

Economy-Wide and Sector Effects of Russia's Accession to the WTO

by
Jesper Jensen, Copenhagen Economics
Thomas Rutherford, University of Colorado
and
David Tarr, The World Bank*

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Abstract: In this paper we employ a computable general equilibrium model of the Russian economy to assess the impact of accession to the World Trade Organization (WTO). We assess that Russia will gain from accession to the WTO due to improved market access to markets of its trading partners, from improved resource allocation an improved access to modern technologies due to increased competition in goods markets, and most importantly from access to higher quality and technologically superior business services as a result of lowering of barriers to foreign direct investment in services. We estimate that Russia will gain about 7.2% of the value of Russian consumption in the medium run from WTO accession and up to about 24% in the long run, when the potential positive impact on the investment climate is taken into account. Export intensive sectors, such as ferrous metals, non-ferrous metals, chemicals and timber, wood, pulp and paper products are the sectors that expand the most as a result of WTO accession. Sectors that do little exporting and are relatively highly protected will lose in the short to medium run. Foreign direct investment in the business services sectors is likely to: (i) increase the demand for labor in these sectors; (ii) present opportunities for Russian firms to form joint ventures with multinationals; but (iii) induce a decline in wholly owned Russian firms that do not form joint ventures with multinationals. The numerical model is innovative as it recognizes that foreign direct investment or the availability of foreign expertise is necessary to have foreign firms compete in key business services.

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Russia is the largest economy in the world that is not a member of the World Trade Organization. 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 Organization (WTO) Working Party in 1995. President Vladimir Putin has made WTO accession a priority for Russia, and after languishing for several years, the Russian accession negotiations began to see real progress under his Administration.

Despite the support of the central government, numerous industrialists, policy analysts and even the Prime Minister have called for an assessment of the gains and losses from WTO accession. Russian goods providers are concerned that a fall in tariffs will imply increased competition from foreign goods providers and a decline in their market share. Russian service providers are concerned that liberalized rules on new foreign direct investment will lead to increased competition from multinational service providers in Russia. The government has appropriately replied that when the economy as a whole is considered, the reduction in the tariff in any one sector does not mean that sector will decline. Moreover, the government argues that Russian exporters will obtain improved access to the markets of WTO member countries. But some commentators remain skeptical, in part, because there is a lack of quantitative estimates of the impacts, and in part because the sources of the gains need to be better articulated.

In this paper we present results and explain the economic intuition for these results from a computable general equilibrium model that we believe is appropriate to evaluate the impact of Russian accession to the WTO.¹ We argue that the gains to Russia from WTO accession derive from four principal effects:

(1) Improved access to the markets of non-CIS countries in selected products.

Russia has already negotiated most-favored nation (MFN) status on a bilateral basis with most of its important trading partners, so Russia's exporters will not see an immediate reduction in the tariffs they face

¹ In a companion paper (Jensen, Rutherford and Tarr, 2004), we explain the model formally, discuss the innovative modeling features and elaborate why these innovative modeling features are crucial to the results.

and this effect may not be expected to be large. But Russia will have improved rights under antidumping and countervailing duty investigations in its export markets, which is the source of the improved access we model;²

(2) Russian tariff reduction

Tariff reduction will lead to improved domestic resource allocation since tariff reduction induces the country to shift production to sectors where production is valued more highly based on world market prices. This impact, known as the “gains from trade” is a fundamental effect from trade liberalization and is often stressed by international trade economists in the literature. In addition, Russian businesses will be able to more easily import modern technologies or a greater variety of technologies and this will increase Russian productivity. As we show, this second impact is much more powerful³;

(3) Liberalization of barriers to foreign direct investment in services.

A growing body of evidence and economic theory suggests that the close availability of a diverse set of business services is important for economic growth. The key idea in the literature is that a diverse set (or higher quality set) of business services allows users to purchase a quality adjusted unit of business services at lower cost.⁴ Russian commitments to multinational service providers will encourage them to increase foreign direct investment to supply the Russian market. Russian businesses will then have improved access to the services of multinational service providers in areas like telecommunication, banking, insurance, transportation and other business services. This should lower the cost of doing business and increase productivity of Russian firms using these services. Our analysis is innovative in applying this methodology to an actual multi-sector

² WTO accession will grant an “injury determination” to Russia in antidumping cases in WTO members countries. Combined with the decision by the US and the EU to treat Russia as a market economy this will imply Russian exporters may have considerably improved rights in these cases in the US. But market economy status may be denied in particular cases, so it will be necessary to see how this is implemented in practice.

³ Feenstra (1994) has emphasized that the impact of trade liberalization on new or higher quality products is much more important quantitatively than improved resource allocation.

⁴ As early as the 1960s, the urban and regional economics literature (e.g., Greenfield, 1966; Jacobs, 1969, 1984; Chinitz 1961; Vernon 1960; Stanback, 1979) recognized the importance of non-tradable intermediate goods (primarily producer services produced under conditions of increasing returns to scale) as an important source of agglomeration externalities which account for the formation of cities and industrial complexes, and explanations of the difference in economic performance across regions.

economy with services provided both by multinational service providers through foreign direct investment and domestic presence as well as through cross-border provision of services.⁵

(4) Potential growth effects from improvement in the investment climate

WTO accession could improve the investment climate. This could occur because lower priced imports result in a reduction in the cost of purchasing capital goods and setting up a business. In addition, conditions agreed at the WTO may reduce the risk that investors face or reduce the costs of doing business such as reducing the red tape costs of complying with the regulatory burden. Long run improvement of the investment climate should increase the return to capital, which will expand the capital stock. An expansion of the capital stock will allow more sectors to expand in the long run and then the long run gains could be much larger than the effects realized in the medium term from the above elements.

Our aggregate results are summarized in table 1. Our central estimates are that the gains to Russia from WTO accession are 7.2 percent of Russian consumption (since consumption is 47% of GDP, this amounts to 3.3 percent of GDP) in the medium run, and could be as high as 23.7 percent of Russian consumption (11.0 percent of GDP) in the long run. We decompose these gains into the sources. We estimate that the welfare gains⁶ from tariff reform are 1.3 percent of consumption (or 0.6 percent of GDP). Improved market access results in gains of 0.6% of consumption. The gains from foreign direct investment (FDI) liberalization in services alone are 5.2 % of the value of Russian consumption. Thus, the estimated gains from FDI liberalization are almost three-quarters of the total gains from Russian WTO accession. Thus, while improving its offer to foreign services providers within the context of the GATS has been one of the most difficult aspects of Russia's negotiation for WTO accession, our estimates suggest that the most important

⁵ There have been a number of theoretical papers on this subject, including several by Markusen and various co-authors. Regarding numerical efforts, Markusen, Rutherford and Tarr (2000) developed a stylized model where foreign direct investment is required for entry of new multinational competitors in services, but they did not apply this model to the data of an actual economy. Brown and Stern (2001) and Dee et al. (2003) employ a multi-country numerical model with many of the same features of Markusen, Rutherford and Tarr. Their models contain three sectors, agriculture, manufacturing and services, and are thus also rather stylized. Results in their model depend crucially on capital flows between nations or (in Dee et al., 2003) the loss of rents by multinationals after service sector liberalization, as opposed to microeconomic endogenous productivity effects. There have also been numerical estimates of the benefits of services liberalization where services trade is treated analogously to goods trade, i.e. trade in services is assumed to be entirely cross-border and subject to tariffs. For example, see Brown, Deardorff, Fox and Stern (1996).

⁶ Welfare can be thought of as real income. It is calculated formally as the Hicksian equivalent variation of the representative consumer of our model. Since firms distribute all value added to the household in the form of wages or rent on capital, any impact of the profits of firms is incorporated in our analysis.

component of WTO accession for Russia in terms of the welfare gains is liberalization of its barriers against FDI in services sectors.

Our estimates show that many of our Russian goods producing sectors should expand. This occurs despite the reduction in all tariffs by 50 percent. The reason is that although tariff reduction increases the demand for imports, Russia will see an increase in exports equal to the increase in imports. The expansion in exports occurs because Russia businesses will be able to purchase inputs at a lower cost. Equally importantly, Russia will have to pay for additional imports through hard currency, which increases the demand for hard currency and causes a real depreciation of the ruble. A depreciated ruble makes exporting more profitable and decreases the demand for imports until the additional exports are equal to the additional imports. Then some sectors will expand and some will contract. What is important is what happens to the incentives of one sector versus another. We estimate below which sectors are likely to expand or contract and why. This paper quantifies and supports the views expressed by the some in the government that when all changes are taken into account, many goods sectors would expand, despite a reduction in their tariff.

We simulate long run effects, using our comparative steady state model, in which we allow the capital stock to adjust to its long run equilibrium. We estimate that the gains in the comparative steady state model could be as large as about 24 percent of consumption. This is an upper bound estimate in the context of our model, since we ignore the costs of foregone consumption to achieve the larger capital stock. On the other hand, Rutherford and Tarr (2002) have shown that a fully dynamic model that incorporates product variety endogenous productivity effects can be expected to produce welfare estimates as large or larger than those of our comparative steady state model. We also show that accounting for the wasteful resource use in rent seeking activity, would further increase the estimated gains from liberalization.

The paper is organized as follows. In section II, we describe the model and the most important data. In section III, we describe and interpret the policy scenarios and quantitatively assess the sensitivity of the results to parameter assumptions. Many of the scenarios we describe are decomposition scenarios that allow us to assess the relative importance of the various aspects that we consider important to Russian WTO accession. We briefly conclude in section IV.

II. Overview of the Model and Data

The Model

There are 35 sectors in the model that are listed in Table 2. There are three primary factors of production in all sectors: unskilled labor, skilled labor and capital. There are three types of sectors: competitive, imperfectly competitive goods sectors and imperfectly competitive business services sectors. The structure of production is depicted in figure 1.

Competitive Sectors. One category of sectors is those in which goods and services that are produced under constant returns to scale and where price equals marginal costs. This includes agriculture, forestry and construction. It also includes certain public services, like education and post office facilities, and key mineral industries.⁷ In these sectors, domestic firms face competition from foreign producers where we assume that the quality of goods produced domestically and by foreign firms are differentiated in the demand functions of Russian consumers and firms. This is known as the Armington assumption. All Russian goods producing firms (including imperfectly competitive firms) can sell on the domestic market or export, but there are quality differences between the domestic and export goods.⁸

Imperfectly Competitive Goods. A second category of sectors is those goods that, according to international literature estimates,⁹ are produced under increasing returns to scale and imperfect competition, such as ferrous metals, non-ferrous metals and chemicals. There are both foreign and domestic firms competing to supply these products in the Russian market. Foreign firms supply the Russian market with production facilities abroad, but, due to fixed costs required to sell in Russia, the number of foreign firms that sell in the Russian market depends on profitability in the Russian market, which in turn depends on the tariff

⁷ To reflect the use of exhaustible resources, we assume capital is sector specific in oil, gas and coal. This implies there are decreasing returns to scale in the variable factors, skilled and unskilled labor, in these three sectors. Although electricity and gas are monopolistically controlled, prices are controlled by the government. Thus, market determined pricing to exploit market power is excluded by the government, and we maintain the assumption of price equal to marginal costs.

