



# **The economic logic behind the creation of the Eurasian Economic Union: A gravity model estimation**

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## ABSTRACT

This paper estimates the impact of the processes of the Eurasian integration in the post-Soviet space that led to the creation of the Eurasian Economic Union (EEU) in 2015 over the exports of the member countries and their main partners outside the EEU and its predecessor, the Customs Union (CU). Applying the gravity model technique over the dataset for 1995-2015 obtained from UNESCAP Trade Analytics, it is possible to determine the influence of the CU membership of both exporter and importer countries over the exports of the former after controlling for all the economic, cultural and logistical independent variables and two different types of estimation (OLS and Poisson estimator). The results indicate that this factor is significant in its influence, boosting exports on average by 87% and 38.9% (before accounting for tariff protection) depending on the type of estimation. When tariff protection is included, those figures go down to 67% and 29% respectively, which allows to conclude that positive effects for exports of the exporting country when both it and the importer are CU members should be attributed in the proportion of 75% to the non-tariff measures. This finding is in line with the expectations that membership of the EEU had at its start in 2015, when the main underlined benefits were related to a massive regulatory harmonization in a vast number of sectors.

**Keywords:** *post-Soviet space, Eurasian integration, Eurasian Economic Union, Customs Union, economic integration, gravity model, trade flows*

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## I. INTRODUCTION

The post-Soviet space<sup>1</sup> since 1991 has represented a case of how hard it is for the elements of a previously unified economic system to agree on mutually acceptable formats of integration in the new world. Political economic considerations have had a major role in shaping the decisions of the newly independent republics, making them look more outward for diversification of the economic links. Hence, what we know as the Commonwealth of Independent States became a region that traded much more with outside partners than within itself. Nearly all of the CIS countries are already members of the WTO or are in the process of accession.<sup>2</sup>

However, the global economic context is changing, and so do the priorities in international trade for the countries that signed the Almaty Protocol on December 21, 1991 (Garant, 1991). The global rules-based trading system is severely strained by the disagreements mounting since the failure of the negotiations at the 1999 WTO Ministerial Conference in Seattle and the start of the Doha Round in 2001. Regional solutions for free trade continued proliferating, making use of the Article XXIV of GATT (WTO, 1994) and adding to the ‘spaghetti bowl’ of bilateral and regional trade agreements (Chua, Garcia et al., 2018). This process has not gone unnoticed in the post-Soviet space, where the promise of a functioning market economy and integration with the West in the 1990s did not live up to expectations. An extremely profound recession caused by the disintegration of the economic links created in Soviet times, political instability and then the default of the Russian government on its bonds in 1998, dealt a blow to their competitiveness. The interest in some form of meaningful economic integration in Northern and Central Eurasia shot up.

Today, this space serves as the arena for the processes described as the “clash of integrations” or “potential integration of integrations”. For the first time since 1991, one of the

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<sup>1</sup> In this work, “post-Soviet space” and “former Soviet republics” are defined as 12 countries that became independent after the dissolution of the USSR, thus excluding Baltic countries.

<sup>2</sup> Belarus, Azerbaijan, and Uzbekistan are in the process of accession, with the former having been expected to complete it before the now cancelled 12<sup>th</sup> WTO Ministerial Conference in Nur-Sultan in August 2020. Turkmenistan has showed no interest in joining.

integration proposals in the emerging ex-USSR region is a project that emerged from within - that of the Eurasian Economic Union (EEU), which is celebrating 5 years since the start of its functioning in 2020. It is relatively early to make any long-term conclusions about its future, but it is of extreme interest to see how the case for its establishment was, or was not backed up by the economic logic of trade flows between its member countries (Armenia, Belarus, Kazakhstan, Kyrgyz Republic and Russian Federation).

This essay analyzes the exports between member countries and other 18 main trade partners outside the EEU between 1995 (when the first attempts of Eurasian integration were unsuccessfully initiated) and 2015 (entry into force of the EEU Treaty). The analysis will be performed by constructing an augmented gravity model of international trade using OLS and Poisson estimators, with exporter, importer, and year fixed effects.

The research question is whether there is an economic logic to the formation of the Eurasian Economic Union, and to which extent said rationale is explained by being part of a comprehensive regional trade agreement. The Customs Union introduced in 2010-2011 as a predecessor of the EEU serves as an example of such an arrangement. We will also look into the extent to which the benefits from the Customs Union membership are accruing from eliminating tariff protection and non-tariff measures respectively.

The work is structured in the following way: first, the evolution of the ideas, approaches and projects related to post-Soviet Eurasian economic integration is traced and described; second, the review of literature on the Eurasian economic integration is provided; third, theoretical background of and the literature review on the gravity model are provided; fourth, the specification of the model itself is introduced and analyzed; fifth, the conclusions are made; sixth, the list of references is provided.

## **II. EURASIAN INTEGRATION IN THE POST-SOVIET CONTEXT: A BACKGROUND**

During the Soviet era, the united economic system was the cornerstone of the regional integration in all the industries under the watch of the State Planning Committee (Gosplan). Once the Soviet Union started disintegrating, its republics have had much fewer incentives to maintain the created production chains and opted for more independence and self-reliance. This process culminated in the signing of the Alma-Ata Protocol that laid the foundation for the creation of the Commonwealth of Independent States in late 1991. As the Protocol itself was just essentially a memorandum of understanding between the heads of the newly established states (only Georgia opted out), a lot of further details had to be tackled later.

