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Improved market access for Russia or own liberalization as part of WTO accession: what will raise Russian income and reduce poverty more?

by

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Abstract: We estimate that a successful completion of the Doha Development Agenda should result in a weighted average loss to Russian households of –0.2 percent of consumption. Russia, as a net food importer, loses from subsidy elimination, and the gains to Russia from tariff cuts in other countries are too small to offset these losses. But Russia's own trade and foreign direct investment liberalization as part of WTO accession should lead to gains of 7.3 percent of Russian consumption, and these gains are fairly evenly distributed throughout the population. We conclude that Russia has more to gain from its own liberalization than from Doha.

Non-Technical Summary

Taking price changes from the GTAP model of world trade, we employ a small open economy computable general equilibrium comparative static model of the Russian economy to assess the impact of global free trade and a successful completion of the Doha Agenda on Russia and the poor in Russia. We compare those results with the impact of Russian accession to the World Trade Organization (WTO) on income distribution and the poor. Our model incorporates all 55,000 households from the Russian Household Budget Survey as "real" households in the model. Crucially, given the importance of FDI liberalization as part of Russian WTO accession, we also include foreign direct investment and Dixit-Stiglitz endogenous productivity effects from liberalization of import barriers against goods and foreign direct investment in services. We estimate that Russian WTO accession in the medium run will result in gains averaged over all Russian households equal to 7.3 percent of Russian consumption (with a standard deviation of 2.2 percent of consumption) with virtually all households gaining. If an inappropriately specified constant returns to scale model were employed the gains from WTO accession would be only about 1.2 percent of consumption with about 7 percent of households expected to lose, i.e., a **model that ignored FDI liberalization and endogenous productivity effects from trade and FDI liberalization will likely get the sign wrong regarding the poverty impacts for many Russian households.** We find that global free trade would result in a weighted average gain to households in Russia of 0.2 percent of consumption, with a standard deviation of 0.2 percent of consumption, while a successful completion of the Doha Development Agenda would result in a weighted average gain to households of –0.2 percent of consumption (with a standard deviation of 0.2 percent of consumption). Russia, as a net food importer, loses from subsidy elimination, and the gains to Russia from tariff cuts in other countries are too small to offset these losses. These results strongly support the view that **Russia has by far the most to gain from its own liberalization, especially in business services, rather than from improvements in market access as a result of reforms in tariffs or subsidies in the rest of the world.**

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I. Introduction

There are two potentially quite important events for Russia with respect to the World Trade Organization (WTO). Russia is negotiating accession to the World Trade Organization and as of late 2004 had signed bilateral agreements on its accession with at least twelve WTO members, including the European Union, China and South Korea. At the same time, the members of the WTO are negotiating tariff and subsidy cuts under the Doha Development Agenda. As a result of WTO member country changes in tariffs and subsidies agreed under the Doha Development Agenda, Russia will face a new set of prices for its exports and imports on world markets. In this paper we evaluate the impact of the likely changes in world prices as a result of a conclusion of the Doha Development Agenda (and of global free trade) on Russia and on poverty in Russia. We also compare these effects with the impact on Russia of Russian WTO accession.

Russian WTO accession is primarily a set of commitments by Russia to liberalize its own trade and crucially its foreign direct investment regime in business services rather than improved market access to the markets of its partners. The comparison of Russian WTO accession with the impact of the Doha Agenda on Russia then devolves fundamentally to a question of whether Russia can gain more from trade and subsidy reform in the rest of the world or from its own liberalization.

This paper uses the model that we have developed through two earlier papers. In Jensen, Rutherford and Tarr (2004) we developed a small open economy model of Russia that incorporated foreign direct investment in business services with Dixit-Stiglitz endogenous productivity effects from investment and trade liberalization in business services and imperfectly competitive goods sectors. We found substantial gains for Russia from its WTO accession, deriving primarily from the liberalization of barriers against foreign direct investment in services. We show that a constant returns to scale model without FDI in business services (that we believe to be an inappropriate model specification given the importance of FDI commitments in Russian WTO negotiations) would produce estimated gains dramatically smaller. In Rutherford, Tarr and Shepotylo (2004) (RT&S), we extend the Jensen, Rutherford and Tarr model by incorporating all the 55,000 households of the Russian Household Budget Survey as agents in our general equilibrium model. That is, we build a "real household" model of the Russian economy with endogenous productivity effects. We showed that WTO accession could be expected to benefit virtually all the poor, but **an inappropriately specified constant returns to scale model without liberalization of barriers against FDI in services and endogenous productivity effects would produce much smaller average welfare gains and the wrong sign for the about seven percent of the Russian population**.

In this paper we employ the same model and dataset that we employed in RT&S to examine the impact on poverty in Russia of the outcome of the Doha Development Agenda as well as a result of global free trade. Crucially, we compare the impact on Russia of the Doha Development Agenda or global free trade with the impact on Russia of its own liberalization through the commitments it will make as part of its WTO accession. In this process we are able to assess the relative benefits to Russia of liberalization of countries in the rest of the world of their tariffs or subsidies with liberalization in Russia of its barriers against FDI and goods imports. We examine impacts on Russia overall, at the decile level and on the entire distribution of Russian households through our "real household" model of Russia.

As with other papers in this conference that are based on national models, for the impact of the Doha agenda and global free trade, the starting point in the analysis are the vectors of percentage changes in the price of exports and imports for Russia as a result of

the completion of the Doha agenda or global free trade. These vectors are derived from simulations in the GTAP model. We take these new price vectors as exogenous shifts in our national small open economy of Russia and determine the impact on household income in Russia percentage.

Some of our key results are as follows. The mean welfare gain to Russia from its Russian WTO accession, averaged over all households is 7.3 percent of Russian consumption (with a standard deviation of 2.2 percent of consumption) in the medium run. We find that virtually all households obtain at least some increase in their income. 99.9 percent of the households gain from a minimum of about 2.0 percent increase in household consumption to about 25 percent. Poor households do slightly better than rich households because the wage rate of unskilled labor rises more than the return on capital. If an inappropriately specified constant returns to scale model were employed the gains from WTO accession would be only about 1.2 percent of consumption with about 7 percent of households expected to lose, i.e., the WTO accession estimates are decisively affected by liberalization of barriers against foreign direct investment in business services sectors and endogenous productivity effects in business services and goods.

Regarding the impact on Russia of cuts in the tariffs and subsidies of other countries, we find that global free trade (which encompasses free trade in goods outside of Russia and the elimination of export subsidies, with domestic support for agriculture retained) would result in a weighted average gain to households in Russia of 0.2 percent of consumption, with a standard deviation of 0.2 percent of consumption. We estimate that a successful completion of the Doha Development Agenda (which we model as the elimination of export subsidies, substantial cuts in tariffs outside of Russia and reduction in domestic support for agriculture) would result in a weighted average gain to households of –0.3 percent of consumption. Russia, as a net food importer, loses from subsidy elimination, and the gains to Russia from tariff cuts in other countries are too small to offset these losses. The impacts on Russia from these terms of trade changes tend to favor neither the rich nor the poor.

Thus we find that, in the medium term, what other countries in the WTO do in terms of their tariff changes or changes in export subsidies or domestic support will have a very small effect on Russian households and poverty. On the other hand, we estimate

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that virtually all households will gain from Russian WTO accession, these gains are substantial and they are very slightly progressive. The distribution of gains across the 55,000 households are decisively affected the inclusion of liberalization of barriers against foreign direct investment in business services sectors and endogenous productivity effects in business services and goods. **These results strongly support the view that Russia has by far the most to gain from its own liberalization, especially in business services, rather than from improvements in market access as a result in reforms in tariffs or subsidies in the rest of the world.**

Despite the significant gains we estimate from WTO accession, during a transition period it is likely that many households will lose. Displaced workers will have to find new employment. We estimate that there will be a decline in employment in light industry, the food industry, mechanical engineering and metal-working and construction materials. Workers in these sectors will suffer losses from transitional unemployment and will likely incur expenses related to retraining or relocation. Some of the poorest members of the population are ill equipped to handle these transition costs. Thus, despite a likely substantial improvement in the standard of living for almost all Russians after adjustment to a new equilibrium after accession to the WTO, government safety nets are very important to help with the transition and especially for the poorest members of society.

We briefly describe the model and data in section II. We focus on the evidence for endogenous productivity effects from liberalization of barriers against imports and FDI in services. Results are presented in section III. We offer brief conclusions in section IV.

II. The Model

We employ a small open economy computable general equilibrium model of the Russian economy with 55,000 households. This paper builds on two earlier papers where the model and data are documented. In Jensen, Rutherford and Tarr (2004), we describe the structure of the single representative agent model, how we disaggregated the official Russian input-output table, and how we calculated the Russian tariff and export tax rates. In that paper we focus on incorporating foreign direct investment liberalization in services and endogenous productivity effects in goods and services. In Rutherford, Tarr

and Shepotylo (2004) (RT&S) we extend the model to incorporate the entire 55,098 households of the Russian Household Budget Survey.

