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Analysis of Economic Impacts of Ukraine's Accession to the WTO

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Overall Impact Assessment

Kyiv, Munich, Copenhagen, December 2005

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List of Abbreviations

APEC	Asia-Pacific Economic Cooperation
CGE	Computable General Equilibrium
CIS	Commonwealth of Independent States
EU	European Union
FDI	Foreign Direct Investments
GDP	Gross Domestic Product
HS	Harmonized System (of trade nomenclature)
ISIC	International Standard Industrial Classification
LES	Linear Expenditure System
m	million
MFN	Most Favoured Nation
NAFTA	North America Free Trade Agreement
NMC	New Member Countries of the EU (see Annex)
R&D	Research and Development
SAM	Social Accounting Matrix
TE	Tariff Equivalent
TRI	Trade Restrictiveness Index
UN	United Nations
VAT	Value Added Tax
WTO	World Trade Organisation

Executive summary

This report describes the overall economic impact of Ukraine's accession to the WTO. The three main components through which WTO membership is expected to impact Ukraine's economy are:

1. Reduction of tariffs on imports from all WTO member countries;
2. Improved access for Ukrainian exports on markets of other WTO members; and
3. Reduction of barriers for Foreign Direct Investment (FDI) in service sectors.

Our quantitative analysis allows simulating the combined impact of all three components under full WTO membership as well as the separate impact of each component. The results of our assessment are as follows:

- **Full WTO membership generates growth of 5.2% in real household income and 2.4% in real GDP**. Those results are driven by a reduction of consumer price levels due to cheaper imports as well as an increase in real wage rates which is primarily caused by higher industrial production and exports.
- **Reducing barriers to FDI in services is the main driver for aggregate welfare gains.** An important source of the welfare gains is the availability of a more diverse set of services that allow users to purchase quality-adjusted units of services at a lower cost, leading to a higher effective productivity of supply.
- **Poor urban and rural households benefit more from tariff liberalisation than from reduced barriers for FDI in services.** Tariff reform has a relatively stronger impact on demand and real wages for unskilled labour than reduced FDI barriers, due to the positive effect of tariff reductions on manufacturing sectors. Since urban and rural poor households derive all their factor incomes from the supply of unskilled labour, this will benefit them more. Poor households also gain relatively more from a reduction in real food prices as food tariffs are reduced significantly.
- **Non-poor urban and rural households benefit more from FDI reforms than tariff liberalization.** FDI reform boosts real returns to both labour and capital. Non-poor urban and rural households derive their factor incomes from mobile and sector-specific capital as well as labour. In addition, non-poor households gain relatively more than poor households from lower prices for e.g. telecommunications and financial services.
- **The financing of reforms can have important poverty impacts.** The results include two sets of welfare results depending on whether only non-poor households, or all households, get reduced income transfers to cover government revenue shortfalls. Whereas the reduction of transfers has a relatively minor impact on the welfare of non-poor households, they are significantly more noticeable for poor households. Thus, the poverty-reducing properties of WTO accession can be influenced by the design of accompanying domestic policies.

- **Manufacturing sectors show the strongest expansion.** Export intensive sectors like metallurgy, non-energy materials and chemical products expand significantly due to the depreciation of the real exchange rate (metallurgy and chemical products also receive more favourable world market prices as a result of market access reforms). The expansion of the metallurgy sector directly contributes to the expansion of coke production. Sectoral expansion is, furthermore, closely related to employment effects.
- **Significant contractions occur in the food processing and fishery sectors.** This is intuitive since these are the sectors where tariffs are reduced the most, and the magnitude of the contractions is in line with the tariff reductions. Output also falls noticeably in the agricultural sector, where tariff reductions by far outweigh market access reforms.
- **A rural development program is called for.** Projected contractions in food processing and agricultural sectors together with relatively low expected growth of rural household incomes focus the attention on stimulating economic development in rural areas. The projected contraction of agricultural production is not to be confused with predicting no competitive advantage for Ukraine in this sector. Rather, the issue is to increase productivity levels and to overcome the predominantly subsistence oriented nature of the production process. This in turn requires a regional development program that aims to provide employment opportunities for rural areas also outside the agricultural sector.

1. Introduction

At present Ukraine is in the final stage of negotiating the membership in the WTO. Although the Government's ambitious plan to complete all talks before the Ministerial Conference in Hong-Kong held in December 2005 could not to be realized, Ukraine struggles to complete talks as soon as possible. The purpose of the "Analysis of Economic Impacts of Ukraine's Accession to the WTO" project is to provide the sound economic analysis of impacts of Ukraine's WTO accession on the economy as a whole and on specific sectors.

To assess the impact of Ukraine's WTO accession we used a General Equilibrium (GGE) Model. These models are nowadays widely used to access the impact of changes in international trade policy, such as the Uruguay and Doha rounds of WTO, the Common European Market, NAFTA, MERCOSUR, the Asia-Pacific Economic Cooperation (APEC), or the accession of single countries to the WTO. To assess the full economic impacts of Ukraine's WTO accession our modelling framework is capable to:

1. Assess the impact of commitments on tariffs in industry and agriculture;
2. Assess the impact of improved market access in export markets of WTO members;
3. Include imperfectly competitive and competitive sectors;
4. Assess the impact of commitments on service liberalization on gains from trade and foreign direct investment;
5. Analyze economic impacts of WTO accession in static and dynamics; and
6. Report changes in economic variables such as real exchange rate, tariff revenue, wage rate of skilled and unskilled labour, rate of return to capital, share of labour that will have to change jobs as a result of WTO accession, as well as output, employment, exports and imports by sector.

This Overall Impact Assessment is organized as follows. The main document will present a complete discussion of the findings of our analysis on both, economy-wide as well as sector-specific levels. The annexes will present detailed sector by sector discussion of results, as well as descriptions of the data and methodology we used for our analysis.

2 Economic Impact Analysis

2.1 Model structure

We simulate the impact of Ukraine's accession to the WTO using a Computable General Equilibrium (CGE) model. The model is constructed on the basis of Ukraine's Input-Output table and National Accounts. It can therefore be understood as replication of the whole Ukrainian economy including all major technical and institutional characteristics.

The production side of the economy is summarized in 37 sectors. Production in each sector requires the use of intermediate inputs of goods and services as well as primary factors capital and labour, the latter distinguished by skill levels. Aggregate output can either be exported to several different regions (divided into Russia, other CIS countries, EU countries, other European countries, American countries, African countries and Asian countries) or sold on domestic markets. Together with imports from all trade partners it forms the total aggregate of goods and services available for domestic consumption.

On the consumption side, the model distinguishes between public, investment and intermediate consumption as well as final household consumption for four different types of households, non-poor rural and urban households and poor rural and urban households.[1]

To sufficiently reflect the technical characteristics of Ukraine's economy production is divided into perfectly and imperfectly competitive sectors. The first group contains of sectors such as agriculture and food which are all price takers on their respective market. Imperfectly competitive sectors are assumed to have some degree of market power and operate under increasing returns to scale. This group mainly contains of manufacturing sectors. Finally, service providers are distinguished into three types:

- Domestic service providers that operate in Ukraine and serve domestic and foreign markets;
- Foreign providers that operate abroad and import into the Ukrainian economy; and
- Domestic international providers that are (partially) foreign owned but operate in Ukraine. They are characterized by using an additional input such as a business platform of franchise format which they import from abroad.

Details of the model are provided in Part II of this Report.

2.2 Scenarios

Using our model framework we simulate different aspects of Ukraine's accession to the WTO in the following five scenarios:

[1] See Annex A2 of this Report.

Scenario 1:

Full WTO accession including reform of FDI barriers to service sectors, reform of import tariffs and improved access to foreign markets for Ukrainian exports as described in the following scenarios.

Scenario 2:

Reform of FDI barriers to service sectors simulates the reduction of barriers that discriminate against foreign service providers of telecommunication and financial services as measured in the Service Sector Studies carried out in the frame of the overall assignment (see Annex A1 for details).

Scenario 3:

Tariff reform simulates the reduction of tariffs on imports according to the commitments made by the Ukrainian WTO negotiators and estimated within this assignment (see Annex A1 for details).

Scenario 4:

Improved market access simulates the effect of reduced entry barriers for Ukrainian exports on foreign markets. In particular, we assume that as a result of WTO accession, prices received by Ukrainian exporters to the EU and North America will increase by 10% for agricultural goods and 5% for steel. Furthermore, prices received for exports of chemical goods to all trading regions will increase by 1% (these assumptions are based on informal expert assessments and have been described and used already in our earlier work on this topic).[2]

Scenario 5:

WTO accession in steady state model captures the dynamic impacts of WTO accession, in particular with respect to the impact of trade policy shocks on the return to capital and the corresponding investment decisions.

Results for all five scenarios will be discussed in the next section.

2.3 Results

Before we start discussing the results of our modelling exercise in detail, several general points must be mentioned:

- The time horizon of our analysis is not explicitly fixed. Rather, our model specification with e.g. flexible factor market adjustments implies that scenario results describe the full adjustment of the economy after an external shock such as tariff reduction has occurred. Typically, this can be understood as a medium term perspective over 7-10 years.
- All results give changes of the respective variable relative to the benchmark year of our assessment (2002). Results do not give indications concerning the adjustment path from benchmark to the new equilibrium.

[2] See IER (2004). Ukraine's Trade Regime: Quantitative and Institutional Aspects. Ukraine trade regime overview. Research Report submitted to the World Bank (see form 3B.), Kiev (Ukraine); or Pavel et al. (2004). Economic impact of Ukraine's WTO accession. First results from a General Equilibrium Model. IER Working paper No. 30. Kiev (Ukraine).

- To also assess long-term effects, our last scenario (Accession in steady state model) is based on WTO accession under a slightly different model setting in which the capital stock can adjust to its long-term equilibrium level. Hence, this scenario also estimates the dynamic benefits of WTO accession on investments.
- Given the purpose of our study, the results presented in this report isolate the economic impacts of Ukraine's WTO accession from all other events that in reality affect economic development at the same time. This includes changes in global energy and commodity prices (to the extent that such changes are not directly caused by Ukraine's WTO accession), changes in relative exchange rates of other currencies (e.g. US dollar and euro), changes in factor productivity, and all other possible shocks that might occur during the period under consideration.

2.3.1 Economy-wide results

2.3.1.1 Macro impacts

Economy-wide results of our model simulations are given in Table 2.1. In this section we will first discuss the main results for each of the five scenarios of our quantitative assessment. Then, we will discuss social impacts of different policies and the general effects of Ukraine's WTO accession on energy prices.

WTO accession

As indicated in column 2 of Table 2.1, we estimate the overall welfare gains (measured as *Equivalent Variation*) from full WTO accession including reform of FDI barriers, reduction of tariffs and improved market access at 5.2% of Ukrainian consumption and an increase in GDP at 2.4%. As can be expected, WTO accession leads to increased imports (+10.4%) and a corresponding depreciation of the Ukrainian currency, so that the shadow price of foreign exchange increases (1.5%) and exports go up by almost 8%. In turn, higher GDP and in particular aggregate exports lead to higher factor demand so that real wages increase. The strongest effects we observe for labour wages that increase by 3.6% for skilled and unskilled labour. Obviously, this suggests that sectors with the high share of labour in the structure of value added (hereinafter, for the purpose of this report named as labour-intensive) expand the most under WTO accession. Finally, WTO accession causes tariff revenues to shrink by more than 50%. Since tariff fiscal revenue accounts for about 5% in the overall public budgets, this underlines that financing the overall reform is an important issue with a potentially big poverty impact. This will be discussed in more detail in Section 2.3.1.2 below.

Table 2.1

Economy-wide effects of Ukraine's accession to the WTO

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
-1-	*-2-*	*-3-*	*-4-*	*-5-*	*-6-*
Total change in welfare, %	5.2	2.2	1.8	1.3	10.2
Changes in real GDP, %	2.4	1.0	1.1	0.3	4.8
Change in consumer price index, %	-1.5	-0.3	-1.8	0.8	-2.0
Changes in real factor wage, %					
- skilled labour	3.6	1.0	2.8	-0.3	5.7
- unskilled labour	3.6	1.0	2.6	-0.1	5.7
- capital	2.2	1.0	0.2	1.1	1.1
Factor adjustment costs, %					
- skilled labour	1.7	0.4	1.0	1.1	1.8
- unskilled labour	2.9	0.4	2.0	2.0	2.7
- capital	2.0	0.3	3.9	0.4	0.3
Change in aggregate exports, %	8.0	0.4	6.0	1.4	9.2
Change in aggregate imports, %	10.4	0.5	7.1	2.6	11.8
Change in the shadow price of foreign exchange, %	1.5	0.3	1.9	-0.8	2.0
Tariff revenue as percent of GDP	0.5	0.9	0.4	1.0	0.5
Change in tariff revenue, %	-51.1	0.3	-52.5	3.5	-51.1
Capital stock, % change					3.7

Source: authors' simulations

In summary, we find **WTO accession** to have **significant positive impacts on Ukraine's economy**.

However, the extent to which our results are caused by a particular effect of Ukraine's WTO accession is so far not fully understandable. Accordingly, the next scenarios look at the impacts of different elements of WTO accession, namely reforms of FDI barriers in the service sector, tariff reduction and improved market access.

Reform of FDI barriers

The economy-wide impact of the removal of barriers to FDI in telecommunications and financial services is described in column 3 (Table 2.1). The welfare impact of reducing barriers for FDI in key services (2.2%) is higher than welfare impacts of tariff reform and improved market access. Two effects can explain this welfare gains:

- The availability of a more diverse set of services allows users to purchase quality-adjusted units of services at a lower cost, leading to a higher effective productivity of supply.

- Increased FDI in key services increases factor demand and thus, wages, for labour and capital alike. In turn, this leads to higher household income.

Finally, it is worth mentioning that reducing barriers to FDI in service sectors has almost no impact on tariff revenues. This reform does not cause any shortfalls in public budgets and is therefore easy to finance. Moreover, adjustment costs to households are also insignificant as less than 0.5% of skilled and unskilled workers have to change jobs.

Tariff reform

If only tariffs are reduced relative prices for imports fall and reduce consumer prices by almost 2%. At the same time, the domestic currency depreciates as the shadow price of foreign exchange increases by 1.9% and exports go up by 6%. As already observed for the overall WTO accession (see above), labour intensive – and in particular skilled labour intensive – sectors expand their production. In turn, this boost labour demand and causes real wages to rise by 2.8% for skilled and 2.6% for unskilled labour, while the rental return to capital remains almost unchanged. Consequently, tariff reform increases welfare significantly (1.8%) and by almost as much as removing barriers to FDI in services.

As for adjustment costs of tariff reduction, the impact on households is rather modest since only 2% of unskilled and 1% of skilled labour has to change jobs. On the other hand, public budgets face the lion share of adjustment costs as tariff revenue goes down by more than 52%.

Improved market access

Improving market access for exporters of chemical products as well as agricultural and steel products in EU and North America pushes up exports by 1.4% (see Table 2.1, column 5). Increased exports in turn cause the exchange rate to revalue so that the shadow price of foreign currencies declines by almost 1%. This in turn reduces prices of imports in domestic currency and causes a welfare gain of more than 1%.

WTO accession in steady state model

In this scenario we present the long-term perspective of Ukraine's WTO accession by assuming that the capital stock adjusts to new steady state equilibrium. That is, if the trade policy shock happens to induce and 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 reaches its new equilibrium level.

As our results (see Table 2.1, column 6) demonstrate, allowing the capital stock to adjust to its long-run equilibrium leads to a significant change in capital stock by almost 4%. This increase in capital stock leads to an additional increases of the real wages of labour by more than 2 percentage points as compared to the static WTO accession (column 2). At the same time, the rental return to capital changes by 1.1% in the long run as compared to the static effect of 2.2%. Accordingly, the larger capital stock and higher real labour wages generate a total welfare effect of 10.2% of Ukrainian consumption, about 5 percentage points more than in the static WTO accession scenario.

2.3.1.2 Social aspects of WTO accession

The social implications for Ukraine's WTO accession are highlighted in Table 2.2, which shows welfare effects in percentage of consumption for four different types of households, differentiated by rural and urban as well as poor and non-poor.

There are several important implications:

- First, comparing the effects of the two main driving forces of welfare changes, reform of FDI barriers for service sectors and tariff reduction, it appears that non-poor urban and rural households benefit more from FDI reforms than from tariff liberalization, while the opposite is true for poor households. Both observations can be explained with the consumption pattern of different households. Urban households consume most of the telecommunication and financial services and hence, benefit over-proportionally from reduced service prices (column 3). On the contrary, poor households spend most of their disposable income on food consumption and thus, benefit more from reduced import tariffs on food (column 4). Finally, as poor urban households consume more processed food than poor rural ones, poor urban households can gain the most from WTO accession, provided that the costs of reforms are reasonably allocated.
- The second aspect is that – as stated above – reduction of import tariffs to the levels committed in the WTO negotiations will reduce tariff fiscal revenues by approximately 50%. Hence, public households either loose a substantial part of their revenue – and thus cut public expenditures accordingly – or policy makers have to impose a mechanism that makes up for revenue losses through e.g. taxation. As the utility derived from public goods provision is not explicitly modelled in our analysis, we assume that an additional lump-sum tax is imposed to keep public budgets on their initial levels for all scenarios. Table 2.2 shows two different possibilities for such lump-sum taxes. In the upper half we assume that all households are subject to taxation, while in the lower half poor households are exempted. As our calculations suggest, the benefits for poor households from tax exemption are significantly bigger than the additional costs for non-poor households for both, the static WTO accession scenario (column 2) and the WTO accession in the steady state model. In particular, while exempting the poor increases static welfare gains of poor urban households from 4.8% to 7% of consumption while welfare effects of other urban households would remain almost unchanged (5.7% versus 5.5%). For rural poor households, a tax exemption increases welfare gains from 2.4% to 3.6% while welfare of other rural households goes down only slightly from 5.1% to 4.5%. In other words, the additional welfare gains for poor households from exempting them from financing obligations can more than compensate the welfare reductions for other households.[3]
- Finally, comparing growth rates of poor and non-poor households it appears that with lump-sum taxes levied on all households, incomes between poor and non-poor rural households will diverge and urban household incomes will

[3] Technically, this is a consequence of modelling consumer preferences in an LES and is clearly more realistic as the additional income for poor households will be spend for food and generate more welfare than the same value could generates for rich households which would spend additional income on e.g. telecommunication services.

only slightly converge. In other words, without specific policies targeting the poor, especially poor rural households are likely to be left behind. On the other hand, once the financing burden is levied only on non-poor households, we do observe convergence in urban areas as poor households' income grows at higher rates than that of non-poor ones. Nevertheless, a similar tendency cannot be observed in rural areas where the income of non-poor households continues to grow at higher rates. Hence, specific integrated concepts will be called for to stimulate rural development.

Table 2.2

Welfare changes by household type

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
-1-	*-2-*	*-3-*	*-4-*	*-5-*	*-6-*
Change in prices (net of VAT), %					
Food-processing	-3.5	0.2	-3.6	0.0	-3.6
Telecommunication	-2.3	-3.7	0.9	0.5	-3.3
Financial intermediation	-5.7	-7.4	1.1	0.7	-6.1
Lump-sum tax on all types of households:					
Urban households	5.7	2.6	1.5	1.6	11.3
Urban poor households	4.8	1.3	4.2	-0.8	8.1
Rural households	5.1	2.0	1.6	1.5	10.0
Rural poor households	2.4	0.5	2.2	-0.4	4.3
Poor households are exempted from lump-sum tax:					
Urban households	5.5	2.6	1.4	1.6	11.2
Urban poor households	7.0	1.1	6.4	-0.8	9.7
Rural households	4.5	2.0	1.0	1.5	9.6
Rural poor households	3.6	0.5	3.4	-0.3	5.2

Source: Ukraine model

For the case of Ukraine's WTO accession the argument might be raised that policy makers are likely to refrain from introducing additional taxes and rather agree to forge public revenue. Nevertheless, as long as we assume that public funds are not wasted (and were not wasted in the benchmark year), the policy implication could be reversed in a sense that necessary cuts on public expenditure should be such that they do not reduce benefits and transfers to households below the poverty line.

2.3.1.3 Energy prices

The impact of WTO accession on energy prices can be described as follows (Table 2.3):

- Domestic prices for coal, petroleum, electricity and gas increase by about 2%, most of which caused by tariff reform.
- Higher domestic prices for energy are caused by increased intermediate demand and higher costs due to higher factor wage rates.

