5	0.8	4.6	5.0	4.7	5.1
Electricity	-0.7	0.2	-0.8	0.2	2.0	2.9	2.4	3.3
<b>Final Consumption Goods</b>								
Motor Vehicles	1.3	0.4	1.1	0.3	-1.8	-2.6	-5.7	-6.4
Manufactures	-8.9	-5.5	-8.6	-5.5	-11.1	-7.7	-9.5	-6.4
Meat Products	-0.4	1.1	-0.3	1.1	-26.0	-24.5	-25.1	-23.8
Dairy Products	-0.4	0.7	-0.3	0.7	-12.9	-11.8	-12.2	-11.2
Animal Products	-0.2	0.2	-0.2	0.2	-5.3	-4.9	-5.3	-4.8
Other Food Products	-0.6	0.0	-0.7	0.0	-8.9	-8.3	-8.8	-8.0
Communications	2.6	0.1	2.4	0.0	3.1	0.6	2.8	0.4
Wheat and Cereals	-0.8	-0.2	-0.8	-0.2	-3.6	-2.9	-3.4	-2.7
Plant Products	-0.4	0.2	-0.4	0.2	-2.9	-2.3	-2.9	-2.3
Light Industry Products	-3.9	-1.5	-3.8	-1.5	-13.1	-10.8	-12.0	-9.8
Business and Financial Services	3.5	0.3	3.5	0.3	4.8	1.5	4.9	1.6
Capital goods	3.9	0.8	3.8	0.7	8.1	5.0	6.8	3.8

Source: Authors' calculations

**Table 13: Sectoral Effects of Trade Liberalisation and the WTO Accession on Russia: Quantity of Export % Changes**

	<b>The WTO accession no entry exit</b>		<b>The WTO accession entry exit</b>		<b>Trade liberalisation no entry exit</b>		<b>Trade liberalisation entry exit</b>	
	<b>Overall effect</b>	<b><i>Due to tariff elimination</i></b>	<b>Overall effect</b>	<b><i>Due to tariff elimination</i></b>	<b>Overall effect</b>	<b><i>Due to tariff elimination</i></b>	<b>Overall effect</b>	<b><i>Due to tariff elimination</i></b>
<b>Export Oriented Sectors</b>								
Nonferrous Metals	-0.5	3.6	0.1	3.8	30.2	34.4	34.9	38.7
Natural Gas	0.0	0.3	0.1	0.3	1.7	1.9	1.9	2.0
Oil	2.5	2.2	2.6	2.3	7.6	7.3	7.7	7.3
Ferrous Metals and Metal Products	-1.6	2.9	-1.2	3.0	24.2	28.9	26.5	30.9
Chemical Products	1.1	2.9	1.4	2.9	14.5	16.1	15.6	17.0
<b>Intermediate Goods</b>								
Construction	-0.9	1.1	-0.7	1.1	7.3	9.2	8.2	10.0
Other Minerals	-1.6	2.0	-1.3	2.1	15.1	18.7	17.1	20.4
Electricity	-0.1	0.9	0.1	0.9	6.2	7.1	6.7	7.4
<b>Final Consumption Goods</b>								
Motor Vehicles	1.6	4.6	1.6	4.4	58.0	61.4	41.0	43.9
Manufactures	-1.0	5.5	-0.3	5.6	42.5	49.6	47.0	53.6
Meat Products	-1.2	3.8	-0.3	4.0	62.0	67.8	67.4	72.4
Dairy Products	-0.9	3.5	-0.2	3.6	46.5	51.3	50.7	54.8
Animal Products	-0.1	1.9	0.5	2.0	33.4	35.5	35.3	37.0
Other Food Products	-0.1	1.9	0.3	1.9	23.6	25.5	25.4	27.0
Communications	10.4	1.0	10.5	1.0	18.8	9.0	19.8	9.8
Wheat and Cereals	-0.2	2.0	0.4	2.1	42.6	45.1	44.5	46.4
Plant Products	-0.8	1.9	0.1	2.1	47.2	50.2	50.2	52.4
Light Industry Products	-0.6	3.9	-0.1	4.0	33.9	38.6	37.1	41.4
Business and Financial Services	13.9	1.0	14.1	1.0	21.8	8.3	22.7	9.0

Source: Authors' calculations



Table 14: Sectoral Effects of Trade Liberalisation and the WTO Accession on Russia: Quantity of Import % Changes

