

EU-EAEU Potential Economic Integration: Methodological Approaches to the Assessment of Economic Impact

IIASA project

“Challenges and Opportunities of Economic Integration within a
Wider European and Eurasian Space”

Workshop Report

Coordinating authors

Evgeny Vinokurov, Peter Balas, Michael Emerson,
Peter Havlik, Vladimir Pereboyev, Elena Rovenskaya,
Anastasia Stepanova, Jurij Kofner, Pavel Kabat

October 2016

This document reports on the work of the International Institute for Applied Systems Analysis and has received only limited review. Views or opinions expressed herein do not necessarily represent those of the institute, its National Member Organizations, or other organizations supporting the work.

Contents

- About the Authors..... iii
- Background..... 1
- 1. Integration scenarios between the EAEU and the EU..... 1
- 2. Current forms of regional economic integration.. 3
- 3. Methods to assess the effects of regional economic integration 6
- The CGE method..... 6
- The gravity model..... 8
- The partial equilibrium model..... 11
- IOT tables..... 11
- The economic growth and productivity function method 12
- Conclusion 12
- References..... 14

About the Authors

Evgeny Vinokurov is Director of the Centre for Integration Studies, Eurasian Development Bank, and Professor of the Russian Academy of Science. (Contact: vinokurov_ey@eabr.org)

Peter Balas is Senior Research Scholar at the International Institute for Applied Systems Analysis (IIASA). (Contact: petbalas@hotmail.com)

Michael Emerson is Associate Senior Research Fellow, Centre for European Policy Studies (CEPS) and Senior Research Scholar at the International Institute for Applied Systems Analysis (IIASA). (Contact: michael.emerson@ceps.eu)

Peter Havlik is Staff Economist, The Vienna Institute for International Economic Studies (wiiw) and Guest Research Scholar at the International Institute for Applied Systems Analysis (IIASA). (Contact: havlik@wiiw.ac.at)

Vladimir Pereboev is Head of Projects at the Centre for Integration Studies, Eurasian Development Bank. (Contact: pereboev_vs@eabr.org)

Elena Rovenskaya is Program Director of Advanced Systems Analysis Program at the International Institute for Applied Systems Analysis (IIASA) and a Researcher at the Faculty of Computational Mathematics and Cybernetics, Lomonosov Moscow State University, Russia. (Contact: rovenska@iiasa.ac.at)

Anastasia Stepanova is Project Manager and Research Scholar at the International Institute for Applied Systems Analysis (IIASA). (Contact: stepanov@iiasa.ac.at)

Jurij Kofner is Associate Research Assistant at the International Institute for Applied Systems Analysis (IIASA). (Contact: kofner@iiasa.ac.at)

Pavel Kabat is Director General and Chief Executive Officer of the International Institute for Applied Systems Analysis (IIASA). Professor Kabat remains a Professor of Earth System Science at Wageningen University, and Director and Chair of the Royal Dutch Academy of Arts and Sciences' Institute for Integrated Research on Wadden Sea Region. (Contact: kabat@iiasa.ac.at)

EU-EAEU Potential Economic Integration: Methodological Approaches to the Assessment of Economic Impact

Evgeny Vinokurov, Peter Balas, Michael Emerson, Peter Havlik,
Vladimir Perebojev, Elena Rovenskaya, Anastasia Stepanova, Jurij Kofner, Pavel Kabat

Background

During the last two decades, interest in regional integration has substantially increased. The number of renewed regional trade agreements has swelled. As a result, regionalism has become a dominating factor in the development of world trade. It affects countries' economic and political relations. They are faced with the choice of whether or not they should enter various trade blocs, and which form of integration they should select at each specific stage. The answer to these questions requires political and policy decisions. It also requires quantitative and qualitative assessments of the economic impacts of accession to regional trade agreements. It also requires a clear understanding of the possible positive and negative impact on the macro- and micro-levels, including the impact on the economy as a whole, on specific sectors and industries, large individual companies, the state budgetary and monetary policy, and various population strata. This type of complex, multi-faceted analysis, commonly known as *ex-ante*, also shows whether the current policy requires modification in order to maximize profits and reduce losses, taking into account the interests of both sides. For countries that have already acceded to regional trade agreements, an *ex-post* evaluation is also necessary to assess the memberships' efficiency, and how expectations fare against reality.

Two years after the Customs Union (CU) of Belarus, Kazakhstan and Russia was created in 2010, the Eurasian Economic Commission (its primary supranational body) becomes an official party in negotiations pertaining to trade relations. In 2012 the CU was supplemented with a comprehensive series of agreements establishing the Single Economic Space (SES) and aiming at a full-fledged common market. These member states have created the Eurasian Economic Union (EAEU) in 2015 and two new member states – Armenia and Kyrgyzstan - have joined in 2015.

1. Integration scenarios between the EAEU and the EU

All of this creates a **demand for comprehensive estimates of the implications of various integration scenarios between the EAEU and the EU**. A clear and detailed understanding on **the factors that should**

be investigated, on the possible dimensions of the economy and society to be impacted, as well as on how it can be evaluated are pre-requisites for obtaining such estimates.¹

As far as **the European Union is concerned, due to the lack of progress of the most preferred option, the multilateral liberalization, in the recent period the regional and bilateral trade agreements have moved into the focus of attention.** While the EU in the previous decades has already concluded numerous preferential agreements, especially since the start of this decade the shift has accelerated. Apart from concluding or negotiating new agreements with a broad range of partners, the upgrading and modernizing of the earlier, “first generation” goods-only arrangements also started. Thus, by now a broad variety of trade agreements, with different extents of coverage, different levels of integration have been signed. The choice among the various models depends on a number of factors discussed below, depending on the interests of both the partner countries, as well as of the EU.