Table 2.3

Impact of WTO accession on energy prices

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
-1-	*-2-*	*-3-*	*-4-*	*-5-*	*-6-*
Change in prices (net of VAT), %					
Coal and peat	2.7	0.3	2.0	0.3	3.5
Petroleum refinement	1.8	0.3	1.7	-0.3	2.2
Electric energy and heat supply	2.2	0.4	1.6	0.2	2.6
Gas supply	2.0	0.1	1.8	-0.1	2.7

Source: Ukraine model

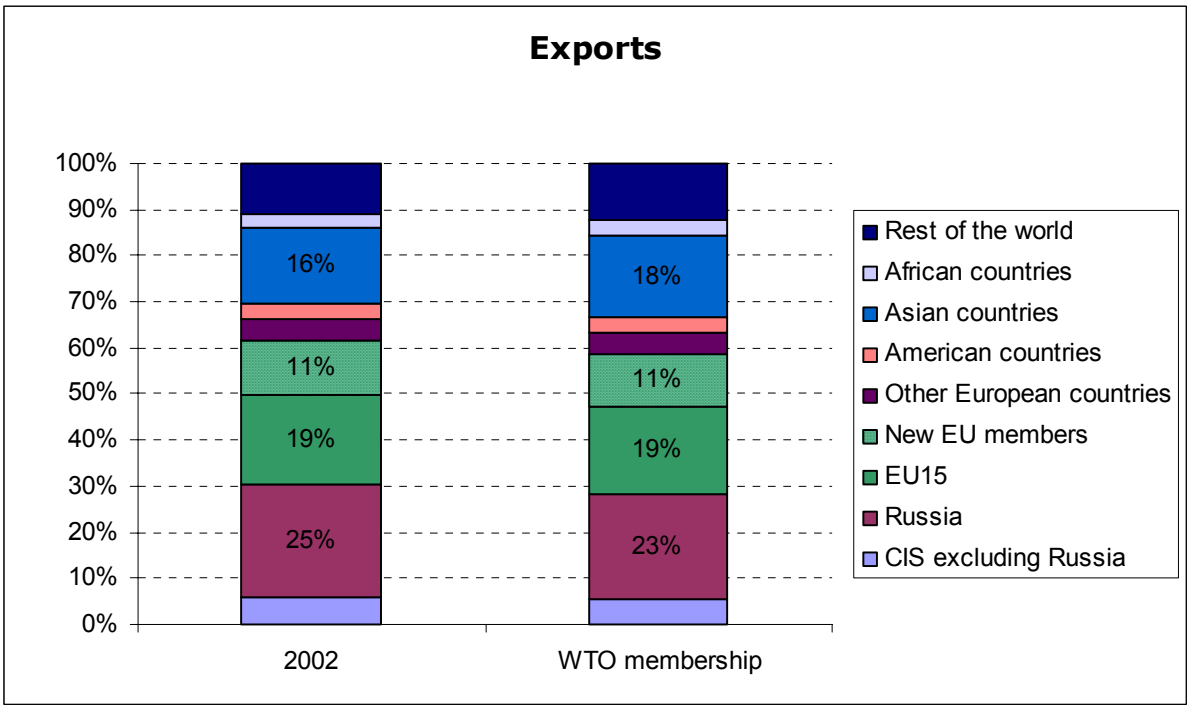
2.3.1.4 Regional distribution of trade flows

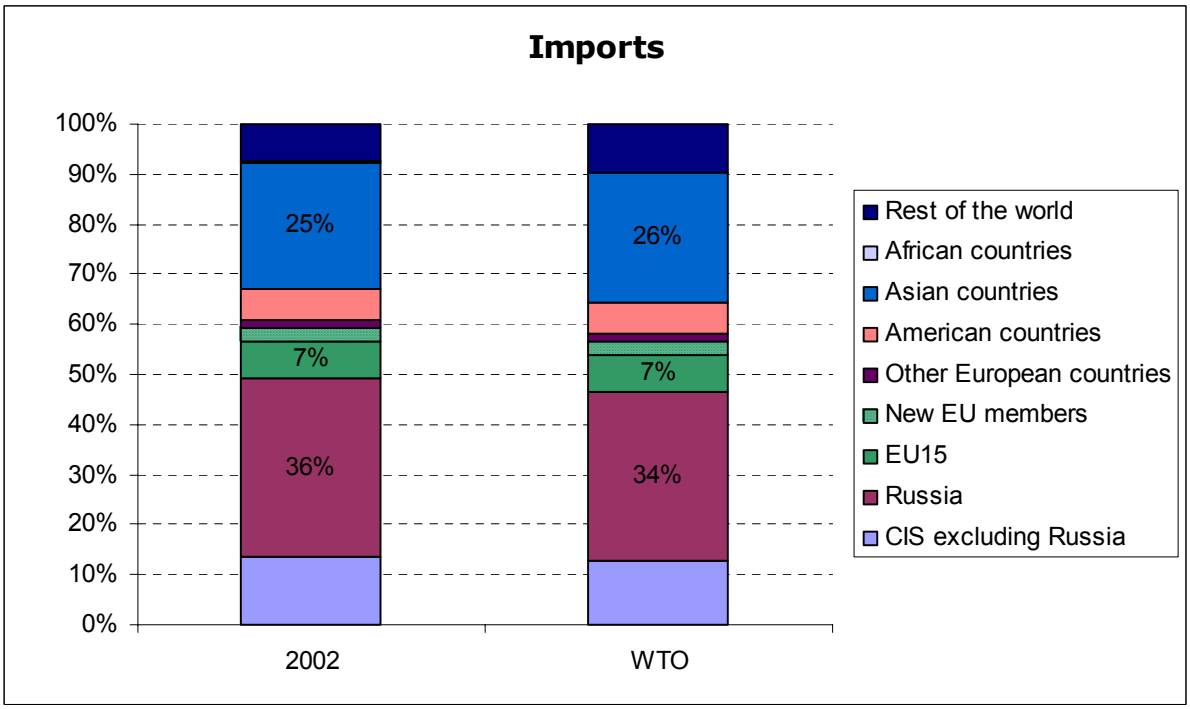
As shown in Table 2.1 above, aggregate exports and imports of goods and services increase by 8% and 10.4% after Ukraine's WTO accession. These changes are mainly caused by the reduction of trade barriers. Accordingly, the observed changes in regional trade patterns do not reflect changes in trade fundamentals between Ukraine and the specific regions, but rather the reduction of policy-induced barriers for bilateral trade flows. This can be seen in Figure 1 which shows the shares of different regions in aggregate exports and imports of goods and services. In total, there will be no major structural shift. Nevertheless, WTO accession will reduce the shares of Russia, where exports will decrease by about 2 percentage points to 23% of total exports and imports will decline from initially 36% to 34%. In both cases, the export and import shares to and from old and new EU members remain constant while they will expand for Asian countries and the 'rest of the world'[4] group of countries that initially faced full tariff protection. As explained above, the main conclusion that can be drawn from this chart is that prior to the WTO accession, trade relations with Asian countries and the 'rest of the world' countries faced more significant barriers than trade with Russia and the EU.

[4] See Annex A1 for exact definition

Figure 2.1

Regional shares in aggregate exports and imports





Source: Ukraine model

Table 2.4

Percentage change in exports by regional groups

	Trade regime before WTO accession	Trade regime after WTO accession	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
Russia	free trade	free trade	0.1	1.2	4.8	-5.4	1.3
CIS	free trade	free trade	3.1	0.8	4.8	-2.4	4.7
EU-15	MFN	MFN	6.7	0.8	4.1	1.7	8.6
NMC-5	MFN	MFN	6.3	0.7	5.0	0.3	6.9
Baltic countries (NMC-3)	free trade	free trade	2.7	1.3	4.3	-2.5	4.4
NMC-2	full tariff	MFN	1.3	1.4	2.4	-2.1	3.3
Other Europe	MFN	MFN	9.2	-0.5	5.9	3.2	9.7
Asia	MFN	MFN	16.2	0.0	9.7	5.9	16.4
America	MFN	MFN	13.1	-0.1	7.8	4.8	14.4
Africa	MFN	MFN	19.5	-0.6	6.6	12.7	22.7
Rest of World	full tariff	MFN	21.1	-1.0	9.3	11.7	21.9

Source: Ukraine model

Note: NMC denotes new member countries of the EU

Table 2.5

Percentage change in imports by regional groups

	Trade regime before WTO accession	Trade regime after WTO accession	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
Russia	free trade	free trade	4.4	0.5	1.2	2.6	5.7
CIS	free trade	free trade	4.8	0.4	1.9	2.2	6.2
EU-15	MFN	MFN	12.3	0.5	9.1	2.6	14.0
NMC-5	MFN	MFN	4.2	1.6	0.2	2.5	5.7
Baltic countries (NMC-3)	free trade	free trade	1.0	0.9	-2.2	2.6	2.5
NMC-2	full tariff	MFN	11.1	2.4	6.8	1.9	13.3
Other Europe	MFN	MFN	8.5	0.7	5.7	2.1	10.2
Asia	MFN	MFN	12.1	0.6	9.0	2.3	13.8
America	MFN	MFN	15.4	0.3	11.6	3.0	16.8
Africa	MFN	MFN	32.2	1.2	24.9	5.0	32.6
Rest of World	full tariff		42.7	0.6	37.1	3.6	43.6

Source: Ukraine model

Note: NMC denotes new member countries of the EU

2.3.2 Sector-specific results

Sector-specific impact of Ukraine's WTO Accession depends on the sectoral production structure, as well as on the initial level of protection. Naturally, different policy changes have more or less significant impacts on different sectors. For instance, a general tariff reduction will benefit sectors that initially are relatively unprotected or have a large share of intermediate demand (and thus, can benefit from lower input prices). In addition, also sectors with a large export share are likely to benefit since tariff-reduction-induced increasing demand for imports will lead to devaluation pressure. Improved market access is favourable for export-oriented sectors that faced significant trade barriers abroad.

WTO accession

Ukraine's membership in the WTO is expected to be most beneficial for metallurgy (+23.1%) and chemical industry (+20.1%) in industry, and for hotels and restaurants (+14.5%) in services. For metallurgy, the largest impact will come from the improved market access; while for hotels and restaurants the expansion is associated with tariff reform. Other industrial sectors that will considerably gain in aggregate output growth are coke products (+17.4%) and production of non-energy materials (+14.6%) that provide important inputs for metallurgy. Except for hotels and restaurants, services demonstrate more moderate growth in aggregate output. Here, largest increase in aggregate output is registered in utility services – gas supply and electricity and heat supply (+6.7% and +5.1% respectively) – and telecommunications (+4.0%). Output in services will grow due to reform in the FDI barriers.

Output in agro-food sectors that have the highest initial level of protections is expected to contract unless a significant upgrading in technology will be made. Sectors that expected to face most significant contraction in aggregate output are food industry (-22.8%) and fishery (-18.5%). These results are intuitive since these are the sectors where tariffs are reduced the most (and the magnitude of the contractions is in line with the tariff reductions). Also, we expect 2.4% drop in aggregate output in agriculture, as the positive impact of improved market access cannot overweight the increasing competitive pressure on production after border protection in agriculture is reduced.

Among other sectors with notable reductions of output are machinery, wood and publishing, and textile and leather. The reduction of output in these sectors is related to improved market access especially for chemical products and steel, which will cause a redistribution of factors of production within economy in favour for these and related to them sectors. Also, strong export growth of agriculture, chemical industry and metallurgy caused by the improved market access generates revaluation pressure on the hryvnia, undermining the development of other export-oriented sectors, in particular machinery and textile industry that export more than a half of their output.

Changes of domestic supply only partially replicate changes of aggregate output. Here, coke production and production of non-energy materials – sectors supplying inputs for metallurgy – and metallurgy itself will lead the expansion in industry. Hotel and restaurants will be the first among services. The largest contraction is expected in food industry and fishery. The scope of gains and losses also differs from aggregate output. In particular, the growth rate of

domestic output in coke production (+18.4%) and production of non-energy materials (+16.2%) is higher than the increase in aggregate output, confirming that a significant part of these sectors expansion comes from domestic demand. At the same time, a 24.7% drop of domestic supply in food industry is slightly higher than the decline in aggregate output, thus indicating much tighter competition on domestic food market after reduction of tariff barriers. Increasing competition from imports explains also more significant drop in domestic supply compared to aggregate output in agriculture, and in wood and publishing.

Domestic-market orientation of the most of services (except for hotels and restaurants) explains the relative coherence in changes of domestic and aggregate outputs for these sectors.

The largest increases in exports are registered in agriculture (+31.9%), metallurgy (+26.7%) and chemical industry (+25.9%). Growth rates in these sectors are much higher than average increase in exports in the economy due to the WTO accession. This is explained by significantly improved market access. In services, the highest export increase are registered in hotels and restaurants business (+19.6%). The service sector with the second-highest export growth rate is telecommunications (+2.9%). Such outrageous (compared to other services) export performance of hotels and restaurants is explained by both high initial share of exports (59%) and by lower costs of intermediate inputs due to lower food prices.

At the same time, fishery, machine building and food industry experience a significant decline in exports, mainly due to tariff reform and improved market access (the latter is important for machinery). In imports, the situation is just the opposite. Imports in food industry increase dramatically (+174.2%), but from a very low level. Agricultural and fishery products imports increase in line with the simulated tariff reductions. Also, imports of intermediate inputs will increase significantly, like for instance, the growth of metallurgy stimulated imports of coke products (+23.2%) and non-energy materials (+22.2%). In services, the reduction of barriers to FDI will lead to higher imports of telecommunication (+12.8%) and financial intermediation services (+8.8%).

Growth of aggregate output is closely related to employment effects. In metallurgy among industrial sectors and in hotels and restaurants among services the increase in both skilled and unskilled labour was are the most significant. In metallurgy, employment grows by around +22%, while in hotels and restaurants business employment rise are nearly +13%. At the same time, the largest contraction of employments is expected in food industry (-24%) and fishery (-19%).

The next scenarios look at the impacts of different elements of WTO accession, which are changes in barriers for FDI in service sectors, tariff reform, and improved market access. This will help us understanding the described effects.

Reform of FDI barriers

Although reform in FDI barriers will bring the largest welfare gains, its sector-specific impact on aggregate output is relatively small compared to impacts of other policy changes. Change in FDI barriers concern mostly service sectors (see DATA section), thus we consider these sectors first. The largest positive gains in aggregate output are observed in telecommunication (+3.7%) and financial intermediation (+2.7%), explaining the lion share of total growth of these

sectors due to the WTO accession. Also, increased FDI will stimulate development of machinery and equipment (+4.6%) and other production (+3.1%). Most of other sectors show minor reactions caused by reallocation of resources, first of all labour.

The development of domestic supply in general replicates the aggregate output pace. Also, reforms of FDI barriers enhance competitiveness and stimulate exports of services, in particular financial intermediation (+5.8%). The rise in cross-border exports of telecommunications (+5.0%) should be interpreted with care since exports tend mainly to consist of interconnection services, for which demand can be expected to be rather inelastic. Also, as a result of the reform, imports increase for both telecommunication services (+11.4%) and financial intermediation services (+9.2%).

Increase in production is replicated in labour market effects. In particular, both skilled and unskilled employment increase for telecommunications (+2.9%) and financial intermediation (+2.4%), as well as for machine building (+3.5%).

Tariff reform

Reduction of tariff barriers lead to welfare gains slightly lower than the impact of reform in FDI barriers. However, the change in tariffs appears to have much more significant sector-specific impact on aggregate output. In industry the largest gains in aggregate output are observed in chemical industry (+11.1%), metallurgy (+10.4%), and related to it production of non-energy materials, in the first place, iron ore (+10.0%), and coke production (+8.6%). Among services, hotels and restaurants gain the most (+27.2%), while changes in other services are much smaller.

At the same time, in line with reduction of border protection (see Annex A1) we observe the contraction of aggregate output in food industry (-19.8%) and fishery (-17.0%) with simultaneous rises in these sectors' imports. In particular, food industry imports are expected to increase by 158.5% leading to much tighter domestic competition on food market, thus reduction of domestic prices and welfare gains for population.

While chemical industry, metallurgy and production of non-energy materials expand aggregate output, first of all, at the expense of exports, for coke production both domestic and external markets are important. Tariff liberalisation is expected also to boost domestic output of textile industry (+7.8%).

Tariff reform is expected to significantly affect the employment structure of the economy. In particular, we expect a growth in employment in chemical industry (+10.0% for unskilled workers and +9.7% for skilled), in metallurgy (+9.4% for unskilled workers and +9.1% for skilled)) and in most of other industries. Also, employment in hotels and restaurants will increase by more than 26%. It happens mostly at expense of lower employment in food industry (-21%), in fishery (-18%), and in agriculture (-8%). Changes in employment in other sectors are only minor.

Improved market access

The improved market access for agriculture, chemical products, and metallurgy – the reform, which has the smallest welfare effect – has rather large sector-

specific impacts. Export-driven sectors gain in aggregate output, especially metallurgy (+12.6%) and chemical industry (+7.9%), plus in several related industries (coke production, coal and peat, production of non-energy materials, gas supply), as well as in agriculture (+3.6%). This gains will produce considerable redistributive effects. Aggregate output and employment contract in more than half sectors of the economy with the largest expected contraction in machine building (-18.8% in aggregate output). The reduction of output and employment in these sectors will be partially driven by significant demand for both skilled and unskilled labour in chemical industry, metallurgy and other related industries. For instance, both skilled and unskilled employment in metallurgy grows by 13%. Also, market-access-driven exports create a revaluation pressure that adversely affects other export-oriented sectors, including machinery, textile and leather, and hotels and restaurants business.

WTO accession in steady state model

In long run, as the capital stock adjusts to a new equilibrium, we expect that the largest gains in aggregate output, and thus, largest employment increase, will be in metallurgy and in chemical industry, and hotels and restaurants. Thus, the steady state model fairly replicates results described in full WTO accession scenario at the sectoral level.

3 Discussion and policy recommendations

3.1 Comparison with other studies

The main finding of our model is that the total effect of Ukraine's WTO accession is an increase in welfare and GDP by 5.2% and 2.4% respectively. How does this result compare with the findings of other modelling exercises concerned about quantifying the impact of trade liberalization? Recently, CGE models have been frequently used to access the impact of changes in international trade policy such as the Uruguay round, the NAFTA, MERCOSUR, the Common European Market ("1992"), the Asia-Pacific Economic Cooperation (APEC), or the accession of single countries to the WTO. All models consistently find that reduction of trade barriers such as quotas and tariffs increases welfare as well as GDP, typically in a range of between 1% and 5%. However, comparing results of different models is difficult since they not only differ by the number of countries or the nature of the specific policies they cover, but also by several model characteristics such as static or dynamic contemplation, perfect or imperfect competition, explicit consideration of indirect effects of trade liberalization, e.g. on total factor productivity etc. For this reason, we concentrate on the results of two models that are similar to ours as they both report static economy-wide effects of WTO accession for a single country.

Ianchovichina and Martin (2001) model China's WTO accession. They concentrate attention on the changes in China's trade regime, in particular the elimination of entry barriers for foreign imports on Chinese markets, the reduction of weighted average tariffs by almost two third, and the reduction of China's aggregate measure of domestic support. They find that with such policy measures Chinese households will gain about 2.2% of their income (compared to not joining the WTO). Those changes will come along with an even larger increase of exports and imports. On a sectoral level, Chinese automobile sector and several high-tech sectors experience substantial export growth while imports of oilseeds, meat, and various food products increase significantly, reflecting a shift in comparative advantage away from agriculture. Finally, wages of both skilled and unskilled workers rise.

Jensen et al. (2003) study the impact of Russia's WTO accession based on a model with a similar structure than ours and they also focus on removing barriers to FDI in service sectors, tariff reduction and improved market access for some sectors. They estimate static welfare gains of Russia's WTO accession at 7.2%, which is bigger than the welfare gains that we find in this study. However, separating the effects of different impacts shows that most of those welfare gains (5.2%) stems from removing barriers to FDI in service sectors, the initial level of which has been quantified at significantly higher levels for Russia than for Ukraine. On the other hand, a reduction of import tariffs results in only 1.3% of welfare gains and improved market access yields 0.6%. This is very much comparable to our results. As in our results, those welfare gains will come in line with higher imports due to lower domestic prices, increased exports because of devaluation of domestic currency and higher real wages for both, skilled and unskilled labour. Hence, results of the Jensen et al. (2003) study on Russia's WTO accession are consistent with ours, and the difference in the level

of overall welfare gains can be explained by the higher initial barriers to FDI in service sectors that prevail in Russia as compared to Ukraine.

3.2 Robustness and sensitivity of results

How robust are our results with respect to the underlying data and parameter values? An apparently obvious point of concern is the issue of whether the particular benchmark year was indeed a 'representative' year and whether the choice of a different year would have led to significantly different results. Comparing our results with those obtained from an earlier prototype of our model that was based on 2001 data (Pavel et al., 2004)[5] does not support these concerns. For example, a tariff reduction of a similar magnitude as in our tariff reform scenario is predicted to increase welfare and GDP by 1.2% and 1.3%, as compared to increases by 1.8% and 1.1%, respectively, in our present study. This observation is further supported by general experience in applied general equilibrium modelling, where the choice of the specific benchmark year is found to have a minor impact on robustness of modelling results. Here, it is typically found that the choice of certain parameters in production and demand functions has a more significant impact, as is also the case for our model. Table 3.1 reports welfare effects of the full WTO accession scenario for different parameter values of several crucial parameters. As can be seen, the choice of certain parameter values can change welfare effects by almost 2%, but it can never lead to fundamentally different results, i.e. WTO accession always remains welfare improving. Hence, while this questions to some extent the precision of our estimates it does not support concerns that our results might contain significant biases

Table 3.1

Welfare effects of full WTO accession under alternative parameter values

	Parameter value			Total change in welfare, %		
	Lower	**Central**	**Upper**	**Lower**	**Central**	**Upper**
Elasticity of substitution between value-added and business services	0.5	1.25	2.0	4.4	5.2	6.6
Elasticity of substitution between firm varieties in imperfectly competitive sectors	2.0	3.0	4.0	6.1	5.2	4.9
"Armington" elasticity of substitution between imports and domestic goods in CRTS sectors	0.5	1.0	1.5	5.0	5.2	5.5
Elasticity of multinational service firm supply with respect to price of output	10.0	15.0	20.0	4.2	5.2	6.0

Source: Ukraine model

[5] Essentially, results only differed because of limitations of this prototype models which e.g. did not consider imperfectly competitive sectors and removal of barriers for FDI in services.

The discussion on robustness and meaningfulness of our results might also expresses concerns of whether or not the impact of shadow economy must be considered in an economic impact analysis of Ukraine's WTO accession. To some extent, shadow activities are implicitly included in our data set since the statistical conventions used to produce National Accounts data foresees several adjustments for such activities. More importantly, however, none of the identified channels through which WTO accession will impact Ukraine's economy will directly affect shadow activities. Hence, whatever the extent and causes of the shadow economy in Ukraine might be, our analysis assumes that they will remain unchanged[6] because they are not explicitly targeted by WTO commitments.

3.3 Conclusions and policy recommendations

The main conclusion from the overall impact assessment is that Ukraine's economy will receive a substantial boost of real economic growth of more than 2%. The biggest winners will be export-oriented sectors with large shares of labour in value added such as production of chemicals, rubber and plastic products or metallurgy. All these sectors will generically gain from improved access on foreign markets and better export opportunities due to devaluation of the local currency and reduced import tariffs. These sectors will also serve as 'locomotives' pulling the producers of intermediate inputs, especially coke products, non-energy materials, coal and peat. In total, these results underline the strong industrial basis of Ukraine's economy and its comparative advantage in these sectors.

Consumers will benefit in two ways. First, growth of industrial activities increases real factor wages and thus household incomes. Second, a larger supply of imported consumer-oriented goods at lower prices will better suit consumers' needs. For poor consumers, better supply and reduced real food prices are most valuable while non-poor consumers mainly gain from improved availability of telecommunication and financial services.