	The WTO accession <u>no</u> entry/exit		The WTO accession entry/exit		Trade liberalisation <u>no</u> entry/exit		Trade liberalisation entry/exit	
	Overall effect	<i>Due to tariff elimination</i>	Overall effect	<i>Due to tariff elimination</i>	Overall effect	<i>Due to tariff elimination</i>	Overall effect	<i>Due to tariff elimination</i>
<b>Export Oriented Sectors</b>								
Nonferrous Metals	0.7	-0.1	0.5	-0.2	47.2	46.7	45.4	44.9
Natural Gas	-0.7	-0.3	-0.9	-0.3	54.3	54.9	54.3	55.2
Oil	-4.4	-3.3	-4.4	-3.3	34.4	35.7	34.8	36.1
Ferrous Metals and Metal Products	1.9	-1.5	1.5	-1.6	20.3	17.0	17.6	14.6
Chemical Products	13.9	12.8	13.5	12.7	32.6	31.6	31.2	30.5
<b>Intermediate Goods</b>								
Construction	4.7	-0.4	4.4	-0.4	0.8	-4.1	-1.2	-5.8
Other Minerals	2.3	-1.7	1.8	-1.8	10.4	6.5	8.0	4.5
Electricity	-0.6	-0.8	-0.8	-0.8	1.6	1.5	1.5	1.6
<b>Final Consumption Goods</b>								
Motor Vehicles	5.7	1.4	5.3	1.5	56.2	51.4	69.2	64.8
Manufactures	13.8	9.6	13.3	9.5	30.9	26.9	28.2	24.6
Meat Products	0.7	-2.8	-0.1	-2.9	71.4	67.6	67.9	64.9
Dairy Products	0.8	-2.8	0.0	-2.9	57.4	53.6	53.9	50.9
Animal Products	-1.2	-2.1	-1.7	-2.2	2.0	1.2	1.0	0.7
Other Food Products	1.7	0.3	1.2	0.3	35.9	34.5	33.8	33.0
Communications	-7.6	-0.9	-8.0	-1.0	-14.1	-7.6	-15.3	-8.5
Wheat and Cereals	-0.5	-2.0	-1.1	-2.1	-16.6	-17.9	-17.5	-18.3
Plant Products	0.6	-1.2	-0.3	-1.4	8.5	6.8	6.4	5.4
Light Industry Products	6.0	3.5	5.2	3.3	34.4	32.1	32.0	30.3
Business and Financial Services	-5.3	-0.4	-5.3	-0.4	-8.3	-3.3	-8.5	-3.6

Source: Authors' calculations

Table 15: The Long Run Effects of Russia's WTO Accession

The WTO Accession Scenario <sup>a</sup>		
	No entry/exit	Entry/exit
<b>Welfare effects</b> (\$ US millions)	1560	1564
<b>Part of which is due to:</b>		
Import tariff reduction	-6	-11
Service liberalisation	1566	1575
<b>Macroeconomic effects</b> (% change)		
Real GDP <sup>b</sup>	0.7	0.7
Real Investment <sup>c</sup>	1.6	1.6
Real Exports <sup>d</sup>	3.1	3.1
Real Imports <sup>e</sup>	2.8	2.8
<b>Sectoral effects:</b> % change in Real Output		
Best Sectors <sup>f</sup>	Business and Financial Services (+4) Non-Ferrous Metals (+4) Communication (+3) Ferrous Metals (+2)	
Worst Sectors <sup>g</sup>	Manufacture (-5)	

a WTO agreement; see Table 5 for new tariff rates

b GDP: quantity of GDP (qgdp)

c Investment: output of capital goods sector (qcgds)

d Export: volume of merchandise export (qxwreg)

e Import: volume of merchandise imports (qiwreg)

f Best sectors are the ones where output expands by more than 2%

g Worst sectors are the ones where output declines by more than 2%

Source: Authors' calculations

Table 16: Sectoral Effects of Trade Liberalisation and the WTO Accession on Russia: Demand on Labour % Changes