Economic integration can take on different forms depending on the objectives of the member states. There is no single accepted approach to classifying the types of regional economic integration, even if the WTO approach is internationally the most broadly accepted one. Under the collective term “Regional Trade Agreements” (RTAs) it distinguishes three types of trade agreements: free-trade area, customs union, and economic integration agreement. GATT Article XXIV, Paragraph 8d states that "a free-trade area shall be understood to mean a group of two or more customs territories in which the duties and other restrictive regulations of commerce (except, where necessary, those permitted under Articles XI, XII, XIII, XIV, XV and XX) are eliminated on substantially all the trade between the constituent territories in products originating in such territories." Paragraph 8a of Article XXIV defines a customs union as "the substitution of a single customs territory for two or more customs territories, so that: (i) duties and other restrictive regulations of commerce (except, where necessary, those permitted under Articles XI, XII, XIII, XIV, XV and XX) are eliminated with respect to substantially all the trade between the constituent territories of the union or at least with respect to substantially all the trade in products originating in such territories, and,(ii) ...substantially the same duties and other regulations of commerce are applied by each of the members of the union to the trade of territories not included in the union."² Article V of the GATS stipulates the economic integration agreements for trade in services, which implies the elimination of barriers to the movement of services, including for investments and for the movement of persons, and in particular cases could also include labor market integration.³

Each of these integration agreements are based on the preferential approach, i.e. the parties are exempted from the fundamental obligation of the Most Favoured Nation (MFN) treatment required by the WTO rules. In other words, these agreements create a legal basis for differentiation among WTO Members, to provide market access and other benefits only to the preferential partners, without extending those to other WTO Members. However, this exceptional treatment is subjects to clear rules

¹ This expanded summary is based on the previously published report of the EDB Centre for Integration Studies: Vinokurov E., Pelipas I., Tochickaya I. (2015) *Quantifying Economic Integration of the European Union and the Eurasian Economic Union: Methodological Approaches*, Report no. 23, EDB Centre for Integration Studies: St. Petersburg. Available online at:

http://eabr.org/e/research/centreCIS/projectsandreportsCIS/index.php?id_4=41401&linked_block_id=0

The relevant literature review and detailed references can be found in this report.

¹http://www.wto.org/english/docs_e/legal_e/gatt47_e.pdf.

²http://www.wto.org/english/docs_e/legal_e/gatt47_e.pdf.

³http://www.wto.org/english/docs_e/legal_e/26-gats.pdf.

and conditions. Thus, among others, the parties must ensure that such agreements are comprehensive, covering substantially all trade, e.g. arrangements covering only some groups or sectors of goods are illegal under the WTO. Certain quantitative criteria have been developed for judging the fulfilment of this requirement. There are also time limits on the transitional periods by the end of which full liberalisation of trade should be achieved. Last but not least, not any measure is subject to MFN-exceptions: there is a complex system of rules for the various government measures regulating which can and which can't be applied in a preferential manner. The WTO has special committees to examine and discuss the preferential agreements and in case of differences of views such agreements are also subject to the WTO's Dispute Settlement system.

The OECD distinguishes four forms of regional economic integration: free-trade area, customs union, common market and economic union, where a common market is understood as a customs union with provisions to liberalize movement of (regional) factors of production, i.e. of persons and capital, and an economic union is a common market with provisions for the harmonization of certain economic policies. It should be noted, however, that the OECD does not have specific rules and procedures applicable for integration agreements, it basically accepts and follows the WTO's approaches.

With respect to its own Internal Market the EU follows the OECD approach, by aiming at achieving the freedom of liberalizing the movement of all 4 factors of production.

Thus, any classification assumes that regional economic integration can have several levels or degrees of depth, depending on the aims, wishes and interests of the participating countries; and with each level implying that certain elements of the common economic space liberalization are added to the previous level.

- Elimination of tariffs and some non-tariff barriers of trade in goods between countries (free-trade areas or partial/sectoral free-trade areas).
- Establishment of a common import policy, including common customs tariffs, as well as common export measures – coupled with the free movement of goods among the parties (customs union).
- Freedom of movement of goods, services, capital and persons which includes policy harmonization also in such areas as competition, the protection of intellectual property, public procurement (common market),
- A common market, covering as well structural, fiscal, monetary, and social policy (economic union).
- Unification of the economic policy and establishment of supranational institutions (economic and political union).

2. Current forms of regional economic integration

The current forms of economic integration are complex and increasingly more complementary. For example, a free-trade area and customs union can incorporate elements of higher levels of integration; in particular, the removal of restrictions on trade in services and movement of capital and persons. This comes from the growing understanding that, from the standpoint of economic impact, removing trade barriers alone may lead to considerably fewer positive effects than deep integration.

The **EAEU** concluded an FTA with Vietnam and currently leads negotiations with Israel. FTAs with Singapore, India and Turkey have been voiced as well. At the same time, the largest trade and investment partner for *all* EAEU member states is the European Union.

The years 2003 to 2007 were a period of growing interest in economic cooperation and integration of the European Union and the Russian Federation. However, in the following years, especially after the establishment of the Customs Union among Russia, Kazakhstan and Belarus, this issue receded into the background. The current political situation in Ukraine is a major additional negative factor. However, from a purely economic point of view there would be common interests in creating the conditions necessary for resurrecting talks on economic integration, this time between the EU and the emerging EAEU. It would be based on the territorial proximity; colossal (from the EAEU point of view) and substantial (from the EU point of view) trade flows; the potential of investment flows, coupled with the transfer of technologies; issues of soft and hard security; common neighborhoods; the unresolved issues of trans-border transport and energy infrastructure, migration issues and so on.

Deep economic integration with the EU would be extremely important **to the emerging Eurasian Economic Union**. Firstly, the EU is the largest trade partner of Russia and Kazakhstan, accounting for over half of Russia's commodity turnover, while Russia is, in turn, the EU's third largest trade partner. Secondly, cooperation with the EU may help resolving the EAEU member states' modernization problems. The key instrument would be the capital flow coupled with the transfer of technologies. Thirdly, the emerging EAEU is currently initiating a number of free-trade agreements with smaller partners, from member states of the European Free Trade Association to Vietnam. In this context, deeper economic integration with the EU is the main long-term objective. Fourthly, the Ukraine's problem may eventually be resolved through a deep economic cooperation between the EU and the EAEU, making this cooperation paramount for developing common neighborhoods.

