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The impact of the EU-Ukraine Deep and Comprehensive Free Trade Area on the Ukrainian industrial sector

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- Using vector autoregression models, we have analysed the impact of the aggregate rate of the EU import duty and a share of the general costs exporters to the EU have to pay to ensure conformity to EU standards on the functioning of selected Ukrainian industries. For this purpose, we tested the research parameters for a unit root and carried out a causal analysis.

- The research findings show an inconclusive effect of the DCFTA on the mentioned sectors of economy. Under the influence of the DCFTA, exports, imports and the average salary in mining and metallurgy are expected to grow while production and foreign direct investment will see a slight decrease.

- The chemical industry will experience an insignificant reduction in exports and a slump in imports. As in metallurgy, the average salary of permanent industry staff will increase.

- Modelling results show that as a result of the Association Agreement, sunflower oil production will decrease insignificantly while its exports to the EU will grow. The findings also show that grain exports to the EU will decrease in the short term but will change their dynamics in the long run.

- The machine industry will see an insignificant decrease in exports (at a slowing pace), while imports will increase in the short run but decrease in a longer term, which corresponds to a decline in manufacturing.

DEMOCRACY HOUSE

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Introduction

The EU-Ukraine Deep and Comprehensive Free Trade Area (DCFTA) officially took effect on 1 January 2016, although many economic provisions of the Association Agreement had been applied before that. The EU's autonomous trade preferences have been in force since spring 2014, and the provisions on Economic and Sector Cooperation of the Agreement since November 2014.

The EU-Ukraine Free Trade Area (hereinafter referred to as the FTA) is an integral part of the Association Agreement, which provides for the liberalisation of trade in goods and services. The FTA is to ensure the gradual integration of the Ukrainian economy into the EU internal market, its distinctive feature being a comprehensive programme of adaptation of trade-related regulations to relevant EU standards. The signing of FTA agreements also comes with a number of specific provisions concerning the deep liberalisation of trade in goods and services that are essentially different from those of relevant WTO agreements; the liberalisation of foreign investment; the liberalisation of state procurement; the introduction of new rules of certain aspects of competition policy, including state aid; the application of more stringent measures of copyright protection; the introduction of general environmental rules and standards, as well as standards of work.

Under the Agreement, the parties shall reduce duties in mutual trade over a period of 10 years. In parallel, over a period of five years, they shall gradually decrease export duties and subsidies to zero. Gradual reduction will apply to the base rate of customs duties as specified in the Agreement.

According to some estimates, in the long run, the FTA+ between the EU and Ukraine will ensure the annual growth of Ukraine's GDP by 0.5%[1], as well as a general increase in citizens' welfare by 1.2% per year[2]. As far as economic indicators are concerned, it was expected that exports to the EU would increase by about 6.3%, imports of goods from the EU by 5.8%, and the average salary in Ukraine by 5.5%.

Undoubtedly, the signing of the Agreement and the functioning of the FTA with the EU have had an extremely strong impact on the entire Ukrainian economy, in particular on the structure of trade, business climate, level of investment, productivity, competition in sectors and so on. This raises the question about the assessment of the FTA impact on the Ukrainian economy. This study models the impact of the EU-Ukraine Association Agreement on such sectors of the Ukrainian economy as mining and metallurgy, agriculture, food, chemical, light and machine industries. It is based on an array of statistical data on the volumes and index of production, export, import, price dynamics, direct foreign and capital investment, dynamics of employment and average monthly salaries of employees in the respective sectors.

Methodology of empirical research

An empirical research of the Association Agreement (AA) impact on certain sectors of the Ukrainian economy has been conducted using a theoretical and methodological approach based on the application of econometric tools.

Econometric modelling included the following stages: unit root testing, causal analysis, constructing of econometric models.

The unit root test has been carried out using an augmented Dickey-Fuller test, causal analysis is based on the Granger causality test. Vector autoregression models have been chosen as model variables are stationary and their past values explain the current ones.

Modelling results are interpreted based on the analysis of impulse response functions. So, shocks

1. "Trade Sustainability Impact Assessment for the EU-Ukraine FTA+", 2008, ECORYS

2. "Quantitative Assessment of Ukraine's Regional Integration Options", 2011, Institute for Economic Research and Policy Consulting, German Advisory Group

in response to the EU's aggregate import duty for Ukraine (TARIFF_EXP) and a share of the general costs exporters to the EU have to pay to ensure conformity to EU standards were taken as impulses. Because the vector autoregression models we have designed only allow to build the functions of reactions to shocks, that reflect the growth of both the aggregate rate of the EU import duty for Ukraine and a share of the general costs exporters to the EU have to pay to ensure conformity to EU standards, conclusions about responses to the modelled shocks based on the modelling results were formulated "with the opposite sign".