We refer the reader to those papers for more detailed documentation of the model. Given its importance, we also briefly below summarize some evidence of the importance of liberalization of barriers against foreign direct investment in services, productivity impacts of greater variety of imported goods and our approach to estimating barriers to foreign direct investment in Russian business services sectors.

The Algorithm. Key to our capacity to solve a computable general equilibrium model with such a large number of households-agents in the model was the development of a new algorithm. In Rutherford, Tarr and Shepotylo we explain the intuition for that algorithm and provide a graphical interpretation. In the website version of this paper, we provide the GAMS code for that algorithm.

Factor Share Estimation. An additional key step in our analysis is the use of Small Area Estimation techniques and the Russian Longitudinal Monitoring Survey to generate factor share information for all households in the Household Budget Survey. Households are modeled endogenously based on the 55,000 households of the Russian Household Budget Survey (HBS). The HBS, which is representative at the regional level, has very detailed information on household consumption expenditures, and information about age, gender, education, and occupation of each member of the household. It also has information about expenditures and savings and by implication household income.

The major shortcoming of the HBS for our purposes is that it does not contain information on the sources of income of the households. For sources of household income, we must turn to the Russian Longitudinal Monitoring Survey (RLMS). The RMLS has less than 5,000 observations and is not representative of the population on the regional level. But is has extensive information on individual and household sources of income: wages and profits from first, second, third jobs; pensions and unemployment benefits; profits and dividends from accumulated assets.

We have employed both small area estimation and Matching techniques to generate sources of income data for all 55,000 plus households in the HBS. We describe our procedures in Rutherford, Tarr and Shepotylo. Results from both techniques yield

similar results. Factor shares aggregated to deciles are presented in table 3. Consumption shares are in Rutherford, Tarr and Shepotylo.

Overview of the Model Formulation

The key modeling features that distinguish this paper from previous applied general equilibrium modeling exercises linking trade and poverty is that we permit foreign direct investment in business services and additional varieties of business services endogenously increase the productivity of sectors using that service through the Dixit-Stiglitz variety effect (see Markusen, Rutherford and Tarr, forthcoming for elaboration). We also allow for Dixit-Stiglitz productivity effects in goods, both for final consumers and for intermediate use, as explained in Ethier (1982). We shall show that these features have a fundamental effect on the results for the estimated impact of WTO accession on poverty in Russia.

There are 35 sectors in the model listed in table 1. These sectors fall into three categories: competitive sectors producing goods and services; imperfectly competitive goods sectors; and imperfectly competitive services sectors. The structure of production is depicted in figure 1.

Competitive Sectors. In competitive sectors price equals marginal costs and imports and domestic goods are differentiated (the Armington assumption). See de Melo and Tarr (1992) for a description of the details of how these sectors are modeled.

Imperfectly Competitive Sectors. In imperfectly competitive goods sectors, goods are produced with a fixed cost and constant marginal costs. Foreign firms supply the Russian market with production facilities abroad. We assume symmetry among domestic firms as well as among foreign firms, but costs differ between domestic and foreign firms. We have firm level competition with pricing decisions based on large group monopolistic competition. The ratio of marginal costs to average costs is assumed fixed, which together with our pricing assumption, implies that output per firm is fixed. Both final and intermediate users of the output of imperfectly competitive sectors obtain a quality adjusted unit more cheaply when there are additional varieties via the Dixit-Stiglitz variety effect. Entry and exit is determined by a zero profit condition.

Business Services Sectors. Business services are supplied both by competitive firms on a cross border basis and, since many services are more effectively supplied with a domestic presence, by imperfectly competitive firms (both multinational and Russian) that have a domestic presence in Russia. For imperfectly competitive firms the cost and pricing structure is similar to imperfective competitive goods producers except that production of service by multinational service providers is done in Russia. 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. 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.

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 the profitability. Reduction in the constraints on foreign direct investment will typically lead to productivity gains from the Dixit-Stiglitz variety effect because when more varieties of services are available, buyers can obtain varieties that more closely fit their demands and needs.

Primary Factors. Primary factors of production are capital, skilled and unskilled labor. There are five types of capital in the model: (1) mobile capital that can be used in any sector without adjustment costs (46% of total capital); (2) sector-specific capital in the energy sectors, namely ownership of the mineral resources in oil extraction, gas and coalmining (representing 15 percent of total capital); (3) sector specific capital required for expansion of output in imperfectly competitive domestic firms producing either goods or services (representing 32 percent of the capital in the benchmark); (4) sector specific capital required for expansion of output in imperfectly competitive foreign firms producing either goods or services (representing 5 percent of the capital in the benchmark); and (5) ownership of licenses for monopoly rents in services sectors (representing 2 percent of capital in the benchmark). We do not have data that would allow us to associate specific capital holdings in given sectors with particular households. Thus, we assume that all households that hold capital, hold the different types of capital in the same proportions.

Household Consumer Demand

We assume each household maximizes a Cobb Douglas utility function of the aggregate 35 goods in our model subject to its budget constraint (which is factor income net of transfers). Each of the 35 aggregate commodities is a CES ("Armington") aggregate of imported goods or services and goods or services produced in Russia. In imperfectly competitive goods sectors, imported and Russian produced goods are Dixit Stiglitz aggregates of the outputs of foreign or Russian firms. (Since consumer demand is analogous to firm level demand, the structure is depicted in figure 1 under "composite intermediate IRTS goods.") The structure of consumer demand in imperfectly competitive services sectors (equivalent to business services in our model) is depicted on the left side of figure 1 under "Business Services." Competitively supplied cross-border services and imperfectly competitive services produced in Russia are a CES (Armington) aggregate. Services produced in Russia are a Dixit-Stiglitz aggregate of services provided by multinational service providers and Russian service providers. Given our elasticity assumptions, we have pure firm level product differentiation (no preferences for varieties according to country of origin) for all Dixit Stiglitz goods and services.

Consumer demand, as well as firm level demand, exhibits love of variety in imperfectly competitive goods. Given that we have weak separability and homothetic functions at all levels of consumer demand, the conditions for two-stage (or multi-stage budgeting) are satisfied. Given the initial data on each of the households, and our assumptions on the structure of demand, we solve for the parameter values in each of the 55,000 household utility functions that are consistent with optimization by the households. Thus, the demand functions of all households are dependent on their initial choices and, in general, differ from one another.

Evidence on the Productivity Impact of Liberalization of Barriers Against Foreign Direct Investment in Services and on Goods

Services Sector Liberalization. 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 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. As early as the 1960s, the urban and regional economics literature argued that non-tradable intermediate goods (primarily producer services produced under conditions of increasing returns to scale) are an important source of agglomeration externalities which account for the formation of cities and industrial complexes, and account for differences in economic performance across regions. The more recent economic geography literature (e.g., 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. 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. 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.

   Productivity Effects from Goods Liberalization. As Romer (1994) has argued, product variety is a crucial and often overlooked source of gains to the economy from trade liberalization. In our model, it is greater availability of varieties that is the engine of productivity growth, but we believe there are other mechanisms as well through which trade may increase productivity. [2] Consequently, we take variety as a metaphor for the various ways increased trade can increase productivity. Winters et al. (2004) summarize the empirical literature by concluding that "the recent empirical evidence seems to suggest that openness and trade liberalization have a strong influence on productivity and its rate of change." Some of the key articles regarding product variety are the following. Broda and Weinstein find that increased product variety contributes to a fall of 1.2 percent per year in the "true" import price index. Hummels and Klenow (2002) and Schott (forthcoming) have shown that product variety and quality are important in explaining trade between nations. Feenstra et al. (1999) show that increased variety of *exports* in a sector increase total factor productivity in most manufacturing sectors in Taiwan (China) and Korea, and they have some evidence that increased input variety also increases total factor productivity. Finally, Feenstra and Kee (2004) show the export variety and productivity of a country are positively correlated.

Barriers to Foreign Direct Investment in Services Sectors.

   In Russia some prominent examples of barriers in the services sectors are the following. In telecommunications, Rostelekom has a monopoly on long distance fixed line telephone service. In its bilateral agreement on WTO accession with the European Union, Russia has agreed to end the Rostelekom monopoly. In banking, although Russia allows multinationals to invest in new banks in Russia, Russia prohibits multinationals from opening branches in Russia. This distinction has been a significant point of negotiation in the accession discussions. There are limits on how much of the insurance

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[2] Trade liberalization may induce firms to move down their average cost curves, or import higher quality products or shift production to more efficient firms within an industry. Tybout and Westbrook (1995) find evidence of this latter type of rationalization for Mexican manufacturing firms.

market that can be captured by foreign banks. And maritime transportation **within** Russia is limited to Russian ships. Commitments within the context of WTO accession should provide Russian businesses with significantly greater access to multinational service providers in these key sectors.[3]

In order to estimate the ad valorem equivalence of barriers to foreign direct investment, we first commissioned surveys in telecommunications; banking, insurance and securities; and maritime and air transportation services by Russian research institutes that specialize in these sectors. Using these surveys as well as supplementary data, Kimura, Ando and Fujii[4] employed methodology and estimates explained in the volume by C. Findlay and T. Warren (2000) to estimate the barriers to FDI.