⁸ Russian firms substitution possibilities are represented by a constant elasticity of transformation production possibility frontier.

⁹ See Harrison, Rutherford and Tarr (1996) for a summary of the literature on increasing returns to scale as it relates to industry classification in CGE models.

rate. Tariff liberalization will typically lead to productivity gains because when more varieties are available, buyers can obtain varieties that more closely fit their demands and needs.¹⁰

Business Services Sectors. The third category of sectors is services sectors that are produced in Russia under increasing returns to scale and imperfect competition, such as telecommunications, financial services, most business services and transportation services. In services sectors, we observe that some services are provided by foreign service providers on a cross border basis analogous to goods providers from abroad. But a large share of business services are provided by service providers with a domestic presence.¹¹ Our model allows for both types of service provision in these sectors. There are cross border services allowed in this sector and they are provided from abroad at constant costs—this is analogous to competitive provision of

¹⁰ The efficiency gains associated with an increased number of varieties accrue to both consumers and firms using these goods as intermediate inputs. In addition, increased efficiency derives from better resource reallocation following tariff liberalization, including the purchase of cheaper inputs.

Goods produced subject to increasing returns to scale are differentiated at the firm level; firms in these industries set prices such that marginal cost equals marginal revenue; and there is free entry, which drives profits to zero. We assume that there is a fixed cost with constant marginal costs. We employ the standard Chamberlinian large group monopolistic competition assumption, which results in constant markups over marginal cost.

Aggregate productivity is affected by the number of varieties using the standard Dixit-Stiglitz formulation. The effective cost function for users of goods produced subject to increasing returns to scale declines in the total number of firms in the industry.

For simplicity we assume that the composition of fixed and marginal cost is identical in all increasing returns to scale sectors. This implies that the ratio of fixed to marginal cost is a constant. This assumption in a standard Chamberlinian large-group model assures that output per firm for all firm types remains constant, i.e., the model does not produce rationalization gains or losses.

We assume that manufactured goods are either produced domestically or imported, and the cost structure of domestic firms is defined by observed primary factor and intermediate inputs to that sector in the base year data. The cif import price of foreign goods is simply defined by the import price, and, by the zero profits assumption, in equilibrium the import price must cover fixed and marginal costs of foreign firms.

Finally, models of this type are often criticized for the lack of heterogeneity among firms. We allow for a sector specific factor in for each firm type (foreign or domestic). This assumption will produce firm heterogeneity represented by a continuous upward sloping supply curve for each firm type in response to a price increase. The elasticity of firm supply can be derived from the share of capital that is sector specific and the elasticity of substitution between the specific factor and the mobile primary factors of production.

¹¹ One estimate puts the world-wide cross-border share of trade in services at 41% and the share of trade in services provided by multinational affiliates at 38%. Travel expenditures 20% and compensation to employees working abroad 1% make up the difference. See Brown and Stern (2001, table 1).

goods from abroad. Cross border services, however, are not good substitutes for service providers who have a presence in Russia.¹²

There are two types of service firms in these sectors that have a domestic presence in Russia: Russian firms and multinational firms. There are multinational service firm providers that choose to establish a presence in Russia in order to compete with Russian firms directly in the Russian market. Multinational service providers will import some of their technology or management expertise when they decide to establish a domestic presence in Russia. Thus, their cost structure differs from Russian service providers. They incur costs related to both imported **inputs** and Russian primary factors, in addition to intermediate factor inputs. Domestic service providers do not import foreign technology or management expertise. Hence, domestic service firms incur primary factor costs related to Russian labor and capital only. These services are characterized by firm-level product differentiation. Restrictions on foreign direct investment, right of establishment, the movement of business personnel, and lack of intellectual property protection and contract enforcement have major, direct impacts on multinational firms providing services to the market.

We think of firms as multinational even if the foreign firm forms a joint venture with a Russian company. Joint ventures will typically involve some foreign management techniques or technology—that is what the foreign partner brings to the joint venture, while the Russian partner brings knowledge of the local institutions. What is important for our model is that the multinational bring in specialized imported inputs that result in a different production structure or method of delivery of the service compared to Russian firms. Russian firms operate without foreign primary inputs and are primarily or wholly Russian owned so that they are not subject to discriminatory taxes against multinationals. The fact that multinationals can include Russian companies as joint venture partners has important implications for interpreting the results of our model regarding the change in the market shares of the multinationals versus Russian firms.

The number of multinational and Russian firms that are present in the Russian market depends on profitability in the Russian market. For multinational firms, the barriers to foreign direct investment affects

¹²Empirical work has traditionally treated producer services as non-traded. See Kravis and Lipsey (1988). Daniels (1985) found that service providers charge higher prices when the service is provided at a distance.

the profitability. Reduction in the constraints on foreign direct investment will typically lead to productivity gains because when more varieties of service providers are available, buyers can obtain varieties that more closely fit their demands and needs.¹³

We believe (as the urban economics literature suggested, Vernon, 1960; Chinitz, 1961), wide availability of producer services leads to important productivity gains. Many business services are either non-traded internationally or provided at much higher costs from a distance so that there are significant disadvantages to a user of these services from being far from the core location of these activities. Marshall (1988) shows that in three regions in the United Kingdom (Birmingham, Leeds and Manchester) almost 80 percent of the services purchased by manufacturers were bought from suppliers within the same region. He cites studies which show that firm performance is enhanced by the local availability of producer services. In developing countries, McKee (1988) argues that the local availability of producer services is very important for the development of leading industrial sectors.¹⁴

Consumer Optimization, Government Revenue and the Balance of Trade Constraint.

Consumers maximize utility subject to their budget constraint. Consumers value product diversity in a manner similar to firms and also are able to purchase a quality-adjusted unit of consumption goods at a lower price when the number of varieties increases. The government collects a variety of indirect taxes (output, intermediate, tariffs, investment, consumption, exports, and public consumption). In any counterfactual in

¹³ We assume that the structure of both the marginal and fixed costs of services firms are identical, so that as was the case in goods production, output per firm is fixed and there are no rationalization gains. For multinational service providers, both the fixed and variable costs of service supply are assumed to be a convex combination of the domestic supply price in the same sector and the cost of imported inputs.

¹⁴ The more recent economic geography literature (e.g., Krugman, 1991; Porter, 1992; Fujita, Krugman and Venables, 1999) has also focused on the fact that related economic activity is economically concentrated due to agglomeration externalities (e.g., computer businesses in Silicon Valley, ceramic tiles in Sassuolo, Italy). Evidence comes from a variety of sources. Ciccone and Hall (1996) show that firms operating in economically dense areas are more productive than firms operating in relative isolation. Caballero and Lyons (1992) show that productivity increases in industries when output of its input supplying industries increases. Hummels (1995) shows that most of the richest countries in the world are clustered in relatively small regions of Europe, North America and East Asia, while the poor countries are spread around the rest of the world. He argues this is partly explained by transportation costs for inputs since it is more expensive to buy specialized inputs in countries that are far away for the countries where a large variety of such inputs are located.

which we lower tariffs, government revenue must increase to offset the lost revenue from tariff reduction (equal government yield constraint). In any counterfactual, the change in the value of imports must equal the change in the value of exports (balance of trade constraint), i.e., any capital flows are held constant since the trade policy changes cannot be presumed to effect the underlying reasons for capital flows.

Distribution of the Rents from the Barriers on Multinationals. One issue in assessing the consequences of elimination of the barriers against FDI in business services sectors is what is the nature of the barrier initially and if it is a quantitative restraint, what happens to the quota rents. We model this three ways: (1) all the rents are dissipated through rent seeking; (2) no rent dissipation and Russians capture the rents; and (3) no rent dissipation and multinationals capture the rents.

Rent dissipation follows from the conventional theory of rent seeking, for example from the model of Barzel (1974). Suppose the barrier takes the form of a license to operate. Given that the license to operate has value, competition among license seekers will result in real resources being used in lobbying costs, queuing costs and inefficiencies in the cost of the delivery. Competition among license seekers would result in the expenditure of resources that dissipate the rents. That is, multinationals purchase Russian capital and labor for the purpose of obtaining the license. Elimination of the barriers would eliminate the rent from obtaining the license and eliminate the wasteful use of resources on rent seeking behavior. Thus, this view of license allocation implies there are real resource gains from elimination of barriers to FDI since Russian labor and capital devoted to acquisition of the license becomes available.

No rent dissipation would occur if recipients of the licenses are unable to influence the decision on who gets the licenses. That is, the size of the firm or any payments on lobbying of officials is irrelevant regarding the receipt of the license. If rents are not dissipated, we must make a further decision on who captures the rents: Russians or multinationals. Russians may capture the rents as payments from multinationals. Or possibly there are discriminatory taxes on multinationals that are captured by the Russian government. In either of these cases, the rents are not lost to the Russian economy. Alternatively, when a multinational firm receives the license to import, it receives a windfall profit equal to the ad valorem

equivalent of the quota. In this latter case, we assume multinationals capture this rent on their sales in Russia and repatriate this profit

We take no rent dissipation and Russians capturing the rents as our central assumption unless otherwise indicated. With rent dissipation the elimination of the barriers results in more resources being available in Russia and larger gains to the Russian economy. Similarly, with no rent dissipation but multinationals capturing the rents, elimination of the barriers results in a transfer of rents back to Russia from the multinational.

Comparative Steady State Formulation. In this version of our model, we approximate the improved impact that we expect to see on the investment climate as a result of accession to the WTO. If the investment climate improves, we would expect to observe an increase in the capital stock available and an increase in production and consumption. We expect the investment climate to improve because the costs of purchasing goods and services as inputs for businesses falls with a reduction in tariffs and the barriers to foreign direct investment. We model and quantify the impact of an increase in investment from this effect.¹⁵ A second way WTO accession could improve the investment climate is through implementation of more transparent rules and regulations and those that guarantee the rights of investor. In our modeling, we do not estimate the impact of this second effect, which is likely to be an important gain from WTO accession.

¹⁵ The rate of return on investment in our model is the rental rate on capital divided by the cost of a unit of the capital good. In this version we allow the capital stock to adjust to its steady state equilibrium along with all of the model features we employ in our WTO reference case, i.e., we allow for tariff and FDI liberalization with endogenous productivity effects as above. We call this our comparative steady state model. In the comparative static model, we assume that the capital stock is fixed and the rental rate on capital is endogenously determined. In the comparative steady state model, the logic is reversed. We assume that the capital stock is in its initial steady state equilibrium in the benchmark dataset, but that the capital stock will adjust to a new steady state equilibrium based on a fixed rate of return demanded by investors. That is, if the trade policy shock happens to induce an increase in the rate of return on capital so that it exceeds the initial rate of return, investors will invest and expand the capital stock. Expansion of the capital stock drives down the marginal product of capital, i.e., it drives down the rental rate on capital, until the rate of return on capital falls back to the initial level. The comparative steady approach has been employed by many authors, including Harrison, Rutherford and Tarr (1996, 1997) and Baldwin and Francois (1998). The approach, however, dates back to the 1970s, when both Koopmans and Manne used it.