	The WTO accession <b>no</b> entry exit		The WTO accession entry exit		Trade liberalisation <b>no</b> entry exit		Trade liberalisation entry exit	
	<b>Overall effect</b>	<i>Due to tariff elimination</i>	<b>Overall effect</b>	<i>Due to tariff elimination</i>	<b>Overall effect</b>	<i>Due to tariff elimination</i>	<b>Overall effect</b>	<i>Due to tariff elimination</i>
<b>Export Oriented Sectors</b>								
Nonferrous Metals	-0.6	2.4	-0.1	2.7	19.0	22.0	22.7	25.5
Natural Gas	-0.4	0.2	-0.5	0.3	1.7	2.3	2.0	2.7
Oil	-0.6	0.1	-0.6	0.1	2.1	2.8	2.4	3.0
Ferrous Metals and Metal Products	-1.0	1.4	-0.7	1.4	7.2	9.6	7.8	10.0
Chemical Products	-2.4	-1.5	-2.3	-1.5	-1.1	-0.2	-0.6	0.2
<b>Intermediate Goods</b>								
Construction	3.5	0.7	3.4	0.7	7.7	5.0	6.7	4.1
Other Minerals	0.6	1.0	0.6	1.0	5.7	6.1	6.0	6.3
Electricity	-0.5	0.3	-0.5	0.3	2.9	3.7	3.5	4.3
<b>Final Consumption Goods</b>								
Motor Vehicles	1.2	0.3	1.0	0.2	-1.1	-1.9	-6.3	-7.0
Manufactures	-8.8	-5.5	-8.5	-5.4	-10.7	-7.4	-9.0	-5.9
Meat Products	-0.3	1.1	-0.1	1.1	-25.6	-24.2	-24.6	-23.4
Dairy Products	-0.2	0.7	-0.2	0.8	-12.4	-11.3	-11.6	-10.7
Animal Products	-0.3	0.3	-0.4	0.3	-6.6	-6.0	-6.5	-5.9
Other Food Products	-0.5	0.1	-0.6	0.1	-8.4	-7.9	-8.1	-7.5
Communications	2.8	0.1	2.6	0.1	3.9	1.2	3.8	1.2
Wheat and Cereals	-1.0	-0.1	-1.0	-0.1	-4.8	-4.0	-4.6	-3.7
Plant Products	-0.5	0.2	-0.6	0.2	-4.1	-3.4	-4.0	-3.2
Light Industry Products	-3.8	-1.5	-3.7	-1.4	-12.8	-10.5	-11.6	-9.4
Business and Financial Services	3.7	0.3	3.7	0.3	5.6	2.2	5.9	2.4

Source: Authors' calculations

**APPENDIX A: AGGREGATION SCHEME AND CLASSIFICATION OF GOODS****Table A1: Aggergation Scheme by Regions**

<b>##</b>	<b>Code</b>	<b>Description</b>	<b>GTAP Regions Included<sup>a</sup></b>
1	RUS	Russian Federation	RUS
2	XSU	Former Soviet Union	XSU
3	EE	Eastern Europe	ALB, BGR, HRV, CZE, HUN, POL, ROM, SVK, SVN, EST, LVA, LTU
4	WE	Western Europe	AUT, BEL, DNK, FIN, FRA, DEU, GBR, GRC, IRL, ITA, LUX, NLD,PRT, ESP, SWE, CHE, XEF, CYP, MLT, TUR
5	NAFTA	NAFTA	USA, CAN, NEX
6	CHINA	China	CHN
7	ASA	Asia and Australia	AUS, NZL, HKG, JPN, KOR, TWN, IND, IDN, MYS, PHL, SGP, THA, VNM, BGD, LKA, XSA
8	SAM	South America	XCM, COL, PER, VEN, XAP, ARG, BRA, CHL, URY, RSM
9	AFR	Africa	MAR, XNF, DWA, XSC, MWI, MOZ, TZA, ZMB, ZWE, XSF, UGA, XSS
10	ROW	Rest of the World	XME, XRW

a. GTAP regions listing available at: [http://www.gtap.agecon.purdue.edu/databases/v54/v54\\_regions.asp](http://www.gtap.agecon.purdue.edu/databases/v54/v54_regions.asp)

Table A2: Aggregation Scheme by Sectors

##	Code	Description	GTAP Sectors Included <sup>a</sup>
1	GROW		WHT, GRO
2	AGP	Agriculture, plant products	PDR, V_F, OSD, C_B,PFB, OCR
3	AGA	Agriculture, animal products	CTL, OAP, RMK, WOL
4	FRFS	Forestry-Fishing	FOR, FSH
5	GAS	Natural gas	GAS
6	OIL	Oil	OIL
7	MEAT	Meat	CMT, OMT
8	DP	Dairy Products	MIL
9	OFP	Other Food Products	VOL, PCR, SGR, OFD, B_T
10	LIN	Light industry products	TEX, WAP, LEA, LUM, PPP
11	CEM	Chemical products	P_C, CRP,
12	FMET	Ferrous Metals and metal products	I_S, FMP
13	NFM	Nonferrous Metals	NFM
14	OMN	Other minerals	COL, OMN, NMM
15	MVH	Motor Vehicles	MVH
16	MNF	Manufactures	OTN, ELE, OME, OMF
17	ELY	Electricity	ELY
18	UTY	Other Utilities	GDT, WTR
19	CNS	Construction	CNS
20	TRD	Trade	TRD
21	OTR	Other Transport	OTP
22	ATP	Air Transport	ATP
23	WTP	Water Transport	WTP
24	CMM	Communications	CMN
25	BFS	Business and financial services	OFI, ISR, OBS
26	OSG	Public Administration, Defense, Education, Health, Recreational and other services	OSG, ROS
27	DWE	Dwellings	DWE