While on average consumers will be better off with Ukraine's WTO membership, there are also a fundamental points of concern. Among the few sectors that experience significant contraction are the so far mostly protected and least restructured sectors, namely food-processing, fishery and agriculture. Most of these sectors are located in rural areas. But despite even higher exports due to improved market access for agriculture, this will not sufficient to compensate for losses against cheaper agricultural imports. In line with this, our results have also indicated that the income of poor rural households grows at the lowest rate indicating that rural household incomes in total will not converge, but rather that they can even further diverge. While we strongly note that WTO accession is not the cause for poverty in rural areas, it will still make it more necessary for policy makers to sufficiently address this issue.

Based on this overall impact assessment, we provide three major policy recommendations:

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[6] Since in the model 'actual' (losses-adjusted) tariffs, and not statutory tariffs were used both for before and after the WTO accession periods. it can be treated as implicit assumption that shadow economy remains unchanged. For tariff discussion see Annex A1.

1. **Ukraine should join the WTO as soon possible as it generates sustainable income growth and strengthens its industrial basis.**
2. **Poor households should be excluded from significant financing obligations that might arise after implementation of the reforms. This not only includes an exemption from possible tax increases, but it also precludes cuts in the provision of public goods and services that they receive.** This recommendation should and must, however, not be confused with changing efficiency of the provision of goods and services to the poor.[7]
3. **The combination of contracting agricultural production and slow income growth in rural areas calls for specific action. As outlined above, the contraction agricultural production must not be confused with predicting that agriculture will not be competitive in Ukraine. Rather, it indicates that the present structure of production characterized by extremely low levels of total factor productivity and technical efficiency will not be competitive. The potential for improvement is significant.** According to empirical estimations, Ukrainian farms could expand their output by up to 150% if they simply improved their management and production decisions (Galushko et al., 2004). On a policy level, stimulating such developments also calls for stimulating structural change in rural areas. This in turn requires a development concept that focuses not only on productivity levels in agriculture, but on rural areas as a whole.

Improving policies along those lines will be the major challenge facing Ukrainian policy makers during the next period of economic development. WTO accession will not be the cause for the problems to be dealt with, but it is capable to generate a part of the resources that will be required to solve them.

[7] For example, the practice of granting the right of free transportation and utility services to the poor is rather short minded since it eliminates the economic basis for service provision and thus, leads to deterioration of service quality and reliability. In this case, the same consumer benefit can be realized more efficiently by letting poor households pay as well while at the same time support them with direct income transfers as necessary.

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Annex A. Description of data and model

A1 Data

A1.1 Social Accounting Matrix

The model builds up on a Social Accounting Matrix (SAM) based on Ukraine's National Accounts and Input-Output tables for 2002. The 38 sectors of the original Input-Output table are mapped into 37 sectors in the SAM.[8] In addition, postal services from the telecommunication account and energy transit activities are separated from the transport account, based on additional information from the balance sheets of the two companies that carry out oil and gas transit ("Ukrtransgaz" and "Ukrtransnafta"). According to the Derzhkomstat, National Accounts figures are also adjusted to consider the impact of shadow economy and non-formal economic activities.[9]

A1.2 Trade structure

Information on commodity trade flows is taken from the UN Commodity Trade (ComTrade) database. As commodity trade is conducted in one of three trade regimes – free trade, MFN, and 'full tariff' trade – we arranged all Ukraine's trading partners into 11 regional groups by key trade partners and trade regime applied (Table A1).

Table A1

Distribution of countries among regions and trade regimes

Trade regime	Region	Country
1. Free trade	1. Russia	Russia
	2. CIS (excl. Russia)	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Uzbekistan
	3. Baltic countries	Estonia, Latvia, Lithuania
2. MFN tariff rates	4. EU-15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden, UK
	5. NMC-5	Czech Republic, Hungary, Poland, Slovakia, Slovenia
	6. Other Europe	Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia[10], Romania, Serbia and Montenegro, Switzerland
	7. Asia	China, Hong-Kong, India, Indonesia, Iran, Israel, Japan, Korea (North), Lebanon, Macao, Mongolia, South Korea, Sri Lanka, Syria, Turkey, United Arab Emirates
	8. America	Argentina, Brazil, Canada, USA
	9. Africa	Algeria, Egypt, Tunisia

8 Only 'heat supply' has been added to 'electric energy'.

9 Derzhkomstat (2004). National Accounts of Ukraine for 2002. Kyiv.

10 Formally, Ukraine and Macedonia signed a free trade agreement. However, this agreement has so many exemptions, that in this study we treat trade relations between Ukraine and Macedonia like MFN.

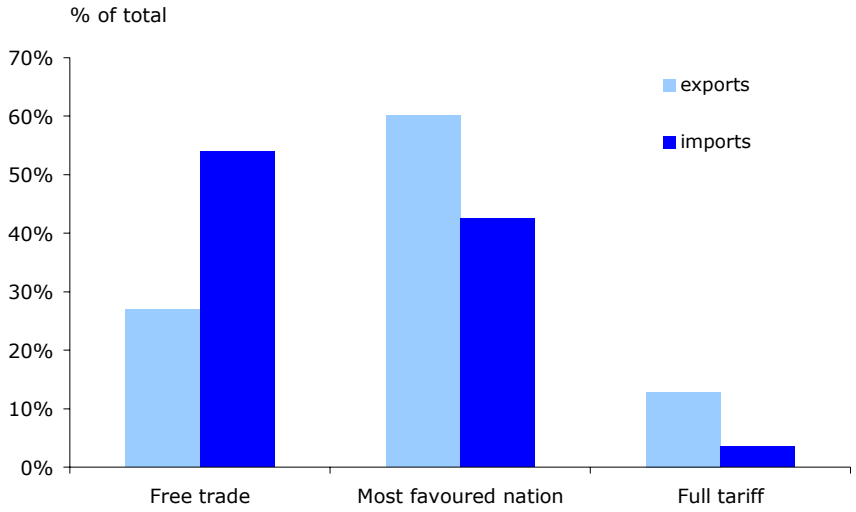
Trade regime	Region	Country
3. Full tariff rates	10. NMC-2	Cyprus, Malta
	11 Rest of the World	All other countries

Source: Ukraine's legislation

Most of commodity trade in Ukraine is conducted under free trade or the MFN regimes (Figure A1). In exports, trade under the MFN regime dominates. In imports more than half of products arrive from countries, with which Ukraine signed free trade agreements and thus most of their goods are imported duty-free.[11]

Figure A1

Structure of exports and imports by trade regimes, % of total exports and imports value



Source: UN ComTrade database, IER estimates

Note: Free trade flow includes imports of raw oil from Russia, which is *de facto* exempt from free trade regime (as soon as Russia levies exports tariff on it), but is subject to zero MFN tariff in Ukraine

Information on services trade flows is taken from the State Committee of Statistics of Ukraine publications.[12] All trade in services was aggregated into

[11] Here, commodity trade with Russia is classified as free trade. However, there are certain exemptions from free trade regime. Explicit exemptions from free trade are sugar and confectionary, chocolate, cookies, and cigars (these goods are subject to import duty in Ukraine). There is also a list of conditional exemptions from the free trade arrangement. These exemptions are conditional on the existence of export tariffs in the country of origin, here Russia. If Russia applies export tariff on its products, Ukraine is supposed to treat them as subject to the MFN tariff, and not as duty-free. As of now, the list of such goods includes raw oil (zero MFN import tariff is levied in Ukraine), selected petroleum products, and some of organic chemicals. Concerning Ukraine's exports to Russia, livestock, selected oil seeds, sugar, alcohol, tobacco products, and skins are non-duty-free. Thus, free trade shares in Figure 4.1 are overestimated as free trade between Russia and Ukraine has important exemptions.

[12] For EU countries and EU accession countries: Cooperation between Ukraine and EU countries in 2002, Statistical publication/State Statistics Committee of Ukraine. –

same 11 regional groups that were developed for commodity trade. For the ROW group, values of exports and imports were obtained as residual. If for some sector across all regional groups the value of exports or imports was zero (e.g. education, healthcare, real estate), then the respective row was filled with ones.

A1.3 Estimation of import tariffs[13]

Information on applied import tariffs was taken from the Custom Tariff of Ukraine[14]. There are three types of tariff rates applied in Ukraine: ad valorem, specific and mixed. While nominal ad valorem tariffs were used directly, we have also estimated ad valorem equivalents of specific and mixed rates, wherever possible. The ad valorem equivalents are estimated on the basis of annual average import unit values at the 6-digit level of the Harmonized System (HS).[15] Because Ukraine's Custom Tariff disaggregates into higher level of tariff rates' (up to 10 digits), tariff rates were taken as simple averages wherever necessary. Also, due to information constraints ad valorem equivalents were estimated only for specific and mixed rates expressed in kilograms or litres.

The formula used to calculate ad valorem equivalent for specific tariff is the following: (specific rate/unit value)*100%. The mixed rates were estimated likewise; the only exception is that maximum value between ad valorem and specific parts of mixed tariff is chosen. Thus, the formula is: *max* {(specific rate/unit value)*100%, ad valorem tariff}.[16]

The resulted tariff rates dataset still contained missed rates appeared because of absence of imports under the code, thus no ad valorem equivalent was estimated; and the expression of specific or mixed rates in units other than kilograms or litres. The dataset was corrected to avoid estimation biases resulting from missed tariff rates. The resulted dataset includes 5230 tariff lines at the 6-digit level of the HS.

In order to map this dataset into the codes used in the SAM, simple average tariffs were aggregated based on a table of concordances between the 6-digit HS codes and the ISIC Rev.2 (4-digit codes), on which the sector classification in Ukraine's Input-Output data is based. Tariffs were estimated for two sets of rates, MFN (privileged) rates and full rates (for details see the Sector Study Industry and Agriculture). Total tariffs were estimated using Ukraine's import value in 2002 as weights. Import-weighted tariffs were estimated for the

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Kyiv, 2003. For other countries: Foreign trade of Ukraine in goods and services in 2002, vol. 1, statistical publication/ State Statistics Committee of Ukraine. – Kyiv, 2003.

13 A detailed description of our estimation of tariff protection is presented in Study of Industry and Agriculture conducted as a part of the "Analysis of Economic Impacts of Ukraine's Accession to the WTO" project.

14 Approved by the Law "On Custom Tariff of Ukraine" # 2371 adopted on April 5, 2001 with subsequent amendments.

15 The annual average import unit value is estimated as the ratio of value of Ukraine's total imports for each 6-digit code of the HS and weight of these imports. Information about value and weight of Ukraine's imports for years 1996-2002 is taken from the UN Commodity Trade database.

16 "Ukraine's Trade Regime: Quantitative and Institutional Aspects. Ukraine trade regime overview", Background paper for World Bank Trade Study, 2004.

constant-year base to ensure that a change in aggregate tariff represents changes in the level of tariff protection only, and not the change in imports. The year 2002 was used as a base year. To avoid estimation biases due to non-uniformity of import distribution between trade regimes, the same weight based on total imports of Ukraine for each code was applied to both for the MFN and full tariffs.

Finally, the expected changes in tariffs under WTO accession were estimated on the basis of available information from sectoral initiatives that Ukraine offered to join, as well as Ukraine's tariff proposal replicated in law "On changes in the Custom Tariff of Ukraine" # 2470 adopted on March 15, 2005; the draft law "On changes in the Custom Tariff of Ukraine" registered under #7354 in April 2005; and the draft law "On changes in selected laws" registered under #7181 in April 2005. The estimation was conducted following the methodology used for the estimation of applied tariff rates.

Results of the estimates are presented in Table A2. In line with prior expectations, the agro-food sector faces the highest level of tariff protection in Ukraine. Thus, it is expected to face the highest absolute reduction in tariffs due to Ukraine's accession to the WTO.

Table A2

Import-weighted applied tariffs in 2002 and the estimate of the import-weighted tariff rates after Ukraine's WTO accession

SAM code	Sector	Import-weighted MFN tariff (2002)	Import-weighted full tariff (2002)	Estimate of import-weighted tariff after WTO accession
A01	Agriculture, hunting	24.2	28.1	2.1
A02	Forestry	2.0	4.2	1.3
A03	Fishing	21.5	38.4	2.8
A04	Mining of coal and peat	0.0	10.0	0.0
A05	Production of hydrocarbons	0.0	3.0	0.0
A06	Production of non-energy materials	1.1	5.1	1.1
A07	Food-processing	54.7	73.8	12.0
A08	Textile and leather	6.2	20.9	5.1
A09	Wood, furniture, paper, publishing	9.6	20.0	0.3
A10	Production of coke	2.3	8.9	1.4
A11	Petroleum refineries	0.3	0.8	0.2
A12	Chemicals, rubber and plastic	5.9	13.0	3.0
A13	Non-metallic mineral products	11.4	22.4	8.1
A14	Metallurgy and metal processing	4.5	11.2	1.8
A15	Machinery and equipment	8.9	17.1	4.2
A16	Other products	3.6	7.2	1.2

Source: Customs tariff, UNCTAD ComTrade database, draft laws #7354 and #7181; IER estimates

The peculiarity of Ukraine's tariff collection is that effective tariff rates on average have been more than 60% below their official levels.[17] To ensure that the model correctly reflects how tariffs are currently applied and provides unbiased estimates of tariff reform consequences, we scale down all tariff rates by a uniform factor, thereby acknowledging that effective tax rates are much below their nominal levels e.g. due to inefficiencies of the customs procedures. Table A3 presents total import-weighted tariffs in the benchmark period and after WTO accession, actually applied in the model.

Table A3

Total import-weighted tariffs in benchmark (2002) and after Ukraine's WTO accession

SAM code	Sector	Import-weighted total tariff in 2002	Post-WTO Accession import-weighted total tariff	Relative change, %
A01	Agriculture, hunting	9.8	0.8	92
A02	Forestry	0.8	0.5	37
A03	Fishing	12.6	1.0	92
A04	Mining of coal and peat	0.0		
A05	Production of hydrocarbons	0.0		
A06	Production of non-energy materials	0.9	0.3	67
A07	Food-processing	17.6	3.5	80
A08	Textile and leather	2.6	1.8	31
A09	Wood, furniture, paper, publishing	3.0	0.1	97
A10	Production of coke	0.1	0.0	64
A11	Petroleum refineries	0.1	0.0	71
A12	Chemicals, rubber and plastic	2.2	1.0	55
A13	Non-metallic mineral products	3.1	2.2	30
A14	Metallurgy and metal processing	0.8	0.3	65
A15	Machinery and equipment	3.0	1.3	56
A16	Other products	1.5	0.5	68

Source: Customs tariff, UNCTAD ComTrade database, draft laws #7354 and #7181; Institute for Economic Research and Policy Consulting, Osteuropa-Institut München, Copenhagen Economics estimates

A1.4 Estimation of service trade restrictions[18]

Foreign service providers entering Ukraine's market face two kinds of barriers: barriers that affect foreign service providers in a discriminatory manner and barriers that affect both foreign and domestic service providers alike. For the analysis of the barriers economy-wide effects, we constructed quantitative

[17] See Pavel et al. (2004): Economic impact of Ukraine's WTO accession. First results from a General Equilibrium Model. IER Working paper No. 30. Kiev (Ukraine).

[18] Detailed description of estimation of barriers to the FDI is presented in Study of Service Sectors conducted as a part of the "Analysis of Economic Impacts of Ukraine's Accession to the WTO" project.

measures of these barriers – the trade restrictiveness indexes (TRI). The TRI covers all the barriers affecting foreign providers, both the barriers that affect foreign and domestic providers alike and the discriminatory barriers affecting foreign providers only. The latter one we separated in the index labelled Trade Restrictiveness Index discriminatory abbreviated TRI*d*. The TRI and the TRI*d* are bounded between zero and one, where zero reflects no barriers and one reflects most barriers.

As the TRI's cannot directly be used for economic modelling to produce results on an economy wide basis, we converted the values of the TRI's into tariff equivalents. Tariff equivalents are hypothetical taxes implying an effect on a firms' performance similar to the barriers captured by the TRI. In other words, the tariff equivalents can be thought of as theoretical tariffs computed to create economic effects that are equivalent to the economic effects of the actual barriers.

We find that the current barriers give rise to trade restrictiveness indices (TRI's) for telecommunications and financial services between 0.15 and 0.42, while they are noticeably higher for railway transport 0.64. The tariff equivalents are not necessarily proportional to the TRI values because they are calculated from TRI values as well as from econometric estimates linking TRI's to prices. The differences in econometric estimates are the reason why we find smaller tariff equivalents for railway transport than for finance even though the TRI's are higher in railway than in finance.

The WTO accession is likely to reduce discriminatory barriers, that is, the barriers affecting foreign firms only. The discriminatory barriers are measured by the Trade Restrictiveness Index discriminatory (TRI*d*) a subset of the TRI. We considered the scenario where no discriminatory barriers exist, meaning that the TRI will be reduced by the size of the TRI*d* such that only barriers affecting domestic and foreign firms alike prevail. This will cause sharp drops in TRI and consequently in the tariff equivalent (TE) in most services sectors (Table A4). For example, the current TRI in fixed telecommunications of 0.22 declines to a mere 0.12 due to elimination of the TRI*d* which has a value of 0.10. This implies a fall in the tariff equivalents from approximately 5 percent to 3 percent.

Table A4

Trade restrictiveness index and tariff equivalents before and after WTO accession

	TRI	**TRI*d***	**TRI after WTO[1]**	**TE[2]**	**TE after WTO[3]**
Telecom					
- Fixed	0.22	0.10	0.12	0.052	0.027
- Internet	0.15	0.10	0.05	0.034	0.011
- Mobile	0.18	0.10	0.08	0.061	0.025
Railway					
- Freight	0.64	0.00	0.64	0.167	0.167
- Passenger	0.64	0.00	0.64	0.167	0.167
Finance					
- Banking	0.27	0.20	0.07	0.219	0.053
- Insurance	0.42	0.30	0.12	0.360	0.092
- Securities	0.35	0.23	0.12	0.287	0.092

Notes:

1: WTO accession is assumed to eliminate all foreign discriminatory barriers. Therefore "TRI after WTO" is calculated as TRI minus TRI*d* from the preceding columns

2: Calculated from values in "TRI" column

3: Calculated from values in "TRI after WTO" column

Source: Osteuropa-Institut München, Copenhagen Economics, Institute for Economic Research and Policy Consulting

A2 Linear Expenditure System (LES)

A2.1 Data and aggregations

To sufficiently represent final demand by different types of households we include results from the Derzhkomstat household budget survey for 2002 in analysis. The survey covers 9422 households and reports consumption of more than 200 different commodity items. To generate a dataset which can be consistently embedded in our overall modelling framework we summarize those different commodities into five main groups:

- Agriculture, Forestry, Fishery
- Food-processing
- Industrial Goods
- Energy and Utility Services
- Other Services

Households are aggregated to 4 groups: urban non-poor, urban poor, rural non-poor and rural poor. As suggested by the Ukrainian government, the poverty threshold is set at 75% of the median total expenditures of all households.[19] The distribution of households by groups is provided in Table A5.

Table A5

Distribution of households by income groups

	Total	Urban poor	Urban non-poor	Rural poor	Rural non-poor
Number of households	9422	1912	4141	1120	2249
Distribution of households	100%	20.3%	43.9%	11.9%	23.9%

Source: Derzhkomstat: Household Budget Survey for 2002

A2.2 Estimations

An important requirement of our modelling framework is the sufficient consideration of the pattern of final consumption in order to assess the impact of WTO accession on different types of households. To fulfil this demand we use the household-level information to estimate the parameter of a microeconomically consistent set of demand functions as specified in the so-called Linear Expenditure System (LES, see e.g. Deaton and Muellbauer, 1980).

For the estimations we also require weighted prices for each commodity group. We calculate them based on prices provided by Derzhkomstat according to the following formula:

[19] According to the Methodology of complex estimation of poverty, approved by the Ministry of Labor and Social Policy of Ukraine, the Ministry of Finance of Ukraine, the Ministry of Economy of Ukraine, etc., the poverty threshold is defined as 75% of the median level of expenditures of "conditional person" in the household.

$$p_i = \frac{\sum_{j=1}^{m} \alpha_j \chi_j}{\sum_{j=1}^{m} \chi_j},$$

where p_i is the weighted price for commodity category i, $i = \overline{1,38}$, α_j is the price of good j, which belongs to category i, χ_j is the consumed quantity of good j, which belongs to the group i (calculated by dividing expenditures for good j by its price).

The weak point of this weighted price is that in some groups very different consumed goods are compared. Besides, while prices for some goods were available at Derzhkomstat, others were evaluated basing on own judgment. However, in the absence of more reliable information this procedure still turns out to be the best-possible option for estimating commodity prices.

In the LES, expenditure for commodity i, $i = \overline{1,5}$ by household m $(m = 9422)$ is given by:[20]

$$p_i x_{i,m} = \gamma_i p_i + \beta_i \left(\mu_m - \sum_{k=1}^{n} p_k \gamma_k \right) + \omega_{i,m},$$

$$p_i x_{i,m} = p_i (1 - \beta_i) \gamma_i + \beta_i \mu_m - \beta_i \sum_{k=1,\ldots,i-1,i+1,n} p_k \gamma_k + \omega_{i,m},$$

where p_i is the weighted price of a group i, $x_{i,m}$ denotes consumed quantity of commodity i by household m, μ are the cash expenditures of households for consumption groups i and β_i denotes marginal budget (expenditure) shares with $0 < \beta_i < 1$, $\sum_{i=1}^{n} \beta_i = 1$. Finally, γ_i is a parameter that implies that a household first purchases γ_i units of commodity i at costs of $\gamma_i p_i$, which is typically interpreted subsistence consumption ($\gamma_i > 0$ implies inelastic demand, and $\gamma_i < 0$ implies elastic demand). Negative γ_i cannot be interpreted as subsistence quantity, and, therefore, cannot be regarded as subsistence quantities.

To estimate parameters β_i and γ_i of the LES we use a Weighted LS procedure.[21] We estimate the equation (3) and we calculate β_i for *i=5* (other services) as a residual, such that $\sum_{i=1}^{n} \beta_i = 1$. As appeared, all gammas are positive (Tables A6

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[20] See e.g. Deaton Angus, Muellbauer John. *Economics and Consumption Behavior*, Cambridge University Press, 1980.