All 11 republics agreed in December 1991 on maintaining the freedom of movement and the common ruble area. However, these measures were presumed to be of a temporary nature as most heads of states were for creating their own financial systems as soon as possible. This decision is understandable, since there was no intention to transform the USSR into a more EU-like structure. In 1992-1993, all former Soviet republics experienced their highest inflation rates, as production and trade collapsed but the prices have already been deregulated. As the ruble was still circulating, it underlined the risks of using a common currency in a disintegrating entity. These circumstances put a halt on further economic integration talks until further signs of recovery.

In 1993 the interest in creating an economic union to preserve at least some value chains and trade links was confirmed at the official level. The heads of states signed a declaration that signified the intention to establish the Economic and Financial Union of the CIS (Consultant, 1993). However, when the treaty based on said declaration has been officially elaborated, its implementation stalled. Mid-tier and smaller states hesitated to get financially integrated again so soon. That alone, however, does not explain the whole picture, as CIS countries at that time were also undergoing a massive privatization campaign and prioritized attracting international investments and acquiring access to the Western markets. As many republics were direct competitors in terms of their export profiles, their incentives to switch back to intra-regional

cooperation and trade were insignificant. One more circumstance that influenced the process was the hesitation on behalf of Russia to adhere to the project which it did not have full ownership of.

Leaders of other countries were coming forward with their initiatives, hoping to re-secure their traditional markets on better terms. Back in 1993, this meant for Russians that they would need to sign off on a collective vision largely lead by the President of Kazakhstan, Nursultan Nazarbayev. Nazarbayev had not given up after the failed experience of the Economic and Financial Union and thought that the key to a restart of the integration process would be to inject it with a sense of wider scope. That is why, during a speech at Moscow State University in 1994, he officially came up with the proposal to create a Eurasian union (Qazaqstan Tarihy, 2014).

Meanwhile, Russia and Belarus quickly concluded negotiations on the creation of a common customs union, which Kazakhstan swiftly joined in early 1996 (Federal Law of Russian Federation No. 21-Φ3, 1997). This decision has also enticed Kyrgyzstan and Tajikistan to follow suit, but the implementation related hurdles (e.g. passage of binding laws, common tariff, coordinated process of entering the WTO) were significantly slowing the process. In 1999, Russia and Belarus proceeded to deepen their integration by formally creating the Union State of Russia and Belarus.

A new momentum was been added to the integration process with the election of Vladimir Putin as President of Russian Federation in May 2000. The new administration was determined to put the Eurasian project on track and generate clout for it in potential member states. By that time, diverging trends in the CIS have emerged. Ukraine and Moldova were determined to focus on their European aspirations and further integration with the West; the latter became a WTO member via the developed country track of commitments the year after. Belarus opted for a closer alignment with Russia. Central Asian republics remained extremely dependent on Russia in trade and remittances, but the resources at the disposal of Kazakhstan were allowing it to pursue a policy of quiet diversification. In the Caucasus, Armenia was more interested in a Eurasian integrationist project than their neighbors, as Georgia was siding more with Ukraine and Moldova and Azerbaijan preferred to keep equal distance from any initiatives.

The binding treaty which created the Eurasian Economic Community was signed in the first year of Putin's presidency (President of the Russian Federation, 2000). EurAsEC agreed on a timetable of the creation of a common tariff schedule, as well as harmonization of ambitions on the technical barriers to trade and market access. Transition to the common external tariff was supposed to take from 7 to 10 years. Russia, Belarus, Kazakhstan, Kyrgyzstan, and Tajikistan were the signatory countries, while Ukraine, Armenia, Moldova, and Uzbekistan joined as observers. The process of fulfilling the commitments taken proved to be tedious due to visible differences in the trade profiles and the structures of national economies. As a result, at least 30% of the tariff lines were under the risk of not being harmonized until the end of 2010 (Naumov, 2015). However, the Common External Tariff of the Customs Union of the EurAsEC started functioning on July 1, 2011, albeit with certain transitional provisions. The price of reaching that milestone was the decision to create the Customs Union just among three countries: Russia, Belarus, and Kazakhstan. Next stop was the implementation of the Common Economic Space via 17 sectoral agreements (President of the Russian Federation, 2003). Meanwhile, a delegation of certain sovereign authority to the supranational Commission of the Customs Union continued. On July 15, 2011 it issued its first Regulation, which concerned the safety standards for the rolling stock (Regulation 001/2011, 2011).

In 2013, Armenia suddenly reversed its decision to sign the Association Agreement with the EU in favor of joining the Customs Union. On May 29, 2014 leaders of the CU member countries met in Astana to sign the Treaty on the Eurasian Economic Union that entered into force on January 2, 2015 (WTO, 2014). The original membership of three was completed by Armenia and Kyrgyzstan. The Customs Union Commission became Eurasian Commission and expanded its structure and mandate, but had to co-exist in a subordinate state to the Eurasian Supreme Economic Council and Eurasian High-Level Inter-Governmental Council. All the heads of states were adamant that the EEU was a purely economic project. It has started affirming its own stance in the international economic relations, as shown by the conclusion of the free trade agreements with Vietnam, Iran, and Serbia, as well as the economic partnership agreement with China. However, the Union remains far from being completed.