a. GTAP sector listing available at: [http://www.gtap.agecon.purdue.edu/databases/v54/v54\\_sectors.asp](http://www.gtap.agecon.purdue.edu/databases/v54/v54_sectors.asp)

**Table A3: Classification of goods (%)**

	Intermediate Usage	Final consumption	Export	Total
<b>Export Oriented Sectors</b>				
Nonferrous Metals	32	0	68	100
Natural Gas	50	7	42	100
Oil	59	0	41	100
Ferrous Metals and Metal Products	62	1	37	100
Chemical Products	64	9	27	100
<b>Intermediate Goods</b>				
Construction	97	3	0	100
Other Minerals	88	4	8	100
Trade	88	11	1	100
Electricity	82	17	1	100
Other Utilities	80	18	1	100
<b>Final Consumption Goods</b>				
Manufactures	71	11	18	100
Public Administration, Defense, Education, Health, Recreational and other services	9	90	1	100
Meat	85	15	0	100
Dairy Products	54	44	2	100
Agriculture, Animal Pproducts	40	59	1	100
Other Food Products	39	55	6	100
Communications	52	42	6	100
Agriculture, Plant Products	57	41	1	100
Forestry-Fishing	52	32	16	100
Light Industry Products	58	25	16	100
Motor Vehicles	73	25	2	100
Business and Financial Services	75	18	7	100
Dwellings	0	100	0	100
<b>Transportation</b>				
	Intermediate Usage	Final consumption	Transportation services	Export Total
Air Transport	25	48	3	24 100
Other Transport (Railroad)	64	28	2	6 100
Water Transport	52	7	19	22 100

Source: GTAP Data Base, Dimaranan and McDougall [2002].

## APPENDIX B: CALIBRATION OF THE CDR

1. Calibration of the Cournot markups is based on the following relationship:

$$\frac{P - MC}{P} = (1 - M^{-1}) = \frac{1}{n\varepsilon} \quad (\text{A1})$$

where  $P$  = price,  $MC$  = (constant) marginal cost,  $M = P/MC$  = the power of the markup over marginal cost,  $\varepsilon$  = the perceived market demand elasticity, and  $n$  is the number of firms operating in the market.

2. Following Elbehri and Hertel [2003] the perceived market demand elasticity is

$$\varepsilon_i = -\hat{X}_i / \hat{P}_i = \sigma + (1 - \sigma) \sum_r \frac{X_{i,r}}{X_i} S_{i,r} \quad (\text{A2})$$

which can be found using data currently available in the GTAP data base.

Thus, the only additional information necessary to calculate the power of markup over marginal costs for a specific sector is the Cournot equivalent number of firms operating in this sector.

3. The markup over average costs can be obtained from the following expression:

$$M_A = \frac{P}{AC} = \frac{P * Q}{AC * Q} = \frac{REVENUE}{TOTAL COSTS} = \frac{PROFIT + TOTAL COSTS}{TOTAL COSTS} = 1 + \frac{PROFIT}{TOTAL COSTS} \quad (\text{A3})$$

4. The Russian statistical agency (Goskomstat) publishes data on the profitability of products (Profitability of products = Profit / Costs). Using this data for the oligopolistic sectors we obtain the power of markup over average costs.

The following relationship relates the CDR to markups over marginal and average costs:

$$M_A = \frac{P}{AC} = (1 - CDR)M \quad \Rightarrow \quad CDR = 1 - \frac{M_A}{M} \quad (\text{A4})$$

5. The CDR's are then obtained from the markups over average and marginal costs. The resulting CDR's are shown in Table A1. In several sectors the CDR was found to be negative. Under the stated formulation for the CDR (A4), a negative value for this parameter means that the markup over average costs is greater than the markup over marginal costs, which is inconsistent with the assumed cost structure<sup>33</sup>. Since

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<sup>33</sup> There are several possible reasons for such inconsistency. First, it may be the case that the actual cost structure is different from assumed (*e.g.* marginal cost is not constant). Second, statistical discrepancy may provide misleading results. Finally, it may be the case that the trade elasticities differ from those used (though there was little evidence that different trade elasticities provide better results).

the obtained negative CDR parameters are very close to zero, to avoid inconsistency we set these CDR equal to the CDR implemented for other regions.

