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## **BELARUSIAN EXPORT POTENTIAL: A GRAVITY MODEL APPROACH**

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### **ABSTRACT**

This research examines Belarusian export potential with Euro-centric and Russia-centric trade blocks, and analyzes key trade patterns of Belarusian exports during the period of 1998-2013. The empirical study applies the generalized gravity model of international trade, and uses the panel data technique for data analysis. The panel dataset includes Belarusian exports to 43key trade partners and 9 explanatory variables.

The results show that the importer's GDP and population, distance and a dummy variable for former soviet republics, are statistically significant for Belarusian exports. However, the real exchange rate, the Slavic language, and common borders were insignificant in the model. Consistent with the gravity model, the importer's GDP and distance have the greatest explanatory power on Belarusian exports, with the expected positive and negative signs on the coefficients, respectively.

The estimates of trade potential demonstrate that Belarus, surprisingly, overtrades with the Euro-centric trade block, mainly due to the remarkably high overtrade of 23 times with one country, the Netherlands. Moreover, the results reveal, unexpectedly, a high propensity to export to Ukraine and Russia, despite the already existing overtrade with the Russia-centric trade block.

The empirical findings suggest that it would be desirable to increase the value and volume of Belarusian exports. Since none of the earlier studies on the potential of Belarusian exports have revealed the surprising results for Ukraine, Russia or the Netherlands, this study lays the foundation for further research in the area, and should be valuable for local policy-makers.

**Keywords:** Belarusian Exports, Gravity Model, Trade Potential, Panel Data, Random Effects Model.

## **1. INTRODUCTION**

After the collapse of the Soviet Union, Belarus, along with other fourteen post-soviet countries, went through a transition period from a planned economy to a market economy. If Baltic countries were able to liberalize their economies and, as a result, joined European Union, Belarus failed to conduct necessary reforms (liberalization, standardization and privatization) to become a market economy, and instead moved closer to the Russia-centric block. It is important to note, that successful transition to a market economy requires openness and international integration, among others.

Integration of Belarusian economy in the global markets would force the inefficient majority of state-controlled Belarusian firms reform (to be able to compete in global economy) or exit the market. As a result, the newly more productive firms would be more likely to export and, therefore, reduce the current account deficit in the country. In addition, more efficient firms are more likely to have more productive labor, and be able to pay higher wages, thus raising the standard of living for thousands of Belarusians.

Since exports contribute to a reduction of current account deficit and welfare improvement, studying the structure of exports, identifying importers with the highest propensity to exports, and learning from success cases would be of great value for Belarusian export-oriented economy. Therefore, this research focuses on Belarusian export potential using the gravity model. In particular, it aims at analysis of the discrepancy between the volume of exports forecasted by the gravity model and the actual data during the period of 1998-2013 (16 years). The assertion here is that the results obtained will highlight the need for structural reforms in Belarus and lead to boost its firms' productivity and increase export volumes.

### **1.1 Relevance of the Topic**

According to a recent IMF (2014) report on the Republic of Belarus, the country faced the risk of a further balance of payment deterioration. In that report, the IMF predicted that the current account deficit would reach around 9% of GDP in 2014 mainly due to weak external demand, low competitiveness of exports, and loose policies. Taking into consideration the country's external financial shortfalls, declining reserves, further slowdown of GDP growth, inflation as well as decreased demand from two key trade partners (Russia and Ukraine) due to recent events, Belarus can no longer allow its current account deficit to grow (IMF, 2014). If no solid actions are taken in the near future, a further increase in the current account deficit will not only have a negative impact on GDP growth, but also on the welfare of Belarusians.

In order to decrease the current account deficit, it is important to know the components of the current account. Current account deficit implies that the amount of money coming into the country is less than the money going out of a country (through imports, investments, and services). Consequently, if we are able to increase the country's exports or decrease its imports, we should be able to decrease current account deficit.

By identifying key patterns of Belarusian exports and analyzing the export potential of the Republic, this study attempts to suggest empirically based recommendations to boost the country's exports. In addition, it is hoped that the study will contribute to the extant limited research on trade potential and trade patterns of emerging countries.

As such, the objectives of this research is to:

1. To analyze the nature of Belarusian exports.
2. To conduct an empirical study in order to find out what effects the most common gravity model variables have on Belarusian exports.
3. To find out the key patterns of trade for Belarusian exports.
4. Based on the findings, to suggest necessary policies targeting on increasing the value and volume of Belarusian exports.