Data

Input-output table. The core input-output model is the 1995 table produced by Goskomstat. The official table contained only 22 sectors, and importantly has little service sector disaggregation. Consequently, Russian input-output expert S. P. Baranov disaggregated this table into a 35 sector input output table. Baranov used unpublished data available to Goskomstat based on the surveys that were used to construct the 1995 table. The principal elements of this disaggregation were: a split of the oil and gas sector into oil, gas and oil processing; a split of the transport sector into railroad, maritime, air, pipeline, truck and other transportation services; the breakup of communication into post services and telecommunications; and disaggregation of the data in several business services sectors regarding market and non-market activities. The documentation by Baranov is available upon request to the authors.

Tariff and Export Tax Data. We estimate the tariff and export tax rates by sector in our model based on the following data and methodology. For the purpose of calculating the tariff and export tax rates, we obtained data on the imports and exports from the 2001 Customs Statistics on the External Trade of the Russian Federation («Таможенная Статистика Внешней Торговли Российской Федерации»), a yearly publication from the Russian Customs Committee. Import tariff rates and export taxes at the tariff line level were obtained from official government decrees available online; the data are current as of August 2002.¹⁶

In the Russian tariff system most tariff lines are subject to a simple ad valorem tariff while on some tariff lines a “mixed system” applies. For the mixed tariff lines the maximum of the ad valorem and applicable specific tariff applies.¹⁷ For tariff lines where a specific tariff applied, we first calculated the implied collected duty if the specific tariff applied based on the aggregate quantity information available from the Customs Committee data. We then applied the maximum of either the calculated duty from specific tariffs or the calculated duty from the legal ad valorem rate to non-CIS imports. Although the Russian tariff system formally contains about 10,000 tariff lines, data are reported on only about 2000 tariff lines. The data in this

¹⁶ The tariff regulations can be found on the web page of the Customs Computer Service: www.tks.ru in the document database (Базы данных → Документы). For export taxes, it was necessary to consult numerous regulations of the government of Russia.

¹⁷ An exception is certain footwear products where the tariff is the sum of the ad valorem and specific tariff.

paper, which were entered manually, are based on a level of aggregation reported by the Customs Committee that yields about 2000 tariff lines.¹⁸

Goskomstat provides a mapping from the tariff line data of the Customs Committee to the sectors in our input output table. Employing that mapping, we calculated a weighted average tariff rate of all tariff lines that map into a sector in our input output table. We calculated these rates two ways: based on all imports (where the collected tariffs as a percent of all imports is 8.1%) and on non-CIS imports (where the collected tariffs as a percent of non-CIS imports is 11.1%). The rates we employ in the model are the rates based on all imports. The rates based on all imports are lower since the base on the calculation includes CIS imports on which no tariffs are imposed. We believe collected tariff rates more closely approximate the protection a sector receives and the incentives it faces. Similar procedures are applied for export taxes. The results at the sector level are in table 4.

Applying these tariff rates across all sectors implies that tariff revenue in our model is about 1.6 percent of GDP in the initial equilibrium. Collected tariffs in Russia are closer to 1.1 percent of GDP.¹⁹ There are several reasons that the collected tariffs in Russia are less than the legal rates on most favored nation (MFN) imports. Most notably, exemptions to the Russian tariff are available for regional agreements (most notably the CIS), personal imports and shuttle trade. While we adjust for the CIS trade, we are applying the MFN rates on all imports from the non-CIS. This slightly biases upward the rates we employ relative to collected rates, but the rates we use are lower than the legal MFN rates.

Barriers to Foreign Direct Investment in Services Sectors. World-wide, discriminatory treatment of multinational FDI takes many forms. Barriers include bans on FDI in certain sectors, limitations on the share of ownership of a company, location conditions, minimum capital requirements, compulsory joint ventures, government approval of some decisions or compulsory government board members, restrictions on

18 We thank Eshref Trushin and Ekaterina Krivonos for their painstaking work on this project.

19 International Monetary Fund, "Russian Federation: Selected Issues and Statistical Appendix," 2002.

foreign shareholder rights, export requirements, local content restrictions, restrictions on imports of labor and capital, limits on repatriation of profits and license requirements for certain operations.²⁰

Kimura, Ando and Fujii (2004a, 2004b, 2004c) have estimated the ad valorem equivalence of barriers to foreign direct investment in several Russian sectors, namely in telecommunications; banking, insurance and securities; and maritime and air transportation services. The work was based on surveys we commissioned from Russian research institutes that specialize in these sectors: ZNIIS in the case of telecommunications, Expert RA for banking, insurance and securities; Central Marine Research and Design Institute (CNIIMF) for maritime transportation services and Infomost for air transportation services.²¹ These institutes completed 20 page questionnaires that provided us with data and descriptions and assessments of the regulatory environment in these sectors. Subsequently, Kimura, Ando and Fujii reviewed the questionnaires and interviewed staff of the Russian research institutes and then converted the answers and data of the questionnaires into an index of restrictiveness in each industry. Supplementary information from multinational institutes, such as the fact that the duration of the Rostelecom monopoly in the provision of long distance fixed line telecommunications services is one of the major issues in the WTO accession negotiations, was also employed. Kimura et al. then applied methodology explained in the volume by C. Findlay and T. Warren (2000). For each of these service sectors, authors in the Findlay and Warren volume evaluated the regulatory environment across many countries; the same regulatory criteria were assessed for all countries in a particular service sector. The price of services is then regressed against the regulatory barriers to determine the impact of any of the regulatory barriers on the price of services. Kimura et al then assumed that the international regression applies to Russia. Applying that regression and their assessments from the questionnaires, they estimated the ad valorem impact of a reduction in barriers to foreign direct investment in these services sectors.²²

²⁰ See UNCTAD (1996) or Brown and Stern (2001, table 2) for a more complete list.

²¹ For the estimates and discussions, we thank Vladimir Klimushin of ZNIIS; Dmitri Grishankov and Irina Shuvalova of ExpertRA; Boris Rybak and Dmitry Manakov of InfoMost; and Tamara Novikova, Juri Ivanov and Vladimir Vasiliev of CNIIMF.

²² The papers by Kimura et al. as well as the underlying questionnaires are available at www.worldbank.org/trade/russia-wto. The estimates we employ are those of Kimura et al. for discriminatory barriers

We arrive at the following estimates of the ad valorem equivalence of barriers to foreign direct investment in key services sectors: telecommunications, 33 percent;²³ banking, insurance and securities, 36 percent; maritime services, 95 percent; and air transportation services, 90 percent. In the case of maritime and air transportation services, we assume that the barrier will only be cut by 15 percentage points, since pressure from the Working Party in these sectors is not strong. These estimates are summarized in table 5.

Share of Expatriate Labor Employed by Multinational Service providers. The impact of liberalization of barriers to foreign direct investment in business services sectors on the demand for labor in these sectors will depend importantly on the share of expatriate labor used by multinational firms. If multinationals use mostly Russian labor, their expansion is likely to increase the demand for Russian labor in these sectors.²⁴ We obtained estimates of the share of expatriate labor or specialized technology not available to Russian firms that is used by multinational service providers in Russia from Russian research institutes that specialize in these sectors. In general, we found that multinational service providers use mostly Russian primary factor inputs and only small amounts of expatriate labor or specialized technology. In particular, the

against foreign direct investment. Kimura et al. also estimate the impact of barriers on investment in services that are the sum of discriminatory and non-discriminatory barriers.

Earlier estimates for these sectors, using the same methodology we provided by Zemnitsky (2000) in financial services and telecommunications and by Sokolov (2002) in external maritime services. These latter estimates, however, were not informed by questionnaires or interviews with experts in the sectors.

²³ Kimura et al. estimated that the price of telecommunications services in Russia are elevated by 10 % due to barriers to multinational service providers. We believe that in telecommunications it is crucial to employ a differentiated product model to characterize competition between multinational and Russian telecommunications providers. This means that we interpret the estimates of Kimura et al. to indicate that the discriminatory tax on multinational service providers results in a 10% increase in the **composite price** of domestic and multinational service provision. Then the ad valorem tax on multinationals, say at rate x , must be above 10% since there is no discriminatory tax on domestic service providers and the composite price is a weighted average of domestic prices (which are untaxed) and multinational prices which are taxed at a rate x . More precisely, if x is the ad valorem equivalent of the barriers to multinational investment in telecommunications in Russia, s is the share of the market in Russia of multinationals, 10% is the amount by which telecommunications prices are elevated due to the barriers and if we assume Russian domestic service providers prices are unaffected, then we may solve for x from:

$sx + (1-s)*0 = .10$. That is, $x = .10/s$. Our data indicate that $s = .15$, then $x = .67$ or 67%.

Barriers to foreign direct investment, however, have an indirect effect on the price of Russian telecommunications services. Consequently, $sx + (1-s)*y = .10$ may be more appropriate, where y is the amount by which Russian telecommunication services are increased in the benchmark as a result of barriers on multinational telecommunications service providers. The value of y would have to be less than the value of the increase in composite services (0.1). It is likely that the indirect effect of barriers to foreign direct investment on the price of domestic Russian telecommunications services is less than 0.05, since the composite price increased by only 0.1 and lower values of y yield higher estimates of x . But if we take $y = .05$, then x equals 0.38, which is approximately the value estimated for financial services, of 0.33. We take a conservative estimate here of 0.33 for telecommunications.

²⁴ See Markusen, Rutherford and Tarr (2000) for a detailed explanation on why FDI may be a partial equilibrium substitute for domestic labor but a general equilibrium complement.

estimated share of foreign inputs used by multinationals in Russia is: telecommunications, 10% plus or minus 2%; financial services, 3%, plus or minus 2%; maritime transportation, 3%, plus or minus 2%; and air transportation, 12.5%, plus or minus 2.5%.²⁵

III. Policy Results

In our general WTO scenario, we assume that barriers against foreign direct investment are reduced as indicated in Table 5, seven sectors subject to antidumping actions in export markets receive improved market access as shown in Table 5, and the tariff rates of all sectors are reduced by fifty percent.²⁶ We first discuss (and present in table 1) the results of our aggregate estimates of the impact of WTO accession on Russia along with several scenarios that allow us to decompose the impacts into their components. Next we discuss the estimates, presented in table 6, of the impact on the productive sectors of the economy. We estimate both the static and comparative steady state welfare gains to Russia of WTO accession as a percent of consumption as well as a percent of GDP. We also estimate the impact of WTO accession on the real exchange rate, aggregate exports, the return to capital, skilled labor and unskilled labor, and the percentage change in tariff revenue.