6. Since we assume an oligopolistic market structure for the sectors as a whole, we need to define both the number of firms and CDR not only for Russian sectors, but for all regions. Unfortunately we do not have data on the concentration and profitability for all regions. However, since most of the regions we consider in the model are highly aggregated, we assume market structures in these regions are close to a competitive market. Analysis shows that if we assume the number of firms greater than 100, the sector behaves as if it were competitive regardless of the CDR imposed. Similarly, we set the CDR parameter for all regions equal to 0.02, *i.e.* close to zero.

**Appendix Table B1: Calculation of CDR Parameters**

	<b>ESUBD = ESUBM</b>	<b>Demand Elasticity</b>	<b>Number of Firms</b>	<b>Marginal Cost Markup</b>	<b>Average Cost Markup</b>	<b>CDR</b>	<b>Accepted CDR</b>
1 GAS	10.4	2.899	1	1.527	1.233	<b>0.192</b>	0.192
2 OIL	10.4	3.998	10	1.025	1.147	<b>-0.110</b>	0.020
3 FMET	6.74	3.824	12	1.022	1.036	<b>-0.013</b>	0.020
4 NFM	8.4	6.385	12	1.013	1.114	<b>-0.099</b>	0.020
5 MVH	5.6	1.668	3	1.250	1.047	<b>0.162</b>	0.162



## **APPENDIX C: LONG RUN IMPACT OF RUSSIA'S WTO ACCESSION ON THE STRUCTURE OF THE RUSSIAN ECONOMY.**

1. In this appendix the long run effects of the WTO accession agreement are examined. To analyse the long run impact of the Russia's WTO accession on the Russian economy we implemented the long run closure developed by Francois [1996].
2. In this closure the capital stock ( $kb(r)$  or  $qo(\text{"capital"},r)$ ) is endogenised so that changes in investment add to the endowment of capital which can be used in production. To endogenise capital stocks the variable  $expand(\text{"capital"},r)$  is exogenised. This means that the % change in capital is set equal to the % change in Investment. Walmsley [1999] showed that this was equivalent to equating the expected further rates of return, which are equal across regions, to the current rate of return.
3. Finally this closure also fixes the ratio of the trade balance to the income (DTBALR) in all regions except one. In order to maintain external balance saving in each region is permitted to adjust to ensure the fixed trade balance<sup>34</sup>. The rationale for fixing the trade balance in the GTAP model is to ensure that foreign capital flows into Russia are not permitted to increase significantly<sup>35</sup>.
4. In the remainder of this appendix we examine the impact of WTO accession on the economy in the long run.

### **Overall effects**

5. The aggregated long run welfare effects of the WTO accession are reported in table C1. Russia gains about USD 1.6 billion (0.4% of GDP). All components of Russia's GDP rise in the long run (Table C1). It is important to notice that exports rise even more than imports, while in the short run the import growth rate was higher. The reason is that as we showed earlier, the WTO accession scenario leads to an increase in investment in the short run. In the long run that investment transforms into additional capital, causing the capital stock in Russia to increase. This drives down the price of capital and hence the costs of production. As a result market prices in Russia fall across all sectors, and output grows in most of the sectors grow due to the additional capital. Cheaper domestic production restrains import expansion and expands exports relative to the short run pattern.
6. The increase in capital positively affects welfare through the endowment term in the welfare decomposition (table C1). Allocation efficiency terms in the long run are close to the ones obtained in the short run, though the composition of allocation efficiency terms in the long run is different: output expansion leads to higher production tax component, while the contributions of the import and export taxes declines.
7. The scale economies term plays a relatively more important role in the long run, especially when firms are not allowed to enter/exit the market. Recall that the scale economies effects are driven by equation (6) and (7). In the no entry/exit case in the long run, existing firms take advantage of decreasing costs and expansion of output and mark-ups; the scale economies term rises substantially. In the entry/exit case firms

<sup>34</sup> This is achieved by endogenizing  $dpsave$  in the GTAP model.