### **III. LITERATURE REVIEW ON THE EURASIAN ECONOMIC INTEGRATION**

The scholarship on the Eurasian Economic Union, its predecessors, and alternatives to it has been very varied, as with time it attracted more researchers from outside the region. Researchers from the CIS space started writing about these topics more in English as well. For the purpose of this essay, the literature both in Russian and English has been selected for review, so it would represent as wide a spectrum of opinions and themes as possible, both from EEU member countries as well as non-members who are part of the CIS and beyond. The cutoff year for the literature review was set at 2011. It was the year when it became clear that the Eurasian economic project would be gaining traction as the Common External Tariff was introduced and the 17 sectoral agreements that were forming Common Economic Space were about to be signed.

One of the first landmark studies on the perspectives of a closer Eurasian integration format was undertaken by Vinokurov and Libman (2012, pp.202-225). They were skeptical about the idea that the model of the European Union should serve as a mandatory prescription to the integration processes in the post-Soviet space. If we are to consider the wider Eurasian context, the authors contend, European model is the most studied, but it is by far not the only one. As a counterweight, they lean more on the concept of open regionalism promoted within ASEAN and explain its potential advantages for the structures of the future Eurasian Economic Union, as it will be getting even more heterogenous in its membership. The authors emphasized that embracing the open regionalism could provide benefits in terms of crafting an indigenous model of integration that would simultaneously be able to attract non-Russian speaking countries as well. They were anticipating that the competition between the Eastern Partnership and the EEU will not lead to any convergence and more to the confrontation, hence their core proposal was to reach a ‘trade-plus’ agreement between the EU, Customs Union and the countries in between. These thoughts have been further developed in Malyshev (2015) in the context of a new alternative arising in the Eurasian space from 2013 – the Chinese project of Silk Road.

Barakhvostov and Rusakovich (2017) were analyzing some key indicators related to the progress of the Eurasian integration process in the Eastern Partnership countries in 2012-2015.

The prevailing types of cooperation between EaP states and the EEU are the following: active with high level of intra-regional trade for Armenia and Belarus; neutral with constantly low level for Azerbaijan; and confrontational with decreasing levels for Moldova, Ukraine and Georgia. While some subregional clusters within the Eurasian integration framework were formed, substantial heterogeneities prevail. The presence of the European Union is also playing its role. A substantial boost to further integration and cluster formation, according to the authors, can be provided only by a meaningful macroeconomic convergence. Authors like Knobel (2017), Borkova (2019) and Gurova (2018) use more traditional trade intensity indicators to measure the degree of integration within the EEU proper all while making sure that the non-oil trade is also properly analyzed. Naumov (2015) pursues another way of measuring the integration dynamics by analyzing whether the trade costs (particularly the customs component) are on a downward trend.

Shadrina (2018) brings to attention a sectoral issue that due to the structure of the economies of member countries is a significant predictor for the future of the EEU: Common Gas Market (CGM). According to her, institutional conversion and drift will be required to enforce complementarity in the process of achieving a harmonized CGM. Its future is an extremely important indicator of the progress of other integration processes, considering their significant level of dependence on commodity prices. This issue is explored at large by Polbin, Andreev and Zubarev (2018). Podkina (2019) is employing SWOT-analysis technique to identify successes and challenges of the integration processes in the EEU.

The non-Russian expertise from the CIS countries provides us with other insightful points of view. Aslamov (2015) provides the analysis on the benefits and dangers of accession for Tajikistan. He acknowledges the fact that the links in remittances between Tajikistan and Russia represent a serious consideration when it comes to adhering to the EEU framework. Moreover, the upcoming (at that moment) accession of Kyrgyzstan assured that Tajikistan was bordering the EEU customs territory before joining. On the other hand, Tajikistan's trade with China and particularly the transshipment potential of the former would be negatively impacted, thus nearly wiping out the benefits of joining the EEU. Bayramov, Breban and Mukhtarov (2019) provided the same type of analysis for Azerbaijan and found out that in the EEU, only Russia and Belarus are benefiting from the integration, with the former doing so to a smaller extent than the latter.

According to them, a potentially widening trade deficit and a similar economic profile to the likes of Russia and Kazakhstan should preclude Azerbaijan from accession.

The scholarship from outside the region traditionally is focused either on geopolitical implications of the Eurasian integration or on its more sectoral impacts. Hamilton and Bird (2019) pay specific attention to the monetary integration issues, cautioning that the synchronization of the business cycles is not assured, and many pitfalls of the euro area case may be unavoidable. Hartwell (2015) is focusing his expertise on how and where the states choosing the path of the EEU membership can improve their economic competitiveness. Mostafa and Mahmood (2018) are contending that the EEU is struggling in its goal setting because of the mismatch between the intentions (economic integration) and the (geopolitical) reality. Rotaru (2018) is contradicting them by claiming that the time that has passed since the creation of the EEU is too little to make any evidence based judgement on whether it constitutes a sustainable integration alternative for the post-Soviet space. Tarr (2016) is focused mostly on functional indicators that can entice the countries of the EEU to believe that it is yielding good geoeconomic returns: levels of remittances, improvement in trade facilitation and reduction of non-tariff barriers. Rinna (2014) is analyzing Armenia's volte-face in September 2013, when its then President Serzh Sargsyan changed his mind away from the DCFTA with the EU towards the membership in the EEU. Apart from the strategic considerations in terms of security reasons, he provides evidence that role of Russian FDI has been a substantial factor in swaying the decision, especially considering that a significant chunk of those investments have been provided by the businessmen of Armenian origin.