Findings

Vector autoregression models were used to model the impact of the EU-Ukraine Deep and Comprehensive Free Trade Area (DCFTA) on selected sectors of the economy[3]. In considering the modelling results, it was necessary to take into account economic changes that took place after 2013; a significant depreciation of the hryvnya in 2014-2015; the loss of Russia as a traditional distribution market for industrial and food products; the loss of industrial facilities located in the antiterrorist operation area (ATO), today Joint Forces Operation (JFO), and the disruption of production links with businesses located in areas controlled by the Ukrainian government. These factors added up to the "traditional" ones such as outdated technology, worn-out equipment, lack of investment in economic sectors and heavy monopolization of resources.

The following conclusions regarding the impact of the DCFTA on the sectors of the Ukrainian economy were obtained based on our modelling.

3. The main advantage of their use is the modelling of stationary variables in dynamics and the ability to calculate short- and long-term forecasts of endogenous variables because the information available for this includes both the present and past values of model variables. Modelling results are interpreted based on the analysis of functions of reactions to impulses connecting the present value of error with the future values of endogenous variables of a model, or, in other words, the present and past values of error with the present values of endogenous variables of a model. So, shocks in response to the EU's aggregate import duty for Ukraine and a share of the general costs exporters to the EU have to pay to ensure conformity to EU standards were taken as impulses.

Mining and metallurgy

Both exports and imports of products in the metallurgical industry will grow. At the same time, there will be an insignificant decline in production because of the growing cost of ensuring the conformity of exports to the EU to the union's standards and an increase in production thanks to the reduction of the EU's aggregate import duty for Ukraine (after all, there will be an insignificant decline). Capital and foreign direct investment is decreasing, which may be a sign that foreign currency earnings were not transferred back from abroad and that there is a lack of motivation to modernise production. At the same time, the average monthly salary of an employee in the metallurgical industry will increase a little.

Agriculture

The EU-Ukraine Association Agreement lists important requirements to agricultural products: duty-free access for Ukrainian agricultural products within tariff quotas; the EU's decision not to use export subsidies for agricultural products sold to Ukraine; Ukraine has the right to take safeguard measures and additional terms of trade; elimination of export duties, harmonization of standards with the EU, a mechanism for recognising the equivalence of sanitary and phytosanitary measures, and more opportunities for sharing best practice and technology.

Sunflower oil
The forecast of sunflower oil production in Ukraine and its export to the EU was made on the basis of a vector autoregression model.

Grain crops
After the EU lowered an aggregate import duty for Ukraine and a share of the general costs exporters have to pay to ensure conformity to EU standards increased, grain exports to Europe are reducing in the short term but will change their dynamics in the long run. In our opinion, this can be a consequence of fodder grain accounting for an overwhelming share of Ukrainian wheat exports.

Year	Export	Import	Production index	Capital investment	Direct foreign investment	Average monthly salary per employee
2017	+2,29%	+3,72%	-1,39%	-11,05%	-8,94%	+2,77%
2018	+2,24%	+3,69%	-1,40%	-15,40%	-13,70%	+4,13%
2019	+2,20%	+3,66%	-1,40%	-20,13%	-19,12%	+5,45%
2020	+2,17%	+3,64%	-1,40%	-21,57%	-25,13%	+6,71%
2021	+2,15%	+3,62%	-1,40%	-31,55%	-31,93%	+7,93%

Table 1. Long-term forecast of main indicators for metallurgy as a result of the Association Agreement

Year	Export to EU	Production
2017	+6,56464%	-1,9112%
2018	+8,05798%	-2,34733%
2019	+6,12719%	-1,11981%
2020	+6,74508%	-1,96844%
2021	+4,60861%	-1,24705%

Table 2. Long-term forecast of sunflower oil export to the EU and production as a result of the Association Agreement

Year	Export to EU
2017	-1,71%
2018	-1,54%
2019	-1,45%
2020	-1,41%
2021	-1,39%

Table 3. Long-term forecast of grain export to the EU as a result of the Association Agreement[4]

It should be noted that agrarian experts are concerned that bread grain can be exported to the EU under the guise of fodder grain.