In order to obtain an assessment of the adjustment costs, we estimate the percentage of mobile labor and capital that must change industries. The gains come from a combination of effects, so we also estimate the comparative static impacts of the various components to WTO accession in order to assess their relative importance.

First we discuss the comparative static results. Comparative static results are not the very short run, because there is enough time for the economy to adjust to the new equilibrium. But it is not the long run either because we assume that the capital stock is fixed. We shall also consider the results of assuming the time

²⁵ We thank Vladimir Klimushin of ZNIIS for the telecommunications estimates; Dmitri Grishankov and Irina Shuvalova of ExpertRA for the estimates for banking, insurance and securities; Boris Rybak and Dmitry Manakov of InfoMost for the estimates for air transportation; and Tamara Novikova, Juri Ivanov and Vladimir Vasiliev of CNIIMF for the estimates for maritime transportation services.

²⁶ Actual tariff reductions remain a part of the accession negotiations and are not known with certainty.

frame is long enough for capital to adjust to its new long run steady state equilibrium in a scenario we call comparative steady state. In addition, we evaluate a “short-run” scenario, in which all labor cannot change the sector in which it is employed (all “sector-specific” labor).

Aggregate Welfare Effects of WTO Accession

We estimate that the welfare gains to Russia are equal to 7.2 percent of Russian consumption (or 3.3 percent of GDP) in the medium term. These gains derive from three key effects: (1) improved access to the markets of non-CIS countries in selected products; (2) Russian tariff reduction;; and (3) liberalization of barriers to foreign direct investment in services sectors. To understand the relative impact of these various elements and the mechanisms through which they operate we execute three scenarios that allow us to assess the relative importance of improved market access, the reduction in tariffs and the reduction in barriers to foreign direct investment.

Impact of Tariff Reduction. The results for this scenario are presented in column (2) of table 1. We lower tariffs by fifty percent, but there is no liberalization of the barriers to FDI or improved market access. The estimated welfare gains to the economy are 1.3 percent of consumption or 0.6 percent of GDP.

The gains to the economy from tariff reduction alone come about for two reasons. Tariff reduction in Russia will lead to improved domestic resource allocation since tariff reduction will induce Russia to shift production to sectors where production is valued more highly based on world market prices. This impact, known as the “gains from trade” is the fundamental effect from trade liberalization and is often stressed by international trade economists. In addition, Russian businesses will be able to more easily import a variety of modern technologies and this will increase Russian productivity.

Impact of Improved Market Access. In column (3) of table 1, we present the results of a scenario in which we allow for improved market access (according to the terms of trade improvements of table 4), but we do not lower tariffs or barriers to FDI in services sectors. We estimate that the impact of improved market access at 0.6 percent of consumption (0.3% of GDP). The gains come from both improved prices for exports. But also a higher value for exports allows Russia to buy more imports and more varieties of imports increase productivity.

Impact of Foreign Direct Investment Liberalization in Business Services. In this scenario, labeled reform of FDI barriers in column (4) of table 6, we eliminate barriers to FDI in the services sectors, but there is no reduction in tariffs or improved market access. Russian commitments to multinational service providers will encourage them to increase foreign direct investment to supply the Russian market. Russian businesses will then have improved access to the services of multinational service providers in areas like telecommunication, banking, insurance, transportation and other business services. This should lower the cost of doing business and increase productivity of Russian firms using these services. Several papers are provided in the references, which suggest that availability of a diverse set of service suppliers is crucial to the growth of countries. We estimate that the gains to Russia from liberalization of barriers to FDI in services are about 5.2 percent of the value of Russian consumption or about 72 percent of the total gains to Russia of WTO accession.

No productivity effects. We also executed a scenario in a version of our model without the possibility of productivity gains (constant returns to scale), where we reduced tariffs by 50%, allowed improved access and lowered FDI barriers. The welfare gains are reduced to 1.2 percent of consumption.²⁷ This shows that productivity effects account for the majority of the gains from tariff liberalization. See Rutherford and Tarr (2002) for an explanation of the productivity gains in a dynamic context.

Long Run Comparative Steady state Results of WTO Accession

In a long run analysis, we should allow for the fact that WTO accession could improve the investment climate in Russia. In this scenario, we employ our comparative steady state model, which we described in section II. The principal feature is that we allow for the fact that accession to the WTO could improve the investment climate in Russia (or rate of return on investment). This would induce an increase in the capital stock to adjust to its steady state equilibrium. With our comparative steady state model, we estimate that the gains to Russia from WTO accession are 23.7% of consumption (11% of GDP). This is more than three times the estimated comparative static welfare gains. The reason the gains are larger is that we estimate that WTO

²⁷ Without increasing returns to scale, removing barriers to FDI has no effect.

accession will induce an increase in the rental rate on capital in Russia in the comparative static model by 6.2%. In the comparative steady state model, this induces an expansion of the capital stock in the new equilibrium. We estimate that the capital stock will increase by about 14.4% of its initial level in the long run steady state equilibrium. With a higher capital stock, the economy is able to produce more output and there is more consumption. We typically argue that this type of model produces an upper bound estimate of the welfare gains because the foregone consumption necessary to achieve the higher capital stock is not taken into account. On the other hand, Russia has had a substantial trade surplus in the past several years; the trade surplus was \$46 billion in 2002, which reflected decisions by Russian investors to invest abroad. If WTO accession can improve the investment climate in Russia, the large annual capital outflow of Russia could be turned around and invested in Russia. Then, it may be possible to achieve a larger capital stock without the foregone consumption that is typically required. Moreover, Rutherford and Tarr (2002) have shown that a fully dynamic model which incorporates productivity effects like those in our present model, and which takes into account foregone consumption from investment decisions, could produce estimated welfare gains that are as large or larger than these comparative steady state effects.²⁸

Sector Results

It is useful to discuss principles of sector analysis before discussing the results. Businessmen in Russia sometimes complain that the tariff or FDI barriers in their sector will decline and forecast that WTO accession could adversely impact on their sector. The initial effect of the tariff reduction is to induce an increase in the demand for imports, and this is the immediate impact that businessmen fear. But the rest of the world will not provide Russia with a “free lunch,” i.e., the increased imports have to be paid for by increased exports. The increased demand for imports raises the prices of foreign exchange (more technically, depreciates the real exchange rate) that in turn induces an increase in exports and a decrease in the quantity of imports. The real exchange rate depreciates until the value of the increase in exports equals the value of

²⁸ In the fully dynamic model, there are two types of fixed costs: a one-time initial fixed cost of firm creation as well as recurring fixed costs in each period in which the firm operates. The existence of a new firm produces efficiency gains into the infinite horizon when products do not depreciate. In the comparative steady state model, we can only represent recurring fixed costs, and this leads to differences the magnitude of gains.

increased imports. The percentage change in the value of increased exports, which equals the value of increased imports, is presented in the table 1 and equals 13.2 percent in our central scenario.²⁹

Thus, not all sectors can decline since Russia has to pay for its imports with hard currency. It is not the absolute level of the tariff that is important for the impact of WTO accession on the sector; rather it is the impact of changes in protection on relative prices. The tariff reduction induces output expansion in many sectors because, first, tariff reduction reduces the costs of imported intermediate inputs, so the price of intermediate inputs may decline in many sectors. Second, and crucially, tariff reduction induces a depreciation in the real exchange rate. We estimate a 13.2 percent increase in the value of increased exports from all impacts in the comparative static case.

In table 6, we present the estimated results in particular sectors. We present the results for three scenarios, one scenario is the full WTO accession scenario involving a proportional reduction in all tariffs to one-half of their original level, improved market access and complete removal of barriers to FDI in services. This corresponds to the aggregate results in column (1) of table 6. In the second set of results, we assume only a 50% cut in the ad valorem equivalent of the barriers to FDI in services, combined with a proportional reduction in all tariffs to one-half of their original level and improved market access. Finally, we present results in our steady state scenario. Results are presented for output, exports, imports and employment of skilled and unskilled labor by sector. We discuss manufacturing and services sectors separately.

Expanding Manufacturing Sectors. Results for the manufacturing sectors that expand or contract depend on several industry characteristics. Sectors which are likely to expand are those that either: export a relatively large share of their output; obtain an exogenous increase in export prices as a result of WTO accession; are relatively unprotected initially compared to other sectors of the economy; or experience a significant reduction in the cost of their intermediate inputs, typically because they have a large share of intermediate inputs that come from sectors that experience productivity advances due to trade or FDI liberalization.

²⁹ Since the initial value of exports exceeds the initial value of imports in our data set, a smaller percentage increase in exports is equal in absolute dollar value to a larger percentage increase in imports.

The manufacturing sectors that we estimate are likely to expand their output the most are non-ferrous metals, ferrous metals and chemicals. These three sectors are among the sectors that we assume will gain an exogenous increase in the price of its exports upon WTO accession. They are also among those that export the highest share of their output—they all export over thirty percent of the value of their output. Export intensity is important because, as explained above, a reduction in tariffs generally depreciates the real exchange rate (see Table 1 for estimates).³⁰ Since the real exchange rate depreciates, sectors that export intensively will gain an increase in the value of their exports in terms of rubles.³¹

Declining Manufacturing Sectors. The sectors that contract the most are the sectors that are the most protected prior to tariff reduction and which have a relatively small share of exports. Most notably this includes machinery and equipment, food and light industry and construction materials. All of these sectors do little exporting and light industry and food are the sectors with the highest tariff rates.

Business Services Sectors. Russian business and labor interests in these sectors are not the same, and we discuss the impact on labor in these sectors first. Our central estimates, shown in table 6, are that skilled and unskilled employment will expand in the business services sectors. The reason is as follows. As a result of a reduction in the barriers to foreign direct investment in these sectors, we estimate that there will be an expansion in the number of multinational firms who locate in Russia to provide business services from within Russia, and a contraction in the number of purely Russian firms. But multinationals also demand Russian labor, even though they use Russian labor slightly less intensively than Russian firms.³² But as more service firms enter the market, the quality adjusted price of services falls, and industries that use services

³⁰ We do not evaluate the impact of domestic price reform of energy, which will reduce domestic energy sales and use.

³¹ Formally, there is no money in the model, so the value of exports increases in terms of the numeraire. The real exchange depreciates because the increased demand for imports accompanying the decline in tariffs induces an increase in the price of foreign exchange. In addition, the reduction in barriers to multinational investment in the services sector depreciates the real exchange rate. This is because multinationals use more foreign skilled labor, and they must pay in foreign exchange for the foreign skilled labor from domestic sales. The depreciation of the real exchange rate encourages exports and mutes the import expansion. The depreciated real exchange rate results in the export sectors having an increased incentive to export even if the tariffs in the export markets are unchanged. This is one of the primary reasons that international trade economists say that an import tariff is equivalent to a tax on exports. Given our view that Russia will neither give nor receive a “free lunch” from the rest of the world in the long run, we assume that there must be an increase in the value of exports to match the increase in the value of imports accompanying tariff reduction. The real exchange rate is the principal variable that induces the equilibrium between the change in imports and exports.