#### IV. GRAVITY MODEL OF INTERNATIONAL TRADE: THEORETICAL BACKGROUND AND LITERATURE REVIEW

Looking into the scholarship on the international trade, one can easily find a significant amount of papers using the gravity model as core tenet. It owes its success to the ability to estimate international trade flows while accounting both for tariff and non-tariff barriers. Tinbergen (1962) was the first scholar who realized the potential of estimating them by applying traditional equations of the gravity theory. The causal link between trade flows and economic size, as well as the reverse link between the former and the trade costs (expressed as distance in the simplest specification) proved to be very steadily significant assumptions. In fact, Leamer and Levihnson (1995) even concluded that these findings are among the clearest and the most robust ever made in the field of empirical economics. Large meta-analyses conducted by scholars such as Disdier and Head (2008) on more than a thousand estimates confirm how widespread the gravity model as a tool in the international trade research has become. Since 1962, the sophistication and use of gravity model evolved. For instance, behind-the-border costs of trade, a category that encompasses various types of non-tariff barriers, were integrated. Variables that were reflecting important political, cultural, or institutional factors that were influencing the costs of trade followed. Kimura and Lee (2006) were the first to have successfully applied the gravity model to the trade in services as well.

As the gravity model itself was essentially an intuitive creation, the ideas about it were in kind, and the variables included were not necessarily robust (De Benedictis and Taglioni, 2011). However, starting with Deardorff (1995), a trend towards theoretically formulated gravity models emerged. It became a commonplace that the newly developed micro-founded models would provide consistent and unbiased estimates of the parameters. This led to a further standardization culminating with the the “gravity with gravitas” model by Anderson and Van Wincoop (2003).

The most basic intuitive gravity model can usually be presented as follows (Shepherd 2016):

$$(1a) \log X_{ij} = c + b_1 \log GDP_i + b_2 \log GDP_j + b_3 \log \tau_{ij} + e_{ij}$$

$$(1b) \log \tau_{ij} = \log(\text{distance}_{ij})$$

$X_{ij}$  represents the exports of country  $i$  to country  $j$ , followed by the gross domestic product variables for both countries,  $\tau_{ij}$  stands for trade costs, the distance variable is usually measured as the distance between the capitals of the respective countries, and  $e_{ij}$  is the error term. The  $c$  term stands for the constant, and the  $b1$ ,  $b2$  and  $b3$  are the coefficients that are to be estimated.

Overcoming the difficulties related to capturing the effects of change in trade costs enabled a wider use of the structural gravity models. The first one was elaborated by Anderson (1979), but the one by Anderson and Van Wincoop (2003) became mainstream. It can be presented as a demand function, and its final form largely depends on the constant elasticity of substitution structure for certain consumer preferences. When it comes to the production side, the standard Krugman assumptions are followed (Krugman, 1979). The “gravity with gravitas model” is obtained after performing this aggregation:

$$(2a) \log X_{ij}^k = \log Y_i^k + \log E_j^k - \log Y^k + (1 - \sigma_k)[\log \tau_{ij}^k - \log \Pi_i^k - \log P_j^k]$$

$$(2b) \Pi_i^k = \sum_{j=1}^c \left\{ \frac{\tau_{ij}^k}{P_j^k} \right\}^{1-\sigma_k} \frac{E_j^k}{Y^k}$$

$$(2c) P_j^k = \sum_{i=1}^c \left\{ \frac{\tau_{ij}^k}{\Pi_i^k} \right\}^{1-\sigma_k} \frac{Y_i^k}{Y^k}$$

$X$  here is represented by exports by country ( $i$  and  $j$ ) and sector ( $k$ ),  $Y$  stands for GDP (with  $Y_k$  being world GDP) and  $E$  for expenditure,  $\sigma_k$  is elasticity of substitution between the varieties in one sector and  $\tau_{ijk}$  is for trade costs. The function of trade costs got more standardized with time, and a workhorse version of it is presented by the following equation:

$$(3) \log \tau_{ijk} = b1 \log distance_{ij} + b2 contig + b3 comlang\_off + b4 colony + b5 comcol$$

$contig$  is a dummy variable that takes the value of unity if the countries  $i$  and  $j$  have a common border,  $comlang\_off$  is a dummy variable that takes the value of unity if the countries in

question share a common official language, *colony* is a dummy variable that takes the value of unity if the country was a colony and *comcol* is a dummy variable that takes the value of unity if both countries share the same colonizer.

Back to the general specification of the model, we can see the introduction of such a category as ‘multilateral resistance’ via two new variables,  $\Pi_{ik}$  and  $P_{jk}$ . Their cumulative effect is that of solving the key problems that the intuitive gravity model cannot overcome. The first variable is known as outward multilateral resistance and captures the dependence of exports from country  $i$  to country  $j$  on trade costs across all possible export markets. The second variable is called inward multilateral resistance and reflects the dependence of imports from country  $i$  to country  $j$  on trade costs across all possible suppliers. Inclusion of these two variables eliminates the omitted variables bias that is present in the intuitive version of the model (Anderson & Van Wincoop, 2003).