Thus, as a result of the Association Agreement, grain exports to the EU will decrease, albeit insignificantly. In particular, the annual drop in exports to the EU by 2021 will not exceed 2%, with the decline rate gradually decreasing. Taking into account the modelling results, grain exports to the EU will increase in a while.

Our forecasts match the expectations of industry players we have interviewed. However, they are more optimistic about the effect of the EU-Ukraine Association Agreement. In particular, they expect exports to grow by 75.4% on average and investment from EU member states by 63.3%. Among the difficulties the companies foresee because of the signing of the Association Agreement are failure to comply with EU phytosanitary and environmental protection standards, and inability to face competition from EU producers.

Free trade in this sector will have a positive effect. Since local producers cannot fully meet EU member states' internal demand and the EU is a "pure" importer of agricultural produce, the reduction of import duties by the EU will result in a boost of Ukrainian exports to its member states.

Food industry

The Association Agreement will negatively affect (albeit on a negligible scale) the food industry. In particular, production index and exports are expected to decrease in parallel to an increase in food imports. At the same time, (capital and foreign direct) investment in the industry will take a dive, which may have to do with the fact that it has lost some of its appeal to investors. Salaries in the food industry will increase.

4. A short-term forecast is up to 12 months.

Year	Export	Import	Production index	Capital investment	Direct foreign investment	Average monthly salary per employee
2017	-1,81%	+0,47%	-1,42%	-1,09%	-2,89%	+2,63%
2018	-2,32%	+0,89%	-1,37%	-1,20%	-4,64%	+5,08%
2019	-2,87%	+1,21%	-1,33%	-1,00%	-5,63%	+7,62%
2020	-3,37%	+1,36%	-1,28%	-0,68%	-5,50%	+10,25%
2021	-3,76%	+1,42%	-1,25%	-0,42%	-4,29%	+12,97%

Table 4. Long-term forecast of main indicators for the food industry as a result of the Association Agreement

Year	Export	Import	Production index	Capital investment	Direct foreign investment	Average monthly salary per employee
2017	-1,47%	-3,21%	+0,27%	+0,51%	+0,90%	+0,89%
2018	-3,46%	-3,29%	+0,28%	+0,30%	-0,30%	+2,41%
2019	-5,53%	-3,54%	+0,31%	+0,61%	-1,57%	+3,99%
2020	-7,69%	-3,58%	+0,31%	+1,20%	-2,88%	+5,65%
2021	-9,94%	-3,63%	+0,29%	+1,79%	-4,26%	+7,38%

Table 5. Long-term forecast of main indicators for the chemical industry as a result of the Association Agreement

Chemical industry

The elimination of EU import duties on the overwhelming majority of chemical products is expected to facilitate the development of industry and the harmonization of the system of technical regulations with corresponding EU standards and rules. The average import duty will decrease from 4.2% to 0.4%. It should be noted that there can be a small increase in competition in the internal market after the reduction of the import duty from 2.9% to 0.2% on average, as well as of the costs associated with ensuring conformity to technical regulations.

As a result of the Association Agreement, the chemical industry will see a decline in exports and imports, a small increase in production index and capital investment. Direct foreign investment will grow in the short term but will fall in the long run. Similar to metallurgy, the average monthly salary per employee will increase, albeit insignificantly.

Machine industry

An empirical study of main indicators in the machine industry under the influence of the Association Agreement has revealed results that are similar to other industries. In particular, machine industry employees' salaries are increasing thanks to tariff restrictions and decreasing due to non-tariff restrictions on exports to the EU.

Overall, the Association Agreement has had an inconclusive effect on the machine industry. Exports are expected to go down to an extent (at a slowing pace), while imports will increase in the short run but decrease in a longer term, which corresponds to a decline in manufacturing. Capi-

Year	Export	Import	Production index	Capital investment	Direct foreign investment	Average monthly salary per employee
2017	-1,25%	+0,67%	-2,51%	+0,71%	+0,76%	+1,54%
2018	-1,03%	+0,36%	-2,54%	+0,36%	-0,12%	+3,48%
2019	-0,84%	+0,11%	-2,63%	+0,04%	-0,95%	+5,41%
2020	-0,68%	-0,11%	-2,72%	-0,26%	-1,73%	+7,32%
2021	-0,53%	-0,31%	-2,79%	-0,53%	-2,44%	+9,23%