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. Assuming that the international regression applies to Russia and assessing the regulatory environment based on the surveys, Kimura, Ando and Fujii estimated the ad valorem impact of a reduction in barriers to foreign direct investment in these services sectors. The results are in table 2.

Solution Methods. The model is solved using GAMS/MPSGE (see Rutherford, 1999) and the algorithm developed for this problem to solve general equilibrium models with a large number of agents.

III. Estimated Impacts of Russian WTO Accession

What are the Counterfactuals?

We examine and compare the potential impact on Russia of the Doha Development agenda as well as the impact on Russia of the changes it will make as a result of commitments it will take on as part of its WTO accession. We first produce

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[3] We estimate that the barriers in air and maritime transportation are higher than in other sectors, due to strong barriers to operation within Russia in these sectors. But since there is less international pressure in these sectors for cuts in these barriers, we believe that WTO accession will not have as significant an effect in these sectors.

[4] The three papers by Kimura, Ando and Fujii as well as the underlying questionnaires are available at www.worldbank.org/trade/russia-wto.

results of Russian WTO accession. These results are based on our integrated "real" 55,000 household model explained in Rutherford, Tarr and Shepotylo (2004) (RT&S). In our WTO scenario, we assume: (1) that barriers against foreign direct investment in business services are reduced as indicated in table 2; (2) seven sectors subject to antidumping actions in export markets receive slightly improved prices in their market access. This is implemented as an exogenous increase in their export price as shown in table 2; and (3) the tariff rates of all sectors are reduced by fifty percent. In all scenarios, unless otherwise stated, we assume that the government employs lump sum distributions or taxes households in equal percentages of household income so that government revenue remains unchanged. The macroeconomic impacts of this scenario are presented in column 1 of table 5. In JRT, we have shown, that the most important impact of WTO accession on Russia is the liberalization of barriers against foreign direct investment in business services. In column 2 we present results where we only liberalize these barriers (by the amount shown in table 2). In column 3 we reduce the barriers against foreign direct investment in services by 50 percent of the cuts shown in table 2. In column, we present results of a scenario in which we only reduce tariff barriers—by cutting tariff barriers by 50 percent across the board.

In columns 5 through 8 we present results of the impact of changes in world prices deriving from reforms undertaken at the global level, primarily in the context of WTO negotiations. We take the changes in world prices derived from the GTAP model as exogenous changes in the export and import prices facing Russia. Then we run our 55,000 household model to examine the impact of these price changes on sector output, exports, imports, household welfare, and other economic variables. In column 5, we consider full elimination of tariffs worldwide, full elimination of export subsidies and elimination of domestic agricultural support. In columns 6, labeled Doha-SDT, we evaluate the impact on Russia of the likely tariff reductions in the Doha agenda, full elimination of export subsidies and cuts in domestic agricultural support, with developing countries making lower cuts. Column 7 differs from column 6 in that we do not assume any special and differential treatment for developing countries.

Aggregate Results in the Full 55,000 Household Model

Aggregate results are summarized in table 4. Welfare results in table 4 are obtained by aggregating the equivalent variation gains (as a percent of consumption) of the 55 thousand consumers.[5]

Russian WTO Accession Scenarios. For our general WTO scenario (column 1), we obtain rather substantial aggregate gains for a comparative state trade model equal to 7.3 percent of aggregate consumption, with a standard deviation in the welfare gains among households of 2.2 percent of consumption.[6] We show in column 2 that the main driving force for this result is that the reduction of Russian barriers against foreign direct investment in the services sectors. Liberalization of barriers to foreign direct investment is responsible for an estimated welfare gain of 5.3 percent of consumption (with a standard deviation in the welfare results among households of 1.5 percent of consumption), or over 70 percent of the total welfare gain from Russian WTO accession. Given that our estimates are that barriers against FDI in services are much higher than tariff barriers and that there will be only small gains in market access the relative importance of liberalization of barriers to FDI is not surprising. In column 3 we also show the results of our estimates of the impact of only a fifty percent reduction in the barriers to FDI, along with the same improved market access and tariff reduction that we implement in our WTO scenario. The gains are reduced to 4.1 percent of consumption, with a standard deviation in the welfare gain of 1.3 percent of consumption; the gains remain substantial, but significantly reduced due to a less significant reduction in FDI barriers. A fifty percent reduction in tariff barriers yields a welfare gain of 1.3 percent of consumption (with a standard deviation of 0.8 percent). Although the gains are significantly less than the gains from services liberalization, this is a significant gain for a country whose tariffs are not very high. The significant size of the gains is due to the endogenous productivity effects of goods liberalization.

The intuition for these results is the following. Reduction of barriers against multinational service providers or foreign goods producers increases the (tariff ridden) demand curve for multinational services or foreign goods. In imperfectly competitive

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[5] The equivalent variation of each household is weighted by its share of base year expenditures.
[6] Computable general equilibrium evaluations of trade policy changes typically estimate gains of less than one percent of GDP. See Rutherford and Tarr (2002) for a discussion and several key examples.

sectors, this induces entry of new multinational service providers or new varieties of foreign goods until zero profit is restored. Although there is a reduction in domestic varieties, there is a net increase in varieties. The increase in varieties lowers the quality-adjusted cost of purchasing the services or goods in downstream industries, and this acts like an externality that increases the total factor productivity in the downstream using sectors.[7]

Since households cannot change their factor endowments between unskilled labor, skilled labor and capital, but they can substitute among commodities consumed, impacts on factor incomes through changes in factor prices tend to dominate the welfare impacts in these kinds of models.[8] In the WTO scenario, the wage rate of skilled labor increases by 5.3 percent, the wage rate of unskilled labor increases by 3.7 percent and the return on capital increases by 1.8 percent. Although the return to capital rises relative to a basket of consumption goods, it does not rise as much as wages. The return to capital increases less than wages because owners of "specific capital" in imperfectly competitive sectors that are subject to increased competition from imports or from foreign direct investment will see a reduction in the value of their returns. Returns to mobile capital increase by over six percent, even faster than returns to skilled labor because the economy shifts resources into the more capital intensive sectors and away from more unskilled labor intensive sectors such as light industry and mechanical engineering and metal working (see table 6). But, the return on sector specific capital in all imperfectly competitive sectors falls, so that the total return on capital rises less than wages. The ratio of skilled to unskilled labor in the expanding sectors in greater than in the contracting sectors. As a result, the wage of skilled labor rises faster than the wage rate of unskilled labor.[9]

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[7] We have shown that if we assume constant returns to scale in all sectors of the economy, the estimated welfare gains from Russian WTO accession are reduced to 1.2 percent of consumption. These results show that incorporating liberalization of barriers to foreign direct investment in the analysis as well as the Dixit-Stiglitz-Ethier formulation for endogenous productivity effects are both crucial in explaining the rather substantial estimated gains from Russian WTO accession.

[8] See, for example, Harrison, Rutherford and Tarr (2003).

[9] The data do not allow us to distinguish capital holdings at the household level between the various types of capital. Thus, all households are assumed to hold the five kinds of capital in our model in equal proportions. Households that depend disproportionately on specific capital that falls in return would be expected to lose from WTO accession.

Changes in the World Trading Environment: Impacts on Russia. In columns 5 through 7, we examine the impact on Russia as a result in changes in the world trading environment. In column 5, we examine the impact of global free trade (without Russian participation)[10], the removal of all export subsidies in agriculture and the removal of domestic support in agriculture. We estimate that without the removal of domestic support that Russia's welfare gain will be 0.2 percent of consumption with a standard deviation among households of 0.2 percent of consumption)..

While the impact on Russia of global free trade outside of Russia and the removal of export subsidies alone is positive, the most noticeable aspect of these estimates is how small they are in relation to the 7.3 percent estimated gain that Russia will obtain from its commitments as part of its WTO accession. This result is similar to results that have been repeatedly found in the literature that emphasize that the largest gains from trade liberalization come from liberalization within your own country and not from the actions of other countries. In our case, we also incorporate as part of the WTO accession scenario the liberalization of Russian barriers against foreign direct investment with endogenous productivity effects from liberalization of trade and FDI barriers.[11]

In columns 6 and 7, we examine possible outcomes of the Doha Development Agenda (without Russia making any changes). Independent of the treatment of developing countries, we estimate that on average Russia will lose about -0.3 percent of consumption, with a standard deviation across households of 0.2 percent of consumption. hese losses are due to the terms of trade loss to Russia from paying higher prices for food

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[10] We assume that any commitments for tariff reduction as part of the Doha agenda will not apply to Russia, since Russia is not yet a member of the WTO and the terms of its accession agreement will define it tariff regime within the time frame of the Doha Development Agenda. Thus, we assume that Russia does not participate in these global liberalization scenarios.