## **2. LITERATURE REVIEW**

### **2.1 Belarus's Foreign Trade Overview**

After the collapse of the Soviet Union, Newly Independent States, including Belarus, were faced with the challenge of how to deal with high interdependence on the inter-republican Soviet market (Havlik, 2009). Keeping in mind that in the late 1980's almost all exports and imports were traded within the Soviet Union, where Russia was the destination market, it was not easy for Belarus to redirect its trade flows (Havlik, 2009). As a result of the collapse of the USSR, two new intra-regional trade blocs emerged: these being the Russia-centric and Euro-centric Block (Broadman, 2005). Even after twenty four years since the collapse of the USSR, the Russian Federation remained to be the main trade partner of Belarus with 45% share of total exports and 53% of total imports (UN Comtrade, 2013).

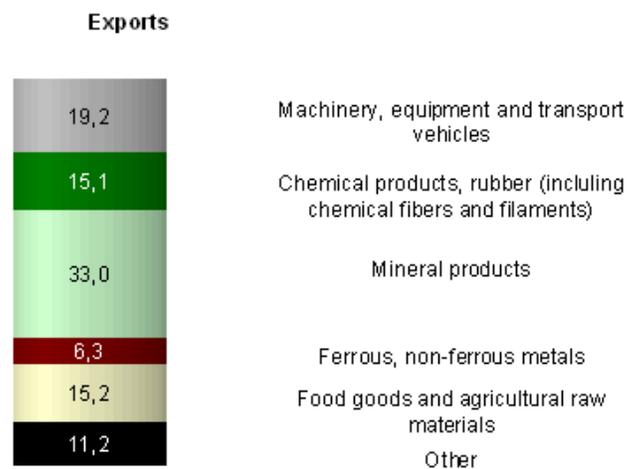
Both the IMF report and Broadman (2005) emphasized the need for diversification of trade partners for such post-soviet country as Belarus, since it would not only accelerate exports, and reduce current account deficit, but also reduce economic dependency on Russia (2005). However, the extent to which Belarus is able to expand its trading partners depends on the nature of Belarusian exports.

### **2.2. Belarusian Exports**

The World Bank reported that in 2013 exports of goods and services accounted for 61% of the GDP of the country (2014). Thus, for Belarus, exports are the major source of sustainable economic growth.

**Commodity structure of exports.** Belarusian export products are numerous (>1000 articles) and diverse (Ministry of Foreign Affairs, 2014). The major export commodities of Belarus today are potash and nitrogen fertilizers, oil products, rolled steel, metal cord, trucks, tractors, chemical fibers, dairy and meat products (Ministry of Foreign Affairs, 2014). The Observatory of Economic Complexity (OEC) identified the five top products exported from Belarus, which are refined petroleum (33%), potassic fertilizers (6.0%), organic composite solvents (5.7%), delivery trucks (3.6%), and tractors (3.2%) (2012). As shown in Figure 1, primary goods have a significant share in Belarusian exports, which may have an impact on its value.

**Figure 1: Commodity Structure of Exports in 2013 (in %)**



Source: National Statistical Committee of the Republic of Belarus, 2014

**Trading countries.** Even though Belarus exports to more than ninety trade partners, the top five Belarusian importers today are Russia, Ukraine, The Netherlands, Germany and Lithuania (National Statistical Committee of the Republic of Belarus, 2014). Interestingly, the core importers are not only the countries coming from the Commonwealth of Independent States (CIS), but also members of the European Union (EU), which indicates that Belarus does not exclusively trade with post-soviet countries.

It is interesting that fuels were the core export good to the Netherlands (98%)<sup>1</sup>, United Kingdom (95%), Italy (86%), Germany (72%), Ukraine (72%), Latvia (70) and Lithuania (47%), while chemicals accounted for 99% to Brazil, 69% to Norway and 68% to China (UN Comrade, 2013). This finding highlights the importance of Russian cheap oil and the abundance of potash for sustaining Belarusian export-oriented economy.

***Competitiveness of Belarusian exports.*** Bearing in mind that almost 80% of Belarusian exports are highly energy-intensive products, low gas prices from Russia have a substantial positive effect on the competitiveness of the country's exports (Balmaceda, 2013).

According to Melitz's theoretical trade model, firms that export have to pay both the fixed cost of manufacturing and any additional costs of exporting; therefore, only productive firms can afford to sell their goods abroad (2003). However, Belarus has more than 70 % of firms as state-controlled enterprises, where the state's control does not allow Belarusian firms to advance and to produce competitive goods (Ehrke, Shymanovich, & Kirchner, 2004).