Table 6. Long-term forecast of main indicators for the machine industry as a result of the Association Agreement

Year	Export	Import	Production index	Capital investment	Direct foreign investment	Average monthly salary per employee
2017	-1,47%	-1,22%	+2,16%	-0,81%	-1,26%	+2,58%
2018	-1,93%	-1,49%	+2,03%	-1,86%	-0,72%	+5,30%
2019	-2,39%	-1,76%	+1,94%	-2,90%	-0,59%	+8,13%
2020	-2,85%	-2,03%	+1,76%	-3,93%	-0,34%	+11,09%
2021	-3,30%	-2,29%	+1,51%	-4,96%	-0,15%	+14,17%

Table 7. Long-term forecast of main indicators for the light industry as a result of the Association Agreement

tal investment is on the rise during the first three years but will go down later. An increase in direct foreign investment will happen during the first period only. However, the average monthly salary per employee, just like in other industries, has seen the upward trend.

Light industry

Simulations based on the designed model showed that tariff restrictions caused a short-term growth of light industry exports and their decline in the long run, while imports are dwindling. This can be due to the low competitiveness of national products in the domestic market as well as in the EU, the shrinking of the internal market and the fact that Europeans want to safeguard their manufacturers. Improving the quality and range of light industry products should boost export potential as well as the internal market. Higher incomes of Ukrainian residents may provide an additional stimulus. At the same time, non-tariff restrictions are pushing light industry exports and imports down. Meanwhile, an insignificant increase in foreign direct investment in the industry and pay rises for light industry employees have been observed.

Conclusions

The EU-Ukraine Association Agreement was enacted on 1 January 2016 when the Deep and Comprehensive Free Trade Area (DCFTA) officially took effect. However, the EU's autonomous trade preferences, which opened the EU market to Ukrainian goods on the same conditions as under the DCFTA, have been in force since spring 2014. It is scientifically important to predict the impact of the Association Agreement on the Ukrainian economy to be able to identify the risks and potential opportunities of economic cooperation.

This study models the impact of the EU-Ukraine Association Agreement on such sectors of the

Ukrainian economy as mining and metallurgy, agriculture, the food, chemical, light and machine industries. Based on autoregression models, it analyses the impact of the aggregate rate of the EU import duty and a share of the general costs exporters to the EU have to pay to ensure conformity to EU standards on the functioning of selected Ukrainian industries. The research parameters were subjected to a unit root test and a causal analysis was carried out in advance. The study used the State Statistics Service of Ukraine data on the production index, exports, imports, capital investment, foreign direct investment and average salaries per employee in selected sectors of the Ukrainian economy.

Research results show an inconclusive effect of the DCFTA on the economy. Under the influence of the DCFTA, exports, imports and the average salary in mining and metallurgy are expected to grow while production and foreign direct investment will see a slight decrease.

An insignificant reduction in exports and a slump in imports are expected in the chemical industry. As in metallurgy, the average salary of permanent industry staff, production index and capital investment will increase.

Simulations based on the designed model show that tariff restrictions have caused a short-term growth of light industry exports and their decline in the long run, while imports are dwindling. The Association Agreement will have an impact (albeit an insignificant one) on the food industry. In particular, its production index and exports are expected to decrease but imports are set to grow.

Modelling results show that as a result of the Association Agreement, sunflower oil production will decrease insignificantly while its exports to the EU will grow. They also show that grain exports to the EU will decrease in the short term but will change their dynamics in the long run.

In the machine industry, exports are expected to go down insignificantly (at a slowing pace), while imports will increase in the short run but decrease in a longer term, which corresponds to a decline in manufacturing.

Analysing the findings, it is important to take into account the economic consequences of the Russian aggression against Ukraine. Ukraine lost production facilities in its eastern regions, its production links were disrupted, while Ukrainian companies no longer have access to their traditional distribution markets (especially in the case of heavy industry). Thus, a great number of companies had to start looking for new markets to sell their products, including in the EU.

The positive impact of the DCFTA can be amplified by systemically reforming the Ukrainian economy, boosting competition, improving the business climate and investment appeal. In this context, the Association Agreement remains a certain signpost and, at the same time, a tool for implementing reforms. Therefore, the gradual adaptation of legislation to the EU regulatory framework will have a positive impact on the Ukrainian economy in the long run.

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