[11] To put these numbers in perspective, Rutherford and Tarr (2002) have analytically derived the relationship between a permanent increase in the steady state growth rate and equivalent variation. A welfare gain of 10 percent of consumption corresponds to a permanent increase in the growth rate of about 0.4 percent. Although cross country assessments of the impact of trade liberalization of growth have been criticized, several authors have estimated that trade liberalization could increase the growth rate by between one and 2.5 percent.

One criticism of these regressions is that trade liberalization is often accompanied by macro stabilization, institutional reforms and other market reforms, and the trade liberalization variable in the cross country regressions may be picking up these other effects. But WTO accession involves a range of reforms, including institutional reforms necessary to accompany FDI liberalization, and trade liberalization may be a *sine qua non* of the overall reform process, because other interventions such as state subsidies often are unsustainable in an open economy.

imports due to export subsidy removal. Without very substantial tariff cuts in the rest of the world to offset the losses from removal of export subsidies in agriculture, Russia loses from the adverse terms of trade effects of higher prices for food imports.

To verify this intuition, we have separately evaluated the impact of the elimination of export subsidies, without any change in tariffs or domestic support. We estimate that Russia will lose –0.4 percent of consumption from the removal of export subsidies. These results are explained by the fact that Russia is a net food importer. So elimination of export subsidies in agriculture results in higher prices for food and agricultural products on world markets. Thus, the terms of trade shift against Russia since as a result of the elimination of these subsidies.[12]

Results Aggregated to the Decile Level

In order to ascertain the impact of the Doha Agenda and WTO accession on the poor, we have separated the 55,000 households into ten deciles, with ten percent of the households in each. Households are ranked according to per capita income with decile 1 comprising the poorest ten percent of the households, decile 10 the richest ten percent and so on. We run the model with all 55,000 households. Then we have aggregated the equivalent variation gains (as a percent of consumption) of the households in each decile and presented those results in table 5. We also present in table 5 the aggregated results for rural and urban households in each decile. In addition, we present the standard deviation of the disaggregated equivalent variation results within each decile. We believe that the distributional consequences on the poor are more transparent when the results are presented in this manner.

WTO Accession and FDI liberalization. In columns one and two we present the results for Russian WTO accession and Russian reduction of barriers against foreign direct investment in services where we weight the gains of the households within each decile to obtain weighted average mean gains for the households. We see that all ten representative households gain significantly, but the richest household gains slightly less in percentage terms than the poorest. This is because the return on capital increases less than the wage rate of unskilled labor. From table 3 we can see that the rich depend more

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[12] To verify this intuition, we have executed the GTAP model in which we eliminate export subsidies but nothing else changes. We find that the negative welfare impact on Russia is equal to 0.4 percent of Russian consumption.

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on earnings from capital than the rest of the population, so the impact on their income is affected more by the relatively lower increase in the returns to capital.[13] Skilled labor is more evenly distributed across income deciles, reflecting that fact that government employees such as researchers and teachers often receive very low wages, and that retirees living only a pension are often retired skilled workers.[14]

Rural households typically gain less than urban households. This is due to the fact that rural households have less education and are therefore classified as less skilled than urban workers in the same income group, and unskilled worker wages do not increase as much as skilled worker wages.

Global Free Trade and the Doha Agenda Scenarios. We see from the results in column four that the impact of global free trade, removal of export subsidies and reduction in domestic support yields very little difference in the results across the deciles. The welfare of all deciles increases between 0.1 percent and 0.3 percent of consumption. That is, the results for all deciles falls within 0.1 percent of the weighted average for the entire population (shown in table 5) of 0.2 percent welfare increase as a percent of consumption. Similar results apply to the other three scenarios shown in columns 5 and 6—the weighted average estimated welfare gains for virtually all deciles is within 0.1 percent of the estimated weighted average for the entire population in the respective scenario. The standard deviations for households within the deciles is either 0.2 or 0.3 percent of consumption.

The results are remarkably neither progressive nor regressive. The similarity of results across deciles for these three scenarios is explained by the fact that in each of these three scenarios, the wage rate of unskilled labor is estimated to increase by the same percentage as the return to capital. Since it is principally in the disparate shares of capital and unskilled labor shares of income that the rich and poor differ, if the

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[13] Household income in Russia exceeds household consumption for almost all households. The reason is that Russian has a large current account surplus. Consistency between the macro balances and the household data in construction of the Social Accounting Matrix implies that household factor income must be larger than household consumption for most households to allow for the transfer of capital to foreigners as well as to pay for investment. It follows that the change in factor income as a percent of consumption will be larger than the change in factor income as a percent of household income.
[14] An individual is classified as skilled if he or she has any education post-high school. We defined skills at the individual level. We define labor and capital shares individually, and then aggregated factor shares within the household.

percentage returns to these factor moves the same, the welfare gains can be expected to move the same.

Results for Individual Households

Distribution of the Results. The distribution of gains from Russian WTO accession across all 55,000 households is summarized in figure 2. We also display in figure 2, the distribution of gains for the poorest ten percent and richest ten percent of all households. Figure 2 shows there is a distribution of income changes across the 55,000 households that is centered around a mean gain of income of 7.3 percent with a standard deviation of the gains equal to 2.2 percent of consumption. As is evident from figure 2, we estimate that virtually all households will gain in the new equilibrium relative to the status quo. We calculate that 98 percent of the population will gain between 3.2 and 13 percent of consumption; 99.9 percent of the households will gain between 2 and 25 percent of consumption.[15] The distribution of gains for the poorest decile of the population is close to the distribution for the entire population, although the mean of the gains is slightly larger, while the richest decile gains slightly less than the average of the population, i.e., WTO accession produces slightly progressive effects for reasons already mentioned.[16]

In figures 3 and 4, we plot the comparable distributions across the 55,000 households based on the global free trade and Doha-ALL scenarios. For global free trade, we estimate that 98 percent of the households will experience a change in welfare of between negative –0.3 and 0.7 percent of consumption. For the Doha-ALL scenario, we estimate that 98 percent of the households will experience a change in welfare of between negative –0.8 and 0.2 percent of consumption. As was evident in the results at the decile level, the impact for the rich and the poor does not differ significantly, i.e. the impacts global free trade or Doha on Russian households are neither progressive nor regressive.

In figure 5, we compare the distributions of gains for all Russian households from WTO accession, global free trade and Doha-ALL. The figure makes it very evident that

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[15] For the scenario where we cut barriers to FDI by only fifty percent of the cuts in our WTO accession scenario, 98 percent of the households experience a gain of between 0.9 and 6.3 percent of consumption.
[16] While households that are heavily endowed with specific capital in declining sectors will lose on average from WTO accession, those who can form joint ventures with foreign investors will likely see the value of their specific capital holdings increase.

WTO accession results in dramatically larger gains for Russian households than the impact on Russia of either global free trade or Doha-ALL. Global free trade is more beneficial than Doha-ALL for Russian households. But the distributions of gains from global free trade and Doha-ALL significantly overlap with each other so that a large part of the distribution from Doha 2 is obscured by the global free trade distribution. That is, the difference in impact on Russia between global free trade and Doha-ALL is rather small compared with the gains we estimate that Russia will reap from its own reforms embodied in its WTO accession commitments.

VII. Conclusions

Own Liberalization is Most Important. We estimate that in the medium term, what other countries in the WTO do in terms of their tariff changes or changes in export subsidies or domestic support will have a very small effect on Russian households and poverty. On the other hand, we estimate that virtually all households will gain from Russian WTO accession, these gains are substantial and they are very slightly progressive. These results strongly support the view that Russia has by far the most to gain from its own liberalization, especially in business services, rather than from improvements in market access as a result in reforms in tariffs or subsidies in the rest of the world.

A model with FDI liberalization with endogenous productivity effects is crucial to even assess the sign of the gains to the Russian poor. The distribution of gains across the 55,000 households is decisively affected the by the inclusion of liberalization of barriers against foreign direct investment in business services sectors and endogenous productivity effects in business services and goods. If an inappropriately specified constant returns to scale model were employed, without liberalization of barriers against FDI in business services, the gains from Russian WTO accession would be only about 1.2 percent of consumption with about 7 percent of households expected to lose, i.e., for these seven percent of the households models that ignore FDI liberalization and endogenous productivity effects will likely get the sign wrong.