[21] See Greene, William H., *Econometric analysis*, 2003 Upper Saddle River, N.J.: Prentice Hall, for the description of WLS method. We use Eviews 3 for our calculations.

and A7), which implies that all γ_i can be interpreted as subsistence consumption levels.

Table A6

Estimation results for urban households

	Urban poor				Urban non-poor			
	Beta		Gamma		Beta		Gamma	
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Agriculture, Forestry, Fishery	0.29	63.41	14.49	2.22	0.10	45.30	424.23	79.11
Food-processing	0.42	66.59	123.12	13.72	0.18	52.24	738.07	120.78
Industrial Goods	0.13	41.56	2.99	8.17	0.15	56.42	45.51	54.07
Energy and Utility Services	0.05	15.72	8.18	24.99	0.02	16.45	21.67	96.06
Other Services	0.11*		0.024	4.886	0.55*		0.58	3.27
No. of Observations	1912				4141			

* The fifth parameter value was received from setting $\beta_5 = \left(1 - \sum_{i=1}^{4} \beta_i\right)$.

Source: IER calculations

Table A7

Estimation results for rural households

	Rural poor				Rural non-poor			
	Beta		Gamma		Beta		Gamma	
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Agriculture, Forestry, Fishery	0.25	42.97	22.36	6.68	0.19	60.14	160.13	33.47
Food-processing	0.48	59.65	62.55	6.70	0.34	72.35	316.71	29.51
Industrial Goods	0.16	31.25	4.64	8.82	0.21	61.00	31.55	40.69
Energy and Utility Services	0.03	7.12	6.22	11.36	0.02	16.17	16.22	35.77
Other Services	0.084*				0.238*			
No. of Observations	1120				2249			

* The fifth parameter value was received from setting $\beta_5 = \left(1 - \sum_{i=1}^{4} \beta_i\right)$.

Source: IER calculations

Based on the estimated parameter values we can calculate the income elasticity for each commodity i as ratio of marginal over average budget share:

$$\varepsilon_i = \frac{\beta_i}{\eta_i},$$

where ε_i is the income elasticity of commodity i, β_i the estimated marginal expenditure share and η_i the average expenditure share as calculated from the

survey data. This income elasticity of demand measures the percentage by which the quantity demanded of an item increases following a one percent increase in household income.

Table A8

Income elasticity for urban households

	Urban poor				Urban non-poor			
	Expenditures	**Expenditure share**	**Beta**	**Income elasticity**	**Expenditures**	**Expenditure share**	**Beta**	**Income elasticity**
Agriculture, Forestry, Fishery	1 335 524.29	0.24	0.29	1.21	6 546 646.41	0.18	0.10	0.55
Food industry	2 596 540.01	0.46	0.42	0.91	14 796 057.19	0.42	0.18	0.43
Industrial Goods	609 343.57	0.11	0.13	1.15	5 717 397.60	0.16	0.15	0.94
Energy and Utility Services	566 939.99	0.10	0.05	0.51	2 440 606.08	0.07	0.02	0.23
Other Services	487 066.70	0.09	0.11*	1.29	6 077 010.43	0.17	0.55*	3.23
Total consumption expenditures	5 595 414.55				35 577 717.71			
Observations	1912				4141			

Source: IER calculations

Table A9

Income elasticity for rural households

	Rural poor				Rural non-poor			
	Expenditures	**Expenditure share**	**Beta**	**Income elasticity**	**Expenditures**	**Expenditure share**	**Beta**	**Income elasticity**
Agriculture, Forestry, Fishery	525 562.68	0.23	0.25	1.08	3 016 182.18	0.22	0.19	0.87
Food industry	1 084 285.77	0.47	0.48	1.01	5 373 378.06	0.39	0.34	0.89
Industrial Goods	376 080.86	0.16	0.16	0.99	2 987 339.68	0.21	0.21	0.96
Energy and Utility Services	147 103.53	0.06	0.03	0.49	696 981.95	0.05	0.02	0.45
Other Services	159 851.85	0.07	0.08 *	1.20	1 866 816.51	0.13	0.24*	1.78
Total consumption expenditures	2 292 884.69				1 394 0698.38			
Observations	1120				2249			

Source: IER calculations

A3 The computable general equilibrium (CGE) model

A3.1 General structure of the model

We use a Computable General Equilibrium (CGE) model to simulate the impact of Ukraine's accession to the WTO. The model is constructed on the basis of a economy-wide Social Accounting Matrix. It can therefore be understood as replication of the whole Ukrainian economy including all major technical and institutional characteristics.

The production side of the economy is summarized in 37 sectors. Production in each sector requires the use of intermediate inputs of goods and services as well as primary factors capital and labour, the latter distinguished by skill levels. Aggregate output can either be exported to several different regional groups (including Russia, other CIS countries, EU countries, other European countries, American countries, African countries and Asian countries) or sold on domestic markets. Together with imports from all trade partners it forms the total aggregate of goods and services available for domestic consumption.

On the consumption side, the model distinguishes between public, investment and intermediate consumption as well as final household consumption for different types of households. Consumers treat imported and domestically produced goods as imperfect substitutes while producers regard sales on domestic markets or exports as imperfect alternatives, a standard structure knows as *Armington assumption*. Exports and imports are disaggregated into 11 different trading partners[22] and modelled with constant elasticities of transformation and substitution. Direct taxes/subsidies are modelled as sector-specific taxes/subsidies on the use of primary input factors. Indirect taxes/subsidies are modelled as a commodity specific tax on private (household) and investment demand. Import tariffs are commodity- and region-specific and apply for all imports. The rates of import tariffs are import weighted averages of the tariff rates specified in Ukrainian legislation.

The model distinguishes four household types: non-poor urban and rural households, and poor urban and rural households.[23] Non-poor households are endowed with both, labour and capital and spend a constant share of their income for investment goods. In contrast, poor households only have labour endowments. Final consumption of each household type is modelled within a Linear Expenditure System (LES), the parameters of which have been econometrically estimated on the basis of household survey data (see Section 5).

Finally, the government receives income from public capital endowments and collects a variety of taxes. These taxes and the associated ad-valorem rates include taxes on output, taxes on intermediate inputs, tariffs, taxes on public

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[22] The Russian Federation, the remaining countries of the Commonwealth of independent States, the EU 15, the 10 new EU members (differentiated in those with a previous Free Trade Agreement, MFN status and the rest), other European countries with MFN status, African countries, American countries, Asian countries and the Rest of the World.

[23] See Section A2.1.

demand, taxes on investment demand, taxes on exports, and taxes on consumption. Total government revenue is used for public investments and the provision of public goods.

A3.2 Production activities

All production uses intermediates and the primary input factors capital and labour (divided into skilled and unskilled). With the exemption of the capital stock in coal mining and energy transit pipelines, all production factors are perfectly mobile. The model includes both perfectly competitive and imperfectly competitive sectors. Each sector of the Ukrainian economy belongs to one of three distinct categories, shown in Table A10, according to the competitive situation in the relevant output market.

Table A10

Sector categories

	SAM code and description	Share of value added (%)
1.	*Sectors with constant returns to scale:*	*70.5*
	A01 Agriculture, hunting	14.9
	A02 Forestry	0.4
	A03 Fishery	0.1
	A04 Mining of coal and peat	2.1
	A05 Production of hydrocarbons	1.8
	A06 Production of non-energy materials	1.4
	A10 Manufacture of coke products	0.2
	A11 Petroleum refinement	0.6
	A16 Other production	0.3
	A17 Electric energy and heat supply	5.2
	A18 Gas supply	0.5
	A20 Water supply	0.3
	A21 Construction	4.0
	A22 Trade	12.9
	A23 Hotels and Restaurants	0.7
	A24P Pipeline transit of oil and gas	2.4
	A25P Postal services	0.2
	A27 Real estate transactions	3.1
	A28 Renting	0.2
	A30 Research and development	1.0
	A31 Services to legal entities	2.9
	A32 Public administration	4.7
	A33 Education	5.7
	A34 Health care and social assistance	3.1
	A35 Sewage, cleaning of streets and refuse disposal	0.4
	A36 Social activities	0.3

	SAM code and description	Share of value added (%)
	A37 Recreational activities	0.7
	A38 Other activities	0.3
2.	*Goods-producing sectors with increasing returns to scale:*	*17.1*
	A07 Food Processing	3.4
	A08 Textile and leather	1.5
	A09 Wood working, pulp and paper industry, publishing	1.1
	A12 Manufacture of chemicals, rubber and plastic products	1.7
	A13 Manufacture of other non-metallic mineral products	0.8
	A14 Metallurgy and metal processing	4.1
	A15 Manufacture of machinery and equipment	4.5
3.	*Service sectors with increasing returns to scale and multinational presence:*	*12.4*
	A24 Transport (excluding transit pipelines)	6.8
	A25 Telecommunications	2.6
	A26 Financial intermediation	2.6
	A29 Information activities	0.4
Total		*100*

Source: Ukrainian model

Note: Share of value added refers to the sectors share of total value added in the Ukrainian economy

The *first and most basic category* covers competitive goods and services sectors where production takes place under constant returns to scale and prices equal marginal costs with zero profits. These sectors include goods sectors like e.g. agriculture and forestry, but also some service sectors like e.g. construction, distributive trade, public administration and education. In this category, as well as in the other two, business services trade off with primary factors of production and the aggregate of these is in turn combined with other intermediate inputs in the production function.

In the *second category*, covering the remaining goods producing sectors, production takes place under increasing returns to scale and imperfect competition. Goods in the second category may be produced domestically or imported on a cross-border basis. For domestically produced goods, Ukrainian firms incur costs for purchases of primary factors and intermediate inputs. Foreign goods are produced at constant marginal costs outside Ukraine, but foreign firms also incur a fixed cost of operating in Ukraine (for the purpose of supplying their products to the local market). By the zero profits assumption, in equilibrium the import price must cover fixed and marginal costs of foreign firms.

The *third category* covers imperfectly competitive services sectors where production takes place under increasing returns to scale. These sectors e.g. include telecommunications, financial services, transport services and most other business services. For these types of services, foreign services supplied on a cross-border basis are poor substitutes for services providers with a local

presence. This implies a potential for multinational service providers, i.e, firms with both domestic and foreign operations. The extended model therefore allows for both types of foreign supply in this third category: via commercial presence as well as via cross border supply.

For the imperfectly competitive goods and services sectors, i.e. sectors in the second and third category, the model applies standard Chamberlinian large group monopolistic competition within a Dixit-Stiglitz framework, resulting in constant mark-ups over marginal costs. Firms set prices such that their marginal costs equal marginal revenues and free entry implies zero profits. Individual firms regard themselves as too small to influence the composite price of their group. Moreover, the composition of fixed and marginal costs is identical for all firms producing goods or services under increasing returns to scale, leading to constant output per firm for all firm types. As the number of firms in a sector increases, the larger number of available varieties means that output can be more efficiently put to use in the economy. This implies that the effective cost function for users of these goods and services declines in the number of total firms in the industry. Following Jensen, Rutherford and Tarr (2005), there is a one to one correspondence between firms and their differentiated varieties, i.e., each firm is assumed to produce one single variety.

A3.3 Multinational services providers

When multinational service providers decide to establish a domestic presence in Ukraine, they will import some of their technology or management expertise. That is, foreign direct investment generally entails importing specialized foreign inputs. Hence, multinational services are produced using both domestic factors of production and imported inputs. Domestic service providers do not import the specialized primary factors available to the multinationals. Consequently, production of domestic services incurs primary factor costs related to Ukrainian labour and capital only. Thus, the use of specialised imported inputs captures a key difference between multinational and domestic production structures.

For multinational firms, the barriers to foreign direct investment affect their profitability and entry. Reduction in the constraints on foreign direct investment will induce foreign entry that 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. Hence, the current version of the model is capable to investigate if commitments on services liberalisation will be crucial to realize significant gains from trade and foreign direct investment.

One issue in assessing the consequences of elimination of the barriers against FDI in business services sectors is what the nature of the barrier is initially and what happens to the quota rents. In the model it is assumed that there is no rent dissipation, but that the Ukrainians capture the rents that stem from the barriers to multinational firms.

A3.4 Sector-specific capital

Generally, the production factors are perfectly mobile between sectors. However, the capital stock in coal mining and energy transit pipelines (sectors A04, A05 and A24P) are sector-specific, reflecting the exhaustible resource. The existence of these fixed factors of production implies that the associated production

sectors exhibit diminishing marginal productivity in terms of other mobile inputs, and changes in the marginal return to the fixed factors determines the supply response to changes in output prices.

A3.5 Macro closure and equal yield

The model uses two significant closure procedures:

- First, on the macro economy level, total investments must equal the sum of depreciation, public and private savings and the current account balance.
- Second, on the government level, fiscal revenue from various direct and indirect taxes must increase to offset the lost revenue from tariff reduction in any counterfactual in which tariffs are reduced. In other words, there is an equal government yield constraint. This is achieved through adjustment of the level of lump sum transfers to households.

A3.6 Comparative steady state formulation

In the comparative static version of the model, the capital stock is always held constant. To take into account more dynamic effects, the comparative steady state formulation of the model allows for an analysis of potential long run gains by allowing the capital stock to adjust to a new steady state equilibrium. This adjustment is driven by the assumption that investors demand a fixed rate of return on investment. In the model, the rate of return on investment is defined as the rental rate on capital divided by the cost of producing a unit of the capital good.

The implication is that if a policy change results in an increase in the rate of return on capital (relative to the cost of investment), investors will respond by increasing investment and thereby expanding the capital stock. The increase in the capital stock will lead to a fall in the rental rate on capital. Investors will keep investing, and expanding the capital stock, until the rental rate on capital has fallen to a level where the rate of return on investment is back to its initial level.

Results using the comparative steady state formulation are normally considered as upper bound estimates (if the capital stock increases). The reason is that the steady state calculation ignores the foregone consumption required to obtain the larger capital stock. However, Rutherford and Tarr (2002) show that a fully dynamic model with similar features (and that takes into account foregone consumption) can produce welfare gains of the same magnitude as comparative steady state results.

The comparative steady state approach has been used by many authors to analyse trade policy, including Francois et al. (1996), Harrison, Rutherford and Tarr (1997), Baldwin et al. (1999) and Jensen, Rutherford and Tarr (2005).

A3.7 Calibration

In order to calibrate the extended CGE model, the database has been complemented with information about multinationals. Specifically, data on the share of output captured by multinational firms in the different sectors, and the share of imported specialised inputs used by the multinationals firms have been

estimated. Table A11 shows the estimated shares for the relevant service sectors.

Table A11

Parameter values for calibrating FDI data

SAM code and description		Share of output captured by multinational firms (%)	Share of imported specialised inputs as a share of value added (%)
A24	Transport	5.0	1.0
A25	Telecommunication	47.0	5.0
A26	Financial intermediation	13.0	5.0
A29	Information activities	45.0	2.0

Source: Sector experts

The relevant elasticities used in the model have been assigned the values shown in Table A12 below.

Table A12

Elasticities

Parameter	Value	Description
esub	3	Elasticity of substitution between firm varieties in imperfectly competitive sectors
esubs	1.25	Elasticity between value-added and business services
esubc	1	Elasticity of substitution in consumer demand
esubva	1	Elasticity of substitution between primary factors
esubt	0	Elasticity of substitution between value added/business services aggregate and other intermediate inputs
eta_dx	5	Elasticity of transformation between exports and domestic production
esubz	1	Firm level elasticity between imported specialised inputs and domestic inputs
sigmadm	3	Armington elasticity of substitution between imports and domestic goods in perfectly competitive sectors
sigmadm(irts)	1.5	Armington elasticity of substitution between cross-border imports and domestic goods in imperfectly competitive sectors
sigmaff	3	Elasticity of substitution between domestic and multinational production

Source: Ukrainian model

Annex B. Results for each sector

Agriculture and hunting (A01)

Table A01.1

Agriculture and hunting: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
14.8	11.0	5.9	83.0

Source: Ukraine model

Table A01.2

Agriculture and hunting: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.8	1.4	5.9	11.3

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A01.3

Agriculture and hunting: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	92% reduction in import tariff*
Market access	prices received by Ukrainian exporters to the EU and North America will increase by 10%
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A01.4

Agriculture and hunting: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-2.4	0.1	-6.1	3.6	1.5
- domestic supply	-6.1	0.2	-6.9	0.8	-3.0
- exports	31.9	-0.9	0.2	31.9	43.5
Imports					
- total	18.5	0.9	15.4	2.2	18.5
- free trade	-23.2	0.9	-25.2	2.2	-23.2
- MFN	18.1	0.9	15.0	2.2	18.2
- full tariff	26.9	0.9	23.7	2.2	27.0
Employment					
-skilled	-3.8	-0.3	-8.1	4.8	-2.4
-unskilled	-3.8	-0.3	-7.9	4.6	-2.4
Price	0.6	0.5	0.3	-0.3	0.1

Source: Ukraine model

Due to the WTO accession aggregate output in agriculture is expected to decline by 2.4% in the medium-term horizon. However it will grow by 1.5% in long-term as capital adjusts to new equilibrium. The drop in aggregate output is explained by expected reduction of domestic supply (-6.1%) with simultaneous rise in imports (+18.5%) due to tariff reform and, thus, reduction of very high initial level of border protection. At the same time, assumed improved market access to the EU and North America markets is expected to lead to significant export growth (+31.9%). Lower domestic production will lead to reduction of sector's employment by 3.8% in medium-run.

Forestry (A02)

Table A02.1

Forestry: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.4	34.8	18.8	46.4

Source: Ukraine model

Table A02.2

Forestry: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.1	12.6	0.3	29.8

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A02.3

Forestry: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	37% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A02.4

Forestry: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-2.6	-0.7	1.7	-3.7	-1.6
- domestic supply	-0.9	-0.1	0.7	-1.6	0.1
- exports	-6.8	-2.1	4.0	-8.9	-5.7
Imports					
- total	3.7	1.1	-0.3	3.1	4.6
- free trade	2.2	1.1	-1.8	3.1	3.1
- MFN	3.7	1.1	-0.3	3.1	4.6
- full tariff	8.4	1.1	4.2	3.1	9.3
Employment					
-skilled	-3.6	-1.0	0.4	-3.0	-4.0
-unskilled	-3.5	-1.0	0.6	-3.2	-4.0
Price	2.5	0.7	1.3	0.6	3.0

Source: Ukraine model

The WTO accession will lead to moderate decline in forestry's aggregate output (-2.6% in medium-run and –1.6% in long-run as capital adjusts). The most of decline is explained by drop in exports (-6.8%), first of all due to revaluation pressure under improved market access scenario. At the same time, imports will increase (+3.7%). Lower production activity in forestry will be mirrored by 3.6% drop in employment in medium-term horizon.

Fishery (A03)

Table A03.1

Fishery: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.1	27.5	33.6	38.8

Source: Ukraine model

Table A03.2

Fishery: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.7	60.5		13.8

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A03.3

Fishery: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	92% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A03.4

Fishery: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-18.5	0.5	-17.0	-2.2	-17.0
- domestic supply	-18.8	0.5	-17.9	-1.6	-17.3
- exports	-16.5	0.4	-11.8	-5.9	-14.7
Imports					
- total	11.9	0.6	10.2	1.1	13.7
- free trade	-36.5	0.6	-37.5	1.1	-35.5
- MFN	-8.5	0.6	-9.9	1.1	-7.1
- full tariff	24.5	0.6	22.7	1.1	26.5
Employment					
-skilled	-19.4	-0.1	-18.0	-1.6	-19.0
-unskilled	-19.4	-0.1	-17.8	-1.8	-19.0
Price	-5.6	0.3	-5.6	-0.4	-5.2

Source: Ukraine model

Fishery will be among net losers due to Ukraine's WTO accession. It is expected that aggregate output in the sector will drop by 18.5% in medium-term horizon and only slightly less (-17.0%) in long-term as capital adjusts. Most of changes are explained by tariff reform, thus reduction of high initial level of border protection. It is expected that domestic supply of the sector will drop by 18.8% while imports – especially due to acceleration of trade with 'full tariff' countries – will rise by 11.9%. As a result, prices will drop by 5.6% benefiting both households and sectors that use fishery products as inputs. Drop in aggregate output will be mirrored by reduction in sector's employment (-19.4%) as workers will be gained over by other, more successful sectors.

Mining of coal and peat (A04)

Table A04.1

Mining of coal and peat: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
2.1	33.0	51.8	15.2

Source: Ukraine model

Table A04.2

Mining of coal and peat: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
1.0	8.4	0.4	4.6

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A04.3

Mining of coal and peat: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A04.4

Mining of coal and peat: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	11.3	-0.5	5.8	5.3	10.9
- domestic supply	11.6	-0.5	5.8	5.5	11.3
- exports	3.9	-0.6	4.5	-0.5	1.9
Imports					
- total	16.5	-0.5	6.6	9.2	17.4
- free trade	16.5	-0.5	6.6	9.2	17.4
- MFN	16.5	-0.5	6.6	9.2	17.4
- full tariff	42.4	-0.5	30.3	9.2	43.5
Employment					
-skilled	12.2	-1.1	6.2	6.2	11.3
-unskilled	12.2	-1.0	6.4	6.0	11.3
Price	2.7	0.3	2.0	0.3	3.5

Source: Ukraine model

The WTO membership will be beneficial for development of mining of coal and peat sector. Its aggregate output is expected to grow by 11.3% in medium-term horizon and by 10.9% in long-term due to tariff reform and, to lesser extent, improved market access. Most of growth will occur due to higher domestic market supply (+11.6%), while exports will grow much slower (+3.9%). Also, it is expected a 16.5% rise in imports, first of all due to improved market access. Strong aggregate growth will be reflected in increased employment (+12.2%).