<sup>35</sup> This is particularly important in the GTAP model since foreign capital flows are not explicitly modeled and income from those capital flows are not tracked back to the foreign owners.

enter the market in all oligopolistic sectors except the oil industry. Thus, the variable “*firms*” is positive for those sectors; and hence the variable “*ao*” is smaller in the entry/exit case, causing the scale economies effects to be smaller as well.

8. In the long run the negative terms of trade effect is larger than in the short run because export prices decline substantially relative to import prices to offset the surge of import.

### Sectoral effects

9. In the long run output increases in 23 out of 27 sectors (table C3). As for the short run case we divide the results into two components, the proportion due to tariff reductions and the total due to tariff and services liberalisation. Comparing the long run and short run cases we can see that the import tariffs reduction positively affects output in both cases, while the effect of service liberalisation is more positive in the long run. This is due to the fact that the service liberalisation leads to a large increase in capital stock, which causes output to increase in most sectors. The only sectors where output decreases are manufactures, chemical products, light industry, and wheat and cereals sectors – the sectors where import tariffs were reduced significantly.

### Conclusion

10. The overall long run welfare effect of the WTO accession on the Russian economy is positive. Most of the sectors also expand in the long run taking advantage of increasing capital stock. The only sectors where output declines are manufactures, chemical products, light industry, and wheat and cereals – the sectors where import tariffs are reduced significantly. However, only in the manufacturer sector output declines by more than 1%, while negative changes in other sectors are very small. Moreover, given that the manufacturing sector is highly aggregated, it may be the case that an output decline in this sector is driven by several specific industries within sector. In this case improvement of the economy as whole as well as expansion of most of the sectors can be considered as strong evidence of the positive effect of the WTO accession on Russia’s economy in the long run.

**Table C1: Long Run Welfare Effects of the WTO Accession on Russia (USD 1997 Million)**

	No entry/exit	Entry/exit
Total Welfare	1560	1564
Allocative Efficiency	876.0	886.7
<i>Production tax</i>	264.2	268.1
<i>Input tax</i>	171.1	176.6
<i>Consumption tax</i>	62.7	63.1
<i>Export tax</i>	98.6	98.7
<i>Import tax</i>	279.4	280.2
Endowment	1294.0	1316.7
Scale Economies	78.0	51.0
Terms of Trade	-839.7	-842.0
Investment-Savings Term	151.7	151.0

**Table C2: Macroeconomics Effects of Trade Liberalisation on Russia**

	Overall effect <sup>a</sup>	Due to tariff elimination
Real Investments <sup>b</sup>	1.6%	0.1%
Real Export <sup>c</sup>	3.1%	2.5%
Real Import <sup>d</sup>	2.8%	2.5%
Real GDP <sup>e</sup>	0.7%	0.1%

a Overall effect includes tariffs reduction and service liberalisation

b Investments: output of capital goods sector (qcgds)

c Export: volume of merchandise export (qxwreg)

d Imports: volume of merchandise imports (qiwreg)

e GDP: quantity of GDP (qgdp)

Source: Authors' calculations

**Table C3: Long Run Sectoral Effects of the WTO Accession on Russia: Quantity of Output % Changes**

	<u>No entry/exit</u>		<u>Entry/exit</u>	
	Overall effect	Due to tariff elimination	Overall effect	Due to tariff elimination
<b>Export Oriented Sectors</b>				
Nonferrous Metals	4.1	3.4	4.3	3.5
Natural Gas	0.3	0.2	0.4	0.2
Oil	0.3	0.1	0.3	0.1
Ferrous Metals and Metal Products	2.0	1.8	2.0	1.8
Chemical Products	-1.0	-1.2	-1.0	-1.2
<b>Intermediate Goods</b>				
Construction	1.4	0.0	1.4	0.0
Other Minerals	1.4	0.8	1.4	0.8
Trade	0.5	0.1	0.5	0.1
Electricity	0.7	0.4	0.8	0.4
Other Utilities	0.6	0.2	0.6	0.2
<b>Final Consumption Goods</b>				
Motor Vehicles	0.9	0.1	1.0	0.1
Manufactures	-5.2	-4.9	-5.2	-5.0
Public Administration, Defense, Education, Health, Recreational and other services	0.1	0.0	0.1	0.0
Meat Products	1.3	1.3	1.3	1.3
Dairy Products	1.0	1.0	1.0	0.9
Agriculture, Animal Products	0.3	0.3	0.3	0.3
Other Food Products	0.5	0.2	0.5	0.2
Communications	3.4	0.1	3.4	0.1
Wheat and Cereals	-0.1	-0.1	-0.1	-0.1
Agriculture, Plant Products	0.0	0.2	0.0	0.2
Forestry-Fishing	0.1	0.1	0.1	0.1
Light Industry Products	-1.1	-1.0	-1.1	-1.0
Business and Financial Services	4.3	0.3	4.3	0.3
<b>Transportation</b>				
Air Transport	1.4	0.4	1.4	0.4
Other Transport (Railroad)	0.6	0.2	0.6	0.2
Water Transport	1.2	0.5	1.2	0.5
Capital goods	1.6	0.0	1.6	0.0