Transition costs must be considered by policy-makers. Although not part of our model, we emphasize that during a transition period WTO accession is likely to result

in losses for many households. As we discuss in Jensen, Rutherford and Tarr (2004), we expect to observe a decline in employment in light industry, the food industry, mechanical engineering and metal-working and construction materials. These displaced workers will have to find new employment. They will suffer losses from transitional unemployment and will likely incur expenses related to retraining or relocation. Thus, despite a likely substantial improvement in the standard of living for almost all Russians after adjustment to a new equilibrium after accession to the WTO, government safety nets are very important to help with the transition and especially for the poorest members of society who can ill afford a harsh transition.

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Table 1. Structure of Value Added in Russia: Factor shares from the Input-Output table and after reconciliation with the Household Budget Survey (HBS)

	Sectors		Value Added	Value Added (%)	Input-Output Table			Reconciled with HBS		
					Unskilled Labor %	Skilled Labor %	Capital %	Unskilled Labor %	Skilled Labor %	Capital %
	Sectors	Total	1354	100.0	28	12	61	21	63	16
Business Services:	Railway transportation		45	3.3	30	24	45	11	85	5
	Truck transportation		20	1.5	31	33	36	8	88	4
	Pipelines transportation		49	3.6	5	3	92	11	58	31
	Maritime transportation		4	0.3	32	19	48	14	81	5
	Air transportation		8	0.6	48	29	24	14	84	2
	Other transportation		14	1.1	21	20	59	9	85	6
	Telecommunications		16	1.2	31	16	53	16	79	5
	Financial services		21	1.5	33	27	40	10	86	4
	Science & science servicing		11	0.8	56	10	34	35	61	4
	Subtotal:		188	13.9	2583	1794	5623	1244	7626	1130
Differentiated Goods:	Ferrous metallurgy		26	1.9	18	17	65	9	85	7
	Non-ferrous metallurgy		31	2.3	18	13	69	12	81	7
	Chemical & oil-chemical industry		24	1.8	28	10	61	20	74	7
	Mechanical engineering & metal-working		71	5.2	48	11	41	30	66	4
	Timber & woodworking & pulp & paper industry		19	1.4	37	17	45	17	79	5
	Construction materials industry		21	1.6	33	13	54	19	75	5
	Light industry		9	0.7	66	3	30	63	32	5
	Food industry		45	3.3	25	11	64	17	76	7
	Other industries		9	0.6	54	19	28	22	76	3
	Subtotal:		255	18.8	3436	1226	5338	2125	7312	562
Extractive Industries:	Oil extraction		39	2.9	4	9	87	1	12	87
	Gas		12	0.9	4	7	89	1	10	89
	Coalmining		15	1.1	13	41	47	2	52	47
	Subtotal:		67	4.9	581	1580	7840	76	2084	7840
Constant Returns Industries:	Electric industry		48	3.6	19	17	64	9	84	6
	Oil processing		10	0.8	7	17	77	3	89	8
	Other fuel industries		0	0.0	30	2	68	49	33	18
	Construction		116	8.6	30	26	44	10	86	4
	Agriculture & forestry		103	7.6	25	2	73	47	31	22
	Post		4	0.3	23	11	66	15	78	7
	Trade		309	22.9	10	3	87	20	53	27
	Public catering		2	0.1	67	28	5	19	81	1
	Other goods-producing sectors		11	0.8	72	23	5	23	76	1
	Communal & consumer services		76	5.6	24	9	67	19	72	9
	Public health & sports & social security		42	3.1	59	7	34	44	52	4
	Education & culture & art		54	4.0	68	5	28	56	40	4
	Geology & hydrometeorology		3	0.2	63	7	30	45	52	3
	Administration & public associations		65	4.8	66	22	12	22	76	1
	Subtotal:		844	62.3	2806	957	6237	2486	5999	1515

Table 2a. Tariff Rates, Export Tax Rates, Estimated Ad Valorem Equivalence of Barriers to FDI in Services Sectors and Estimated Improved Market Access from WTO Accession*

(ad-valorem in %) -- by sector

Sectors		Tariff rates	Export tax rates	Estimated change in export prices from WTO accession	Equivalent % barriers to FDI	
					Base Year	Post-WTO Accession
ELE	Electric industry	4.5	0	0		
OLE	Oil extraction	0	7.9	0		
OLP	Oil processing	3.8	4.6	0		
GAS	Gas	0.5	18.8	0		
COA	Coalmining	0	0	0		
OFU	Other fuel industries	2.6	2.6	0		
FME	Ferrous metallurgy	2.9	0.4	1.5		
NFM	Non-ferrous metallurgy	7.4	5.3	1.5		
CHM	Chemical & oil-chemical industry	7.1	1.6	1.5		
MWO	Mechanical engineering & metal-working	7.2	0	0		
TPP	Timber & woodworking & pulp & paper industry	9.9	6.9	0		
CNM	Construction materials industry	10.6	1.6	0		
CLO	Light industry	11.8	4.1	0.5		
FOO	Food industry	11.3	3.1	0.5		
OTH	Other industries	6.4	0	0.5		
AGF	Agriculture & forestry	8.2	0.6	0		
OIN	Other goods-producing sectors	0	0	0.5		
TMS	Telecommunications				33	0
SCS	Science & science servicing				33	0
FIN	Financial services				36	0
RLW	Railway transportation				33	0
TRK	Truck transportation				33	0
PIP	Pipelines transportation				33	0
MAR	Maritime transportation				95	80
AIR	Air transportation				90	75
TRO	Other transportation				33	0

* Source: Authors' estimates

Table 2b. Changes in Export and Import Prices Facing Russia on World Markets as a Result of the Doha Round or Global Free Trade *

(ad-valorem in %) -- by sector

Sectors		Doha 1		Doha 2		Global Free Trade	
		Export prices	Import prices	Export prices	Import prices	Export prices	Import prices
ELE	Electric industry						
OLE	Oil extraction						
OLP	Oil processing						
GAS	Gas						
COA	Coalmining						
OFU	Other fuel industries						
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						
AGF	Agriculture & forestry						
OIN	Other goods-producing sectors						

* Source: GTAP model estimates.

Table 3. Factor Income Shares and their Standard Deviations by Consumption Decile

	All Households			Rural Households			Urban Households		
	Unskilled Labor %	Skilled Labor %	Capital %	Unskilled Labor %	Skilled Labor %	Capital %	Unskilled Labor %	Skilled Labor %	Capital %
Decile 1 (0-10%)	40.9	56.8	2.3	45.8	50.8	3.4	35.6	63.2	1.2
	(39.5)	*(39.8)*	*(5.3)*	*(39.5)*	*(39.6)*	*(6.2)*	*(38.6)*	*(38.8)*	*(3.8)*
Decile 2 (11-20%)	37.6	58.5	3.9	42.8	51.5	5.8	34.1	63.4	2.6
	(37.6)	*(38.0)*	*(8.8)*	*(38.2)*	*(38.2)*	*(11.3)*	*(36.7)*	*(37.0)*	*(6.1)*
Decile 3 (21-30%)	32.2	62.3	5.4	40.0	52.5	7.5	28.5	67.0	4.5
	(37.1)	*(37.6)*	*(10.1)*	*(37.9)*	*(38.2)*	*(12.8)*	*(36.2)*	*(36.5)*	*(8.4)*
Decile 4 (31-40%)	30.1	62.9	7.0	36.8	54.2	9.1	27.3	66.5	6.2
	(36.2)	*(36.5)*	*(10.8)*	*(39.3)*	*(38.6)*	*(13.3)*	*(34.5)*	*(34.9)*	*(9.4)*
Decile 5 (41-50%)	27.5	62.5	10.0	34.7	53.7	11.6	25.0	65.5	9.5
	(35.4)	*(35.2)*	*(12.3)*	*(38.3)*	*(36.0)*	*(13.9)*	*(34.0)*	*(34.4)*	*(11.7)*
Decile 6 (51-60%)	25.3	60.9	13.8	35.4	49.3	15.3	22.1	64.5	13.3
	(34.7)	*(34.1)*	*(14.6)*	*(40.0)*	*(36.8)*	*(16.4)*	*(32.1)*	*(32.3)*	*(13.9)*
Decile 7 (61-70%)	20.7	61.4	17.9	33.2	50.4	16.4	17.6	64.1	18.3
	(30.9)	*(31.9)*	*(16.0)*	*(38.3)*	*(35.9)*	*(16.9)*	*(27.8)*	*(30.1)*	*(15.7)*
Decile 8 (71-80%)	16.8	62.1	21.1	31.2	48.0	20.8	13.9	65.0	21.1
	(28.5)	*(29.7)*	*(16.2)*	*(36.8)*	*(34.6)*	*(19.1)*	*(25.4)*	*(27.6)*	*(15.5)*
Decile 9 (81-90%)	16.1	55.2	28.7	28.0	46.6	25.4	14.4	56.5	29.2
	(27.2)	*(28.4)*	*(17.3)*	*(37.3)*	*(32.9)*	*(19.3)*	*(24.7)*	*(27.4)*	*(16.9)*
Decile 10 (91-100%)	11.2	47.2	41.7	23.3	39.9	36.8	10.5	47.6	41.9
	(24.9)	*(27.0)*	*(22.1)*	*(33.9)*	*(27.7)*	*(21.1)*	*(23.9)*	*(26.9)*	*(22.2)*

Note: Numbers in parentheses are the standard deviations of the decile factor share.