From the **EU's point of view** the EAEU does not play a similar decisive role in its international economic-trade relations, but especially Russia is an important economic partner. In the previous decade there was a strong interest to develop integration relations with the countries in the East. Negotiations about a new generation, so-called Deep and Comprehensive FTAs (DCFTAs) have been signed with Ukraine and with other Eastern neighbors and in parallel there were preparatory talks with Russia about a bilateral FTA. However, the creation of the Customs Union has made this bilateral route impossible, on the other hand it meant new challenges: the CU members were not yet members of the WTO, what for the EU is a major pre-condition for preferential relations. Russia's WTO accession in 2012 seemed to open up the possibility of restarting the process, but very soon Russia's and the EAEU's economic/trade policies in the EU's view have taken a turn towards reliance on protectionist measures which much reduced the EU's interest. Since 2013 additional complications emerged with the worsening political situation around Ukraine, which from 2014 led to the known consequences of sanctions, counter-sanctions, various trade-restrictive measures, etc.

Thus, from the EU's point of restarting the broader regional integration process would require, apart from finding a political solution to the Ukrainian crisis, economic policy changes, first of all by Russia. Assuming such positive developments in the near future, in our view, a comprehensive EU-EAEU agreement might become reality by 2020s. That is why there is a task for researchers to work on the economic assessment and design of the prospective deal.

The prototypes of the potential EU-EAEU integration are manifold. They include a deep and comprehensive free trade agreement (DCFTA) as well as a comprehensive economic and trade agreement (CETA). The latter is exemplified by the recent agreement between the EU and Canada. There is also a prototype of the Transatlantic Trade and Investment Partnership (TTIP) and there might be other models to look at. As mentioned, the full-fledged EU-EAEU negotiations would require all members of the EAEU to become WTO members. Hence the necessity for (particularly) Russia to provide support for Belarus in its Geneva WTO negotiations. In order to achieve Belarus' WTO membership, the support of, and agreement with, the EU and other important WTO members is also needed.

In order to investigate the costs and benefits of any potential EU-EAEU trade agreement, one has to identify existing trade barriers, model bilateral trade under different scenarios in terms of trade barriers, and, on this basis, develop a set of political recommendations supporting *asymmetric* negotiations maximizing benefits and minimizing costs of each party. More specifically, it includes the following.

1. *Deep EU-EAEU economic integration: identifying the barriers.* Research on the current state of affairs, including trade barriers and non-tariff measures, regulatory discrepancies, and border issues. Essentially, this is a study of what the problems currently are. This stage should also include qualitative assessment, the Government policies and the actual implementation of the various regulations: often there is a deep gap between the officially prescribed, formal measures and the steps taken in reality.
2. *Deep EU-EAEU economic integration: quantitative assessment of impacts in various scenarios.* This stage, being based on the first stage of the project, should include modeling and a quantitative assessment, based on several methods. As mentioned in point 1 above, also qualitative assessment of the policies and their implementation are needed.
3. *Development of a set of political recommendations, very probably in the form of options, to support negotiations.* Figuratively speaking, the negotiating parties will have a variety of 'chips' at hand. It is thus necessary to understand and evaluate the absolute and relative value of these 'chips' in order to find a suitable consensus.

The selection of each research method is determined by the tasks being addressed at each specific stage of the study, as well as by the availability of data. In particular, to assess at the *ex-ante* stage of the analysis the consequences of a free-trade area being established between the EAEU and EU, it is appropriate to use:

- Simple and informative methods based on index calculations. These allow to assess: the value of commercial agreements with future partners; the similarity of the export and import profiles; and the revealed comparative advantages of the trade of EAEU member states with the EU and the rest of the world, and reciprocally, the comparison of the benefits for the EU of an integration agreement with the EAEU with other regions. They also provide for a preliminary ascertainment of the pros and cons of taking part in an RTA, which can be discussed at the initial negotiations.
- More complex methods, in particular, computable general and partial equilibrium models. These models provide a scenario-based assessment of static effects, both for simple forms of integration and for deeper agreements that entail the removal of restrictions on the movement of capital and persons, harmonization of the legislation and etc. However, the limitations of these models should be taken into account.
- Gravity models that allow the researcher to extrapolate the effects of various trade agreements between other countries on the regional trade agreement under review, as well as to estimate the consequences of integration initiatives: These models also provide an opportunity to assess the potential that is not being realized due to non-membership in various RTAs.

- When analyzing the effects of lowering non-tariff barriers on integrating countries' economies, it is desirable to use a combination of methods. These include direct assessments based on company surveys, gravity models and computable general equilibrium models. Really, the assessment of the actual practices and the impacts of various measures on companies, as well as of the broader business-investment environment constitute important qualitative aspects of the overall assessment process. This approach is also necessitated by the difficulty in data collection and quantification of the effects of NTB.

3. Methods to assess the effects of regional economic integration

It is quite clear that, when used separately, no single method can provide a comprehensive RTA impact assessment. Therefore, if statistics or other relevant information is available, **a combination of quantitative analysis methods should be used**, with consideration for their strengths, weaknesses, capabilities and limitations.

The CGE method

First and most commonly used method to assess the effects of integration is computable general equilibrium (CGE) approach. CGE models are used extensively, both by the governments of individual countries and by international organizations such as the World Bank, OECD, WTO, and the European Commission (for trade policy impact assessment). They constitute an effective analytical tool enabling complex ex-ante modeling of the consequences of exogenous policy changes (Bohringer, Rutherford, Wiegard, 2003).

One of the most frequently mentioned strengths of these models is their theoretical logic and consistency. This allows them to be guided by a "theoretically correct" understanding of how the economy functions in the economic policy decision-making process. In addition, "general equilibrium" also shows that there is a clear interdependency between economic variables, and that any economic policy change affects a variety of elements in an economy (Piermartini and Teh, 2005).

CGE models are used extensively to assess the impact of a country's or group of countries' membership in RTAs, since they enable:

- an analysis of the costs and benefits of various integration scenarios, providing a quantitative assessment of impact on trade, economic growth, production, employment, budget, and household incomes;
- determining of winners and losers, both on the level of individual economic sectors and economic agents - households, governments and companies, as well as the elaboration of compensatory measures, or a trade policy adjustment programme;
- the elaboration of a trade negotiation strategy.

In addition, modern CGE models are more in line with real life and can be used to assess the economic impact of a trade policy, including regional trade integration, for developing countries and transition economies. This is because they are not based solely on Walras' perfect competition model or its modification – the Arrow–Debreu model, but also include elements of imperfect competition, such as, for example, price determination and increasing returns to scale (Francois, 1998).