It is also extremely important to pay attention to the way the gravity model is set up in its structural variant. Applying a gravity model without producing misleading results requires that each line in the database should contain only a single export flow, hence using log of exports as dependent variable is preferred. Theoretical gravity models require that trade and GDP values should be reflected in nominal terms as the multilateral resistance terms are already acting like an unobserved deflator. Accounting for intra-national trade allows an efficient simulation of the effects of non-discriminatory trade policies, such as trade facilitation measures (Piermartini & Yotov, 2016).

Rewriting the model from Anderson and Van Wincoop (2003) in a way that allows to group the terms (i.e. switch from sectoral to aggregate trade) allows to apply the fixed effects estimation and proceed to specification:

$$(4a) \log X_{ij} = C + F_i + F_j + (1-\sigma) [\log \tau_{ij}]$$

$$(4b) C = -\log Y$$

$$(4c) F_i = \log Y_i - \log \Pi_i$$

$$(4d) F_j = \log Y_j - \log P$$

$$(4e) \log \tau_{ij} = b_1 \log \text{distance}_{ij} + b_2 \text{contig} + b_3 \text{comlang\_off} + b_4 \text{colony} + b_5 \text{comcol}$$

From an econometric standpoint, the  $C$  term serves here as the regression constant. However, in terms of the economic theory it can be classified as world GDP. Both of the  $F$  terms represent the fixed effects for exporter and importer countries. Fixed effects are dummy variables equal to unity when a particular exporter or importer appears in the dataset. By introducing fixed effects, we can reasonably expect that it will help us to account for all sources of the otherwise unobserved heterogeneity for an exporter across all importers and vice versa. In fact, by taking a look at other terms in the structured gravity model such as GDP and the multilateral resistance terms, it can be seen that they fit these conditions as well. Once the dummy variables for fixed effects are created and added as explanatory variables, the usual Ordinary Least Squares (OLS) estimation can go through as a consistent and unbiased estimator if its three key conditions are satisfied.

Another important issue is the one of endogeneity, especially when one has to introduce policy related dummy variables there. The simplest technique available for the purpose of purging the endogenous variables in this case is two stage least squares (TSLS). The crux of the method is in running the OLS twice. In the first iteration, the variable suspected of endogeneity is run as the dependent variable, and the independent variables are comprised of the remaining exogenous ones from the model plus at least one instrument. In the second iteration, the gravity model itself is brought back in, but the dependent variable from the first stage is put in instead of the potentially endogenous variable.

Moreover, it is not preordained that the OLS is not the only estimation method to go. A standard gravity model in the linearized form but with a multiplicative error term is introduced:

$$(5) \log X_{ijk} = \log Y_{ik} + \log E_{jk} - \log Y_k + (1 - \sigma_k) [\log \tau_{ijk} - \log \Pi_{ik} - \log P_{jk}] + \log e_{ijk}$$

$e_{ij}$  is heteroskedastic with a high probability, which coupled with the fact that mean of its logarithm is dependent on higher moments of it means that the expected value of the error term would be depending on one or more explanatory variables, which will lead to the OLS estimator being biased and inconsistent. Santos Silva and Tenreyro (2006) concluded that with weak assumptions Poisson estimator can be employed. This does not mean that the data itself will be distributed as Poisson. This estimator, according to Shepherd (2016), contains three desirable properties for the policy researchers employing the structured gravity model. Firstly, unlike the usual non-linear maximum likelihood estimators, it is consistent in the presence of fixed effects. Considering that modern theoretical gravity models customary employ three sets of fixed effects – by exporter, importer and year – this fact strongly speaks in favor of the Poisson estimator. Secondly, unlike in the case of OLS, it can incorporate the value of the observations equal to zero and thus avoid the sample selection bias. Thirdly, the coefficients from the Poisson model follow the same pattern as the OLS and are easily explainable at the same time.



## V. GRAVITY MODEL SPECIFICATION AND INTERPRETATION OF ITS RESULTS

The gravity model to be presented in this chapter has been computed in Stata 16 software package to estimate the effect of the membership in the Customs Union for both exporters and importers on export flows of the former within and outside the future EEU. Reporting and partner countries are the EEU member countries together with their main trade partners outside the EEU. The latter are defined here as the customs territories that have at least 1.0% share in the exports of at least two EEU member countries either for 3 or more consecutive years before the establishment of the EEU or at least for half of the overall period between 1995 and 2015, as per the data from the Harvard Observatory of Economic Complexity.<sup>3</sup> As a result, the following counterparts were selected: Bulgaria, People's Republic of China, Czech Republic, France, Germany, Greece, India, Italy, Japan, Korea Republic, Netherlands, Poland, Turkey, Ukraine, United Arab Emirates, United Kingdom and United States. The main dataset underpinning the gravity model was obtained upon an e-mailed request from the UNESCAP Trade Analytics Portal staff.<sup>4</sup>

In line with the theoretical considerations outlined in the previous chapter, the variable  $\ln(\text{export}_{ij})$  is selected as the dependent one for this model. Independent variables  $\ln(\text{GDP}_i)$ ,  $\ln(\text{GDP}_j)$ ,  $\ln(\text{dist})$  are making part of the gravity model by default. As the goal is to test significance of the Customs Union membership for the economic rationale of becoming an EEU member, the variable *EEU* is also introduced. It is a dummy variable that takes the value of unity when the reporter and partner countries are both members of the Customs Union.