Production of hydrocarbons (A05)

Table A05.1

Production of hydrocarbons: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
1.8	7.3	11.5	81.2

Source: Ukraine model

Table A05.2

Production of hydrocarbons: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
29.5	86.3	1.1	25.5

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A05.3

Production of hydrocarbons: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A05.4

Production of hydrocarbons: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	0.3	0.3	0.1	-0.2	0.2
- domestic supply	1.8	0.3	0.8	0.5	2.0
- exports	-4.1	0.3	-2.0	-2.3	-5.4
Imports					
- total	5.5	0.3	2.6	2.1	6.8
- free trade	5.5	0.3	2.6	2.1	6.8
- MFN	5.5	0.3	2.6	2.1	6.8
- full tariff	12.1	0.3	9.1	2.1	13.5
Employment					
-skilled	-0.6	-0.4	0.0	-0.5	-1.8
-unskilled	-0.6	-0.3	0.2	-0.7	-1.8
Price	1.7	0.3	1.9	-0.7	2.2

Source: Ukraine model

Aggregate output in production of hydrocarbons will moderately increase (+0.3% in medium-run and +0.2% in long-run) due to the WTO accession. While domestic supply is expected to increase by 1.8%, exports will decline by 4.1%. At the same time, we expect growth in imports (+5.5%) due to tariff reform and improved market access. Employments will decline in the sector by 0.6% in medium-run.

Production of non-energy materials (A06)

Table A06.1

Production of non-energy material: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
1.4	25.5	40.1	34.4

Source: Ukraine model

Table A06.2

Production of non-energy material: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
1.9	25.7	2.5	39.3

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A06.3

Production of non-energy material: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	67% reduction in import tariffs*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A06.4

Production of non-energy material: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	14.6	-1.4	10.0	5.1	14.3
- domestic supply	16.6	-1.3	8.6	8.1	16.2
- exports	11.4	-1.7	12.2	0.2	11.2
Imports					
- total	22.2	-1.0	8.5	13.1	21.6
- free trade	18.4	-1.0	5.1	13.1	17.8
- MFN	18.4	-1.0	5.1	13.1	17.8
- full tariff	28.3	-1.0	14.0	13.1	27.8
Employment					
-skilled	13.5	-1.9	8.8	5.6	11.8
-unskilled	13.6	-1.8	9.1	5.4	11.8
Price	1.9	0.4	1.2	0.3	2.4

Source: Ukraine model

The WTO membership of Ukraine will lead to growth of aggregate output in production of non-energy materials by 14.6% in medium-run and by 14.3% in long-run, primarily due to tariff reform. The latter will stimulate exports (+12.2%) and, to the lesser extent, domestic market supply (+8.6%). At the same time, improved market access of metallurgy – the primer consumer of non-energy materials sector – will stimulate domestic supply (+8.1%). As a result, overall domestic supply is expected to rise by 16.6% outperforming exports (+11.4%). Imports of the sector will increase by 22.2% due to both tariff reform and improved market access. Strong growth in production of non-energy materials will be reflected in sector's employment, first of all unskilled (+13.6%).

Food-processing industries (A07)

Table A07.1

Food-processing industries: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
3.3	18.7	29.4	51.9

Source: Ukraine model

Table A07.2

Food-processing industries: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
3.7	8.9	7.2	19.5

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A07.3

Food-processing industries: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	80% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A07.4

Food-processing industries: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-22.8	0.1	-19.8	-2.6	-19.6
- domestic supply	-24.7	0.2	-22.5	-1.8	-22.1
- exports	-15.2	-0.1	-9.0	-6.1	-9.4
Imports					
- total	174.2	1.3	158.5	8.9	167.9
- free trade	37.3	1.3	29.5	8.9	34.2
- MFN	197.1	1.3	180.0	8.9	190.3
- full tariff	305.0	1.3	281.8	8.9	295.7
Employment					
-skilled	-24.0	-0.7	-21.0	-1.9	-22.2
-unskilled	-24.0	-0.7	-20.8	-2.1	-22.2
Price	-3.5	0.2	-3.6	0.0	-3.6

Source: Ukraine model

Food-processing industries are expected to experience the largest drop in aggregate output due to the WTO accession, and mainly tariff reform. This is explained by sector's large initial tariff protection. Indeed, a 22.8% drop in sector's aggregate output in medium-term will be complemented by 174.2% growth in imports that creates severe competitive pressure on the food market. As a result, price for food products are expected to drop by 3.5%, contributing to households' welfare gains and development of sectors that use food products as inputs. It is expected that reduction in sector's output will be mirrored in decline of employment. Both skilled and unskilled employment will drop by 24.0%.

Textile and leather industry (A08)

Table A08.1

Textile and leather industry: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
1.4	20.9	32.8	46.3

Source: Ukraine model

Table A08.2

Textile and leather industry: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
5.7	67.1	3.6	62.7

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A08.3

Textile and leather industry: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	31% reduction in import tariffs*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A08.4

Textile and leather industry: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-5.1	-2.7	6.9	-9.5	-3.4
- domestic supply	-5.8	-3.1	7.8	-10.7	-3.9
- exports	-4.7	-2.5	6.3	-8.8	-3.2
Imports					
- total	1.1	0.7	0.2	0.4	2.7
- free trade	-3.0	0.7	-3.9	0.4	-1.5
- MFN	-0.8	0.7	-1.8	0.4	0.7
- full tariff	32.0	0.7	30.7	0.4	34.0
Employment					
-skilled	-6.0	-3.1	5.5	-8.9	-5.7
-unskilled	-5.9	-3.0	5.7	-9.1	-5.7
Price	0.6	0.1	1.0	-0.6	0.6

Source: Ukraine model

Aggregate output in textile and leather industry is expected to decline in medium-term perceptive (-5.1%). If capital adjusts to a new equilibrium (long-term perspective) the reduction of aggregate output in the sector will be somewhat lower (-3.4%). Expected considerable gains in aggregate output (+6.9%) due to tariff reform will be counterweighted by changes due to reform of FDI barriers and improved market access for agriculture, metallurgy, and chemical industry. Both domestic supply and exports are expected to deteriorate in medium-run, while imports grow (+1.1%) due to increased trade with countries that previously were under full tariff trade regime. It is anticipated that employment – primarily skilled employment - will decline by 6.0% flowing into more successful sectors.

Woodworking, pulp and paper industry, publishing (A09)

Table A09.1

Woodworking, pulp and paper industry, publishing: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
1.1	24.3	38.2	37.5

Source: Ukraine model

Table A09.2

Woodworking, pulp and paper industry, publishing: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
3.4	50.6	2.2	35.5

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A09.3

Woodworking, pulp and paper industry, publishing: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	97% reduction in import tariffs*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A09.4

Woodworking, pulp and paper industry, publishing: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-8.4	0.0	-0.2	-7.9	-8.0
- domestic supply	-10.6	0.1	-4.2	-6.5	-10.1
- exports	-4.3	-0.1	7.1	-10.5	-4.3
Imports					
- total	0.8	0.8	0.5	0.1	3.3
- free trade	-12.9	0.8	-13.2	0.1	-10.8
- MFN	5.0	0.8	4.7	0.1	7.5
- full tariff	28.4	0.8	28.0	0.1	31.5
Employment					
-skilled	-9.6	-0.7	-1.3	-7.4	-10.4
-unskilled	-9.5	-0.7	-1.1	-7.5	-10.4
Price	0.7	0.1	0.6	-0.2	0.5

Source: Ukraine model

Woodworking, pulp and paper industry, publishing is expected to be a net loser due to the WTO accession. Its aggregate output is expected to decline by 8.4% in medium-run and by 8.0% in long-run, mostly due to reduction in domestic supply provoked by tariff reform and drop in exports due to improved market access. At the same time, no significant simultaneous increase in imports is expected. Imports will rise moderate by 0.8% as declined imports from free trade will be counterbalanced by increased imports countries that were previously under MFN and full tariff trade regimes. Decline in sector's output will be mirrored in drop in employment, first of all skilled employment (-9.6%).

Manufacture of coke products (A10)

Table A10.1

Manufacture of coke products: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.2	33.3	52.3	14.3

Source: Ukraine model

Table A10.2

Manufacture of coke products: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.6	11.7	0.6	13.8

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A10.3

Manufacture of coke products: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	64% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A10.4

Manufacture of coke products: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	17.4	-1.0	8.6	8.6	16.3
- domestic supply	18.4	-1.0	8.7	9.4	17.5
- exports	11.1	-0.8	8.0	3.0	8.7
Imports					
- total	23.2	-1.2	9.4	13.4	23.5
- free trade	22.7	-1.2	8.9	13.4	23.0
- MFN	25.0	-1.2	10.9	13.4	25.3
- full tariff	42.7	-1.2	26.6	13.4	43.0
Employment					
-skilled	15.9	-2.0	7.9	8.9	14.0
-unskilled	15.9	-2.0	8.1	8.7	14.0
Price	2.6	0.3	2.0	0.3	3.4

Source: Ukraine model

Manufacture of coke products is expected to gain significantly due to the WTO accession, mostly due to tariff reform and improved market access. The sector's aggregate output will increase by 17.4% in medium-term perspective and by 16.3% in long-term perspective when capital is allowed to adjust. Increased output is explained by expansion of major consumers of sector's products, first of all metallurgy. Thus, domestic supply will expand the most (+18.4%), while exports growth will lag slightly behind (+11.1%). Also, we expect strong increases in imports (+23.2%). The expansion of the sector will translate into employment growth, which is expected for both skilled and unskilled employment to grow by 15.9%.

Petroleum refinement (A11)

Table A11.1

Petroleum refinement: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.6	19.4	30.5	50.1

Source: Ukraine model

Table A11.2

Petroleum refinement: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
2.7	14.8	4.9	32.4

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A11.3

Petroleum refinement: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	71% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A11.4

Petroleum refinement: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-0.5	0.7	-0.9	-0.3	1.9
- domestic supply	0.0	0.7	-1.1	0.4	2.3
- exports	-1.5	0.7	-0.5	-1.8	0.9
Imports					
- total	1.2	0.7	-1.1	1.6	3.5
- free trade	0.7	0.7	-1.6	1.6	3.0
- MFN	0.9	0.7	-1.4	1.6	3.2
- full tariff	1.9	0.7	-0.4	1.6	4.2
Employment					
-skilled	-1.6	0.2	-2.3	0.4	-0.8
-unskilled	-1.5	0.3	-2.1	0.2	-0.8
Price	1.8	0.3	1.7	-0.3	2.2

Source: Ukraine model

The WTO accession will cause a slight reduction of petroleum refinement aggregate output in medium term (-0.5%), while if capital is allowed to adjust aggregate output will rise by 1.9%. Reduction in aggregate output is explained by drop in exports (-1.5%), first of all due to revaluation pressure in improved market access scenario. At the same time, imports will slightly increase (+1.2% in medium term) thanks to reforms to FDI barriers and improved market access. Employment is anticipated to shrink and flowing into faster-growing sectors. In particular, skilled employment will decline by 1.6%, while unskilled – by 1.5%.

Manufacture of chemicals, rubber and plastic products (A12)

Table A12.1

Manufacture of chemicals, rubber and plastic products: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
1.6	22.1	34.8	43.1

Source: Ukraine model

Table A12.2

Manufacture of chemicals, rubber and plastic products: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
9.9	70.1	7.9	65.7

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A12.3

Manufacture of chemicals, rubber and plastic products: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	55% reduction in import tariffs*
Market access	prices received for exports to all trading regions will increase by 1%
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A12.4

Manufacture of chemicals, rubber and plastic products: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	20.1	-0.6	11.1	7.9	20.8
- domestic supply	11.4	-0.4	6.3	4.2	12.1
- exports	25.9	-0.7	13.6	11.0	26.6
Imports					
- total	2.4	0.4	1.0	0.9	3.9
- free trade	-3.5	0.4	-4.8	0.9	-2.1
- MFN	2.3	0.4	1.0	0.9	3.8
- full tariff	17.7	0.4	16.1	0.9	19.4
Employment					
-skilled	18.6	-1.3	9.7	8.6	17.6
-unskilled	18.7	-1.2	10.0	8.4	17.6
Price	1.3	0.1	1.2	-0.2	1.2

Source: Ukraine model

Manufacture of chemicals, rubber and plastic products will enjoy the second largest growth in aggregate output due the WTO accession after metallurgy. As estimated, its aggregate output will increase by 20.1% in medium-term and by 20.8% in long-term, due to both tariff reform and improved market access. The most of the gain is explained by strong export growth (+25.9%) against the background of very high export intensity of the sector. Change in domestic supply will also be high (+11.4%). At the same time, only very modest growth in imports is expected (+2.4%). The fast development of chemical industry will lead to increased sector's labour demand. It is expected that skilled employment will increase by 18.6% in medium-term horizon, while unskilled employment growth will be somewhat higher (+18.7%).

Manufacture of other non-metallic mineral products (A13)

Table A13.1

Manufacture of other non-metallic mineral products: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.8	29.4	46.2	24.4

Source: Ukraine model

Table A13.2

Manufacture of other non-metallic mineral products: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.9	13.5	0.9	19.2

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A13.3

Manufacture of other non-metallic mineral products: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	30% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A13.4

Manufacture of other non-metallic mineral products: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-2.9	0.1	-0.4	-2.7	-2.2
- domestic supply	-2.3	0.1	-0.7	-1.7	-1.4
- exports	-5.6	0.1	1.1	-6.9	-5.4
Imports					
- total	18.4	0.2	6.3	11.3	22.0
- free trade	13.0	0.2	1.5	11.3	16.5
- MFN	20.6	0.2	8.3	11.3	24.3
- full tariff	48.9	0.2	33.8	11.3	53.5
Employment					
-skilled	-3.9	-0.5	-1.2	-2.3	-4.1
-unskilled	-3.8	-0.4	-1.0	-2.5	-4.1
Price	1.2	0.2	1.2	-0.2	1.3

Source: Ukraine model

Due to the WTO accession aggregate output in manufacture of other non-metallic mineral products is expected to decline by 2.9% in medium-run and by 2.2% in long-run. The reduction is attributed to redistributive effects in the economy provoked by improved market access for agriculture, metallurgy and chemical industry. In particular, revaluation pressure will dampen sector's exports. At the same time, it is expected that imports in the sector will grow by 18.4% thanks to both tariff reform and especially improved market access, increasing competition and exhibiting further pressure on domestic producers. Reduction in sector's output result in drop in both skilled (-3.9%) and unskilled (-3.8%) employment.

Metallurgy and metal processing (A14)

Table A14.1

Metallurgy and metal processing: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
4.1	23.8	37.5	38.7

Source: Ukraine model

Table A14.2

Metallurgy and metal processing: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
7.2	58.3	29.3	77.2

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A14.3

Metallurgy and metal processing: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	65% reduction in import tariff*
Market access	prices received by Ukrainian exporters to the EU and North America will increase by 5%
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A14.4

Metallurgy and metal processing: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	23.1	-1.5	10.4	12.6	22.0
- domestic supply	16.2	-1.0	7.8	7.8	15.4
- exports	26.7	-1.6	11.2	15.3	25.6
Imports					
- total	7.2	1.0	5.2	1.2	8.0
- free trade	4.5	1.0	2.6	1.2	5.3
- MFN	10.3	1.0	8.3	1.2	11.2
- full tariff	26.0	1.0	23.7	1.2	27.0
Employment					
-skilled	21.8	-2.0	9.1	13.2	19.2
-unskilled	21.9	-1.9	9.4	13.0	19.2
Price	2.7	-0.2	1.3	1.4	2.8

Source: Ukraine model

Metallurgy is expected to be the sector that will benefit the most from Ukraine's WTO accession. Its aggregate output will increase by 23.1% in medium-term horizon and by 22.0% in long-term horizon because of both, tariff reform and improved market access. In particular, it was assumed that due to the WTO accession prices received by Ukrainian exporters to the EU and North America will increase by 5%. As a result, most of the increase in aggregate output is attributed to exports expansion (+26.7%), as this sector has the highest export intensity in industry (77.2%). Tariff reduction expected due to the WTO accession will lead to growth in sector's imports, with highest growth observed in trade with countries that currently face full tariff trade regime (+23.7%). However, as most of imports are traded under free trade and MFN regimes, the overall impact of tariff reform on imports will be lower (+5.2%). Strong performance of the sector is reflected in increased employment. It is expected that skilled employment will grow by 21.8%, and unskilled by 21.9% in medium-run.

Manufacture of machinery and equipment (A15)

Table A15.1

Manufacture of machinery and equipment: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
4.5	27.6	43.4	29.0

Source: Ukraine model

Table A15.2

Manufacture of machinery and equipment: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
19.2	58.0	12.3	56.0

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A15.3

Manufacture of machinery and equipment: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	56% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A15.4

Manufacture of machinery and equipment: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-14.5	4.6	1.8	-18.8	-14.8
- domestic supply	-13.3	3.4	-1.8	-13.9	-13.2
- exports	-15.5	5.7	4.6	-22.7	-16.2
Imports					
- total	5.0	-0.3	2.1	3.3	7.6
- free trade	-3.5	-0.3	-6.2	3.3	-1.1
- MFN	6.0	-0.3	3.0	3.3	8.6
- full tariff	24.4	-0.3	20.9	3.3	27.4
Employment					
-skilled	-15.8	3.5	0.8	-18.4	-17.1
-unskilled	-15.8	3.5	1.0	-18.5	-17.1
Price	0.0	0.2	0.3	-0.6	-0.3

Source: Ukraine model

For manufacture of machinery and equipment the total impact of WTO accession is expected to be negative, as the aggregate output in the sector will drop by 14.5% in medium-run and by 14.8% long-run. It is explained, first of all, by reduction of exports (-15.5%), while the domestic supply drop will be less significant (-13.3%). However, different policy changes are expected to have oppositely-directed impacts. In particular, both reform in FDI barriers and tariff reforms are expected to stimulate aggregate output boosting exports, while improved market access for selected sectors (agriculture, chemical industry and metallurgy) will considerable dampen sectoral development. The latter is explained by serious redistributive effects in the economy provoked by improved market access scenario as several 'winners' gain over labour force at the expense of other sectors. Also, improved market access will create revaluation pressure that adversely affects exports. In improved market access scenario, manufacture of machinery and equipment loses more than 18% of skilled and unskilled employees, and its exports decline by 22.7%.

Other production (A16)

Table A16.1

Other production: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.3	20.2	31.8	48.0

Source: Ukraine model

Table A16.2

Other production: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.6	14.7	1.9	48.2

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A16.3

Other production: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	68% reduction in import tariff*
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Note: *see details in Annex A

Table A16.4

Other production: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-0.7	3.1	5.0	-7.3	3.9
- domestic supply	0.6	1.6	1.6	-2.1	3.5
- exports	-2.1	4.7	8.8	-13.0	4.3
Imports					
- total	5.4	-0.3	0.5	5.0	6.1
- free trade	0.2	-0.3	-4.4	5.0	0.9
- MFN	5.2	-0.3	0.4	5.0	6.0
- full tariff	13.1	-0.3	7.9	5.0	13.9
Employment					
-skilled	-2.6	1.8	3.5	-6.6	0.1
-unskilled	-2.5	1.8	3.8	-6.8	0.1
Price	1.8	-0.1	0.7	1.0	1.7

Source: Ukraine model

The WTO accession is expected to cause a decline in aggregate output in 'other production' by 0.7% in medium-run and rise by 3.9% in long-run. While tariff reform and reform to FDI barriers will positively influence both domestic supply and exports, effects of improved market access will dominate and lead to negative growth in medium-term and declining exports (-13.0% due to improved market access only) against a background of high export intensity of the sector. It is explained by revaluation pressure and strong growth in production factors demand due to improved market access for selected export-oriented industries. At the same time, we expect 5.4% growth in sectors imports. Sector's decline explains reduction in both skilled (-2.6%) and unskilled (-2.5%) employment.

Electric energy and heat supply (A17)

Table A17.1

Electric energy and heat supply: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
5.1	16.3	25.7	58.0

Source: Ukraine model

Table A17.2

Electric energy and heat supply: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
	0.1	0.3	1.6

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A17.3

Electric energy and heat supply: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A17.4

Electric energy and heat supply: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	5.1	0.1	2.7	2.0	5.9
- domestic supply	5.2	0.1	2.7	2.0	5.9
- exports	1.8	-0.2	4.3	-2.7	3.1
Imports	7.3	0.3	1.7	5.0	7.6
Employment					
-skilled	3.7	-0.5	1.1	2.8	2.6
-unskilled	3.8	-0.4	1.3	2.6	2.6
Price	2.2	0.4	1.6	0.2	2.6

Source: Ukraine model

The WTO accession is expected to increase aggregate output in electric energy and heat supply by 5.1% in the medium-run. In the long run – when capital is allowed to adjust to a new equilibrium – the growth in sector will be 5.9%. Most of change is explained by domestic supply expansion (+5.2%), as sector's export intensity is very low. Still, tariff reform – that affects the sector most significantly – is expected to stimulate first of all exports (+4.3%), while improved market access – imports (+5.0%). Positive changes in aggregate output are reflected in sector's employment. It is expected that skilled employment will increase by 3.7% and unskilled by 3.8% in medium-term horizon.

Gas supply (A18)

Table A18.1

Gas supply: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.5	31.9	46.7	21.4

Source: Ukraine model

Table A18.2

Gas supply: structure of exports and Imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A18.3

Gas supply: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A18.4

Gas supply: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	6.7	0.1	3.3	2.7	7.3
- domestic supply	6.7	0.1	3.3	2.7	7.3
- exports					
Imports					
Employment					
-skilled	5.0	-1.1	2.5	3.2	4.5
-unskilled	5.0	-1.1	2.7	3.0	4.5
Price	2.0	0.1	1.8	-0.1	2.7

Source: Ukraine model

The WTO accession is expected to increase aggregate output in gas supply sector in Ukraine by 6.7% in medium-term and by 7.3% in long-term. Major changes will occur due to tariff reform and improved market access. Higher output will require more labour force. It is expected that sector's employment increase by 5.0% in medium-term horizon.

Water supply (A20)

Table A20.1

Water supply: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.3	33.0	48.4	18.7

Source: Ukraine model

Table A20.2

Water supply: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A20.3

Water supply: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A20.4

Water supply: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	2.2	0.3	1.2	0.6	3.0
- domestic supply	2.2	0.3	1.2	0.6	3.0
- exports					
Imports					
Employment					
-skilled	1.0	-0.5	0.5	1.0	1.0
-unskilled	1.1	-0.5	0.7	0.8	1.0
Price	2.3	0.4	1.7	0.1	2.9

Source: Ukraine model

As no direct policy changes are considered for water supply sector, expected increase in its aggregate output (+2.2% in medium-run) is explained by indirect influence of reforms in other sectors, in particular tariff reform. It is expected that high output will be mirrored in growth in sectors employments: +1.0% for skilled labour and 1.1% for unskilled.