³² As discussed above, we have employed estimates of the share of expatriate labor used by multinationals provided by Russian research institutes in the services sectors. In general the share is small, from about 3 to 15 percent, depending on the sector. We perform sensitivity analysis, using the high and low estimates provided by the research institutes.

expand their demand for business services. On balance, the increase in labor demand from the increase in the demand for business services typically exceeds the decline in labor demand from the substitution of multinational supply for Russian supply in the Russian market. Thus, we estimate that labor in the business services sectors will typically gain from an expansion in foreign direct investment and multinational provision of services in Russia.

Regarding capital, as a result of the removal of restrictions, we estimate there would be significant increase in foreign direct investment and an increase in multinational firms operating in Russia. Regarding Russian firms, we must be careful in interpreting what this means. As discussed above, we define a firm as a multinational even if a foreign firm and a Russian firm have formed a joint venture. Multinationals will often look for Russian joint venture partners when they want to invest in Russia. Many Russian companies providing business services are likely to see this as a profitable opportunity and form joint ventures with multinationals. These Russian companies will become part of the expanding multinational share of the business services market. The wholly owned Russian firms that become part of joint ventures with foreign investors will likely preserve or increase the value of their investments. Russian capital owners in business services who remain wholly independent of multinational firms, either because they avoid joint ventures or are not desired as joint venture partners, will likely see the value of their investments decline, and the least efficient may exit the industry.³³

This suggests that domestic lobbying interests within a service sector could be diverse regarding FDI liberalization. We estimate that labor should find it in their interest to support FDI liberalization even if capital owners in the sector oppose it. But capital owners themselves may have diverse interests depending on their prospects for acquisition by multinationals.

IV. Sensitivity Analysis

³³ Faced with increased competition, it will be the less efficient Russian firms that exit the industry. We assume that firms in the business services sectors must use a specific factor in order to produce output. This specific factor results in an upward sloping supply curve in each business services sector.

The results depend on the choice of parameters in the model. In this section, we evaluate the impact on the results of the changing the values of the key parameters in the model. We begin with “piecemeal sensitivity” analysis and proceed to “systematic sensitivity” analysis.

Piecemeal Sensitivity Analysis

In table 7, we present the impact on welfare of varying the value of key parameters. In these scenarios, we retain the central value of all parameters except the parameter in question. In general, the gains to the economy (welfare gains) increase with an increase in elasticities, since higher elasticities imply that the economy is able to more easily shift to sectors or products that are cheaper after trade and FDI liberalization.³⁴ There are two parameters in the table that have a strong impact on the results: the elasticity of substitution between value-added and business services (esubs) and the elasticity of multinational firm supply (etaf). A liberalization of the barriers to FDI will result in a reduction in the cost of business services, both from the direct effect of lowering the costs of doing business for multinational service providers and from the indirect effect that additional varieties of business services allow users to purchase a quality adjusted unit of services at less cost. When the elasticity of substitution between value-added and business services is high, users have the greater potential to substitute the cheaper business services and this increases productivity. The elasticity of multinational firm supply (etaf) reflects the sector specific factor for each firm type (foreign or domestic). When this elasticity is high, a reduction in the barriers to foreign direct investment results in a larger expansion in the number of multinational firms supplying the Russian market, and hence more gains from additional varieties of business services. In addition, the share of the services market captured by multinationals has a strong effect, since a liberalization results in a larger number of new varieties introduced.

Sensitivity to Results to a 50% Cut in the Barriers to Foreign Direct Investment. We perform sensitivity analysis with respect to the extent of liberalization of barriers to foreign direct investment. In this scenario, we simulate a cut in the barriers by one-half as much as in our central scenario (shown in table 5). But we allow for improved market access and a fifty percent cut in tariff barriers. We find that the gains to the economy are reduced to about 4.1 percent of consumption. From table 1, we can see this is slightly less than

³⁴ An increase in the elasticity of substitution between varieties reduces the welfare gain. This is because when varieties are good substitutes, additional varieties are worth less to firms and consumers.

the sum of three components: (i) half of the gains from FDI liberalization; (ii) tariff reduction; and (iii) improved market access.

Rent Capture or Dissipation. Resource loss from rent seeking of licenses is a significant problem in Russia. In our central scenario we have ignored these costs. As we discussed above, however, it may be appropriate to assume that those that obtain the licenses used Russian capital and labor in wasteful license seeking activities and the like. Then the ad valorem equivalence of the barriers to multinational investment are a real resource cost. With this assumption, the costs to the economy of the barriers are higher. Consequently (as shown in column 7 of Table 1) the estimated gains from WTO accession increase from 7.2 percent to 7.7 percent of consumption,³⁵ because the resources expended to attain the rents from licenses are available for productive activity.

Similarly, if foreigners capture the rents initially, liberalization of the barriers will allow competition among foreigners that will result in a transfer of the rents from foreigners to Russia. Then we estimate the gains to Russia from WTO accession will increase from our central estimate of 7.2 percent to 7.5 percent of consumption.

Sector Specific Labor. In our central scenario all labor is mobile. In the short run, a significant portion of labor will be unable to switch jobs between sectors. Thus, to evaluate short run effects, it would be useful to examine a scenario where we take the opposite assumption and presume all labor is immobile. That is, in this scenario, we assume that labor can not move between sectors, that is labor is “sector-specific.” With sector specific labor, wages of skilled and unskilled labor will vary across sectors in response to shifts in demand coming from WTO accession.

The aggregate results are presented in table 1, column 8. The welfare gains fall to 5.9 percent of consumption. This decline in the gains is expected when labor is sector specific since when labor is immobile, it cannot move to the sectors where it is valued most highly. While the welfare gains are smaller, no labor changes jobs in this scenario (see the rows on factor adjustments in table 1). Then the “social” adjustment costs of labor are zero. Despite no dislocation of labor, the wages of workers in each sector will have their

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wages go up or down relative to the average wage in the economy for skilled or unskilled labor; thus, there are private adjustment costs of WTO accession in this short-run model.

What is striking about this scenario is that the gains remain very substantial. This shows how important productivity effects are since without productivity effects a model with no labor market resource reallocation would produce very small gains.

Share of Expatriate Labor Employed by Multinational Service providers. The impact of liberalization of barriers to foreign direct investment in business services on the demand for labor in the business services sectors will depend on the share of expatriate labor used by multinational firms. If multinationals use mostly Russian labor, their expansion is likely to increase the demand for Russian labor in these sectors.³⁶ We employed the estimates of the share of expatriate labor or specialized technology not available to Russian firms that is used by multinational service providers in Russia provided by the various Russian research institutes mentioned above.³⁷ Here we estimate the impact of employing the upper or lower bound estimates of this share in all business services sectors.

We find that the impact on the welfare estimates of lower or higher share of imported inputs in the business services sectors is only one-tenth of a percentage point of consumption. But the impact on labor demand in the business services sector is more significant. For example, skilled labor demand in telecommunications increases by 6.0% with our central estimates of labor demand change, but would increase by 7.5% with the lower shares of imported inputs by multinationals and by 4.5% with higher shares of labor demand by multinationals. There is a similar range of results for labor demand in most of the business services sectors. With sufficiently high share of expatriate labor use by the multinationals, the demand for labor in the business services sectors would decline, but based on the expert estimates of the use of expatriate

³⁶ See Markusen, Rutherford and Tarr (2000) for a detailed explanation on why FDI may be a partial equilibrium substitute for domestic labor but a general equilibrium complement.

³⁷ The estimated shares were: financial services, 3%, plus or minus 2%; maritime transportation, 3%, plus or minus 2%; and air transportation, 12.5%, plus or minus 2.5% and telecommunications 10% plus or minus 2%. We thank Vladimir Klimushin of ZNIIS for the telecommunications estimates; Dmitri Grishankov and Irina Shuvalova of ExpertRA for the estimates for banking, insurance and securities; Boris Rybak and Dmitry Manakov of InfoMost for the estimates for air transportation; and Tamara Novikova, Juri Ivanov and Vladimir Vasiliev of CNIIMF for the maritime transportation estimates.

labor, we expect to see an increase in the demand for labor in telecommunications, financial services and truck transportation, but a decline in air transportation services and science servicing. In all these cases, the shift in employment is less than fifteen percent of initial employment.

Systematic Sensitivity Analysis

Piecemeal sensitivity analysis shows how the results change when we vary the value of key parameters one-by-one, with central values of all parameters except the one under consideration. In the systematic sensitivity analysis, we allow all parameters to change simultaneously. A probability distribution for each parameter is chosen. We typically choose uniform probability distribution, with the lower and upper bounds for the values of the parameters taken from the lower and upper values of the key parameters presented in table 7. We furthermore assume that all distributions are stochastically independent.

We then run the model 30000 times. Each time the program chooses a random configuration of parameters and executes the model with this configuration. For each variable in our model, we then harvest the sample distribution based on the 30000 solutions. Consequently the sample distribution is not dependent on any particular set of parameter values, but represents results representative of the full distribution of parameter values.

We present the distribution of the results below for three key variables: welfare change as a percent of consumption, output change and skilled employment changes. For each report variable, we calculate the percentage of solutions associated with a given result for the variable. The top panel of figure 2 shows that the welfare gains as a percent of consumption are, in most cases, between 6% and 8%. The minimum value is 4.5% and the maximum value is 11.4%. The bottom panel of figure 2 shows the corresponding cumulative distribution of the welfare gains. The statistics shows that only 6.4% of the solutions are below a welfare gain of 6% and that 13.0% are above a gain of 8%. More than 80% of the solutions yield a gain between 6% and 8%. This shows that the welfare results are very robust within the six to eight percent of consumption range.

In figure 3, we focus on the employment impacts in the six sectors where the impacts are the greatest: the three sectors with the largest increase in employment and the three sectors with the largest decline in employment. We only show the results for skilled labor, as the results for unskilled labor are very close to the

results for skilled labor. We assume total employment is unchanged, so employment must expand in some sectors and contract in others. The sectors where employment expands the most are: ferrous metallurgy, non-ferrous metallurgy and chemical industry. The manufacturing sectors where employment declines the most are: mechanical engineering, light industry and food industry. The results for all six sectors show that our central results are robust to most parameter configurations, and in particular that the expanding (declining) sectors are expanding (declining) for virtually all configurations. The figure also shows that the magnitude of the results for the expanding sectors is more uncertain than the results for the declining sectors. This is explained by the relatively greater use of business services and goods from imperfectly competitive sectors.³⁸

In figure 4, we display the frequency distributions of the output changes in the same six sectors. The pattern of which sectors expand or contract is the same as for employment, but the results are more positive. Whereas total employment is fixed by our assumption, output increases overall. Output expands due to greater efficiency in the use of resources, and, more importantly, due to greater productivity of factors of production from the increase in varieties of business services and differentiated goods.