It is important to include logistical and cultural factors that are influencing trade. When it comes to logistics, there are two variables that represent a special interest. The variable *contig*, introduced in the previous chapter, has entered the model as described there. Another important variable that was included is the dummy *landlocked<sub>ij</sub>*, which takes the value of unity when either exporter or partner country is landlocked. This factor is of a significant importance in our case, as from five EEU member countries (Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russian

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<sup>3</sup> <https://oec.world/>

<sup>4</sup> <https://trade.unescap.org/analytics/#regression>

Federation) only Russian Federation has access to sea. Two culturally relevant variables are introduced as well. *Comlang<sub>off</sub>* was introduced in the model as per the specification outlined in the theory chapter. However, adding just this variable is not enough to reflect the influence of linguistic links between the EEU countries and some of the countries outside the EEU in the context of the links formed during the Communist era. For example, in Armenia and Ukraine Russian language is widely spoken but has no official status. Trade that is taking place between the border regions may be influenced by the knowledge of a common language different from Russian too. Hence, the *comlang<sub>ethno</sub>* variable has been introduced. It is a dummy variable that takes the value of unity when at least 9% of the population in both countries *i* and *j* speak the same language.<sup>5</sup> Finally, the variables that are related to the levels of tariff protection for both the exporter and partner country are added. The logarithm of the weighted average tariff levels of *i* charging partner *j* and vice versa were chosen as the way of measuring it.

In the first stage, the intuitive gravity model is computed. Here it does not account for the fixed effects of any kind, which will be introduced later.

Number of obs	=	212,993				
				F(4, 11618)	=	9324.24
				Prob > F	=	0.0000
				R-squared	=	0.5883
				Root MSE	=	2.4327
(Std. Err. adjusted for 11,619 clusters in dist)						
ln_export_ij	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
ln_distance	-1.269555	.024978	-50.83	0.000	-1.318516	-1.220594
ln_gdp_i	1.129761	.0076061	148.53	0.000	1.114851	1.14467
ln_gdp_j	.7943815	.0076446	103.91	0.000	.7793968	.8093662
eeu	.8189317	.0516489	15.86	0.000	.7176913	.9201722
_cons	-21.60992	.3674087	-58.82	0.000	-22.33011	-20.88974

*Table 1. Intuitive gravity model*

<sup>5</sup> As per CEPII data.

Table 1 demonstrates the resulting regression. The intuitive model has an R-squared value of 0.5883. This underscores the importance of meaningfully including fixed effects into the gravity model. All the variables are significant at 0.1% confidence level. After controlling for the distance between the countries and the size of their economies, it can be estimated that the membership in the Customs Union for both exporting and importing countries in the years preceding the creation of the EEU was boosting exports on average by 126.8% for the exporting country compared to when someone in the pair (exporter, importer or both) was not a member of the CU.

In the next stage, logistical and cultural variables, as well as the fixed effects are introduced.

Number of obs		=	212,992			
					F( 8, 212651)	= 13682.16
					Prob > F	= 0.0000
					R-squared	= 0.7252
					Adj R-squared	= 0.7248
					Within R-sq.	= 0.3398
					Root MSE	= 1.9891

  

ln_export_ij	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_distance	-1.532147	.0076528	-200.21	0.000	-1.547146	-1.517148
ln_gdp_i	.4737239	.0203936	23.23	0.000	.4337529	.5136949
ln_gdp_j	.58903	.0182968	32.19	0.000	.5531688	.6248913
eeu	.6259947	.0151428	41.34	0.000	.5963151	.6556743
comlang_off	.7837462	.0232565	33.70	0.000	.7381639	.8293284
comlang_ethno	.2400339	.0235785	10.18	0.000	.1938206	.2862473
contig	.866266	.0298237	29.05	0.000	.8078122	.9247197
landlocked_ij	-.9296852	.0345918	-26.88	0.000	-.9974842	-.8618862
_cons	2.161742	.6877796	3.14	0.002	.8137115	3.509773

*Table 2. Structural gravity model with exporter, importer and year fixed effects*

All the variables remained or proved to be quite significant for the model, as the p-values for their coefficients remained below 0.001. Moreover, the introduction of fixed effects allowed not only full compliance with the theoretical (both economically and econometrically)

requirements outlined in the previous chapter, but also an increase in the predictive power of the model. This can be confirmed by an increase in the R-squared value to 0.7252. After controlling for the distance between the countries, the size of their economies, contiguity, landlocked status (or lack thereof) and linguistic similarities (or lack thereof), it can be estimated that the membership in the Customs Union for both exporting and importing countries in the years preceding the creation of the EEU was boosting exports on average by 87% for the exporting country compared to when someone in the pair (exporter, importer or both) was not a member of the CU.

The model provided in Table 3 incorporates the average weighted tariff rates of country  $i$  on the goods from country  $j$  and vice versa.