## APPENDIX D: THE EFFECTS OF CROSS-BORDER SERVICE LIBERALISATION ON THE RUSSIAN ECONOMY

1. The effect of cross-border service liberalisation in construction, and business and financial services sectors is examined in this appendix. We implement import augmenting technical change in construction and business and financial services sectors via a shock to the *AMS* variable. Changes in *AMS* capture the impact of reducing non-tariff measures on the price of imports from a particular exporter. An increase in  $AMS_{irs}$  has two effects: first, it decreases the effective domestic price of goods exported from  $r$  to  $s$ <sup>36</sup> and hence increases demand; and second, it increases the effective quantity, reducing demand. Further details on the *AMS* variable can be obtained from Itakura, Hertel and Walmsley (2001).

2. For purposes of this study, we follow the work of Francois (1999) who has estimated two gravity models of trade – one for business services and one for construction services – using bilateral services export data from the United States (BEA, 1999). Francois' gravity models permit him to predict what trade would be in the absence of barriers to trade – using Hong Kong and Singapore as “free trade” benchmarks. By positing an import demand function he is then able to obtain tariff equivalents for the unobserved trade barriers for services trade in business and finance and construction. Using this method, Francois estimated that Russia's tariff equivalent to be 52.1% for business and financial services and 19.1% for construction imports into Russia. According to the data Russia was found to be very restrictive compared to other regions.

3. Since the methods used to calculate these estimates are somewhat rudimentary we choose to examine the case of both complete service liberalisation and partial (25% of non-tariff barriers reduction) service liberalisation. As before, we implement import tariff reduction to the proposed level and “physical presence” service liberalisation shocks. We consider the effects under the WTO accession scenario only.

4. The overall welfare gain varies from USD 2.5 billion in the case of complete cross-border service liberalisation to USD 1.1 billion in the case of partial cross-border service liberalisation (Table D1). Decomposition of welfare gain shows that most benefits come from technological changes caused by the *ams* shocks in the case of complete cross-border service liberalisation, while in the partial cross-border service liberalisation allocative efficiency effects are higher.

5. From the macroeconomic point of view (Table D2) the main effect of the cross-border service liberalisation is growth of investment, which can be used as a source of economic growth in the long run. All other components of GDP also grow except the private consumption in the partial cross-border service liberalisation, entry-exit case.

6. Percentage changes in output of each sector are represented in Table D3. In the partial cross-border service liberalisation case, output decreases in 19 out of 27 sectors, *i.e.* generally tendencies are the same as in the case without cross-border service liberalisation. It allows us to conclude that most of the sectors will not decline in the long run.

7. Thus, the cross-border service liberalisation may provide an additional source of investment but does not change general results of the Russia WTO accession.

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<sup>36</sup> For more information about the *ams* variable see: Hertel, Itakura, and Walmsley [2001].

Table D1: Static Welfare Effects of the WTO Accession on Russia (USD 1997 Million)

	Complete cross-border service liberalisation		Partial cross-border service liberalisation	
	The WTO accession <u>no</u> entry/exit	The WTO accession entry/exit	The WTO accession <u>no</u> entry/exit	The WTO accession entry/exit
Total Welfare	2449.7	2351.8	1072.8	982.6
Allocative Efficiency <sup>a</sup>	1088.2	1038.2	925.5	871.3
<i>Production tax</i>	-38.9	-39.6	2.2	2.3
<i>Input tax</i>	407.0	395.9	268.3	257.2
<i>Consumption tax</i>	117.5	118.4	111.1	105.0
<i>Export tax</i>	22.3	31.5	38.3	47.5
<i>Import tax</i>	580.3	531.9	505.7	459.3
Technological Changes	1526.4	1530.2	422.5	440.3
Cross Border Service Liberalisation	1462.0	1453.2	383.4	381.1
Scale Economies <sup>b</sup>	64.4	76.9	39.1	59.2
Terms of Trade <sup>c</sup>	-227.6	-291.4	-295.5	-360.6
Investment-Savings Term <sup>d</sup>	62.7	74.9	20.3	31.7

a. The allocative efficiency arises when the allocation of resources changes relative to the initial allocation.

b. The scale economy effect captures the effect of unrealised economies of scale.

c. The terms of trade contributions to national welfare arise from changes in export relative to import prices as producers and consumers adjust their purchasing and sale patterns in response to policy change.

d. Investment-Saving term relates to the change in the price of saving relative to the price of capital goods.