V. Conclusion

These results highlight the crucial importance of liberalization of barriers against foreign direct investment in business services. They are also consistent with the themes of empirical work on multilateral trade liberalization that suggest that a country will generally gain more from its own liberalization than it gains from improved access to the markets of its trading partners. Improved market access is a gain to Russia but is quantitatively less important than its own tariff and FDI liberalization in terms of increases in Russian welfare from WTO accession. The fact that, for Russia, liberalization of barriers to FDI are quantitatively more important than tariff liberalization partly reflects the starting point of the analysis. That is, we assess that Russia has done more to lower its tariffs on goods than it has to liberalize its barriers to FDI in services sectors.

³⁸ Thus, variation in the values of η_{fdi} , ϵ_{subs} and θ_{fdi} have a greater impact on these sectors.

But as emphasized in the economic geography literature, our results support the view that access to a diverse set of service providers is crucial for productivity enhancement and growth.

Table 1: Impact of WTO Accession on Economy-Wide Variables in Russia: Policy Results and Decomposition of Effects
(results are percentage change from initial equilibrium)

	Benchmark	WTO accession	Tariff reform only	Improved market access only	Reform of FDI barriers only	WTO accession in steady state model	WTO accession with partial reform of FDI barriers	WTO accession with domestic rent dissipation	WTO accession in short run model
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Aggregate welfare									
Welfare (EV as % of consumption)		7.2	1.3	0.6	5.2	23.6	4.1	7.7	5.9
Welfare (EV as % of GDP)		3.3	0.6	0.3	2.4	11.0	1.9	3.6	2.8
Government budget									
Tariff revenue (% of GDP)	1.4	0.9	0.8	1.4	1.4	1.0	0.8	0.9	0.8
Tariff revenue (% change)		-33.4	-38.4	8.4	10.6	-23.3	-35.4	-33.2	-35.8
Aggregate trade									
Real exchange rate (% change)		2.6	2.0	-0.5	1.1	4.8	1.8	2.7	3.0
Aggregate exports (% change)		13.2	7.9	1.5	3.5	24.3	10.8	13.5	9.5
Returns to mobile factors									
Unskilled Labor (% change)		2.5	0.4	0.1	1.9	13.2	1.0	2.7	1.9
Skilled Labor (% change)		4.7	1.5	0.6	2.5	17.6	2.6	4.9	3.4
Capital (% change)		4.9	2.0	0.7	3.1	19.5	3.6	4.9	4.3
Factor adjustments									
Unskilled labor (% of non-sector specific workers who change jobs)		2.6	1.1	0.5	1.6	4.4	1.7	2.6	0.0
Skilled labor (% of non-sector specific workers who change jobs)		2.1	0.4	0.4	1.5	2.5	1.0	2.2	0.0
Capital		0.6	0.4	0.4	0.2	0.1	0.6	0.6	0.4

Source: Authors' estimates.

Table 2. List of Sectors

1. Sectors where foreign direct investment from new multinational services providers is possible

RLW	Railway transportation
TRK	Truck transportation
PIP	Pipelines transportation
MAR	Maritime transportation
AIR	Air transportation
TRO	Other transportation
TMS	Telecommunications
SCS	Science & science servicing
SSM	Public health & sports & social security
ECM	Education & culture & art
FIN	Financial services

2. Sectors where new foreign firms may provide new goods from abroad

FME	Ferrous metallurgy
NFM	Non-ferrous metallurgy
CHM	Chemical & oil-chemical industry
MWO	Mechanical engineering & metal-working
TPP	Timber & woodworking & pulp & paper industry
CNM	Construction materials industry
CLO	Light industry
FOO	Food industry
OTH	Other industries

3. Competitive sectors subject to constant returns to scale

ADM	Administration & public associations
AGF	Agriculture & forestry
COA	Coalmining
PSM	Communal & consumer services
CON	Construction
ELE	Electric industry
GAS	Gas
GEO	Geology & hydrometeorology
OLE	Oil extraction
OLP	Oil processing
OFU	Other fuel industries
OIN	Other goods-producing sectors
PST	Post
CAT	Public catering
TRD	Trade

Table 3. Structure of Value Added in Russia

		VA	VA%	UNSK%	SKL%	CAP%
ELE	Electric industry	48	4	19	17	64
OLE	Oil extraction	39	3	4	9	87
OLP	Oil processing	10	1	7	17	77
GAS	Gas	12	1	4	7	89
COA	Coalmining	15	1	13	41	47
OFU	Other fuel industries	0	0	30	2	68
FME	Ferrous metallurgy	26	2	18	17	65
NFM	Non-ferrous metallurgy	31	2	18	13	69
CHM	Chemical & oil-chemical industry	24	2	28	10	61
MWO	Mechanical engineering & metal-working	71	5	48	11	41
TPP	Timber & woodworking & pulp & paper industry	19	1	37	17	45
CNM	Construction materials industry	21	2	33	13	54
CLO	Light industry	9	1	66	3	30
FOO	Food industry	45	3	25	11	64
OTH	Other industries	9	1	54	19	28
CON	Construction	116	9	30	26	44
AGF	Agriculture & forestry	103	8	25	2	73
RLW	Railway transportation	45	3	30	24	45
TRK	Truck transportation	20	1	31	33	36
PIP	Pipelines transportation	49	4	5	3	92
MAR	Maritime transportation	4	0	32	19	48
AIR	Air transportation	8	1	48	29	24
TRO	Other transportation	14	1	21	20	59
TMS	Telecommunications	16	1	31	16	53
PST	Post	4	0	23	11	66
TRD	Trade	309	23	10	3	87
CAT	Public catering	2	0	28	12	60
OIN	Other goods-producing sectors	11	1	73	24	3
PSM	Communal & consumer services	76	6	24	9	67
SSM	Public health & sports & social security	42	3	59	7	34
ECM	Education & culture & art	54	4	68	5	28
SCS	Science & science servicing	11	1	56	10	34
GEO	Geology & hydrometeorology	3	0	63	7	30
FIN	Financial services	21	2	33	27	40
ADM	Administration & public associations	65	5	66	22	12

VA: Value added net of tax

VA%: Sectoral value added as a percent of aggregate value added

UNSK%: Unskilled labor share of value added, in percentage form

SKL%: Skilled labor share of value added, in percentage form

CAP%: Capital share of value added, in percentage form

Table 4: Structure of Exports and Imports

	EXP	EXP%	EXPIN%	IMP	IMP%	IMPIN%
Electric industry	2	0	1	0	0	0
Oil extraction	73	18	70	3	1	8
Oil processing	23	6	18	4	1	7
Gas	62	15	26	0	0	1
Coalmining	5	1	10	2	0	5
Other fuel industries	0	0	3	0	0	0
Ferrous metallurgy	40	10	37	12	4	18
Non-ferrous metallurgy	69	17	55	6	2	16
Chemical & oil-chemical industry	35	8	33	22	7	29
Mechanical engineering & metal-working	39	9	17	84	27	36
Timber & woodworking & pulp & paper industry	21	5	31	7	2	17
Construction materials industry	1	0	2	4	1	8
Light industry	4	1	13	51	17	69
Food industry	12	3	6	64	21	30
Other industries	2	0	5	4	1	13
Construction	0	0	0	8	2	3
Agriculture & forestry	2	0	1	8	3	4
Railway transportation	1	0	1	1	0	1
Truck transportation	1	0	1	2	1	4
Pipelines transportation	0	0	0	2	1	2
Maritime transportation	6	1	56	6	2	52
Air transportation	8	2	39	1	0	8
Other transportation	1	0	3	1	0	2
Telecommunications	1	0	5	3	1	11
Post	0	0	9	0	0	4
Trade	2	1	1	7	2	2
Public catering	0	0	2	0	0	1
Other goods-producing sectors	0	0	0	3	1	16
Communal & consumer services	0	0	0	0	0	0
Public health & sports & social security	0	0	0	0	0	0
Education & culture & art	0	0	0	1	0	1
Science & science servicing	1	0	6	1	0	5
Geology & hydrometeorology	0	0	0	0	0	0
Financial services	1	0	2	1	0	3
Administration & public associations	0	0	0	0	0	0

EXP: Value of exports

EXP%: Sector exports as a percentage of aggregate exports

EXPIN%: Sector exports as a percentage of domestic output

IMP: Value of imports

IMP%: Sector imports as a percentage of aggregate imports

IMPIN%: Sector imports as a percentage of domestic demand

Table 5. Tariff Rates, Export Tax Rates, Estimated Ad Valorem Equivalence of Barriers to FDI in Services Sectors and Estimated Improved Market Access

(ad-valorem in %) -- by sector

	Tariff rates	Export tax rates	Estimated change in world market price	Equivalent % barriers to FDI	
				Base Year	Post-WTO Accession
Electric industry	4.5	0.0	0.0		
Oil extraction	0.0	7.9	0.0		
Oil processing	3.8	4.6	0.0		
Gas	0.5	18.8	0.0		
Coalmining	0.0	0.0	0.0		
Other fuel industries	2.6	2.6	0.0		
Ferrous metallurgy	2.9	0.4	1.5		
Non-ferrous metallurgy	7.4	5.3	1.5		
Chemical & oil-chemical industry	7.1	1.6	1.5		
Mechanical engineering & metal-working	7.2	0.0	0.0		
Timber & woodworking & pulp & paper industry	9.9	6.9	0.0		
Construction materials industry	10.6	1.6	0.0		
Light industry	11.8	4.1	0.5		
Food industry	11.3	3.1	0.5		
Other industries	6.4	0.0	0.5		
Agriculture & forestry	8.2	0.6	0.0		
Other goods-producing sectors	0.0	0.0	0.5		
Telecommunications				33.0	0.0
Science & science servicing (market)				33.0	0.0
Financial services				36.0	0.0
Railway transportation				33.0	0.0
Truck transportation				33.0	0.0
Pipelines transportation				33.0	0.0
Maritime transportation				95.0	80.0
Air transportation				90.0	75.0
Other transportation				33.0	0.0

Source: Authors' estimates

Table 6: Impact of WTO Accession on Russian industry and labor by sector
(percentage change in variable -- full versus partial FDI reform)