Number of obs = 132,256		F( 10, 131934) = 6594.41	
		Prob > F = 0.0000	
		R-squared = 0.7420	
		Adj R-squared = 0.7414	
		Within R-sq. = 0.3333	
		Root MSE = 1.8771	

  

ln_export_ij	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_distance	-1.554648	.0097094	-160.12	0.000	-1.573678	-1.535618
ln_gdp_i	.3727225	.0255975	14.56	0.000	.3225519	.4228931
ln_gdp_j	.7037433	.0246561	28.54	0.000	.6554177	.7520688
ln_tarifftrateij_wa	-.0060536	.0039324	-1.54	0.124	-.0137611	.0016538
ln_tarifftrateji_wa	-.0799544	.0041395	-19.31	0.000	-.0880678	-.071841
comlang_off	.6990388	.0280699	24.90	0.000	.6440223	.7540553
comlang_ethno	.2391059	.0279419	8.56	0.000	.1843403	.2938714
contig	.9556494	.0376264	25.40	0.000	.8819024	1.029396
landlocked_ij	-.8961751	.0458587	-19.54	0.000	-.9860574	-.8062929
eeu	.5129255	.0194868	26.32	0.000	.4747317	.5511193
_cons	2.38972	.9125908	2.62	0.009	.6010585	4.178382

*Table 3. Structural gravity model with all the independent variables and fixed effects included (OLS estimators)*

The introduction of the tariff rates related variables at such a late stage was determined by the need to see the evolution of significance of the *EEU* variable (as being part of a customs union necessarily entails elimination of tariffs between the members as well) before their appearance, and to compare with the estimates after their inclusion. In the newly computed regression, all independent variables have the p-values of less than 0.001 except for the logarithm of the average weighted tariff rate of country *i* towards goods from country *j* whose p-value is equal to 0.124. This means that this variable is not statistically significant even at 10% confidence level. Adding the tariff related variables has slightly increased the predictive power of the gravity model, with the R-squared value getting at 0.742.

After controlling for the distance between the countries, the size of their economies, contiguity, landlocked status (or lack thereof), linguistic similarities (or lack thereof) and the level of tariff protection from both sides in the country pair, it can be estimated that the membership in the Customs Union for both exporting and importing countries in the years preceding the creation of the EEU was boosting exports on average by 67% for the exporting country compared to when someone in the pair (exporter, importer or both) was not a member of the CU. As we remember, the value of the boost to exports of the exporting country stemming from the CU membership of both exporter and importer amounted to 87% before the introduction of tariff protection variables. This means that after controlling for all other independent variables, only 23% of the boost to exports generated by the CU membership of both exporter and importer countries can be explained by the abolition of or significant decrease in tariff rates. 77% of it should be attributed to other, non-tariff measures facilitating trade in the Customs and later Eurasian Economic Union. What those measures exactly are lies beyond the research question of this essay.

As it was outlined in the theory chapter, using OLS estimators is not the only way to interpret the outcomes of a gravity model: so is the Poisson estimator as well. Employing it should allow for increasing the number of observations by including the zero values from the dataset. Two regressions are being computed with the Poisson estimator, exactly replicating the previous rationale and order of introduction of independent variables. The only different pre-condition is not using OLS.

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Number of observations: 212993  
Pseudo log-likelihood: -519713.71  
R-squared: .70275377

(Std. Err. adjusted for 11,619 clusters in dist)

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ln_export_ij	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
ln_distance	-.093157	.0022045	-42.26	0.000	-.0974776	-.0888363
ln_gdp_i	.0318988	.0019975	15.97	0.000	.0279838	.0358138
ln_gdp_j	.0378253	.0016569	22.83	0.000	.0345779	.0410727
eeu	.0328454	.003331	9.86	0.000	.0263169	.039374
comlang_off	.0542969	.0056926	9.54	0.000	.0431397	.0654541
comlang_ethno	.0162506	.0058083	2.80	0.005	.0048665	.0276346
contig	.0363158	.009905	3.67	0.000	.0169024	.0557291
landlocked_ij	-.0541521	.0094511	-5.73	0.000	-.0726759	-.0356282
_cons	1.509783	.12801	11.79	0.000	1.258888	1.760678

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*Table 4. Structural gravity model with exporter, importer, and year fixed effects (Poisson estimator)*

As it was expected, the use of Poisson estimator in this regression led to an increase in the number of observations that were used, as well as a decrease in the value of coefficients for the key independent variables. However, contrary to the expectations outlined in the theory chapter, the use of Poisson estimator has not increased the predictive power of the gravity model – moreover, the value of R-squared slightly decreased to a little over 0.7 compared to 0.74 in the Table 2. P-values for all the independent variables except *comlang\_ethno* are less than 0.001, and for the latter it is less than 0.01, which means that all the variables included in this regression are statistically significant at 1% confidence level. After controlling for the distance between the countries, the size of their economies, contiguity, landlocked status (or lack thereof) and linguistic similarities (or lack thereof), it can be estimated that the membership in the Customs Union for both exporting and importing countries in the years preceding the creation of the EEU was boosting exports on average by 38.9% for the exporting country compared to when someone in the pair (exporter, importer or both) was not a member of the CU.