Construction (A21)

Table A21.1

Construction: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
4.0	27.6	37.3	35.1

Source: Ukraine model

Table A21.2

Construction: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
1.1	5.7	0.1	0.8

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A21.3

Construction: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A21.4

Construction: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-0.1	0.0	0.1	-0.2	3.5
- domestic supply	0.0	0.0	0.1	-0.2	3.6
- exports	-2.9	0.0	2.2	-5.1	0.8
Imports	1.7	0.1	-1.2	2.9	5.2
Employment					
-skilled	-1.1	-0.5	-0.9	0.3	1.2
-unskilled	-1.0	-0.4	-0.7	0.1	1.2
Price	2.1	0.4	1.5	0.2	2.5

Source: Ukraine model

Only marginal reductions in construction aggregate output are expected due to the WTO accession of Ukraine in medium-run. In long-term horizon – after capital is allowed adjusting – aggregate output will increase by 3.5%, mostly due to growth in domestic supply. It is expected that other sectors will win over some of sector's employees in medium-run: -1.1% for skilled workers and -1.0% in unskilled.

Trade (A22)

Table A22.1

Trade: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
12.8	11.1	34.8	54.0

Source: Ukraine model

Table A22.2

Trade: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.1	0.1		

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A22.3

Trade: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A22.4

Trade: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	1.4	0.6	0.6	0.2	3.3
- domestic supply	1.4	0.6	0.6	0.2	3.3
- exports	0.5	2.2	3.6	-5.3	3.9
Imports	1.9	-0.3	-1.2	3.7	2.9
Employment					
-skilled	-0.7	-0.7	-0.9	1.0	-0.6
-unskilled	-0.6	-0.7	-0.7	0.8	-0.6
Price	1.7	0.0	1.3	0.4	1.9

Source: Ukraine model

Aggregate output in trade will increase by 1.4% in medium-term horizon and by 3.3% in long-term horizon due to the WTO accession, first of all due to higher domestic supply. While no direct changes in sector is considered, indirect influence of reform of FDI barriers and tariff reform explain most of the changes. It is expected that faster-growing sectors will gain over some of sector's employees, and that will result in 0.7% drop in skilled and 0.6% drop in unskilled employment in medium-run in trade.

Hotels and restaurants (A23)

Table A23.1

Hotels and restaurants: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.7	22.2	46.2	31.7

Source: Ukraine model

Table A23.2

Hotels and restaurants: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
1.6	58.5	1.4	59.2

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A23.3

Hotels and restaurants: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A23.4

Hotels and restaurants: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	14.5	1.0	27.2	-9.7	18.7
- domestic supply	6.9	1.3	10.4	-4.0	10.5
- exports	19.6	0.8	38.6	-13.6	24.3
Imports	-0.1	1.6	-3.7	2.2	3.0
Employment					
-skilled	13.2	0.4	26.0	-9.2	16.0
-unskilled	13.2	0.4	26.3	-9.4	16.0
Price	0.6	0.4	-0.1	0.1	1.0

Source: Ukraine model

Among the service sectors hotels and restaurants business will benefit the most from the WTO accession. It is expected that aggregate output in this sector will increase by 14.5% in medium-run and 18.7% in long-run, primarily due to tariff reform. Most of output increase is explained by rise in exports (+19.6%), while growth in domestic supply will be considerably lower (+6.9%), although still higher than in most of other sectors. The strong expansion of exports is due to both a high initial export intensity (59%) and reduction of intermediate inputs costs due to lower food prices. Such a strong sector expansion will lead to its increased demand for labour, resulted in boost in both skilled and unskilled employment in the sector (+13.2%).

Transport (A24)

Table A24.1

Transport: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
6.8	29.5	33.6	36.9

Source: Ukraine model

Table A24.2

Transport: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
2.7	11.9	1.4	7.0

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A24.3

Transport: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A24.4

Transport: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	1.3	1.1	0.8	-0.7	3.0
- domestic supply	1.5	1.2	0.7	-0.4	3.3
- exports	-2.6	0.6	2.0	-5.4	-1.9
Imports	2.6	1.2	0.2	1.3	4.4
Employment					
-skilled	0.1	0.5	-0.3	-0.2	0.5
-unskilled	0.1	0.5	-0.1	-0.3	0.5
Price	1.8	0.1	1.4	0.2	2.0

Source: Ukraine model

Although no direct policy changes in the transportation sector are expected due to Ukraine's WTO accession, changes in other sectors will translate into increased aggregate output in transportation by +1.3% in medium-term perspective and by +3.0% in long-term perspective, when capital is allowed to adjust to new equilibrium. Most of growth is explained by expansion of domestic supply (+1.5%), while exports will drop (-2.6%) as improved market access leads to revaluation pressure. Also, improved market access and reforms to FDI barriers will increase sector's imports (+2.6%). No significant changes in employment are expected.

Pipeline transit of oil and gas (A24P)

Table A24P.1

Pipeline transit of oil and gas: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
2.4	15.6	17.8	66.7

Source: Ukraine model

Table A24P.2

Pipeline transit of oil and gas: structure of exports and Iimports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
		13.5	111.4

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A24P.3

Pipeline transit of oil and gas: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A24P.4

Pipeline transit of oil and gas: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	0.3	2.3	1.1	-3.2	0.6
- domestic supply					
- exports	0.3	2.3	1.1	-3.2	0.6
Imports					
Employment					
-skilled	-2.0	1.3	0.3	-3.8	-3.2
-unskilled	-2.0	1.3	0.5	-3.9	-3.2
Price	1.5	0.3	1.9	-0.8	2.0

Source: Ukraine model

As pipeline transit is considerably different from other types of transportation services, we considered it as separate sector. It is expected that Ukraine's WTO accession will lead to 0.3% increase in sector's aggregate output in medium-run, and somewhat decline in employment (-2.0%). As no direct policy changes are modelled for the sector, changes are explained by structural adjustment in the economy after policy changes in other sectors.

Telecommunications (A25)

Table A25.1

Telecommunications: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
3.0	15.6	26.4	58.0

Source: Ukraine model

Table A25.2

Telecommunications: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.4	4.9	0.4	4.9

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A25.3

Telecommunications: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	67% reduction in tariff equivalent*

Source: Ukraine model

Note: *see details in Annex A

Table A25.4

Telecommunications: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	4.0	3.7	1.0	-0.6	7.8
- domestic supply	4.1	3.6	0.9	-0.3	7.8
- exports	2.9	5.0	4.4	-6.4	8.1
Imports	12.8	11.4	-0.1	1.5	16.3
Employment					
-skilled	2.5	2.9	-0.5	0.2	4.2
-unskilled	2.5	2.9	-0.3	0.0	4.2
Price	-2.3	-3.7	0.9	0.5	-3.3

Source: Ukraine model

Aggregate output in telecommunication will grow by 4.0% in medium-run and 7.8% in long-run thanks to the Ukraine's WTO accession, primarily due to elimination of barriers to FDI. It is presumed that elimination of discriminatory trade barriers in this sector will result in 67% drop in sector's tariff equivalent. As a result of this policy change only, aggregate output in the sector will grow by 3.7%, with primary growth in exports (+5.0%). However, the rise in cross-border exports of telecommunications should be interpreted with care since exports tend mainly to consist of interconnection services, for which demand can be expected to be rather inelastic. At the same time, we expect notable rise in imports (+11.4%). As a result, under reforms to FDI barrier scenario prices will reduce by 3.7%, benefiting both producers and final consumers. It will be especially valuable for urban households — main final consumers of sector's products — and will lead to gains in welfare. Positive developments will be mirrored in increased employment in the sector (+2.5% in medium-run).

Postal services (A25P)

Table A25P.1

Postal services: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.2	15.6	26.4	58.0

Source: Ukraine model

Table A25P.2

Postal services: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
	4.9		4.4

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A25P.3

Postal services: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A25P.4

Postal services: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	2.4	2.2	0.9	-0.6	6.1
- domestic supply	2.4	2.0	0.7	-0.3	5.9
- exports	2.5	4.7	4.5	-6.5	8.9
Imports	2.3	0.5	-1.5	3.6	4.2
Employment					
-skilled	0.0	0.6	-0.7	0.2	1.4
-unskilled	0.1	0.6	-0.5	0.0	1.4
Price	1.5	-0.1	1.2	0.5	1.5

Source: Ukraine model

Ukraine's WTO accession is expected to increase aggregate output in postal services by 2.4% in medium-term horizon and 6.1% in long-term horizon, due to increased domestic supply and exports. As no direct policy changes are modelled for this sector, changes result from indirect impact of policy changes in other sectors, especially positive impact of reforms to FDI barriers. No significant changes in employment are expected in the sector.

Financial intermediation (A26)

Table A26.1

Financial intermediation: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
2.6	6.8	34.5	58.7

Source: Ukraine model

Table A26.2

Financial intermediation: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
1.1	12.1	0.1	1.4

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A26.3

Financial intermediation: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	75% reduction in tariff equivalent*

Source: Ukraine model

Note: *see details in Annex A

Table A26.4

Financial intermediation: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	1.6	2.7	0.6	-1.5	3.9
- domestic supply	1.6	2.7	0.6	-1.5	3.9
- exports	2.3	5.8	4.0	-7.1	6.3
Imports	8.8	9.2	-0.5	0.5	10.5
Employment					
-skilled	0.5	2.4	-1.0	-0.8	0.9
-unskilled	0.6	2.4	-0.7	-0.9	0.9
Price	-5.7	-7.4	1.1	0.7	-6.1

Source: Ukraine model

Aggregate output in financial intermediation sector is expected to increase by 1.6% in medium-term and by 3.9% in long-term perspective as a result of the WTO accession. The major changes occur due to reform in FDI barriers. Ukraine's WTO accession is expected to eliminate discrimination in financial intermediation trade. We modelled this change as a 75% reduction in sector's tariff equivalent. Reform to FDI barriers only are expected to boost aggregate output in financial intermediation by +2.7%, primarily due to growth in exports (+5.8%). Liberalisation of services trade will cause also growth in imports (+9.2%), and lead to reduction in sector prices by 7.4%, allowing both cheaper inputs for producers and higher welfare gains for households, first of all urban and rural non-poor households who are major final consumers of financial services. Thanks to growth in aggregate output due to reforms of FDI barriers, we expected an increase in both skilled and unskilled employment in the sector.

Real estate transactions (A27)

Table A27.1

Real estate transactions: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
3.1	6.7	33.7	59.6

Source: Ukraine model

Table A27.2

Real estate transactions: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
	0.3	0.4	5.6

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A27.3

Real estate transactions: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A27.4

Real estate transactions: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	1.4	1.3	0.0	0.2	5.2
- domestic supply	1.6	1.3	-0.2	0.6	5.2
- exports	-1.1	1.5	3.1	-5.7	4.2
Imports	3.2	1.2	-2.1	4.5	5.8
Employment					
-skilled	-0.2	0.4	-1.6	1.0	1.5
-unskilled	-0.2	0.4	-1.4	0.9	1.5
Price	2.1	0.3	1.2	0.5	2.2

Source: Ukraine model

Real estate transactions will benefit from Ukraine's WTO accession, as the aggregate output grows by 1.4% in medium-run and by 5.2% in long-run, when capital adjusts. While domestic output will expand (+1.6%), exports is expected to decline by 1.1% The most significant positive impact will come from reform to FDI services, as prices for financial intermediation drops and incomes of urban households that consume approximately half of sector's services grow.

Renting (A28)

Table A28.1

Renting: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.2	5.5	27.7	66.8

Source: Ukraine model

Table A28.2

Renting: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
	2.2		7.5

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A28.3

Renting: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A28.4

Renting: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-0.8	0.9	-0.4	-1.2	1.3
- domestic supply	-0.6	1.0	-0.8	-0.8	1.3
- exports	-3.2	0.3	3.6	-7.0	1.5
Imports	0.9	1.4	-3.3	3.2	1.2
Employment					
-skilled	-2.2	0.4	-2.1	-0.4	-2.1
-unskilled	-2.1	0.4	-1.9	-0.6	-2.1
Price	2.0	0.5	1.0	0.5	2.0

Source: Ukraine model

Aggregate output in renting is expected to reduce somewhat (-0.8%) due to Ukraine's WTO accession in medium-run, while in long-run perspective – after capital adjustment – sector's output is expected to rise by +1.3%, first of all thanks to exports growth. While no direct policy changes in the sector are expected, reform of FDI barriers is expected to have largest positive effect on aggregate output counterweighted by improved market access. Considerable labour reduction effect of Ukraine's WTO accession – especially skilled labour reduction (-2.2%) – is expected, as employees move to faster-growing sectors.

Informatisation activities (A29)

Table A29.1

Informatisation activities: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.4	7.8	39.6	52.6

Source: Ukraine model

Table A29.2

Informatisation activities: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.3	24.4	0.3	23.2

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A29.3

Informatisation activities: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A29.4

Informatisation activities: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-0.2	1.3	1.4	-2.7	3.3
- domestic supply	0.3	1.4	0.3	-1.3	3.4
- exports	-1.9	0.8	5.1	-7.6	3.0
Imports	0.9	1.4	-1.3	1.1	2.9
Employment					
-skilled	-1.5	0.7	0.0	-2.0	0.2
-unskilled	-1.5	0.7	0.2	-2.2	0.2
Price	1.7	0.0	1.1	0.5	1.1

Source: Ukraine model

Aggregate output in informatisation activities is expected to reduce by 0.2% in medium-term horizon, while rise by +3.3% in long-term horizon as a result of Ukraine's WTO accession. The decline is explained by strong impact of changed market access that causes the exchange rate to revalue and thus adversely affects exports. At the same time, both reforms to FDI barriers and tariffs are expected to positively influence output, including domestic supply and exports. Imports are expected to increase by 0.9% due to reforms to FDI barriers and improved market access. Reallocation of production factors in the economy provoked by improved market access will cause a 1.5% reduction of sector employment in medium-run.

Research and development (A30)

Table A30.1

Research and development: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
1.0	10.4	52.5	37.1

Source: Ukraine model

Table A30.2

Research and development: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
2.2	44.1	0.4	12.7

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A30.3

Research and development: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A30.4

Research and development: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-2.3	0.4	0.7	-3.4	-1.5
- domestic supply	-1.8	0.5	0.5	-2.8	-1.0
- exports	-5.5	-0.2	2.3	-7.8	-5.1
Imports	0.5	0.9	-0.6	0.4	1.5
Employment					
-skilled	-3.3	-0.1	-0.3	-2.8	-3.8
-unskilled	-3.2	-0.1	-0.1	-3.0	-3.8
Price	2.0	0.4	1.7	-0.2	2.5

Source: Ukraine model

As no direct policy change due to Ukraine's WTO accession is considered for research and development sector, all changes are attributed to indirect influences of policy changes. It is expected that sector's output will decrease by 2.3% in medium-run and by 1.5% in long-run. It is explained by strong redistributive effect of improved market access scenario, national currency revaluation (and thus drop in exports) and labour force reallocation. At the same time, both reform in FDI barriers and tariff reform will have positive impact on sector's output. As domestic supply will decline less than exports, the sector will become even more domestic-market-oriented. Also, imports will grow (+0.5%) further increasing import intensity of the sector. Reallocation of labour in the economy will concern also R&D sector, as it expected to lose 3.3% of its skilled employees and 3.2% of unskilled in medium-term.

Services to legal entities (A31)

Table A31.1

Services to legal entities: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
2.9	7.1	35.9	57.0

Source: Ukraine model

Table A31.2

Services to legal entities: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.9	11.4	0.3	3.9

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A31.3

Services to legal entities: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A31.4

Services to legal entities: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-1.8	1.1	-0.1	-2.6	0.2
- domestic supply	-1.7	1.1	-0.2	-2.4	0.3
- exports	-4.9	0.5	3.0	-8.2	-1.4
Imports	0.2	1.5	-2.1	1.3	1.3
Employment					
-skilled	-3.1	0.5	-1.6	-1.9	-2.9
-unskilled	-3.1	0.5	-1.4	-2.0	-2.9
Price	2.1	0.5	1.3	0.3	2.3

Source: Ukraine model

Due to WTO accession aggregate output in services to legal entities is expected to decline by 1.8% in medium-term. In long-term horizon – if capital is allowed adjusting – the output will grow by 0.2% due to reform in FDI barriers and, thus, lower prices on services used as inputs (in particular, telecommunications and financial intermediation). It is expected that tariff reform and associated intensification of trade will stimulate sector's exports, while reform in FDI barriers – sector's domestic supply and imports. Employment – including more valuable skilled employment – is expected to decline in services to legal entities by 3.1% as employees will be gained over by faster-growing sectors.

Public administration (A32)

Table A32.1

Public administration: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
4.7	14.4	73.2	12.3

Source: Ukraine model

Table A32.2

Public administration: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
1.4	9.7		0.3

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A32.3

Public administration: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A32.4

Public administration: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	-0.4	0.0	-0.3	-0.2	-0.5
- domestic supply	-0.4	0.0	-0.3	-0.2	-0.5
- exports	-4.8	-1.1	-0.3	-3.8	-7.5
Imports	2.4	0.7	-0.3	2.1	4.0
Employment					
-skilled	-1.0	-0.3	-0.8	0.1	-1.7
-unskilled	-1.0	-0.3	-0.6	-0.1	-1.7
Price	2.4	0.6	1.9	-0.1	3.4

Source: Ukraine model

No specific policy changes are modelled for the public administration sector due to the WTO accession. Thus, all changes in sector's performance indicators are explained by indirect impact of policy changes that cause structural adjustment in the economy. In particular, it is expected that it will be minor reduction in public administration aggregate output (-0.4% in medium-term and –0.5% in long-term perspective), mainly due to tariff reform. Lower output is associated with drop in sector's employment by -1.0% in medium-term.

Education (A33)

Table A33.1

Education: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
5.7	12.3	62.4	25.3

Source: Ukraine model

Table A33.2

Education: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.1	1.1	0.1	0.8

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A33.3

Education: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A33.4

Education: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	0.3	0.2	0.0	0.1	1.1
- domestic supply	0.4	0.2	0.0	0.2	1.2
- exports	-4.5	-1.7	0.9	-4.1	-5.9
Imports	3.4	1.4	-0.6	2.8	5.7
Employment					
-skilled	-0.2	0.0	-0.7	0.5	-0.2
-unskilled	-0.1	0.1	-0.5	0.3	-0.2
Price	2.5	0.7	1.7	0.1	3.5

Source: Ukraine model

As no direct impact of Ukraine's WTO accession on education is considered, all changes result from indirect impact of policy changes. We expect only marginal changes in education sector aggregate output (+0.3%) in medium-term horizon and somewhat larger growth in long-term (+1.1%). Education will become even more domestic-market-oriented, as growth in domestic supply (+0.3%) will be accompanied by drop in exports (-4.5%). Most of changes are associated with reform to FDI barriers and improved market access. It is expected that sector's employment – especially skilled employment - will decline (-0.2%) as employees will be gained over by faster-growing sectors in both industry and services.

Health care and social assistance (A34)

Table A34.1

Health care and social assistance: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
3.1	12.1	61.5	26.4

Source: Ukraine model

Table A34.2

Health care and social assistance: structure of exports and imports

Imports		exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
0.1	1.1	0.1	0.9

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A34.3

Health care and social assistance: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A34.4

Health care and social assistance: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	0.8	0.4	0.2	0.2	1.8
- domestic supply	0.8	0.4	0.2	0.2	1.9
- exports	-2.3	-0.9	2.3	-3.8	-2.6
Imports	2.7	1.2	-1.0	2.8	4.6
Employment					
-skilled	0.1	0.1	-0.6	0.6	0.3
-unskilled	0.2	0.1	-0.3	0.4	0.3
Price	2.1	0.6	1.5	0.0	2.9

Source: Ukraine model

In health care and social assistance an 0.8% rise in aggregate output is expected in the medium-term and an 1.8% increase in long-term. Growth is caused by a rise in domestic supply, while the already tiny exports will further drop (-2.3%). At the same time, an 2.7% rise in imports is expected. As no direct policy changes due to WTO accession are considered for this sector, observed growth is attributed to indirect impacts. For aggregate output, nearly half of changes can be attributed to reform in FDI barriers (+0.4%), associated with increased income of non-poor urban and rural households who are main consumers of sector's services. Yet other positive impacts result from tariff reform due to drop in food prices, important input for health care and social assistance production.

Sewage, cleaning of streets and refuse disposal (A35)

Table A35.1

Sewage, cleaning of streets and refuse disposal: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.4	11.4	57.8	30.8

Source: Ukraine model

Table A35.2

Sewage, cleaning of streets and refuse disposal: structure of exports and imports

Imports		exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
-	-	-	-

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A35.3

Sewage, cleaning of streets and refuse disposal: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A35.4

Sewage, cleaning of streets and refuse disposal: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	1.4	1.1	0.1	0.2	4.1
- domestic supply	1.4	1.1	0.1	0.2	4.1
- exports					
Imports					
Employment					
-skilled	0.4	0.6	-0.8	0.7	2.0
-unskilled	0.5	0.7	-0.5	0.5	2.0
Price	2.3	0.5	1.7	0.1	3.0

Source: Ukraine model

Aggregate output in sewage, cleaning of streets and refuse disposal will increase by 1.4% in medium-term horizon and by 4.1% in long-term horizon in parallel with growth of domestic supply. Most of the changes are explained by indirect influence of reform to FDI barriers, in particular increased demand for these services from urban households as their income grow. No significant changes in employment are expected in the sector due to the WTO accession.