Table 4. Shares of Consumption Expenditure on Goods and Services, by Decile (Rural versus Total)

	Sectors	Decile 1 (0-10%) [a]		Decile 5 (41-50%)		Decile 10 (91-100%) [b]	
		Urban	Rural	Urban	Rural	Urban	Rural
ELE	Electric industry	0.9	0.7	0.6	0.4	0.3	0.3
OLE	Oil extraction	0.0	0.0	0.0	0.0	0.0	0.0
OLP	Oil processing	0.5	0.4	0.8	0.8	1.7	1.3
GAS	Gas	0.7	1.2	0.3	0.6	0.1	0.2
COA	Coalmining	0.2	0.9	0.1	1.0	0.0	0.2
OFU	Other fuel industries	0.0	0.0	0.0	0.0	0.0	0.0
FME	Ferrous metallurgy	0.0	0.0	0.0	0.0	0.0	0.0
NFM	Non-ferrous metallurgy	0.0	0.0	0.0	0.0	0.0	0.0
CHM	Chemical & oil-chemical industry	3.9	2.7	2.8	1.7	1.5	1.2
MWO	Mechanical engineering & metal-working	1.3	1.3	3.0	3.9	15.2	16.9
TPP	Timber & woodworking & pulp & paper industry	1.1	0.7	1.3	0.9	3.1	2.0
CNM	Construction materials industry	0.3	0.4	0.4	0.5	1.0	1.2
CLO	Light industry	15.2	12.7	15.7	12.1	16.8	11.4
FOO	Food industry	48.7	29.9	43.6	24.6	27.1	18.6
OTH	Other industries	0.4	0.2	0.5	0.3	0.9	0.4
CON	Construction	0.0	0.0	0.0	0.0	1.8	1.1
AGF	Agriculture & forestry	9.5	38.3	10.8	42.2	7.5	30.3
RLW	Railway transportation	0.4	0.2	0.7	0.3	0.7	0.4
TRK	Truck transportation	0.6	2.2	0.7	1.6	1.1	3.0
PIP	Pipelines transportation	0.0	0.0	0.0	0.0	0.0	0.0
MAR	Maritime transportation	0.1	0.0	0.0	0.0	0.0	0.0
AIR	Air transportation	0.1	0.0	0.8	0.2	4.6	2.0
TRO	Other transportation	1.5	0.5	1.4	0.4	0.8	0.3
TMS	Telecommunications	1.2	0.6	1.5	0.6	1.2	0.7
PST	Post	0.3	0.1	0.4	0.2	0.2	0.3
TRD	Trade	0.0	0.0	0.0	0.0	0.0	0.0
CAT	Public catering	0.8	0.8	1.7	0.8	2.4	1.4
OIN	Other goods-producing sectors	0.3	0.3	0.6	0.3	0.9	0.5
PSM	Communal & consumer services	8.5	2.0	8.0	2.5	5.0	2.2
SSM	Public health & sports & social security	1.3	0.7	1.3	0.7	2.6	0.7
ECM	Education & culture & art	0.7	0.3	0.9	0.7	1.3	1.2
SCS	Science & science servicing	0.0	0.0	0.0	0.0	0.0	0.0
GEO	Geology & hydrometeorology	0.0	0.0	0.0	0.0	0.0	0.0
FIN	Financial services	1.0	0.5	0.8	0.6	1.2	0.7

[a] Poorest ten percent of the population.

[b] Richest ten percent of the population.

Table 5: Impact of Russian WTO Accession and the Doha Agenda on Economy-Wide Variables in Russia

(results are percentage change from initial equilibrium)

	WTO accession	Reform of FDI barriers only	WTO Accession with partial reform of FDI barriers	Full Removal of Export Subsidies			
				Global Free Trade		Doha 1 [a/]	Doha 2 [b/]
				No change in domestic support	Full removal of domestic support	No change in domestic support	Some reduction in domestic support
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Aggregate welfare							
Welfare (EV as % of consumption)	7.3	5.3	4.1	0.2	0.0	-0.3	-0.2
	(2.2) [c/]	(1.5)	(1.3)	(0.2)	(0.2)	(0.2)	(0.2)
Welfare (EV as % of GDP)	3.4	2.4	1.9	0.1	0.0	-0.1	-0.1
Government budget							
Tariff revenue (% of GDP)	0.9	1.4	0.8	1.4	1.3	1.3	1.3
Tariff revenue (% change)	-33.2	10.9	-35.2	5.1	3.4	3.3	3.5
Aggregate trade							
Real exchange rate (% change)	2.6	1.1	1.8	-0.1	-0.5	-0.3	-0.4
Aggregate exports (% change)	14.4	3.7	11.9	0.2	-0.1	-0.5	-0.3
Returns to mobile factors							
Unskilled Labor (% change)	3.7	2.9	1.7	0.1	0.1	0.0	0.0
Skilled Labor (% change)	5.3	2.8	3.2	0.0	-0.1	-0.2	-0.2
Capital (% change)	1.8	1.4	2.2	0.0	-0.2	-0.3	-0.3
Percent of Factors that must adjust							
Unskilled labor	1.2	0.4	1.3	0.2	0.4	0.3	0.3
Skilled labor	1.4	0.7	1.0	0.1	0.3	0.2	0.2
Capital	0.5	0.1	0.4	0.2	0.4	0.3	0.3

Source: Authors' estimates

[a/] Doha 1 assumes modest tariff reductions, without participation by Russia.

[b/] Doha 2 assumes more substantial tariff cuts, without participation by Russia.

[c/] Numbers in parentheses are the standard deviations.

Table 6: Impact of WTO Accession and the Doha Agenda on Russian industry and labor by sector

(percentage change in variable)

Sectors [a/]	WTO Accession					Doha Agenda 2 [b/]				
	output	exports	imports	skilled employment	unskilled employment	output	exports	imports	skilled employment	unskilled employment
	(1)					(2)				
ELE	2	-1	8	1	3	0	0	1	0	0
OLE	3	3	3	0	2	0	0	1	0	0
OLP	2	5	7	1	3	0	1	1	0	0
GAS	4	10	43	19	20	-1	-3	-7	-5	-5
COA	5	11	9	5	7	0	1	-2	0	0
OFU	1	31	4	0	2	0	1	1	0	0
FME	14	32	7	13	15	0	1	2	0	-1
NFM	29	42	36	28	30	-1	0	2	-1	-1
CHM	9	27	9	7	9	-1	-1	3	-1	-1
MWO	-14	-12	22	-15	-14	-2	-1	2	-2	-2
TPP	-5	3	35	-6	-5	0	1	4	0	-1
CNM	-6	-1	74	-8	-6	0	1	2	0	0
CLO	-9	1	8	-11	-10	-1	-1	0	0	-1
FOO	-13	-7	38	-15	-14	5	5	-9	5	5
OTH	-6	0	47	-8	-6	0	-1	6	0	-1
CON	0	1	0	-1	0	0	0	1	0	0
AGF	-2	-4	11	-3	-2	1	4	1	2	1
RLW	0	-4	224	0	1	0	0	0	0	0
TRK	8	7	42	7	8	0	0	0	0	0
PIP	-4	0	149	-5	-3	-1	0	0	-1	-1
MAR	2	7	-4	-2	0	0	1	0	0	0
AIR	-2	0	24	-6	-4	0	0	0	0	0
TRO	4	2	105	2	4	0	0	0	0	0
TMS	7	10	48	6	7	0	0	0	0	0
PST	3	5	2	0	1	0	0	1	0	0
TRD	6	2	9	4	6	0	0	0	0	0
CAT	6	16	0	2	4	0	-2	2	0	-1
OIN	-2	2	30	-3	-2	0	0	0	0	0
PSM	2	-2	5	1	3	0	0	1	0	0
SSM	1	1	1	-1	0	0	0	1	0	0
ECM	0	-2	2	-1	0	0	-1	1	0	0
SCS	-11	-2	149	-13	-12	0	0	0	0	0
GEO	0	0	0	-3	-1	0	0	0	0	0
FIN	8	16	54	6	7	0	0	0	0	0
ADM	0	0	0	-8	-6	0	0	0	0	0

[a/] Sector codes are defined in Table 4.

[b/] Doha 2 assumes more substantial tariff cuts, without participation by Russia.