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Number of observations: 132256  
Pseudo log-likelihood: -321933.32  
R-squared: .7216557

(Std. Err. adjusted for 9,016 clusters in dist)

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ln_export_ij	Coef.	Robust		z	P> z	[95% Conf. Interval]	
		Std. Err.					
ln_distance	-.0943507	.0023864		-39.54	0.000	-.099028	-.0896734
ln_gdp_i	.0243178	.002416		10.07	0.000	.0195826	.0290531
ln_gdp_j	.0443896	.0021572		20.58	0.000	.0401617	.0486176
eeu	.0254898	.0037734		6.76	0.000	.0180941	.0328854
comlang_off	.0481902	.0062866		7.67	0.000	.0358687	.0605117
comlang_ethno	.0139752	.0063053		2.22	0.027	.0016171	.0263332
contig	.0473383	.0109257		4.33	0.000	.0259244	.0687522
landlocked_ij	-.0476284	.0110057		-4.33	0.000	-.0691991	-.0260578
ln_tarifftrateij_wa	-.0008226	.0004759		-1.73	0.084	-.0017552	.0001101
ln_tarifftrateji_wa	-.0063672	.0006319		-10.08	0.000	-.0076057	-.0051287
_cons	1.148772	.1248187		9.20	0.000	.9041322	1.393412

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*Table 5. Structural gravity model with all the independent variables and fixed effects included (Poisson estimators)*

Comparing to the regression results in Table 3, one can see many similarities in the way that Table 5 differs from it with the case of comparison of the Tables 2 and 4. The number of observations increased, while the value of R-squared slightly decreased in the regression in the Table 5 compared to the Table 3. A decrease is noticed in the value of the coefficients as well. The p-values for all the variables bar two are less than 0.001. *comlang\_ethno* variable remains significant at 5% confidence level, while for *ln\_tarifftrateij\_wa* this is the case at 10% confidence level.

After controlling for the distance between the countries, the size of their economies, contiguity, landlocked status (or lack thereof), linguistic similarities (or lack thereof) and the level of tariff protection from both sides in a country pair, it can be estimated that the membership in the Customs Union for both exporting and importing countries in the years preceding the creation of the EEU was boosting exports on average by 29% for the exporting country compared to when someone in the pair (exporter, importer or both) was not a member of the CU. As we remember,

the value of the boost to exports stemming from the CU membership of both exporter and importer amounted to 38.9% before the introduction of tariff protection variables. This means that after controlling for all other independent variables, only 25.4% of the boost to exports generated by the CU membership of both exporter and importer countries can be explained by the abolition of or significant decrease in tariff rates. This represents a rate comparable with the 23% figure obtained using OLS estimators, and thus is significant across both estimation techniques used in this essay.



## VI. CONCLUSION

The creation of the Eurasian Economic Union in 2015 was a landmark in the very uneven development history of the economic integration in the post-Soviet space. Completed in the context of Russian confrontation with the West and an oil crisis, it was immediately thought to be a bloc where political considerations are as present as the economic ones. While this essay does not venture into disputing this thesis, its goal was to assess whether the involvement in Eurasian integration initiatives prior to the establishment of the EEU has had a statistically significant economic effect and to which extent the benefits of membership in the Customs Union (predecessor of the EEU) were caused by tariff-related and non-tariff-related measures respectively. In order to provide a response to these questions, a structural gravity model was computed. Core independent variables, CU membership dummy, logistical and cultural variables and the variables related to tariff protection levels were subsequently introduced in the regression together with fixed effects, with the resulting coefficients estimated using both OLS and Poisson estimator.

As a result, it can be concluded that the independent variables included in the gravity model explain the change in the dependent one (logarithm of exports by value) consistently by more than 70%. Except for one of the independent variables in one of the regressions, all of them were consistently significant at least at the 10% confidence level, but mostly even at 0.1% level. After accounting for all independent variables bar tariff ones, the influence of the membership in the Customs Union for both exporter and importer countries has been significant for the level of exports from the exporting country regardless of the use of estimation technique. The effect is estimated at 87% using the OLS estimator and at 38.9% using the Poisson one. After accounting for the influence of the levels of tariff protection, it decreased to 67% and 29% respectively. Thus, the influence of the CU membership of both countries in a pair over the increase in exports for the exporting country can be explained by elimination or decrease in tariff rates only to the extent of 23-25%. Hence, the benefits of being a member of the Customs Union could primarily be attributed to the non-tariff measures of trade facilitation, which is in fact one of the main action points for the Eurasian Economic Union since its launch in 2015.

However, future researchers can still act on the model to achieve certain improvements. It would be required to detect the non-tariff measures that had the greatest trade facilitation effect. Membership in the EEU still has a different significance for different member countries too – only Belarus and Armenia can be characterized as deeply involved in the regional value chains, while the rest, especially Russia, are still more oriented outward than inward in their export activities. If the researchers want to exclude the pervasive influence of the commodities trade for the EEU member countries, the remaining exports only may be used as the dependent variable to obtain the estimates that are less prone to the boom and bust cycles. This may also amplify the influence of factors such distance (as in the case of oil and gas trade for EEU countries the distance factor is less significant due to the availability of pipeline infrastructure) and tariffs (as oil and gas trade in the EEU countries is regulated via export duties or internal taxes instead).

Moreover, a tougher accounting of the transshipment from China and the EU may be applied, and its value subtracted from the data sample. From the point of view of theory, further research on this topic may include not just trade in goods but in services and account for the intra-national trade flows. It is also recommended that new dummy variables would be introduced that would capture some significant events post-2015 that impacted the development of the Eurasian Economic Union. Those could be the oil crisis, ‘milk wars’ between Russia and Belarus or ‘trucker wars’ between Kazakhstan and Kyrgyzstan, the launch of Kazakh state programme for infrastructural investments ‘Nurlyzhol’, and conclusion by the EEU of its own free trade agreements (with Iran on a temporary and partial basis, Vietnam and Serbia). Further research could potentially explore the role of macroeconomic factors in an augmented gravity model, such as the Consumer Price Index or the interest rates set by the central banks of reporting and partner countries.

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