Despite the popularity of CGE models, they are subject to serious criticism, which particularly points out their limitations and the need to approach the results with caution for the following reasons.

- One important limitation of the model is its comparative static approach, which makes it possible to identify the impact of trade policy changes on the endogenous variables. However, it assumes that the factors being compared are the initial and final equilibrium, without accounting for the costs and benefits of the transition process. This, in turn, leads to overestimation or underestimation of the impact of the trade policy changes (Piermartini, The, 2005). In addition, the model does not provide an accurate estimation of the duration of the transition to the new equilibrium.
- The model's calibration and specification require advanced programming skills and depend on the *modeller's* experience and intuition. Due to this, CGE models are often perceived as a "black box". They are also often criticised for errors in their numerical specification. In this connection, efforts have been undertaken to increase the accessibility of CGE analysis by creating a more user-friendly interface, one that could be understood by users other than modelling specialists (Bohringer, Rutherford, Wiegard, 2003).
- Statistical data have varying degrees of reliability. For example, commodity trade statistics are more reliable than trade in services statistics, as it is more difficult to measure capital than labour. The available information on non-tariff barriers and subsidies is limited, and its use in models depends on the choice made by the researcher.
- The elasticities used in the models are often taken from other models without modification, or are partially modified due to the complex and labour-consuming econometric estimates (Hazledine, 1992).
- The models are very sensitive to Armington elasticities, which are very important to determining the trade policy impact. Measuring these elasticities is a difficult task. Most disputes regarding the measurement of Armington elasticities arise due to the structural discrepancy between the econometric models used to measure them, and the simulation models used to evaluate the trade policy (McDaniel, Balistreri, 2001).⁴

Overall, we can draw the conclusion that quantitative estimates of the results of economic/trade policy changes, obtained using CGE models, are valuable not so much from the standpoint of specific numerical figures, but for the degree of the impact of these changes on the economy of the country, or group of countries. This provides a better understanding of which scenario of economic/trade policy is the most preferable, for example, when considering various options of participation in regional trade agreements.

The main software used today for solving CGE models are: GEMPACK (General Equilibrium Modelling Package); GAMS (General Algebraic Modelling System); and a special module of the latter—MPSGE (Mathematical Programming System for General Equilibrium Analysis).

The GTAP model

The most commonly used tool to analyze the impact of trade policy changes, particularly those related to RTA membership, is the GTAP Model, developed by Thomas Hertel (Hertel, 1997).

The standard GTAP Model is a multi-region, multi-sector CGE model, with perfect competition, constant returns to scale, and application of the Armington assumption. The current GTAP Version 8 data base contains data on 129 regions⁵, which include both individual countries and groups of countries, as well

⁴A description of problems associated with the use of CGE models can also be found in Grassini (2009).

⁵In GTAP 8.1 Data Base (February 2013) the number of regions was increased up to 134

as 57 standard sectors. The previous version included 113 regions. The model presents data for two reference years: 2004 and 2007 (for further detail on the difference between GTAP 8 and previous versions, see Narayanan, Aguiar, McDougall, 2012). Before the user begins modelling, the data has to be aggregated to the required level using GTAP Agg (or FlexAgg), and then GTAP or GTAP in GAMS used to assess the impact of trade policy changes and RTA membership globally, or for several countries. There is also an option to extract a social accounting matrix for a particular country for the data base, and perform computations for this country alone.

The standard GTAP model is implemented with the use of the GEMPACK software, and therefore a GEMPACK license is required to modify the standard GTAP Model. The standard model can be extended and modified, for example, by incorporating elements such as imperfect competition, technology spillover, and the agricultural goods market. It is also extended to enable assessment of dynamic effects using the GDyn model (Narayanan, Aguiar, McDougall, 2012). This model can be used to determine how changes in policy, technology, population and factor endowments can affect the path of economies over time. Another extension of the standard model is GMig2, which makes it possible to track labor migration and evaluate immigrants' monetary transfers.

However, when using the GTAP Model to compute the consequences of countries' membership both in the EAEU and in RTAs established between this union and other countries, as well as unions of countries, it is necessary to keep in mind that in GTAP 8, the reference year for Belarus and Kazakhstan is 2004, while for Russia it is 2003. Thus, the model incorporates these countries' social accounting matrices, which are based upon near decade-old intra-industry balance data and input-output tables.

The gravity model

The second most popular tool for RTA assessment is based on modern gravity models, which are widely used to analyze international trade flows. Gravity approach is based on studies published in the 1960s by Tinbergen (1962) and Linneman (1966). Interest in gravity models has been revived over the last decade (Bergeijk, Brakman, 2010). Most papers on the use of the gravity model mention that it is a "workhorse" for analyzing international trade, providing quite accurate estimates of bilateral trade flows. In addition, the economic literature also notes that the gravity model is one of the most stable empirical relationships in an economic analysis (for example, see Porojan, 2001).

One of the most important traits of the gravity model is its ability to assess and predict the impact of FTAs on the shift of trade flows between separate countries or groups of countries. It is notable that the gravity model not only enables an analysis of the impact of the existing FTAs, but also assessment of the impact of proposed agreements based on retrospective data on the existing state of affairs. Among econometric methods, gravity models are the main tool for modelling trade flows.

The gravity model is based on an analogy with the Newton's law of universal gravitation, whereby trade between two countries depends on the sizes of their economies and the distance between them. While the gravity model was initially a simple stable empirical relationship describing trade flows, without any theoretical grounding, in later years it was supported with appropriate theoretical foundations (Anderson, 1979; Anderson, Wincoop, 2003; Bergstrand, 1985; Helpman, Krugman, 1985; Deardorff, 1998).

In applied research, gravity models are used to resolve a broad range of problems in the economics of trade, with economic policy issues occupying an important position. These issues include the creation of various integration and currency unions, as well as the assessment of the corresponding effects. These models are used to obtain econometric estimates of the relationship between foreign trade and economic growth, and the influence of foreign trade on the environment.