Table D2: Macroeconomics Effects of the WTO Accession on Russia

	Complete cross-border service liberalisation			Partial cross-border service liberalisation		
	The WTO accession no entry/exit <sup>a</sup>	Due to tariff elimination	The WTO accession entry/exit <sup>a</sup>	The WTO accession no entry/exit <sup>a</sup>	Due to tariff elimination	The WTO accession entry/exit <sup>a</sup>
Real Investments <sup>c</sup>	6.4%	0.8%	6.3%	4.5%	0.8%	4.4%
Real Export <sup>d</sup>	0.2%	2.2%	0.5%	0.7%	2.2%	0.9%
Real Import <sup>e</sup>	6.8%	3.1%	6.3%	5.6%	3.1%	5.0%
Real GDP <sup>f</sup>	0.6%	0.1%	0.6%	0.3%	0.1%	0.3%
				Overall effect <sup>b</sup>	Due to tariff elimination	Overall effect <sup>b</sup>
						Due to tariff elimination

a WTO agreement; see Table 5 for new tariff rates

b Overall effect includes tariffs reduction (elimination) and service liberalisation

c Investments: output of capital goods sector (qcgds)

d Export: volume of merchandise export (qxwreg)

e Imports: volume of merchandise imports (qiwreg)

f GDP: quantity of GDP (qgdp)

Source: Authors' calculations

Table D3: Sectoral Effects of the WTO Accession on Russia: Quantity of Output % Changes

	Complete cross-border service liberalisation				Partial cross-border service liberalisation			
	<u>No</u> entry/exit		Entry/exit		<u>no</u> entry/exit		Entry/exit	
	Overall effect	Due to tariff elimination	Overall effect	Due to tariff elimination	Overall effect	Due to tariff elimination	Overall effect	Due to tariff elimination
<b>Export Oriented Sectors</b>								
Nonferrous Metals	-1.8	2.5	-1.4	2.6	-1.1	2.5	-0.6	2.6
Natural Gas	-0.5	0.2	-0.5	0.2	-0.4	0.2	-0.4	0.2
Oil	-0.5	0.1	-0.5	0.1	-0.4	0.1	-0.4	0.1
Ferrous Metals and Metal Products	-1.8	1.4	-1.6	1.4	-1.3	1.3	-1.1	1.4
Chemical Products	-2.8	-1.5	-2.7	-1.5	-2.6	-1.5	-2.6	-1.5
<b>Intermediate Goods</b>								
Construction	4.0	0.7	3.9	0.7	3.5	0.7	3.4	0.7
Other Minerals	0.4	0.8	0.4	0.8	0.4	0.8	0.5	0.8
Electricity	-0.9	0.2	-0.9	0.2	-0.8	0.2	-0.8	0.2
<b>Final Consumption Goods</b>								
Motor Vehicles	2.3	0.4	2.2	0.3	1.6	0.4	1.4	0.3
Manufactures	-9.8	-5.5	-9.5	-5.5	-9.2	-5.5	-8.9	-5.5
Meat Products	-0.8	1.1	-0.7	1.1	-0.5	1.1	-0.4	1.1
Dairy Products	-0.7	0.7	-0.6	0.7	-0.5	0.7	-0.4	0.7
Animal Products	-0.2	0.2	-0.3	0.2	-0.2	0.2	-0.3	0.2
Other Food Products	-0.7	0.0	-0.8	0.0	-0.6	0.0	-0.7	0.0
Communications	2.7	0.1	2.5	0.0	2.6	0.1	2.4	0.0
Wheat and Cereals	-1.0	-0.1	-1.0	-0.2	-0.8	-0.2	-0.9	-0.2
Plant Products	-0.4	0.2	-0.5	0.2	-0.4	0.2	-0.5	0.2
Light Industry Products	-4.6	-1.5	-4.5	-1.5	-4.1	-1.5	-4.0	-1.5
Business and Financial Services	1.6	0.3	1.6	0.2	3.0	0.3	3.0	0.3
Capital goods	6.4	0.8	6.3	0.7	4.5	0.8	4.4	0.7

Source: Authors' calculations