Source: Authors' estimates

Table 7. The Mean and Standard Deviation of the Welfare Impacts of WTO Accession on Russian Households, from Poorest to Richest (welfare change as a percent of consumption)

Household types [a]		WTO accession (1)		Reform of FDI barriers only (2)		Full Removal of Export Subsidies							
						Global Free Trade				Doha 1 [b]		Doha 2 [c]	
						No change in domestic support (3)		Full removal of domestic support (4)		No change in domestic support (5)		Some reduction in domestic support (6)	
		Mean	S.D. [d]	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Decile 1 (0-10%)	Rural	7.0	(4.0)	5.3	(3.0)	0.2	(0.3)	0.1	(0.3)	-0.2	(0.2)	-0.1	(0.2)
	Urban	8.3	(2.0)	5.8	(1.3)	0.1	(0.2)	-0.1	(0.3)	-0.3	(0.2)	-0.2	(0.2)
	Combined	7.6	(3.4)	5.5	(2.4)	0.2	(0.2)	0.0	(0.3)	-0.2	(0.2)	-0.2	(0.2)
Decile 2 (11-20%)	Rural	6.7	(2.2)	5.1	(1.6)	0.2	(0.2)	0.1	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	8.2	(1.7)	5.6	(1.1)	0.1	(0.2)	-0.1	(0.2)	-0.3	(0.2)	-0.2	(0.2)
	Combined	7.6	(2.0)	5.4	(1.3)	0.1	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 3 (21-30%)	Rural	6.6	(2.4)	5.0	(1.6)	0.2	(0.2)	0.1	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	8.3	(1.8)	5.6	(1.1)	0.1	(0.2)	-0.1	(0.2)	-0.3	(0.2)	-0.3	(0.2)
	Combined	7.7	(2.1)	5.4	(1.3)	0.1	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 4 (31-40%)	Rural	6.6	(2.1)	5.0	(1.6)	0.2	(0.1)	0.1	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	8.2	(1.6)	5.6	(1.1)	0.1	(0.1)	-0.1	(0.2)	-0.3	(0.2)	-0.3	(0.2)
	Combined	7.7	(1.9)	5.4	(1.3)	0.1	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 5 (41-50%)	Rural	6.4	(2.0)	4.8	(1.4)	0.2	(0.1)	0.1	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	8.1	(1.7)	5.6	(1.2)	0.1	(0.2)	-0.1	(0.2)	-0.3	(0.2)	-0.2	(0.2)
	Combined	7.7	(2.0)	5.4	(1.3)	0.1	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 6 (51-60%)	Rural	6.2	(1.9)	4.7	(1.3)	0.2	(0.1)	0.0	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	8.0	(1.6)	5.5	(1.1)	0.1	(0.2)	-0.1	(0.2)	-0.3	(0.2)	-0.3	(0.2)
	Combined	7.5	(1.9)	5.3	(1.2)	0.1	(0.2)	-0.1	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 7 (61-70%)	Rural	6.2	(2.2)	4.8	(1.6)	0.2	(0.1)	0.1	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	7.8	(1.7)	5.5	(1.3)	0.2	(0.2)	-0.1	(0.2)	-0.3	(0.2)	-0.2	(0.2)
	Combined	7.5	(2.0)	5.3	(1.4)	0.2	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 8 (71-80%)	Rural	6.0	(1.9)	4.6	(1.3)	0.2	(0.1)	0.1	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	7.8	(1.7)	5.4	(1.2)	0.2	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.1)
	Combined	7.5	(1.9)	5.3	(1.2)	0.2	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 9 (81-90%)	Rural	6.1	(2.4)	4.8	(2.1)	0.2	(0.1)	0.1	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Urban	7.3	(1.6)	5.3	(1.3)	0.2	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
	Combined	7.2	(1.8)	5.2	(1.5)	0.2	(0.2)	0.0	(0.2)	-0.3	(0.2)	-0.2	(0.2)
Decile 10 (91-100%)	Rural	5.6	(2.3)	4.4	(2.0)	0.3	(0.2)	0.1	(0.2)	-0.1	(0.2)	-0.1	(0.2)
	Urban	6.8	(1.9)	5.2	(1.6)	0.3	(0.2)	0.1	(0.2)	-0.2	(0.2)	-0.2	(0.2)
	Combined	6.8	(2.0)	5.1	(1.7)	0.3	(0.2)	0.1	(0.2)	-0.2	(0.2)	-0.2	(0.2)

[a] The model is executed with 55 thousand households. Decile 1 is the poorest ten percent of all households on a per capita consumption basis. Results for decile 1 (combined, rural and urban) are a weighted average of the equivalent variation as a percentage of consumption of the households (combined, rural and urban) in the decile. Other deciles are calculated analogously.

[b] Doha 1 assumes modest tariff reductions, without participation by Russia. 30

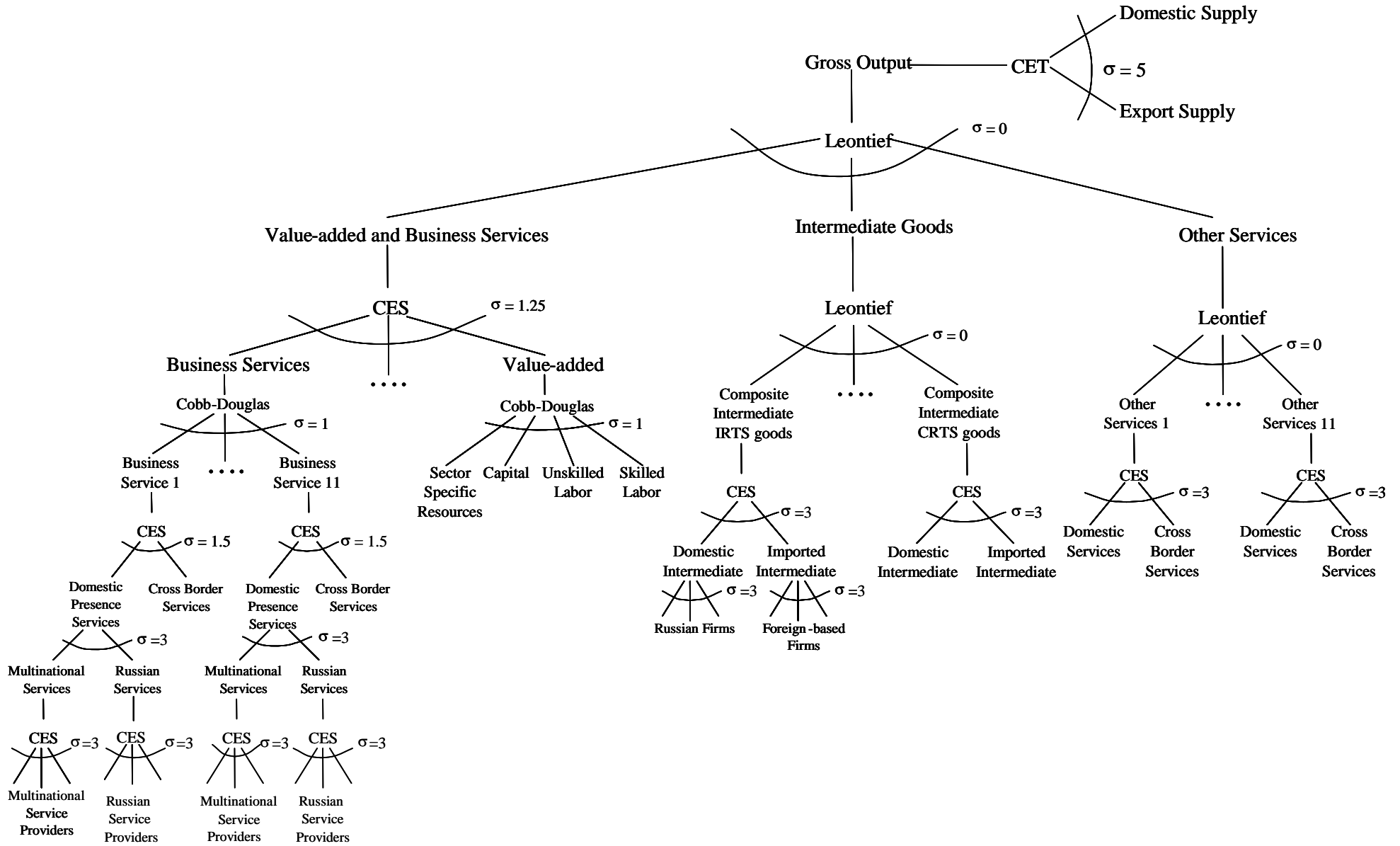**Figure 1: Production and Allocation of Output**