The use of gravity models to solve the above-mentioned problems is popular for a number of reasons. First, they are quite precise (from the econometric standpoint) in explaining mutual trade flows between countries. Secondly, they are a sufficiently simple tool to assess the influence of various factors on the dynamics of international trade, besides the standard variables for the basic gravity model. The explanatory capability of the variables of a standard gravity model supports the supposition that the statistical significance of additional variables included in the model (in particular, variables characterizing the effects of integrative agreements) attests to their actual significance for a country's foreign trade and its economy as a whole. For purposes of studying various economic policy measures, gravity models use not only variables, characterizing the effects of the presence or absence of tariffs as, but also additional variables reflecting countries' various political and institutional characteristics, which may affect international trade.

The gravity model can be estimated with the use of both cross-section data (data for one year or the average of several years for each pair of countries), and panel data (data for several years for each pair of countries). Most modern studies that apply gravity models use panel data. Currently, studies that use cross-section data are quite rare. Excluding time – an important source of variation – from the analysis may lead to inconsistent econometric results (Matyas, 1997). Therefore, gravity models based on cross-section data may produce unstable results (Ghosh, Yamarik, 2004). In addition, the use of panel data enables the consideration of the interconnections between the variables in time and the individual effects between trade partners (Nowak-Lehmann et al., 2007).

Kepaptsoglou et al. (2010) analyzes over 50 papers with the use of the gravity model. The authors conclude that despite some criticism during the initial years of this tool's application to analyze trade flows and the impact of regional trade agreements, over the last decade it has become one of the main research tools. The main areas of this approach's development were focused on improving the model's theoretical grounds and the econometric methods of estimation.

The GDP, GDP per capita and distance between pairs of countries are the most commonly used indicators in gravity models to characterize the supply and demand (the variable-masses and proximities). Variables such as a common language and border are commonly used as dummy variables, which are often useful to assess the effect of various regional trade agreements, customs unions and currency unions.

In terms of econometric methodology, lately OLS in its pure form is used extremely rarely to estimate the gravity model. Commonly used models include fixed and random effects, which enable the consideration of countries' interaction in space and over time. At the same time, the choice of the model depends on the aim of the study, the qualities of the data being analyzed and the theoretical reasoning upon which the model is based. In this regard, Egger (2002) notes that the fixed effects model is more suitable for short-term forecasts. The random effects model can also be used provided this approach is adequate given the available data and the aim is to assess the effects of constants over time. Overall, however, most empirical studies rely on fixed effect gravity models.

Although gravity models are widely used to assess the effects of regional trade agreements, the results obtained with their help do not provide a well-defined result vis-à-vis the creation and diversion effects (Baier, Bergstrand, 2007; Kapsoglou, et al., 2010). At the same time, research shows that regional trade agreements lead to a significant increase in trade between member states, often at the expense of countries that are not included in such agreements (Carrere, 2006). Baier and Bergstrand (2007) attempted to shed light on the impact of creating free trade areas while considering the theoretical foundations of this issue and modern econometric research, viewing the FTA as an endogenous factor. The results showed that FTAs indeed have a significant impact on the development of trade. It is notable that the consideration of possible endogeneity, when assessing the impact of FTAs in the gravity model, is an important area in the studies and applied analysis of the consequences of integration agreements.

Although the gravity model is a traditional and universal tool to analyze trade flows and the effect of regional integration agreements, lately some authors have criticized the econometric methodology and its estimations. Zwickels and Beugelsdijk (2010) pose the question of whether the "workhorse" is actually a Trojan horse due to its inadequate econometric methodology when assessing the gravity model. In their work, the authors focus on three main problems: 1) non-stationarity of data used to assess the gravity model, and the problems that arise due to not considering this circumstance, 2) overestimated coefficients of gravity model in case inadequate econometric methodology is used, and 3) methods of estimating the gravity model for non-stationary data.

The problem of non-stationary variables conceals a hazard when using the gravity model since ignoring this fact and using econometric analysis methods that are inadequate to the situation results in an incorrect specification of the model. If the first differences of non-stationary variables are used, making them stationary, then in the case of a gravity model, we are faced not only with the loss of important information pertaining to the long-term, but also the impossibility of considering the effects of various integration initiatives reflected by the dummy variables, which are stationary variables.

Zwickels and Beugelsdijk (2010) demonstrate that the use of an adequate econometric methodology to assess the gravity model, as compared to the traditional approach, results in a lower statistical significance of model coefficients and a lower absolute effect of most of the model's variables. It is clear that overestimated coefficients in the traditional gravity model may provide mistaken reference points for economic policy. In connection to this, it is sensible to revisit the previously obtained estimates of gravity models as a whole, and vis-à-vis the impact of variables characterizing the effects of regional trade agreements. Thus, despite the enormous popularity of gravity models, paying attention to the dynamic properties of data and using an adequate method of econometric analysis are of utmost importance. Otherwise, researchers risk their gravity model becoming a Trojan horse instead of the tried-and-true "workhorse" of empirical analysis.

The problems of non-stationary variables, the possibility of their co-integration and the use of gravity model estimation methods adequate to the given situation are also examined in a number of other works (see, for example, Fidrmuc, 2009; Gomez, Tamarit, 2011; Camarero, Gomez, Tamarit, 2013). However, these works are still the exception rather than the norm in the plethora of publications relying on the gravity model.

The partial equilibrium model

Besides using general equilibrium and gravity models to assess the economic impact of creating an RTA, **partial equilibrium models** can be used as well. They allow the researcher to analyze the static effects of membership in a regional trade agreement on a sector that is particularly important to the economy, for example – agriculture (Naanwaaba, Yeboah, 2012). They assess the effects of various measures stipulated in the agreement (elimination of tariffs, reduction of non-tariff barriers, and application of the country of origin rule) (Fetzer, Rivera, 2005). These models are simpler than general equilibrium models since they do not require an interrelation between various markets. Michalopoulos and Tarr (1997) used the partial equilibrium model to examine the static effects of membership in the CIS Customs Union,⁶ which has a lower tariff than the CU. The conclusion drawn from assessing the impact of a common foreign tariff on these countries was that membership in this preferential trade agreement leads to diminished welfare in these countries.