Sectors	WTO Accession					WTO Accession in Long Run					WTO Accession with Partial Reform of FDI Barriers				
	output	exports	imports	skilled employ-ment	unskilled employ-ment	output	exports	imports	skilled employ-ment	unskilled employ-ment	output	exports	imports	skilled employ-ment	unskilled employ-ment
	(1)					(2)					(3)				
ELE	2	0	8	2	2	8	1	18	-2	-2	1	0	6	1	1
OLE	3	4	2	1	1	3	-2	22	-6	-6	1	1	-1	0	0
OLP	2	5	7	2	2	11	16	22	0	0	0	-1	6	0	0
GAS	3	7	34	15	15	8	13	159	42	42	-1	-8	-9	-8	-8
COA	6	13	9	6	6	7	-2	28	3	3	3	1	7	4	4
OFU	1	32	5	1	1	10	57	11	0	0	0	6	2	0	0
FME	16	34	7	15	15	11	25	20	0	0	11	27	7	12	12
NFM	25	37	34	25	25	74	98	69	57	57	37	52	37	37	37
CHM	10	29	8	9	9	12	30	21	0	0	7	24	8	7	7
MWO	-12	-8	20	-13	-13	-14	-14	40	-21	-21	-12	-9	19	-13	-13
TPP	-2	7	33	-4	-4	-3	3	58	-12	-12	-6	0	32	-7	-7
CNM	-6	0	71	-7	-7	0	6	111	-9	-9	-6	-4	69	-7	-7
CLO	-7	4	8	-9	-9	-13	-9	23	-20	-20	-8	3	6	-9	-9
FOO	-14	-8	38	-15	-15	-5	4	55	-15	-15	-14	-7	33	-14	-14
OTH	-5	2	43	-7	-7	-2	4	66	-9	-9	-6	0	43	-7	-7
CON	0	2	-1	-1	-1	14	12	15	5	5	0	2	-1	0	0
AGF	-3	-6	11	-3	-3	9	14	20	-2	-2	-4	-5	8	-3	-3
RLW	1	-3	224	0	0	7	-3	257	0	0	0	-1	51	0	0
TRK	8	9	42	7	7	18	11	58	10	10	2	3	12	1	1
PIP	-5		148	-4	-4	-1		150	-13	-13	-4		33	-3	-3
MAR	4	10	-4	1	1	10	16	0	-2	-2	2	5	-2	1	1
AIR	0	4	25	-4	-4	4	3	41	-5	-5	0	1	11	-2	-2
TRO	4	2	105	3	3	14	11	127	3	3	0	0	26	0	0
TMS	7	12	47	6	6	16	14	62	6	6	-2	-1	17	-2	-2
PST	3	5	2	0	0	13	17	10	-1	-1	1	0	1	0	0
TRD	6	0	9	5	5	19	27	14	4	4	3	-1	6	4	4
CAT	6	17	0	1	1	19	38	9	10	10	4	13	-2	2	2
OIN	-1	9	26	-3	-3	3	-11	53	-2	-2	-2	6	24	-4	-4
PSM	2	-2	5	2	2	10	4	14	-1	-1	1	-1	2	1	1
SSM	1	3	-1	-1	-1	2	-2	5	-6	-6	0	3	-1	0	0
ECM	0	1	0	-2	-2	1	-11	10	-6	-6	0	2	-1	-1	-1
SCS	-11	1	148	-13	-13	-10	-7	158	-18	-18	-6	-1	52	-7	-7
GEO	0			-3	-3	14			4	4	0			-1	-1
FIN	8	18	53	6	6	15	16	67	5	5	-1	2	17	-2	-2
ADM	1			-8	-8	1			-13	-13	0			-3	-3

Source: Authors' estimates

Table 7: Piecemeal Sensitivity Analysis–Welfare effects

Parameter ^a	Parameter value			Hicksian equivalent variation ^b with corresponding parameter		
	Lower	Inter- mediate	Upper	Lower	Inter- mediate	Upper
esubs	0.5	1.25	2.0	5.6	7.2	9.7
esub	2.0	3.0	4.0	7.3	7.2	6.8
sigmadm	2.0	3.0	4.0	7.1	7.2	7.3
esubprimary	0.70	1.00	1.30	7.1	7.2	7.2
esubintermed	0.0	0.0	0.25	7.2	7.2	7.4
esubconsumer	0.5	1.0	1.5	6.8	7.2	7.5
etadx	3.0	5.0	7.0	7.1	7.2	7.2
etad	5.0	7.5	10.0	6.9	7.2	7.4
Etaf	10.0	15.0	20.0	5.1	7.2	8.7
theta_m(i)	see table below			7.1	7.2	7.2
theta_fdi(i)	see table below			5.2	7.2	8.4

^a The piecemeal sensitivity analysis employs central values for all parameters (see below) other than the tested parameter and lump sum tax replacement.

^b Hicksian equivalent variation as a percent of the value of consumption in the benchmark equilibrium.

Key:

Parameter	Central	Definitions of the parameter
	value	
esubs	1.25	Elasticity of substitution between value-added and business services
esub	3.0	Elasticity of substitution between firm varieties in imperfectly competitive sectors
sigmadm	3.0	"Armington" elasticity of substitution between imports and domestic goods in CRTS sectors
esubprimary	0.0	Elasticity of substitution between primary factors of production in value added
esubintermed	0.0	Elasticity of substitution in intermediate production between composite Armington aggregate goods
esubconsumer	1.0	Elasticity of substitution in consumer demand
etadx	5.0	Elasticity of transformation (domestic output versus exports)
etad	7.5	Elasticity of Russian service firm supply with respect to price of output
etaf	15.0	Elasticity of multinational service firm supply with respect to price of output
theta_m(i)	varies	share of specialized imports V as a share of value added in multinational firms in sector I in the benchmark equilibrium
theta_fdi(i)	varies	share of output of service sector I captured by multinationals firms in the benchmark equilibrium

Parameter values for:	theta_fdi(i)			theta_m(i)		
	low	central	high	low	central	high
railway transportation	0.01	0.03	0.05	0.02	0.04	0.06
truck transportation	0.03	0.05	0.07	0.01	0.03	0.05
pipelines transportation	0.01	0.03	0.05	0.05	0.1	0.15
maritime transportation	0.25	0.35	0.4	0.01	0.03	0.05
air transportation	0.15	0.25	0.35	0.1	0.125	0.15
other transportation	0.02	0.04	0.06	0.03	0.05	0.07
telecommunications	0.05	0.15	0.25	0.08	0.1	0.12
science and science servicing (market)	0.05	0.1	0.15	0.1	0.15	0.2
financial services	0.05	0.1	0.15	0.01	0.03	0.05