Figure 2: Distributions of estimated welfare gains from Russian WTO accession for the entire sample, the poorest decile, and the richest decile.
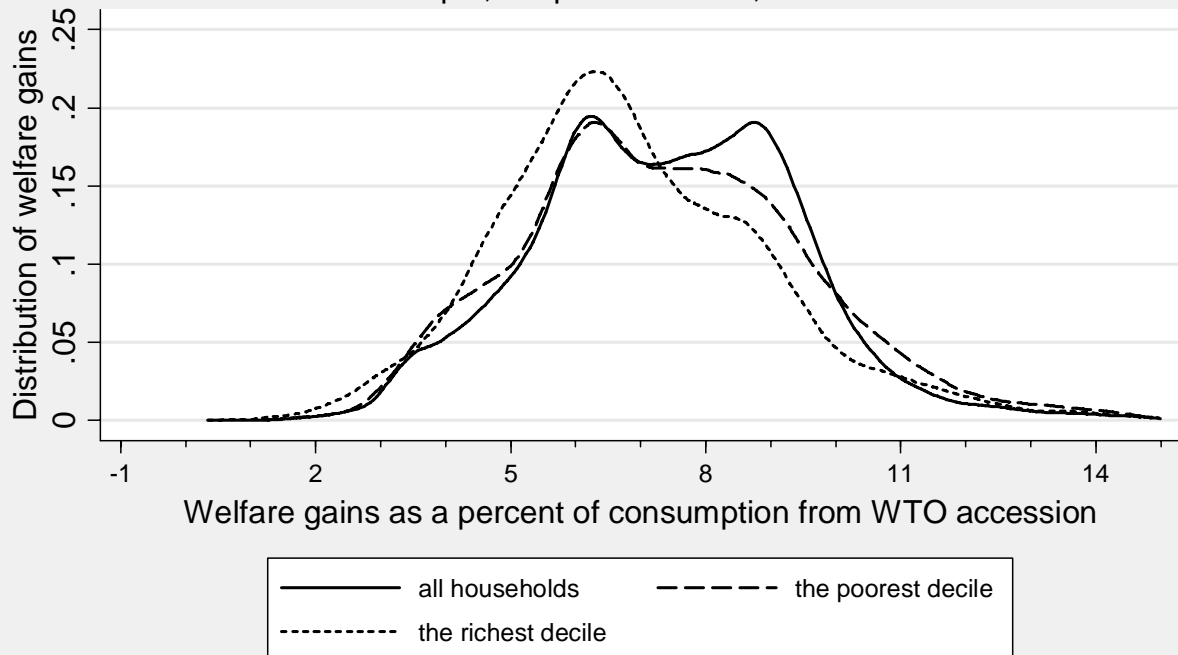
Observations in a range from 0 % to 15 % are shown.

Deciles are constructed to be representative of ten percent of Russian population based on the weights of the Household Budget Survey

Figure 3. Distributions of estimated welfare gains for Russian households from global free trade [a] for the entire sample, the poorest decile, and the richest decile.

Graph is truncated in a range from - 1.6 to 1
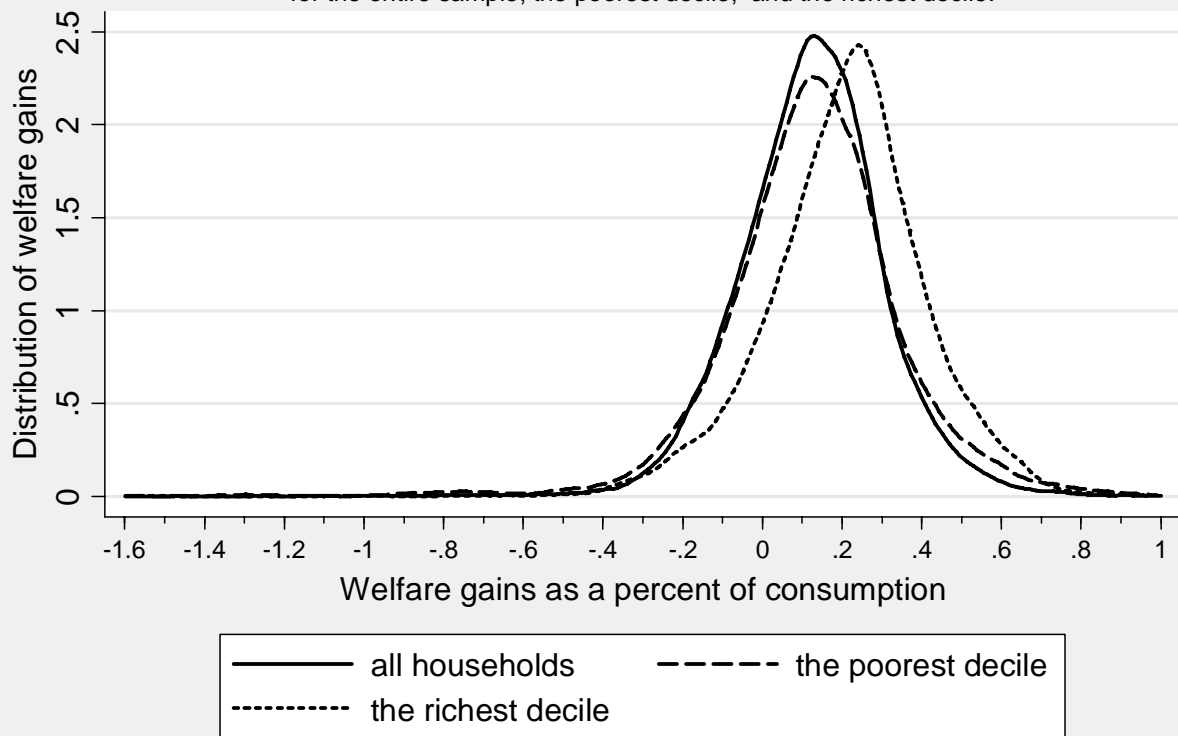
[a] Global free trade assumes full removal of export subsidies, no change in domestic support, and full removal of tariffs outside of Russia.

Figure 4. Distributions of estimated welfare gains for Russian households from Doha 2 [a]
for the entire sample, the poorest decile, and the richest decile.

legend:
all households
the poorest decile
the richest decile
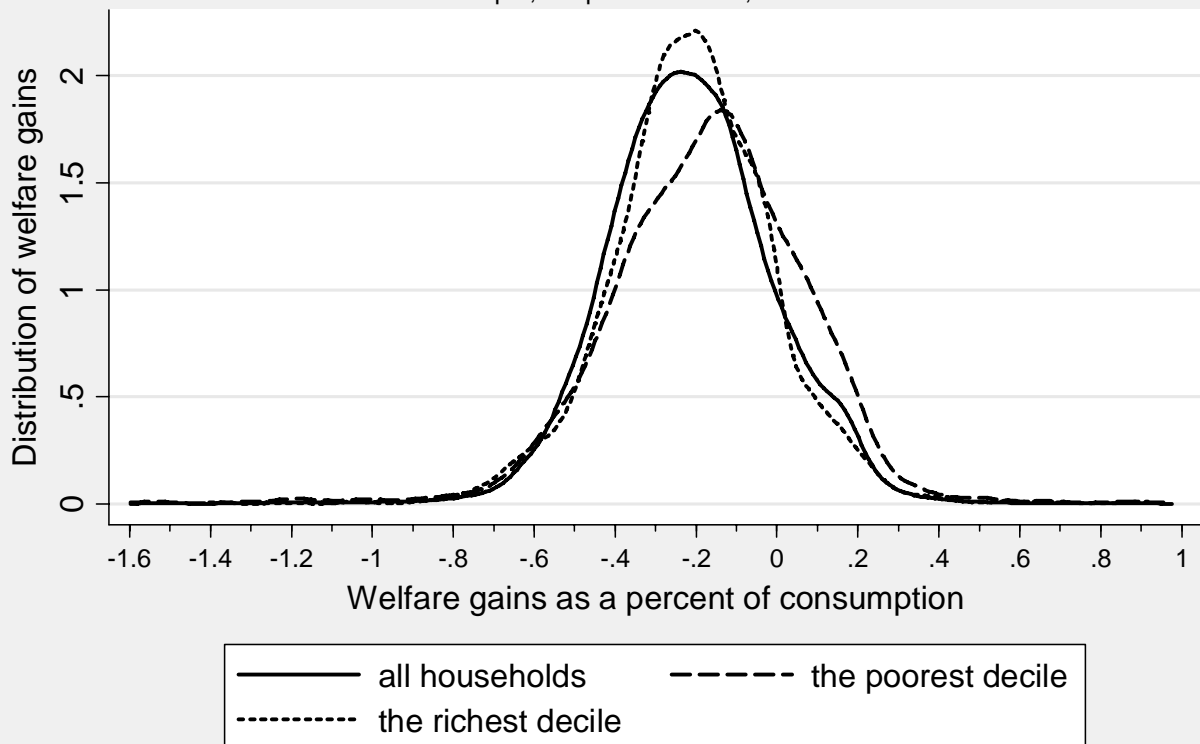
[a] Doha 2 assumes full removal of export subsidies, some reduction in domestic support, and significant tariff cuts
outside of Russia.

Figure 5. Distributions of the estimated welfare gains: WTO accession, Doha 2,
and global free trade model results compared. 55098 households sampled.

legend:
Global free trade
WTO accession
Doha 2