IOT tables

Models based on **input-output tables (IOTs)** represent another possible tool for ex-ante analysis of various integration effects. This approach is well developed in Russia and Ukraine. This model enables simulation estimations to be made based on a complex of intra-industry macro-economic models of an agreement's member states. Analogously to general equilibrium models, various integration scenarios can be developed.

OECD and WIOD constructed a system of balances for all EU countries, developed and developing countries (including Russia). Besides, there exists an integrated inter-industry balance of the world economy. The data series cover 1995-2009.

Despite this method's significant analytical potential, it has certain limitations when used to assess the economic effects given various scenarios of interaction between the EU and EAEU, especially a deep and comprehensive free trade area:

- This approach does not provide an assessment of a number of important aspects associated with progress toward increasingly complex forms of integration. These aspects include, importantly, the consideration of the impact of non-tariff barrier reduction/elimination and the movement of labor. The latest studies show that precisely these effects may have the greatest impact on integrating countries.

It is important to show which impact an RTA would have on RoW (e.g., main trade partners of the EU and EAEU), including not only trade, but also general economic and sectorial effects. IOT method does not allow providing such estimates.

Various indices are used to assess the consequences of countries' membership in regional trade agreements as well. Such indices allow an assessment of the following (Mikic, Gilbert, 2007):

– How dependent a country is on trade, including regional trade (its openness to foreign trade, i.e. export and import vis-à-vis the GDP; the import penetration index showing which portion of the internal demand is satisfied by import, including from partner states; marginal propensity to import,

⁶ This refers to the Belarus, Kazakhstan and Russia's Customs Union, which was established in 1995. Kyrgyzstan acceded in 1996, followed by Tajikistan.

i.e. how much import changes as a result of GDP growth; the trade concentration index by goods and services; and the intra-industry trade index);

- Which commodity/sector is developing most rapidly and growing both within the region and in trade as a whole (export trade structure, goods export growth rates);
- What the export basket looks like to partner countries and non-member states of the RTA from the standpoint of the revealed comparative advantages (indices of the revealed comparative advantages for separate commodities and groups of commodities, both for export to RTA member states and non-member states);
- Is the growth of intraregional trade related to supply to one specific country, or is it equally distributed among member states (the specific weight of separate RTA member states in the import and export);
- How intense is trade within the regional trade agreement (trade intensity index, adjusted regional export share, i.e. the correlation of the intraregional export share to the share of the region's export in world trade);
- How complementary is trade within the trade agreement (trade complementarity index);
- Is trade undergoing a geographic shift after a country's accession to the RTA?

These indices can be useful for both ex-ante and ex-post estimations. In the ex-ante case, they are able to quickly provide information on: the state of trade agreements with future partners; the similarity of the export and import profiles; and countries' revealed comparative advantages in trade with potential member states and the rest of the world. This allows a preliminary estimation of the pros and cons of acceding to a given RTA at the initial negotiations stage.

The economic growth and productivity function method

Approaches to assess economic growth and the productivity function can also be used to assess dissemination of new technologies through trade and investment. The focus is to evaluate the impact of trade-related effects and technological dissemination on the total factor productivity (Schiff, Wang, 2003). This type of analysis enables an assessment of the influence of increasing openness of the less developed countries' economies on the dissemination of technological innovations from more developed countries. This allows the researcher to detect the impact of economic openness on economic growth, and total factor productivity, through the influence of new technologies.

Conclusion

To conclude, we should stress that, when used separately, none of the above analytical tools allows a comprehensive assessment of the impact of an EU-EAEU deeper economic integration. A combination of these methods should therefore be used based on their strengths, weaknesses, capabilities and limitations. Experts from all major participants should work together to choose those analytical tools which give the most reliable outcomes, taking also into account the different conditions in the EU and the EAEU. In addition, a limiting factor to the use of any given method is the availability of the required quantitative or qualitative data (for example data on non-tariff barriers, and restrictions to the movement of labor and capital). If the required information is available, it is best to utilize all of the above methods since the combination facilitates an analysis of the various aspects of the multi-faceted regional integration phenomenon. In this case, quantitative methods of analysis will not compete, but

will complement one another. It is important to note that these methods are being actively developed. Therefore, when using them, new scientific developments presented in the economic literature should be used in the applied analysis.

Even assuming the use of a combination of the most advanced analytical tools, econometric models, from the EU's point of view high-quality and reliable conclusions about the desirability, possibility and conditions of an EU-EAEU integration can be drawn only by **taking into account the actual economic policies, the extent of implementation of existing international commitments, the direct intervention of the state/government in the economy and business decisions and even outright political considerations**. Such elements include the declared and undeclared import substitution, local content and localization policies, used on their own or linked to investments (TRIMs), the use of non-tariff measures, like technical regulations and standards, as well as SPS measures for restricting imports, the role of direct government instructions in business decisions, the real business autonomy versus the governmental supervision of State Owned Companies (SOEs), the application or lack of effective competition policies, both with respect of subsidy and anti-trust measures, the practices applied in case of Government procurement or procurement by SOEs, transport and transit measures used to affect trade flows, customs administration and valuation methods, etc.

These kind of measures – with few exceptions – are not declared or formalized, thus even their existence is mostly hidden. Therefore, their impacts can't be taken into account in econometric modelling. Their existence and impacts can be assessed only by such methods as interviews with companies both trading with, and investing in the EAEU member countries, the reports of business associations, think tanks and NGOs covering economic issues, contacts with the Governments whose trade relations are affected, reports by international organizations like the WTO, OECD, IMF, IBRD, EBRD, etc. Thus this element of the assessment process needs a separate work program and targeted actions.

The final conclusions about the EU-EAEU relations and possible integration models will have to be drawn from combining the results of both the various modeling techniques as well as the assessment of the economic policy and political measures and practices actually used.