Social activities (A36)

Table A36.1

Social activities: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.3	15.6	78.9	5.5

Source: Ukraine model

Table A36.2

Social activities: structure of exports and imports

Imports		exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
-	-	-	-

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A36.3

Social activities: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A36.4

Social activities: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	2.4	1.7	-0.5	1.4	6.0
- domestic supply	2.4	1.7	-0.5	1.4	6.0
- exports					
Imports					
Employment					
-skilled	1.8	1.2	-0.9	1.6	4.8
-unskilled	1.8	1.2	-0.7	1.4	4.8
Price	2.7	0.6	2.2	-0.1	4.0

Source: Ukraine model

Social activities aggregate output will increase by 2.4% in medium-term horizon and by 6.0% in long-term horizon in parallel with growth of domestic supply. Most of the changes are explained by indirect influence of reform to FDI barriers. Increase in urban and rural non-poor households' income stimulated by this reform will allow the expansion of social activities, as these households' are primary recipients of services provided by sector. It is expected that both skilled and unskilled employment will growth by approximately 1.8% in medium-term. In long-term, after capital is allowed to adjust to policy shock, we expected 4.8% rise in number of both skilled and unskilled workers in social activities.

Recreational, entertainment, cultural and sporting activities (A37)

Table A37.1

Recreational, entertainment, cultural and sporting activities: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.7	10.6	53.5	35.9

Source: Ukraine model

Table A37.2

Recreational, entertainment, cultural and sporting activities: structure of exports and imports

Imports		exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
	0.6		0.5

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A37.3

Recreational, entertainment, cultural and sporting activities: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A37.4

Recreational, entertainment, cultural and sporting activities: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	1.4	1.1	0.3	0.2	3.9
- domestic supply	1.5	1.1	0.3	0.2	3.9
- exports	-1.7	0.9	2.0	-4.7	0.5
Imports	3.4	1.2	-0.7	3.2	6.1
Employment					
-skilled	0.1	0.3	-0.8	0.7	1.2
-unskilled	0.2	0.4	-0.6	0.5	1.2
Price	2.2	0.4	1.5	0.2	2.7

Source: Ukraine model

Aggregate output will increase by 1.4% in medium-term horizon and by 3.9% in long-term horizon in recreational, entertainment, cultural and sporting activities. As no direct policy shocks are modelled for these activities, all changes are explained by adjustments of the economy's structure after the WTO accession. The most significant impact on the sector will come from reform of FDI barriers that explains more than two third of medium-term change in aggregate output. The positive impact could be partially attributed to reduction of service prices due to the reform. Another factor that contributed to sector's development is an increase in urban households' income as urban households are key consumers of sector products. It is expected that imports will increase due to the WTO accession (+3.4%). For exports, both tariff reform and reform of FDI barriers will be beneficial, however the net result will be affected by drop in exports in improved market access scenario leading to general reduction of exports (-1.7%). No significant changes in sector's employment are foreseen.

Other activities (A38)

Table A38.1

Other activities: structure of value added

Share of total value added [%]	Factor shares as percent of value added		
	Unskilled labour [%]	Skilled labour [%]	Capital [%]
0.3	6.6	33.7	59.7

Source: Ukraine model

Table A38.2

Other activities: structure of exports and imports

Imports		Exports	
Share [%]	Intensity [%]	Share [%]	Intensity [%]
-	-	-	0.1

Source: Ukraine model

Technical note:

share is the fraction of e.g. exports of agriculture in total exports (they add up to almost one hundred per cent)

intensity is the share of exports in total output by sector or imports in total consumption by commodity

Table A38.3

Other activities: policy changes due to the WTO accession

Scenario	Policy change
Import tariffs:	no change
Market access	no change
FDI barrier in services	no change

Source: Ukraine model

Table A38.4

Other activities: impact assessment of the WTO membership (percentage change)

	WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state
-1-	-2-	-3-	-4-	-5-	-6-
Output:					
- total	1.6	1.6	0.4	-0.2	5.1
- domestic supply	1.6	1.6	0.3	-0.2	5.1
- exports	-1.3	0.9	3.7	-5.7	4.1
Imports					
Employment					
-skilled	0.3	1.0	-1.2	0.7	1.8
-unskilled	0.4	1.1	-1.0	0.5	1.8
Price	2.1	0.5	1.2	0.4	2.2

Source: Ukraine model

It is estimated that 'other activities' aggregate output will increase by 1.6% due to WTO accession in medium-term horizon and by 5.1% in long-term horizon, when capital adjusts. As no direct policy changes due to WTO accession are considered for this sector, observed growth is attributed to indirect impacts, first of all, to reform of FDI barriers. The latter will bring an 1.6% increase in aggregate output, directed to domestic supply in the first place. Such a strong impact of reform to FDI barriers could be explained by reduction of service prices (in particular, telecommunication and financial intermediation), which are important inputs to the sector. The other important factor for growth is increase in income of and thus demand by urban households, the major consumers of sector's output. It is expected that employment will somewhat increase in the sector in medium-term perspective: +0.3% of skilled workers and +0.4% of unskilled will be hired.

Annex C. Tables

Table C1

Percentage change in aggregate output

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Agriculture, hunting	a01	-2.4	0.1	-6.1	3.6	1.5
Forestry	a02	-2.6	-0.7	1.7	-3.7	-1.6
Fishery	a03	-18.5	0.5	-17.0	-2.2	-17.0
Coal and peat	a04	11.3	-0.5	5.8	5.3	10.9
Hydrocarbons	a05	0.3	0.3	0.1	-0.2	0.2
Non-energy materials	a06	14.6	-1.4	10.0	5.1	14.3
Food-processing	a07	-22.8	0.1	-19.8	-2.6	-19.6
Textile and leather	a08	-5.1	-2.7	6.9	-9.5	-3.4
Wood working, pulp and paper industry, publishing	a09	-8.4	0.0	-0.2	-7.9	-8.0
Coke products	a10	17.4	-1.0	8.6	8.6	16.3
Petroleum refinement	a11	-0.5	0.7	-0.9	-0.3	1.9
Chemicals, rubber and plastic products	a12	20.1	-0.6	11.1	7.9	20.8
Other non-metallic mineral products	a13	-2.9	0.1	-0.4	-2.7	-2.2
Metallurgy and metal processing	a14	23.1	-1.5	10.4	12.6	22.0
Machinery and equipment	a15	-14.5	4.6	1.8	-18.8	-14.8
Other production	a16	-0.7	3.1	5.0	-7.3	3.9
Electric energy and heat supply	a17	5.1	0.1	2.7	2.0	5.9
Gas supply	a18	6.7	0.1	3.3	2.7	7.3
Water supply	a20	2.2	0.3	1.2	0.6	3.0
Construction	a21	-0.1	0.0	0.1	-0.2	3.5
Trade	a22	1.4	0.6	0.6	0.2	3.3
Hotels and restaurants	a23	14.5	1.0	27.2	-9.7	18.7
Transport	a24	1.3	1.1	0.8	-0.7	3.0
Pipeline transit of oil and gas	a24P	0.3	2.3	1.1	-3.2	0.6
Telecommunication	a25	4.0	3.7	1.0	-0.6	7.8
Postal services	a25P	2.4	2.2	0.9	-0.6	6.1
Financial intermediation	a26	1.6	2.7	0.6	-1.5	3.9
Real estate transactions	a27	1.4	1.3	0.0	0.2	5.2
Renting	a28	-0.8	0.9	-0.4	-1.2	1.3
Informatisation activities	a29	-0.2	1.3	1.4	-2.7	3.3
Research and development	a30	-2.3	0.4	0.7	-3.4	-1.5
Services to legal entities	a31	-1.8	1.1	-0.1	-2.6	0.2
Public administration	a32	-0.4	0.0	-0.3	-0.2	-0.5
Education	a33	0.3	0.2	0.0	0.1	1.1
Health care and social assistance	a34	0.8	0.4	0.2	0.2	1.8
Sewage, cleaning of streets and refuse disposal	a35	1.4	1.1	0.1	0.2	4.1
Social activities	a36	2.4	1.7	-0.5	1.4	6.0
Recreational, entertainment, cultural and sporting activities	a37	1.4	1.1	0.3	0.2	3.9
Other activities	a38	1.6	1.6	0.4	-0.2	5.1

Source: Ukraine model

Table C2

Percentage change in domestic supply

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Agriculture, hunting	a01	-6.1	0.2	-6.9	0.8	-3.0
Forestry	a02	-0.9	-0.1	0.7	-1.6	0.1
Fishery	a03	-18.8	0.5	-17.9	-1.6	-17.3
Coal and peat	a04	11.6	-0.5	5.8	5.5	11.3
Hydrocarbons	a05	1.8	0.3	0.8	0.5	2.0
Non-energy materials	a06	16.6	-1.3	8.6	8.1	16.2
Food-processing	a07	-24.7	0.2	-22.5	-1.8	-22.1
Textile and leather	a08	-5.8	-3.1	7.8	-10.7	-3.9
Wood working, pulp and paper industry, publishing	a09	-10.6	0.1	-4.2	-6.5	-10.1
Coke products	a10	18.4	-1.0	8.7	9.4	17.5
Petroleum refinement	a11	0.0	0.7	-1.1	0.4	2.3
Chemicals, rubber and plastic products	a12	11.4	-0.4	6.3	4.2	12.1
Other non-metallic mineral products	a13	-2.3	0.1	-0.7	-1.7	-1.4
Metallurgy and metal processing	a14	16.2	-1.0	7.8	7.8	15.4
Machinery and equipment	a15	-13.3	3.4	-1.8	-13.9	-13.2
Other production	a16	0.6	1.6	1.6	-2.1	3.5
Electric energy and heat supply	a17	5.2	0.1	2.7	2.0	5.9
Gas supply	a18	6.7	0.1	3.3	2.7	7.3
Water supply	a20	2.2	0.3	1.2	0.6	3.0
Construction	a21	0.0	0.0	0.1	-0.2	3.6
Trade	a22	1.4	0.6	0.6	0.2	3.3
Hotels and restaurants	a23	6.9	1.3	10.4	-4.0	10.5
Transport	a24	1.5	1.2	0.7	-0.4	3.3
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	4.1	3.6	0.9	-0.3	7.8
Postal services	a25P	2.4	2.0	0.7	-0.3	5.9
Financial intermediation	a26	1.6	2.7	0.6	-1.5	3.9
Real estate transactions	a27	1.6	1.3	-0.2	0.6	5.2
Renting	a28	-0.6	1.0	-0.8	-0.8	1.3
Informatisation activities	a29	0.3	1.4	0.3	-1.3	3.4
Research and development	a30	-1.8	0.5	0.5	-2.8	-1.0
Services to legal entities	a31	-1.7	1.1	-0.2	-2.4	0.3
Public administration	a32	-0.4	0.0	-0.3	-0.2	-0.5
Education	a33	0.4	0.2	0.0	0.2	1.2
Health care and social assistance	a34	0.8	0.4	0.2	0.2	1.9
Sewage, cleaning of streets and refuse disposal	a35	1.4	1.1	0.1	0.2	4.1
Social activities	a36	2.4	1.7	-0.5	1.4	6.0
Recreational, entertainment, cultural and sporting activities	a37	1.5	1.1	0.3	0.2	3.9
Other activities	a38	1.6	1.6	0.3	-0.2	5.1

Source: Ukraine model

Table C3

Percentage change in exports

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Agriculture, hunting	a01	31.9	-0.9	0.2	31.9	43.5
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.5	0.4	-11.8	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.3	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	26.7	-1.6	11.2	15.3	25.6
Machinery and equipment	a15	-15.5	5.7	4.6	-22.7	-16.2
Other production	a16	-2.1	4.7	8.8	-13.0	4.3
Electric energy and heat supply	a17	1.8	-0.2	4.3	-2.7	3.1
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.6	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.9
Pipeline transit of oil and gas	a24P	0.3	2.3	1.1	-3.2	0.6
Telecommunication	a25	2.9	5.0	4.4	-6.4	8.1
Postal services	a25P	2.5	4.7	4.5	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.2
Renting	a28	-3.2	0.3	3.6	-7.0	1.5
Informatisation activities	a29	-1.9	0.8	5.1	-7.6	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.9	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.3	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.3	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C4

Percentage change in imports

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Agriculture, hunting	a01	18.5	0.9	15.4	2.2	18.5
Forestry	a02	3.7	1.1	-0.3	3.1	4.6
Fishery	a03	11.9	0.6	10.2	1.1	13.7
Coal and peat	a04	16.5	-0.5	6.6	9.2	17.4
Hydrocarbons	a05	5.5	0.3	2.6	2.1	6.8
Non-energy materials	a06	22.2	-1.0	8.5	13.1	21.6
Food-processing	a07	174.2	1.3	158.5	8.9	167.9
Textile and leather	a08	1.1	0.7	0.2	0.4	2.7
Wood working, pulp and paper industry, publishing	a09	0.8	0.8	0.5	0.1	3.3
Coke products	a10	23.2	-1.2	9.4	13.4	23.5
Petroleum refinement	a11	1.2	0.7	-1.1	1.6	3.5
Chemicals, rubber and plastic products	a12	2.4	0.4	1.0	0.9	3.9
Other non-metallic mineral products	a13	18.4	0.2	6.3	11.3	22.0
Metallurgy and metal processing	a14	7.2	1.0	5.2	1.2	8.0
Machinery and equipment	a15	5.0	-0.3	2.1	3.3	7.6
Other production	a16	5.4	-0.3	0.5	5.0	6.1
Electric energy and heat supply	a17	7.3	0.3	1.7	5.0	7.6
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.2	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	-0.1	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.2	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.3
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.2	1.2	-2.1	4.5	5.8
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	0.9	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.4	1.4	-0.6	2.8	5.7
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.4	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C5

Percentage change in skilled employment

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Agriculture, hunting	a01	-3.8	-0.3	-8.1	4.8	-2.4
Forestry	a02	-3.6	-1.0	0.4	-3.0	-4.0
Fishery	a03	-19.4	-0.1	-18.0	-1.6	-19.0
Coal and peat	a04	12.2	-1.1	6.2	6.2	11.3
Hydrocarbons	a05	-0.6	-0.4	0.0	-0.5	-1.8
Non-energy materials	a06	13.5	-1.9	8.8	5.6	11.8
Food-processing	a07	-24.0	-0.7	-21.0	-1.9	-22.2
Textile and leather	a08	-6.0	-3.1	5.5	-8.9	-5.7
Wood working, pulp and paper industry, publishing	a09	-9.6	-0.7	-1.3	-7.4	-10.4
Coke products	a10	15.9	-2.0	7.9	8.9	14.0
Petroleum refinement	a11	-1.6	0.2	-2.3	0.4	-0.8
Chemicals, rubber and plastic products	a12	18.6	-1.3	9.7	8.6	17.6
Other non-metallic mineral products	a13	-3.9	-0.5	-1.2	-2.3	-4.1
Metallurgy and metal processing	a14	21.8	-2.0	9.1	13.2	19.2
Machinery and equipment	a15	-15.8	3.5	0.8	-18.4	-17.1
Other production	a16	-2.6	1.8	3.5	-6.6	0.1
Electric energy and heat supply	a17	3.7	-0.5	1.1	2.8	2.6
Gas supply	a18	5.0	-1.1	2.5	3.2	4.5
Water supply	a20	1.0	-0.5	0.5	1.0	1.0
Construction	a21	-1.1	-0.5	-0.9	0.3	1.2
Trade	a22	-0.7	-0.7	-0.9	1.0	-0.6
Hotels and restaurants	a23	13.2	0.4	26.0	-9.2	16.0
Transport	a24	0.1	0.5	-0.3	-0.2	0.5
Pipeline transit of oil and gas	a24P	-2.0	1.3	0.3	-3.8	-3.2
Telecommunication	a25	2.5	2.9	-0.5	0.2	4.2
Postal services	a25P	0.0	0.6	-0.7	0.2	1.4
Financial intermediation	a26	0.5	2.4	-1.0	-0.8	0.9
Real estate transactions	a27	-0.2	0.4	-1.6	1.0	1.5
Renting	a28	-2.2	0.4	-2.1	-0.4	-2.1
Informatisation activities	a29	-1.5	0.7	0.0	-2.0	0.2
Research and development	a30	-3.3	-0.1	-0.3	-2.8	-3.8
Services to legal entities	a31	-3.1	0.5	-1.6	-1.9	-2.9
Public administration	a32	-1.0	-0.3	-0.8	0.1	-1.7
Education	a33	-0.2	0.0	-0.7	0.5	-0.2
Health care and social assistance	a34	0.1	0.1	-0.6	0.6	0.3
Sewage, cleaning of streets and refuse disposal	a35	0.4	0.6	-0.8	0.7	2.0
Social activities	a36	1.8	1.2	-0.9	1.6	4.8
Recreational, entertainment, cultural and sporting activities	a37	0.1	0.3	-0.8	0.7	1.2
Other activities	a38	0.3	1.0	-1.2	0.7	1.8

Source: Ukraine model

Table C6

Percentage change in unskilled employment

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Agriculture, hunting	a01	-3.8	-0.3	-7.9	4.6	-2.4
Forestry	a02	-3.5	-1.0	0.6	-3.2	-4.0
Fishery	a03	-19.4	-0.1	-17.8	-1.8	-19.0
Coal and peat	a04	12.2	-1.0	6.4	6.0	11.3
Hydrocarbons	a05	-0.6	-0.3	0.2	-0.7	-1.8
Non-energy materials	a06	13.6	-1.8	9.1	5.4	11.8
Food-processing	a07	-24.0	-0.7	-20.8	-2.1	-22.2
Textile and leather	a08	-5.9	-3.0	5.7	-9.1	-5.7
Wood working, pulp and paper industry, publishing	a09	-9.5	-0.7	-1.1	-7.5	-10.4
Coke products	a10	15.9	-2.0	8.1	8.7	14.0
Petroleum refinement	a11	-1.5	0.3	-2.1	0.2	-0.8
Chemicals, rubber and plastic products	a12	18.7	-1.2	10.0	8.4	17.6
Other non-metallic mineral products	a13	-3.8	-0.4	-1.0	-2.5	-4.1
Metallurgy and metal processing	a14	21.9	-1.9	9.4	13.0	19.2
Machinery and equipment	a15	-15.8	3.5	1.0	-18.5	-17.1
Other production	a16	-2.5	1.8	3.8	-6.8	0.1
Electric energy and heat supply	a17	3.8	-0.4	1.3	2.6	2.6
Gas supply	a18	5.0	-1.1	2.7	3.0	4.5
Water supply	a20	1.1	-0.5	0.7	0.8	1.0
Construction	a21	-1.0	-0.4	-0.7	0.1	1.2
Trade	a22	-0.6	-0.7	-0.7	0.8	-0.6
Hotels and restaurants	a23	13.2	0.4	26.3	-9.4	16.0
Transport	a24	0.1	0.5	-0.1	-0.3	0.5
Pipeline transit of oil and gas	a24P	-2.0	1.3	0.5	-3.9	-3.2
Telecommunication	a25	2.5	2.9	-0.3	0.0	4.2
Postal services	a25P	0.1	0.6	-0.5	0.0	1.4
Financial intermediation	a26	0.6	2.4	-0.7	-0.9	0.9
Real estate transactions	a27	-0.2	0.4	-1.4	0.9	1.5
Renting	a28	-2.1	0.4	-1.9	-0.6	-2.1
Informatisation activities	a29	-1.5	0.7	0.2	-2.2	0.2
Research and development	a30	-3.2	-0.1	-0.1	-3.0	-3.8
Services to legal entities	a31	-3.1	0.5	-1.4	-2.0	-2.9
Public administration	a32	-1.0	-0.3	-0.6	-0.1	-1.7
Education	a33	-0.1	0.1	-0.5	0.3	-0.2
Health care and social assistance	a34	0.2	0.1	-0.3	0.4	0.3
Sewage, cleaning of streets and refuse disposal	a35	0.5	0.7	-0.5	0.5	2.0
Social activities	a36	1.8	1.2	-0.7	1.4	4.8
Recreational, entertainment, cultural and sporting activities	a37	0.2	0.4	-0.6	0.5	1.2
Other activities	a38	0.4	1.1	-1.0	0.5	1.8

Source: Ukraine model

Table C7

Percentage change in price (net of VAT)

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Agriculture, hunting	a01	0.6	0.5	0.3	-0.3	0.1
Forestry	a02	2.5	0.7	1.3	0.6	3.0
Fishery	a03	-5.6	0.3	-5.6	-0.4	-5.2
Coal and peat	a04	2.7	0.3	2.0	0.3	3.5
Hydrocarbons	a05	1.7	0.3	1.9	-0.7	2.2
Non-energy materials	a06	1.9	0.4	1.2	0.3	2.4
Food-processing	a07	-3.5	0.2	-3.6	0.0	-3.6
Textile and leather	a08	0.6	0.1	1.0	-0.6	0.6
Wood working, pulp and paper industry, publishing	a09	0.7	0.1	0.6	-0.2	0.5
Coke products	a10	2.6	0.3	2.0	0.3	3.4
Petroleum refinement	a11	1.8	0.3	1.7	-0.3	2.2
Chemicals, rubber and plastic products	a12	1.3	0.1	1.2	-0.2	1.2
Other non-metallic mineral products	a13	1.2	0.2	1.2	-0.2	1.3
Metallurgy and metal processing	a14	2.7	-0.2	1.3	1.4	2.8
Machinery and equipment	a15	0.0	0.2	0.3	-0.6	-0.3
Other production	a16	1.8	-0.1	0.7	1.0	1.7
Electric energy and heat supply	a17	2.2	0.4	1.6	0.2	2.6
Gas supply	a18	2.0	0.1	1.8	-0.1	2.7
Water supply	a20	2.3	0.4	1.7	0.1	2.9
Construction	a21	2.1	0.4	1.5	0.2	2.5
Trade	a22	1.7	0.0	1.3	0.4	1.9
Hotels and restaurants	a23	0.6	0.4	-0.1	0.1	1.0
Transport	a24	1.8	0.1	1.4	0.2	2.0
Pipeline transit of oil and gas	a24P	1.5	0.3	1.9	-0.8	2.0
Telecommunication	a25	-2.3	-3.7	0.9	0.5	-3.3
Postal services	a25P	1.5	-0.1	1.2	0.5	1.5
Financial intermediation	a26	-5.7	-7.4	1.1	0.7	-6.1
Real estate transactions	a27	2.1	0.3	1.2	0.5	2.2
Renting	a28	2.0	0.5	1.0	0.5	2.0
Informatisation activities	a29	1.7	0.0	1.1	0.5	1.1
Research and development	a30	2.0	0.4	1.7	-0.2	2.5
Services to legal entities	a31	2.1	0.5	1.3	0.3	2.3
Public administration	a32	2.4	0.6	1.9	-0.1	3.4
Education	a33	2.5	0.7	1.7	0.1	3.5
Health care and social assistance	a34	2.1	0.6	1.5	0.0	2.9
Sewage, cleaning of streets and refuse disposal	a35	2.3	0.5	1.7	0.1	3.0
Social activities	a36	2.7	0.6	2.2	-0.1	4.0
Recreational, entertainment, cultural and sporting activities	a37	2.2	0.4	1.5	0.2	2.7
Other activities	a38	2.1	0.5	1.2	0.4	2.2