Figure 1: Production and Allocation of Output

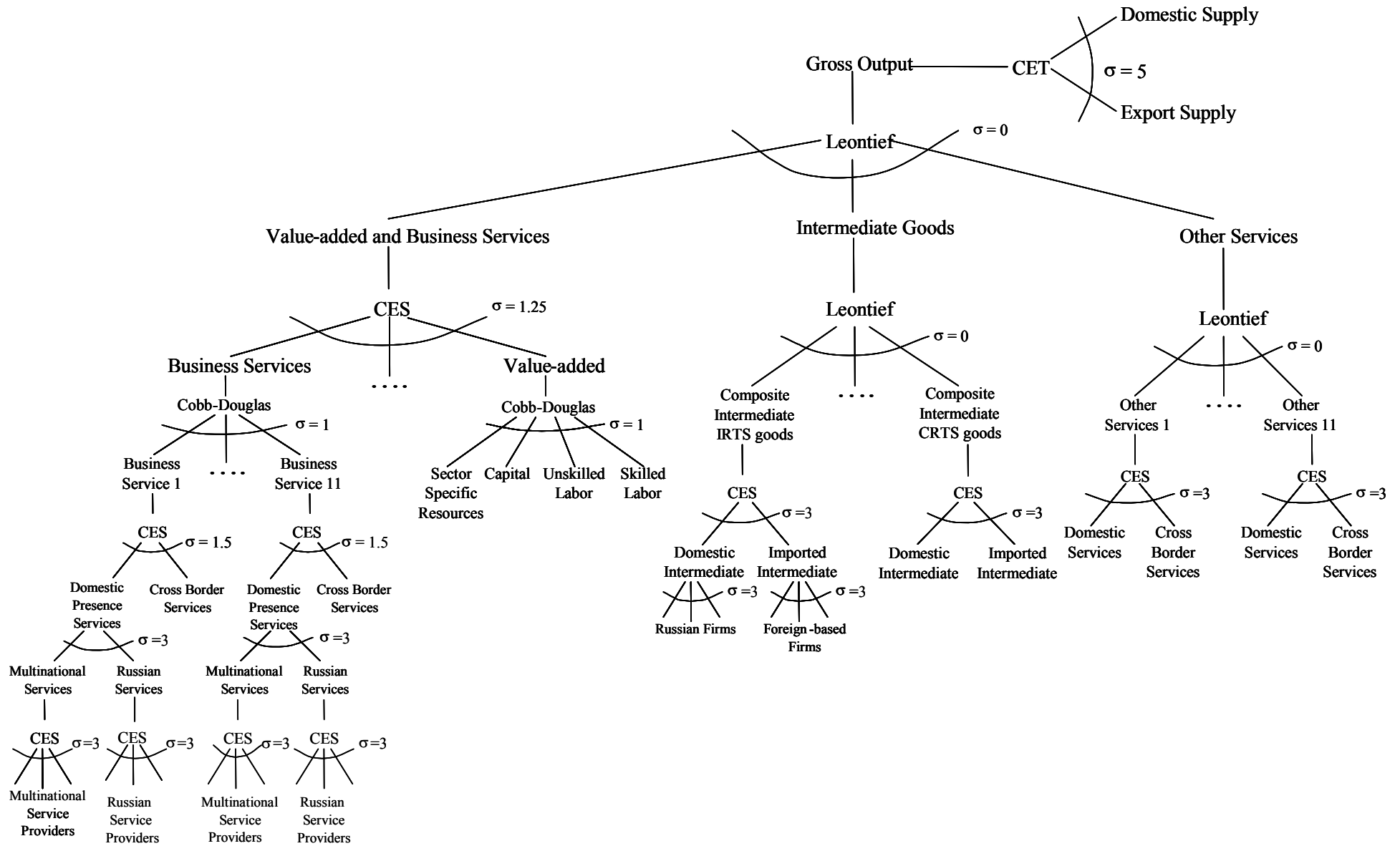


Figure 2: Frequency and cumulative distribution of welfare

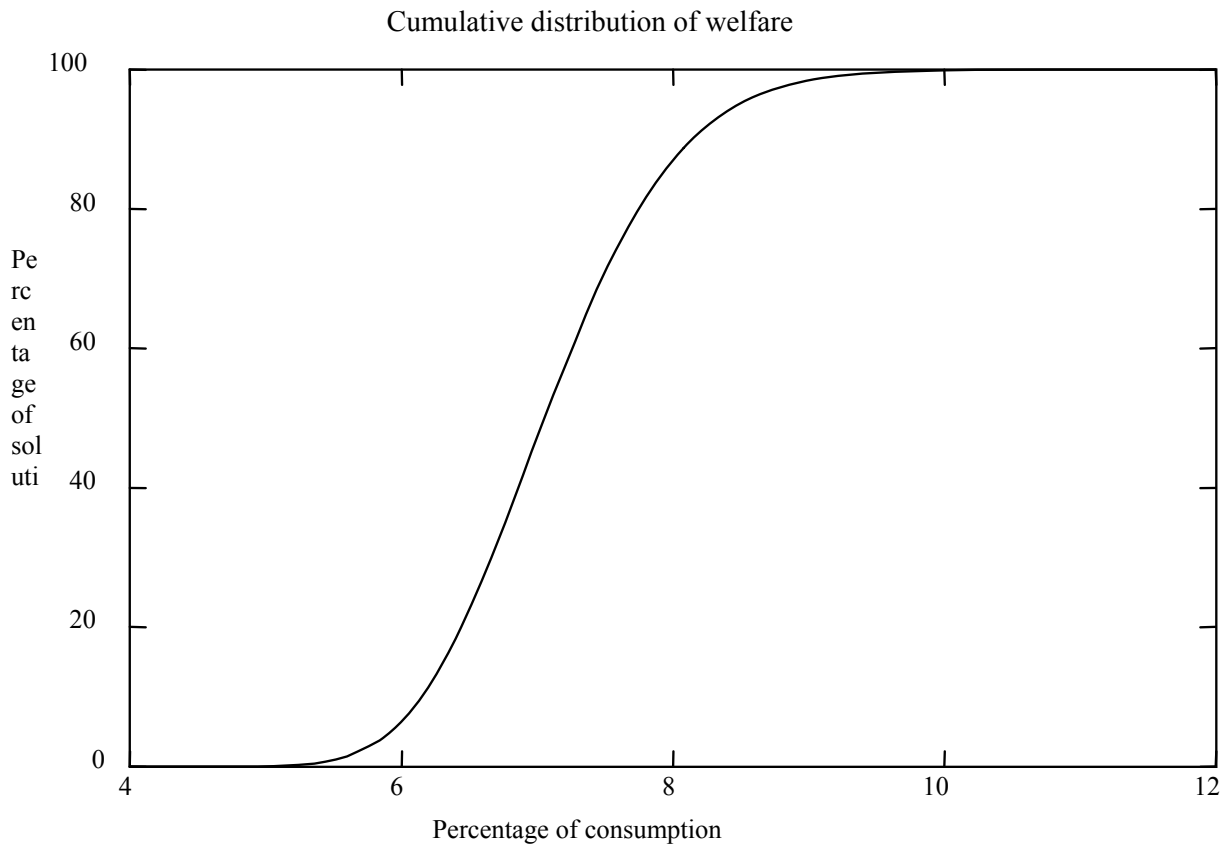
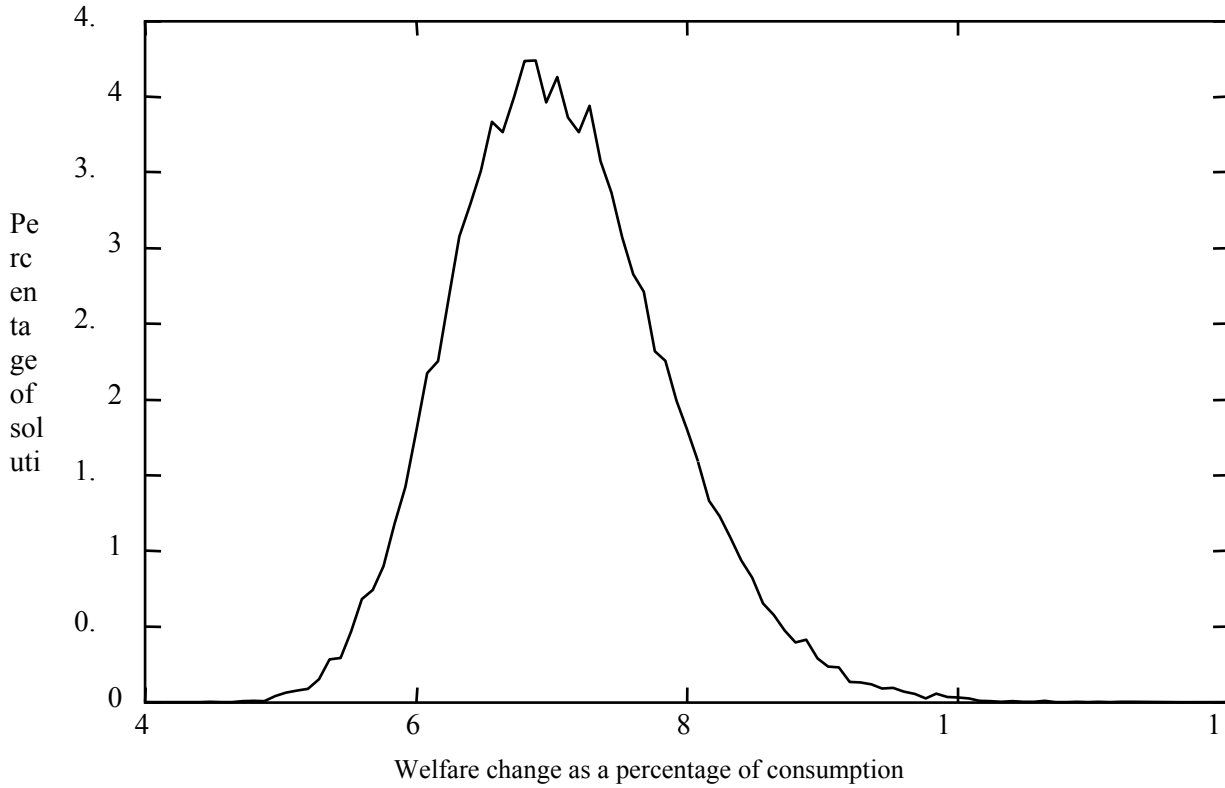


Figure 3: Frequency distributions of skilled employment impacts

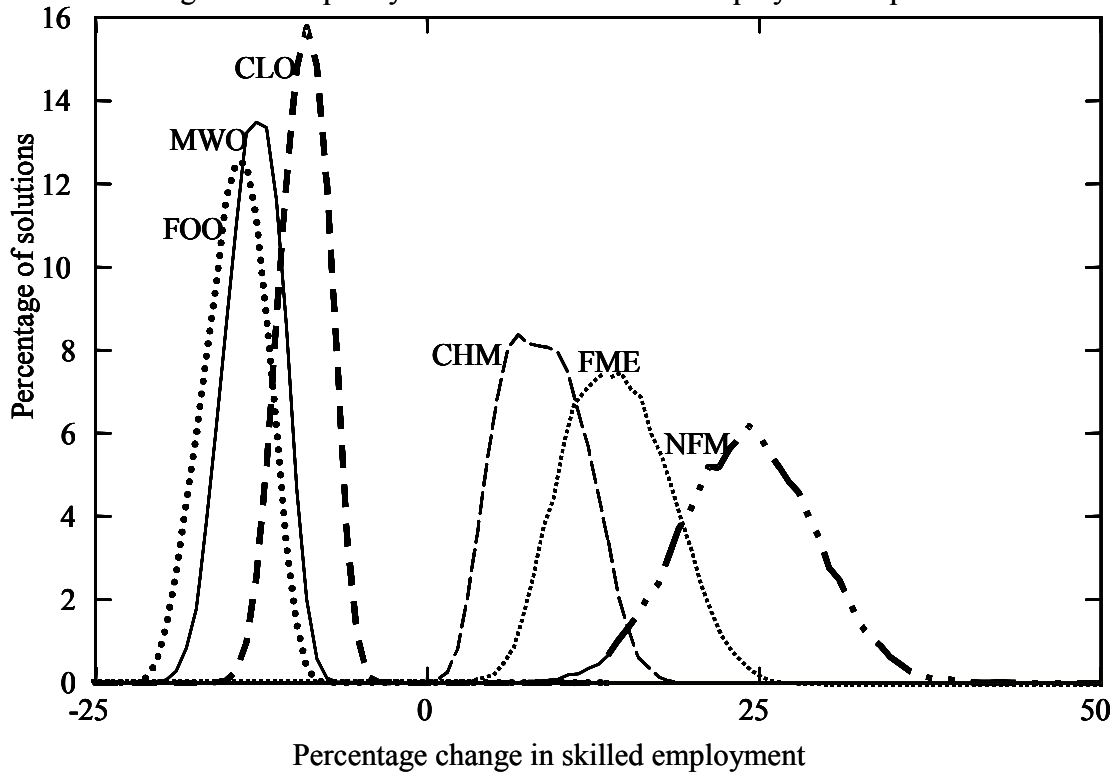
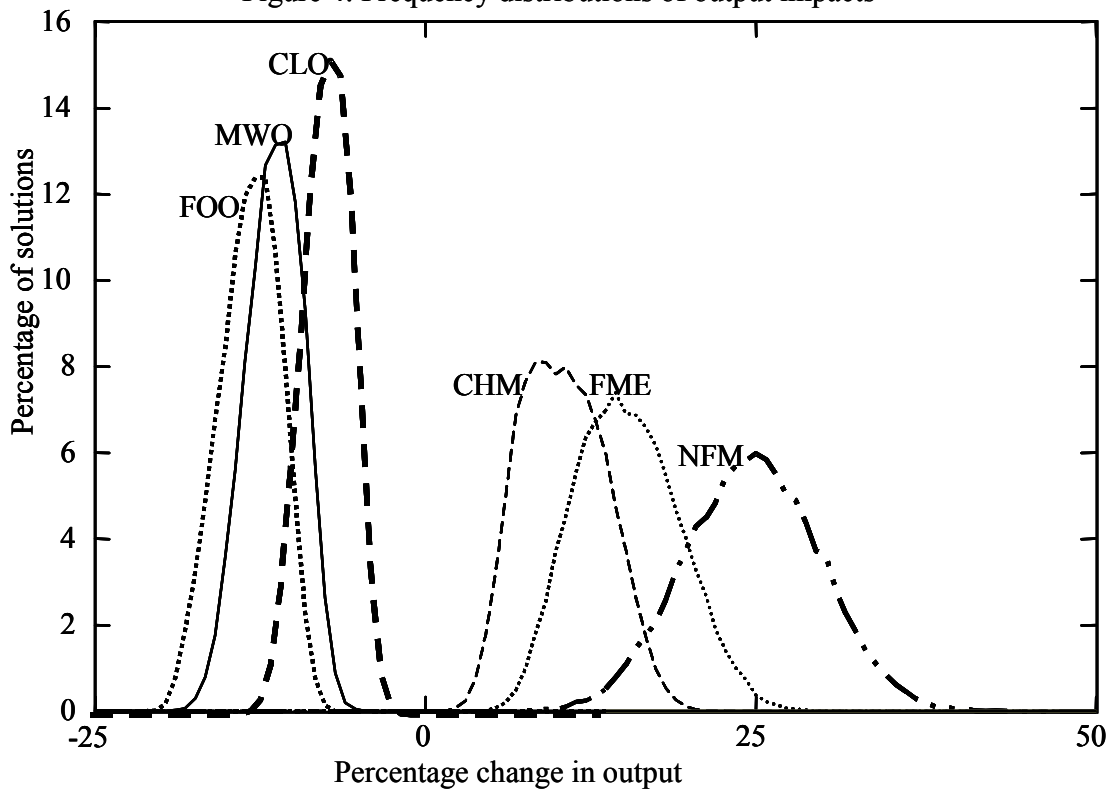


Figure 4: Frequency distributions of output impacts



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