References

- Aguiar, A., McDougall, R., Narayanan, B. (2012) *Global Trade, Assistance, and Production: The GTAP 8 Data Base*, Center for Global Trade Analysis, Purdue University
- Anderson, J. E. (1979) A theoretical foundation of the gravity equation, *American Economic Review*, 69, 106–16
- Anderson, J. E., van Wincoop, E. (2003) Gravity with gravitas: a solution to the border puzzle, *American Economic Review*, 93, 171–92.
- Baier, S., Bergstrand J. (2004) Economic determinants of free trade agreements, *Journal of International Economics*, 64, 29–63.
- Baier, S.L, Bergstrand, H. (2007) Do free trade agreements actually increase members' international trade? *Journal of International Economics*, 71, 72–95.
- Bergeijk, P.A.G., Brakman, S. (2010) Introduction: The comeback of the gravity model. In Bergeijk, P.A.G., Brakman, S. (eds.), *The gravity model in international trade: Advances and Applications*, Cambridge University Press.
- Bergstrand, J. H. (1985) The gravity equation in international trade: Some microeconomic foundations and empirical evidence, *Review of Economics and Statistics*, 67, 474–481.
- Bohringer, C., Rutherford, T., Wiegard, W. (2003) Computable general equilibrium analysis: Opening a black box, *Discussion Paper 03–56*, Center for European Economic Research.
- Camarero, M., Gomez, E., Tamarit, C. (2013) EMU and trade revisited: Long-run evidence using gravity equations, *The World Economy*, 36, 1146–1164.
- Deardorff, A. V. (1998) Determinants of bilateral trade: Does gravity work in a neoclassical world? In Frankel, J. (ed.), *The regionalization of the world economy*, Chicago University Press, Chicago.
- Fetzer, J., Rivera, S. (2005) *Modeling modifications in rules of origin: A partial equilibrium approach*. Paper prepared for the 8th Annual conference on global economic analysis, 9-11 June, Lubeck, Germany.
- Fidrmuc, J. (2009) Gravity models in integrated panels, *Empirical Economics*, 37, 435–446.
- Francois, J. (1998) Scale Economies and Imperfect Competition in the GTAP Model. GTAP Technical Paper No. 16
- Ghosh, S., Yamarik, S. (2004) Are regional trading arrangements trade creating? An application of extreme bounds analysis, *Journal of International Economics*, 63, 369–395.
- Gomez, E., Tamarit, C. (2011) The Euro effect on trade: evidence in gravity equations using panel cointegration techniques, *WP–EC 2011–07*, Valencian Institute of Economic Research.
- Hazledine, T. (1992) A critique of computable general equilibrium models for trade policy analysis, *Working Paper 92-4*, International Agricultural Trade Research Consortium.
- Helpman, E., Krugman, P. (1985) *Market structure and foreign trade*, MIT Press, Cambridge, MA.
- Hertel, T.W., Tsigas, M.E. (1997) *Structure of GTAP*, UNCTAD
- Kepaptsoglou, K., Karlaftis, M. G., Tsamboulas, D. (2010) The gravity model specification for modeling international trade flows and free trade agreement effects: A 10-year review of empirical studies, *The Open Economics Journal*, 2010, 3, 1–13.
- Linneman, H. (1996) *An econometric study of world trade flows*, North-Holland Publishing, Amsterdam.

Matyas, L. (1997), *Proper Econometric Specification of the Gravity Model*, *The World Economy*, 20, (3), 363-368

McDaniel, C., Balistreri, E. (2002) *A discussion on Armington trade substitution elasticities*, U.S. International Trade Commission, Office of Economics Working Paper, 2002-01-A.

Michalopoulos, C., Tarr D. (1997) The Economics of Customs Unions in the Commonwealth of Independent States, *Post-Soviet Geography and Economics*, 38, 125–143.

Mikic, M., Gilbert J. (2007) Trade statistics in policymaking: a handbook of commonly used trade indices and indicators, *Studies in Trade and Investment*, Trade Policy Section, Trade and Investment Division, UNESCAP.

Matyas, L. (1997) Proper econometric specification of the gravity model, *The World Economy*, 20 363–368.

Naanwaaba, C., Yeboah, O. (2012) The impact of NAFTA on agricultural commodity trade: A partial equilibrium analysis. Paper prepared for the Southern Agricultural Economics Association Annual Meeting, Birmingham, AL, 4-7 February.

Nowak-Lehmann, F., Herzer, D., Martinez-Zarzoso, I., Vollmer, S. (2007) The impact of a Customs Union between Turkey and the EU on Turkey's exports to the EU, *JCMS: Journal of Common Market Studies*, 45, 719–743.

Piermartini, R., Teh R. (2005) Demystifying modeling methods for trade policy, *WTO Discussion Paper*, 10, Geneva: World Trade Organization.

Porojan, A. (2001) Trade flows and spatial effects: the gravity model revisited, *Open Economies Review*, 12: 265–80.

Schiff M., Wang Y., Olarreaga M. (2002) *Trade-related technology diffusion and the dynamics of North-South and South-South integration*, Policy Research Working Paper Series 2861, The World Bank.

Schiff, M., Wang, Y. (2003) Regional integration and technology diffusion: The case of the North American free trade agreement, *World Bank Policy Research Paper* 3132.

Tinbergen, J. (1962) *Shaping the world economy*, Twentieth Century Fund, New York.

Vinokurov E., Pelipas I., Tochickaya I. (2015) *Quantifying Economic Integration of the European Union and the Eurasian Economic Union: Methodological Approaches*, Report no. 23, EDB Centre for Integration Studies: St. Petersburg.

Zwinkels, R. C. J., Beugelsdijk, S. (2010) Gravity equations: Workhorse or Trojan horse in explaining trade and FDI patterns across time and space? *International Business Review*, 19, 102–115.