Source: Ukraine model

Table C8

Percentage change in exports to the CIS excluding Russia

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		3.1	0.8	4.8	-2.4	4.7
Agriculture, hunting	a01	25.6	-0.9	0.1	25.7	36.6
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	25.3	-1.6	11.2	14.1	24.2
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17	1.8	-0.2	4.3	-2.7	3.1
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C9

Percentage change in exports to the Baltic countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		2.7	1.3	4.3	-2.5	4.4
Agriculture, hunting	a01	38.2	-0.9	0.1	38.2	50.3
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05					
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	31.6	-1.6	11.2	19.8	30.4
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21					
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C10

Percentage change in exports to the new EU members with Full Tariff status

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		1.3	1.4	2.4	-2.1	3.3
Agriculture, hunting	a01	38.2	-0.9	0.1	38.2	50.3
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03					
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	31.6	-1.6	11.2	19.8	30.4
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29					
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C11

Percentage change in exports to the new EU members with MFN status

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		6.3	0.7	5.0	0.3	6.9
Agriculture, hunting	a01	38.2	-0.9	0.1	38.2	50.3
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	31.6	-1.6	11.2	19.8	30.4
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17	1.8	-0.2	4.3	-2.7	3.1
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P	0.3	2.3	1.1	-3.2	0.6
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C12

Percentage change in exports to the EU-15

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		6.7	0.8	4.1	1.7	8.6
Agriculture, hunting	a01	38.2	-0.9	0.1	38.2	50.3
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	31.6	-1.6	11.2	19.8	30.4
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P	0.3	2.3	1.1	-3.2	0.6
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C13

Percentage change in exports to other European countries with MFN status

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		9.2	-0.5	5.9	3.2	9.7
Agriculture, hunting	a01	25.6	-0.9	0.1	25.7	36.6
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	25.3	-1.6	11.2	14.1	24.2
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21					
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28					
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30					
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38					

Source: Ukraine model

Table C14

Percentage change in exports to Russia

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		0.1	1.2	4.8	-5.4	1.3
Agriculture, hunting	a01	25.6	-0.9	0.1	25.7	36.6
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05					
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	25.3	-1.6	11.2	14.1	24.2
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17	1.8	-0.2	4.3	-2.7	3.1
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C14

Percentage change in exports to American countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		13.1	-0.1	7.8	4.8	14.4
Agriculture, hunting	a01	38.2	-0.9	0.1	38.2	50.3
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10					
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	31.6	-1.6	11.2	19.8	30.4
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C15

Percentage change in exports to African countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		19.5	-0.6	6.6	12.7	22.7
Agriculture, hunting	a01	25.6	-0.9	0.1	25.7	36.6
Forestry	a02					
Fishery	a03					
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05					
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	25.3	-1.6	11.2	14.1	24.2
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25					
Postal services	a25P					
Financial intermediation	a26					
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28					
Informatisation activities	a29					
Research and development	a30					
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32					
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37					
Other activities	a38					

Source: Ukraine model

Table C16

Percentage change in exports to Asian countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		16.2	0.0	9.7	5.9	16.4
Agriculture, hunting	a01	25.6	-0.9	0.1	25.7	36.6
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	25.3	-1.6	11.2	14.1	24.2
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21					
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26					
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37					
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C17

Percentage change in exports to the rest of the world

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		21.1	-1.0	9.3	11.7	21.9
Agriculture, hunting	a01	25.6	-0.9	0.1	25.7	36.6
Forestry	a02	-6.8	-2.1	4.0	-8.9	-5.7
Fishery	a03	-16.6	0.4	-11.9	-5.9	-14.7
Coal and peat	a04	3.9	-0.6	4.5	-0.5	1.9
Hydrocarbons	a05	-4.1	0.3	-2.0	-2.3	-5.4
Non-energy materials	a06	11.4	-1.7	12.2	0.2	11.2
Food-processing	a07	-15.2	-0.1	-9.0	-6.1	-9.4
Textile and leather	a08	-4.7	-2.5	6.3	-8.8	-3.2
Wood working, pulp and paper industry, publishing	a09	-4.4	-0.1	7.1	-10.5	-4.3
Coke products	a10	11.1	-0.8	8.0	3.0	8.7
Petroleum refinement	a11	-1.5	0.7	-0.5	-1.8	0.9
Chemicals, rubber and plastic products	a12	25.9	-0.7	13.6	11.0	26.6
Other non-metallic mineral products	a13	-5.6	0.1	1.1	-6.9	-5.4
Metallurgy and metal processing	a14	25.3	-1.6	11.2	14.1	24.2
Machinery and equipment	a15	-15.6	5.7	4.6	-22.7	-16.2
Other production	a16	-2.0	4.7	8.8	-13.0	4.4
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	-2.9	0.0	2.2	-5.1	0.8
Trade	a22	0.5	2.2	3.6	-5.3	3.9
Hotels and restaurants	a23	19.7	0.8	38.6	-13.6	24.3
Transport	a24	-2.6	0.6	2.0	-5.4	-1.8
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	2.9	5.0	4.5	-6.4	8.1
Postal services	a25P	2.6	4.7	4.6	-6.5	8.9
Financial intermediation	a26	2.3	5.8	4.0	-7.1	6.3
Real estate transactions	a27	-1.1	1.5	3.1	-5.7	4.3
Renting	a28	-3.1	0.3	3.7	-7.0	1.5
Informatisation activities	a29	-1.8	0.8	5.1	-7.5	3.0
Research and development	a30	-5.5	-0.2	2.3	-7.8	-5.1
Services to legal entities	a31	-4.8	0.5	3.0	-8.2	-1.4
Public administration	a32	-4.8	-1.1	-0.3	-3.8	-7.5
Education	a33	-4.5	-1.7	0.9	-4.1	-5.9
Health care and social assistance	a34	-2.2	-0.9	2.3	-3.8	-2.6
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	-1.7	0.9	2.0	-4.7	0.5
Other activities	a38	-1.2	0.9	3.7	-5.7	4.1

Source: Ukraine model

Table C18

Percentage change in imports from the CIS excluding Russia

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		4.8	0.4	1.9	2.2	6.2
Agriculture, hunting	a01	-23.2	0.9	-25.2	2.2	-23.2
Forestry	a02	2.2	1.1	-1.8	3.1	3.1
Fishery	a03	-36.5	0.6	-37.5	1.1	-35.5
Coal and peat	a04	16.5	-0.5	6.6	9.2	17.4
Hydrocarbons	a05	5.5	0.3	2.6	2.1	6.8
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	37.3	1.3	29.5	8.9	34.2
Textile and leather	a08	-3.0	0.7	-3.9	0.4	-1.5
Wood working, pulp and paper industry, publishing	a09	-12.9	0.8	-13.2	0.1	-10.8
Coke products	a10	22.7	-1.2	8.9	13.4	23.0
Petroleum refinement	a11	0.7	0.7	-1.6	1.6	3.0
Chemicals, rubber and plastic products	a12	-3.5	0.4	-4.8	0.9	-2.1
Other non-metallic mineral products	a13	13.0	0.2	1.5	11.3	16.5
Metallurgy and metal processing	a14	4.5	1.0	2.6	1.2	5.3
Machinery and equipment	a15	-3.5	-0.3	-6.2	3.3	-1.1
Other production	a16	0.2	-0.3	-4.4	5.0	0.9
Electric energy and heat supply	a17	7.2	0.3	1.7	5.0	7.6
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C19

Percentage change in imports from Baltic countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		1.0	0.9	-2.2	2.6	2.5
Agriculture, hunting	a01	-23.2	0.9	-25.2	2.2	-23.2
Forestry	a02	2.2	1.1	-1.8	3.1	3.1
Fishery	a03	-36.5	0.6	-37.5	1.1	-35.5
Coal and peat	a04					
Hydrocarbons	a05					
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	37.3	1.3	29.5	8.9	34.2
Textile and leather	a08	-3.0	0.7	-3.9	0.4	-1.5
Wood working, pulp and paper industry, publishing	a09	-12.9	0.8	-13.2	0.1	-10.8
Coke products	a10	22.7	-1.2	8.9	13.4	23.0
Petroleum refinement	a11	0.7	0.7	-1.6	1.6	3.0
Chemicals, rubber and plastic products	a12	-3.5	0.4	-4.8	0.9	-2.1
Other non-metallic mineral products	a13	13.0	0.2	1.5	11.3	16.5
Metallurgy and metal processing	a14	4.5	1.0	2.6	1.2	5.3
Machinery and equipment	a15	-3.5	-0.3	-6.2	3.3	-1.1
Other production	a16	0.2	-0.3	-4.4	5.0	0.9
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C20

Percentage change in imports from the new EU members with full tariff status

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		11.1	2.4	6.8	1.9	13.3
Agriculture, hunting	a01	26.9	0.9	23.7	2.2	27.0
Forestry	a02					
Fishery	a03					
Coal and peat	a04					
Hydrocarbons	a05					
Non-energy materials	a06					
Food-processing	a07	305.0	1.3	281.8	8.9	295.7
Textile and leather	a08	32.0	0.7	30.7	0.4	34.0
Wood working, pulp and paper industry, publishing	a09	28.4	0.8	28.0	0.1	31.5
Coke products	a10					
Petroleum refinement	a11	1.9	0.7	-0.4	1.6	4.2
Chemicals, rubber and plastic products	a12	17.7	0.4	16.1	0.9	19.4
Other non-metallic mineral products	a13	48.9	0.2	33.8	11.3	53.5
Metallurgy and metal processing	a14	26.0	1.0	23.7	1.2	27.0
Machinery and equipment	a15	24.4	-0.3	20.9	3.3	27.4
Other production	a16	13.1	-0.3	7.9	5.0	13.9
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C21

Percentage change in imports from the new EU members with MFN status

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		4.2	1.6	0.2	2.5	5.7
Agriculture, hunting	a01	18.1	0.9	15.0	2.2	18.2
Forestry	a02	3.7	1.1	-0.3	3.1	4.6
Fishery	a03	-8.5	0.6	-9.9	1.1	-7.1
Coal and peat	a04	16.5	-0.5	6.6	9.2	17.4
Hydrocarbons	a05					
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	197.1	1.3	180.0	8.9	190.3
Textile and leather	a08	-0.8	0.7	-1.8	0.4	0.7
Wood working, pulp and paper industry, publishing	a09	5.0	0.8	4.7	0.1	7.5
Coke products	a10	25.0	-1.2	10.9	13.4	25.3
Petroleum refinement	a11	0.9	0.7	-1.4	1.6	3.2
Chemicals, rubber and plastic products	a12	2.3	0.4	1.0	0.9	3.8
Other non-metallic mineral products	a13	20.6	0.2	8.3	11.3	24.3
Metallurgy and metal processing	a14	10.3	1.0	8.3	1.2	11.2
Machinery and equipment	a15	6.0	-0.3	3.0	3.3	8.6
Other production	a16	5.2	-0.3	0.4	5.0	6.0
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C22

Percentage change in imports from the EU-15

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		12.3	0.5	9.1	2.6	14.0
Agriculture, hunting	a01	18.1	0.9	15.0	2.2	18.2
Forestry	a02	3.7	1.1	-0.3	3.1	4.6
Fishery	a03	-8.5	0.6	-9.9	1.1	-7.1
Coal and peat	a04	16.5	-0.5	6.6	9.2	17.4
Hydrocarbons	a05					
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	197.1	1.3	180.0	8.9	190.3
Textile and leather	a08	-0.8	0.7	-1.8	0.4	0.7
Wood working, pulp and paper industry, publishing	a09	5.0	0.8	4.7	0.1	7.5
Coke products	a10	25.0	-1.2	10.9	13.4	25.3
Petroleum refinement	a11	0.9	0.7	-1.4	1.6	3.2
Chemicals, rubber and plastic products	a12	2.3	0.4	1.0	0.9	3.8
Other non-metallic mineral products	a13	20.6	0.2	8.3	11.3	24.3
Metallurgy and metal processing	a14	10.3	1.0	8.3	1.2	11.2
Machinery and equipment	a15	6.0	-0.3	3.0	3.3	8.6
Other production	a16	5.2	-0.3	0.4	5.0	6.0
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C23

Percentage change in imports from other European countries with MFN status

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		8.5	0.7	5.7	2.1	10.2
Agriculture, hunting	a01	18.1	0.9	15.0	2.2	18.2
Forestry	a02	3.7	1.1	-0.3	3.1	4.6
Fishery	a03					
Coal and peat	a04					
Hydrocarbons	a05					
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	197.1	1.3	180.0	8.9	190.3
Textile and leather	a08	-0.8	0.7	-1.8	0.4	0.7
Wood working, pulp and paper industry, publishing	a09	5.0	0.8	4.7	0.1	7.5
Coke products	a10	25.0	-1.2	10.9	13.4	25.3
Petroleum refinement	a11	0.9	0.7	-1.4	1.6	3.2
Chemicals, rubber and plastic products	a12	2.3	0.4	1.0	0.9	3.8
Other non-metallic mineral products	a13	20.6	0.2	8.3	11.3	24.3
Metallurgy and metal processing	a14	10.3	1.0	8.3	1.2	11.2
Machinery and equipment	a15	6.0	-0.3	3.0	3.3	8.6
Other production	a16	5.2	-0.3	0.4	5.0	6.0
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21					
Trade	a22					
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28					
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30					
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C24

Percentage change in imports from Russia

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		4.4	0.5	1.2	2.6	5.7
Agriculture, hunting	a01	-23.2	0.9	-25.2	2.2	-23.2
Forestry	a02	2.2	1.1	-1.8	3.1	3.1
Fishery	a03	-36.5	0.6	-37.5	1.1	-35.5
Coal and peat	a04	16.5	-0.5	6.6	9.2	17.4
Hydrocarbons	a05	5.5	0.3	2.6	2.1	6.8
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	37.3	1.3	29.5	8.9	34.2
Textile and leather	a08	-3.0	0.7	-3.9	0.4	-1.5
Wood working, pulp and paper industry, publishing	a09	-12.9	0.8	-13.2	0.1	-10.8
Coke products	a10	22.7	-1.2	8.9	13.4	23.0
Petroleum refinement	a11	0.7	0.7	-1.6	1.6	3.0
Chemicals, rubber and plastic products	a12	-3.5	0.4	-4.8	0.9	-2.1
Other non-metallic mineral products	a13	13.0	0.2	1.5	11.3	16.5
Metallurgy and metal processing	a14	4.5	1.0	2.6	1.2	5.3
Machinery and equipment	a15	-3.5	-0.3	-6.2	3.3	-1.1
Other production	a16	0.2	-0.3	-4.4	5.0	0.9
Electric energy and heat supply	a17	7.2	0.3	1.7	5.0	7.6
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C25

Percentage change in imports from American countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		15.4	0.3	11.6	3.0	16.8
Agriculture, hunting	a01	18.1	0.9	15.0	2.2	18.2
Forestry	a02	3.7	1.1	-0.3	3.1	4.6
Fishery	a03	-8.5	0.6	-9.9	1.1	-7.1
Coal and peat	a04					
Hydrocarbons	a05					
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	197.1	1.3	180.0	8.9	190.3
Textile and leather	a08	-0.8	0.7	-1.8	0.4	0.7
Wood working, pulp and paper industry, publishing	a09	5.0	0.8	4.7	0.1	7.5
Coke products	a10	25.0	-1.2	10.9	13.4	25.3
Petroleum refinement	a11	0.9	0.7	-1.4	1.6	3.2
Chemicals, rubber and plastic products	a12	2.3	0.4	1.0	0.9	3.8
Other non-metallic mineral products	a13	20.6	0.2	8.3	11.3	24.3
Metallurgy and metal processing	a14	10.3	1.0	8.3	1.2	11.2
Machinery and equipment	a15	6.0	-0.3	3.0	3.3	8.6
Other production	a16	5.2	-0.3	0.4	5.0	6.0
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21					
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28					
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37					
Other activities	a38					

Source: Ukraine model

Table C26

Percentage change in imports from African countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		32.2	1.2	24.9	5.0	32.6
Agriculture, hunting	a01	18.1	0.9	15.0	2.2	18.2
Forestry	a02	3.7	1.1	-0.3	3.1	4.6
Fishery	a03	-8.5	0.6	-9.9	1.1	-7.1
Coal and peat	a04					
Hydrocarbons	a05					
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	197.1	1.3	180.0	8.9	190.3
Textile and leather	a08	-0.8	0.7	-1.8	0.4	0.7
Wood working, pulp and paper industry, publishing	a09	5.0	0.8	4.7	0.1	7.5
Coke products	a10					
Petroleum refinement	a11	0.9	0.7	-1.4	1.6	3.2
Chemicals, rubber and plastic products	a12	2.3	0.4	1.0	0.9	3.8
Other non-metallic mineral products	a13	20.6	0.2	8.3	11.3	24.3
Metallurgy and metal processing	a14					
Machinery and equipment	a15	6.0	-0.3	3.0	3.3	8.6
Other production	a16	5.2	-0.3	0.4	5.0	6.0
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21					
Trade	a22					
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24					
Pipeline transit of oil and gas	a24P					
Telecommunication	a25					
Postal services	a25P					
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28					
Informatisation activities	a29					
Research and development	a30					
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37					
Other activities	a38					

Source: Ukraine model

Table C27

Percentage change in imports from Asian countries

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		12.1	0.6	9.0	2.3	13.8
Agriculture, hunting	a01	18.1	0.9	15.0	2.2	18.2
Forestry	a02	3.7	1.1	-0.3	3.1	4.6
Fishery	a03	-8.5	0.6	-9.9	1.1	-7.1
Coal and peat	a04	16.5	-0.5	6.6	9.2	17.4
Hydrocarbons	a05	5.5	0.3	2.6	2.1	6.8
Non-energy materials	a06	18.4	-1.0	5.1	13.1	17.8
Food-processing	a07	197.1	1.3	180.0	8.9	190.3
Textile and leather	a08	-0.8	0.7	-1.8	0.4	0.7
Wood working, pulp and paper industry, publishing	a09	5.0	0.8	4.7	0.1	7.5
Coke products	a10	25.0	-1.2	10.9	13.4	25.3
Petroleum refinement	a11	0.9	0.7	-1.4	1.6	3.2
Chemicals, rubber and plastic products	a12	2.3	0.4	1.0	0.9	3.8
Other non-metallic mineral products	a13	20.6	0.2	8.3	11.3	24.3
Metallurgy and metal processing	a14	10.3	1.0	8.3	1.2	11.2
Machinery and equipment	a15	6.0	-0.3	3.0	3.3	8.6
Other production	a16	5.2	-0.3	0.4	5.0	6.0
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model

Table C28

Percentage change in imports from the rest of the world

		WTO Accession	Reform of FDI barriers only	Tariff reform only	Improved market access only	WTO Accession in steady state model
Total		42.7	0.6	37.1	3.6	43.6
Agriculture, hunting	a01	26.9	0.9	23.7	2.2	27.0
Forestry	a02	8.4	1.1	4.2	3.1	9.3
Fishery	a03	24.5	0.6	22.7	1.1	26.5
Coal and peat	a04	42.4	-0.5	30.3	9.2	43.5
Hydrocarbons	a05	12.1	0.3	9.1	2.1	13.5
Non-energy materials	a06	28.3	-1.0	14.0	13.1	27.8
Food-processing	a07	305.0	1.3	281.8	8.9	295.7
Textile and leather	a08	32.0	0.7	30.7	0.4	34.0
Wood working, pulp and paper industry, publishing	a09	28.4	0.8	28.0	0.1	31.5
Coke products	a10	42.7	-1.2	26.6	13.4	43.0
Petroleum refinement	a11	1.9	0.7	-0.4	1.6	4.2
Chemicals, rubber and plastic products	a12	17.7	0.4	16.1	0.9	19.4
Other non-metallic mineral products	a13	48.9	0.2	33.8	11.3	53.5
Metallurgy and metal processing	a14	26.0	1.0	23.7	1.2	27.0
Machinery and equipment	a15	24.4	-0.3	20.9	3.3	27.4
Other production	a16	13.1	-0.3	7.9	5.0	13.9
Electric energy and heat supply	a17					
Gas supply	a18					
Water supply	a20					
Construction	a21	1.7	0.1	-1.1	2.9	5.2
Trade	a22	1.9	-0.3	-1.2	3.7	2.9
Hotels and restaurants	a23	0.0	1.6	-3.7	2.2	3.0
Transport	a24	2.6	1.1	0.2	1.3	4.4
Pipeline transit of oil and gas	a24P					
Telecommunication	a25	12.8	11.4	-0.1	1.5	16.4
Postal services	a25P	2.3	0.5	-1.5	3.6	4.2
Financial intermediation	a26	8.8	9.2	-0.5	0.5	10.5
Real estate transactions	a27	3.3	1.2	-2.1	4.5	5.9
Renting	a28	0.9	1.4	-3.3	3.2	1.2
Informatisation activities	a29	1.0	1.4	-1.3	1.1	2.9
Research and development	a30	0.5	0.9	-0.6	0.4	1.5
Services to legal entities	a31	0.2	1.5	-2.1	1.3	1.3
Public administration	a32	2.4	0.7	-0.3	2.1	4.0
Education	a33	3.5	1.4	-0.5	2.8	5.8
Health care and social assistance	a34	2.7	1.2	-1.0	2.8	4.7
Sewage, cleaning of streets and refuse disposal	a35					
Social activities	a36					
Recreational, entertainment, cultural and sporting activities	a37	3.5	1.2	-0.7	3.2	6.1
Other activities	a38					

Source: Ukraine model