The presentation slides and report texts given at the workshop are available by request from the project manager Anastasia Stepanova stepanov@iiasa.ac.at

Appendix 1: Agenda

IIASA, 6-7 March 2014

Day 1

Welcome and Goals of the workshop - Pavel Kabat

Introduction - Vladimir Yasinsky

Introduction - Evgeny Hotulev

Session I

Chair and moderator - Matthias Luecke

Quantifying EU-EEU economic integration: methodological approaches - Evgeny Vinokurov, Irina Tochitskaya, Igor Pelipas

Spatial approach to the assessment of the possibilities to expand the integrational interconnections - Valery Heyets

Greater Eurasia - Michael Emerson

Integration assessment: Eurasian Economic Commission approach - Andrey Lipin

Session II

Chair and moderator - Stanislav Naumov

About the principles of calculating macroeconomic effects of creating a Free Trade Area between the European Union and the Eurasian Economic Union - Alexander Shirov

Alternative methodologies to assess the growth effects of economic integration: computable general equilibrium (CGE) modeling vs. gravity model cum Melitz-style productivity growth - Matthias Luecke

Intra-regional and extra-regional trade within Europe and the CIS countries - David Goul

Integration Effects Studies: Results and Policy Implications - Peter Havlik

Regionalization Trends and Multilateral Trading System: Landmarks and Possibilities for Customs Union - Vladimir Nesterov

Day 2

Session III

Chair and moderator - Alexander Shirov

Eurasian Energy Perspectives in the Global Context - Nebojsa Nakicenovic

Infrastructure in energy and transport – the basis for the Integration - Stanislav Naumov

EU's cooperation with non-member neighboring countries: the lessons for other integration blocks - Marek Dabrowski

EU-Ukraine DCFTA impact on the Ukrainian economy and specific sectors - Volodymyr Panchenko

Trade integration in the CIS: Economic effects of alternative options - Olga Pindyuk

Estimating inter-industry firms cooperation effects in integrating countries: cases for Belarus, Kazakhstan and Russia - Vladimir Salnikov

Concluding session

Chair and moderator - Pavel Kabat

Appendix 2: List of participants

Péter Balás	Deputy Director, DG Trade, European Commission, Belgium
Marek Dabrowski	Fellow, Center for Social and Economic Research (CASE), Poland
Michael Emerson	Associate Senior Research Fellow, Centre for European Policy Studies (CEPS), Belgium
Marina Galyamova	Expert, Scientific Center for Eurasian Integration, Russia
Daria Galtsina	Specialist for interaction with experts societies and analytic centers, Eurasian Center for Integrative Studies and Communications, Russia
David Gould	Lead Economist, Office of the Chief Economist of the Europe and Central Asia region, The World Bank, USA
Peter Havlik	Guest Research Scholar, International Institute for Applied Systems Analysis (IIASA) and Staff Economist, The Vienna Institute for International Economic Studies (wiiw), Austria
Valery Heyets	Director, Institute of Economics and Forecasting, NASU, Ukraine
Hans Holzhaecker	Consultant, Kazakh Economic University named after Turar Ryskulov, Kazakhstan
Evgeny Hotulev	Director, Department of Macroeconomic Policy, Eurasian Economic Commission (EEC), Russia
Leena Ilmola-Sheppard	Research Scholar, International Institute for Applied Systems Analysis (IIASA), Austria

Pavel Kabat	Director General/CEO, International Institute for Applied Systems Analysis (IIASA), Austria
Daria Korotkova	Expert, Group of Methodology and Analysis, Department of Macroeconomic Policy, Eurasian Economic Commission (EEC), Russia
Dmitry Korshunov	Direction Chief, Centre for Integration Studies, Eurasian Development Bank (EDB), Russia
Andrey Lipin	Head, Division of Methodology and Analysis, Department of Macroeconomic Policy, Eurasian Economic Commission (EEC), Russia
Matthias Luecke	Professor, Kiel Institute for World Economy, Germany
Dmitry Mityaev	Vice-President, Federal Governmental and Academic Institute Council for the Study of Productive Forces Ministry of Economic Development and RAS, Russia
Nebojsa Nakicenovic	Deputy Director General/CEO, International Institute for Applied Systems Analysis (IIASA), Austria
Stanislav Naumov	President, Russian Association of Public Relations (RPRA), Russia
Vladimir Nesterov	Consultant, Division of bilateral and multilateral cooperation, Department for Trade Policy, Eurasian Economic Commission (EEC), Russia
Volodymyr Panchenko	Director, International Centre for Policy Studies, Ukraine
Igor Pelipas	Chairman of the Supervisory Board and Deputy General Director, Institute for Privatization and Management (IPM) Research Center, Belarus
Olga Pindyuk	Staff Economist, Vienna Institute for Economic Studies (wiiw), Austria
Olesya Polyakova	Expert, Group of Methodology and Analysis, Department of Macroeconomic Policy, Eurasian Economic Commission (EEC), Russia
Elena Rovenskaya	ASA Acting Program Director, International Institute for Applied Systems Analysis (IIASA), Austria
Vladimir Salnikov	Head of Direction, Center for Macroeconomic Analysis and Short-Term Forecasting (CMASF), Russia
Alexander Shirov	Deputy Director, Institute for Economic Forecasting (IEF) RAS, Russia
Anastasia Stepanova	Project Manager, International Institute for Applied Systems Analysis (IIASA), Austria
Irina Tochitskaya	Research Director, Institute for Privatization and Management (IPM) Research Center, Belarus
Evgeny Vinokurov	Director, Centre for Integration Studies, Eurasian Development Bank (EDB), Russia
Alexey Yantovsky	Senior Researcher, Institute for Economic Forecasting (IEF) RAS, Russia
Vladimir Yasinsky	Managing Director and Member of Board, Eurasian Development Bank (EDB), Kazakhstan

About IIASA

Founded in 1972, the International Institute for Applied Systems Analysis (IIASA) conducts policy-oriented research into problems of a global nature that are too large or too complex to be solved by a single country or academic discipline. IIASA's research areas are energy & climate change; food & water; and poverty & equity.

IIASA is at the center of a global research network of around 2,500 scholars and nearly 600 partner institutions in over 65 countries. It is funded and supported by its National Member Organizations which represent the scholarly communities in the following countries:

Australia, Austria, Brazil, China, Egypt, Finland, Germany, India, Indonesia, Iran, Japan, Malaysia, Mexico, Netherlands, Norway, Pakistan, Republic of Korea, Russia, South Africa, Sweden, Ukraine, United Kingdom, United States of America, Vietnam.

Contact

IIASA

Schlossplatz 1

A-2361 Laxenburg

Austria

Phone: +43 2236 807 0

Fax: +43 2236 71313

E-mail: info@iiasa.ac.at

Web: www.iiasa.ac.at



twitter.com/iiasavienna



facebook.com/iiasa



blog.iiasa.ac.at



linkedin.com/company/iiasa-vienna



youtube.com/iiasalive



flickr.com/iiasa



International Institute for
Applied Systems Analysis
IIASA www.iiasa.ac.at