With this in mind, as Helpman argues, in order to boost industry's productivity, trade liberalization is required (2011). In addition, he points out that reduction of trade barriers is an effective way to lower the cost of exporting, thus, increasing export volumes.

### **2.3. Gravity Model of Trade**

Similar to Newton's universal law of gravitation, the gravity model adopts the concept of gravitation force, and it is used as a research tool both in economics and politics. Today the gravity model is broadly used in explaining patterns of trade, and is known as "the most empirically successful model in economics" (Anderson & Wincoop, 2003).

The gravity model was first implemented by Tinbergen in 1962 and Poyhonen in 1963, who used national income data and distance between trading countries as the main explanatory variables for the volume of trade. Thus, in a basic gravity model, trade between countries *i* and country *j* is proportional to the size of the economies, and is inversely related to distance, which is a proxy for transportation costs (Feenstra, 2004). Hence, it is described as:

$$X_{ij} = A \frac{Y_i Y_j}{D_{ij}}$$

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<sup>1</sup> % of total Belarusian exports to the country in 2013.

Where  $X_{ij}$  is trade flow from country  $i$  to  $j$ .  $GDP$  for countries  $I$  and  $j$  are represented by  $Y_i$  and  $Y_j$  respectively, while  $D_{ij}$  notes geographical distance between the two countries. In the standard model, the size of  $GDP$  is a proxy for both the demand of the county and its diversity of production.

Even though the pioneering study of gravity model of trade by Tinbergen was a breakthrough at that time, today this model is considered too simplified and underdeveloped. The last 60 years of abundant research has, however, significantly improved theoretical justification for the gravity model. Among the brightest researchers who modified the model were Anderson (1979), Bergstrand (1985), Helpman and Krugman (1985), Anderson and van Wincoop (2003), and others. These studies realized that the basic gravity model ignores to take into account other factors that explain trade patterns, and therefore may result in omitted variable bias. Such factors are transaction costs; preferences of trading countries; as well as time-variant and time-invariant effects of the country.

Thus, depending on the research question, current researchers usually add to the traditional gravity model other independent variables, which are usually: population of both countries, real exchange rates, foreign currency reserves, and such dummy variables as: shared language, shared border, membership in trade agreements, colonial links, common currency, and common religion (Nitsch, 2003).

Even if the logic behind the gravity model is easily understood, there is no blueprint of the model. Thus, depending on the goal and research question of the study, the gravity model looks different and takes different shape as circumstances dictate.

***Fixed and random effects.*** Despite the empirical success of the standard gravity model, it had been widely criticized for lack of theoretical foundations (Wall, 2000). An influential paper titled: “*Gravity Model Specification and the Effects of the Canada-U.S. Border*” by Howard J. Wall (2000) points out that the standard gravity model has its limitations, as it assumes the same parameter value for all trading pairs, which cannot be true due to historical, political and cultural differences between countries. Because it is not only difficult to quantify these heterogeneous factors, but also simply observe them, the risk of having missing variables in the model is likely to be very high. In order to avoid heterogeneous bias, therefore, econometricians apply fixed or random effects to their models.

However, it is important to mention that, despite the vast empirical literature on the gravity model, there is no clear technique on how to make a choice between a static model (FEM) and a dynamic model (REM). In general, and for now, The Hausman Test is widely used to determine which approach is more appropriate.

## **2.4. Earlier Empirical Studies for Belarus**

Previous studies on the potential of Belarusian exports by Lubas Evgeniya used the period from 1998 till 2008 only (2011). Bearing in mind the substantial devaluation of the Belarusian ruble in 2011; the current account deficit and the decreased demand from its two main export trading partners, Russia and Ukraine; a more recent study is needed to evaluate current trends of Belarusian exports as well as to determine today's export potential for the country.

The next hypotheses to be tested are listed below, and will be discussed in the section that follows:

### **Hypotheses:**

**H1:** The GDP of 'importer' and 'distance' have the greatest explanatory power on Belarusian exports.

**H2:** The Distance variable is negatively correlated with Belarusian exports.

**H3:** The 'common border' and 'common language' variables have a positive effect on Belarusian exports.

**H4:** The 'Former Soviet Republic' dummy variable has a positive effect on the volume of Belarusian exports.

**H5:** The Real Effective Exchange Rate is negatively correlated with Belarusian exports, and

**H6:** Belarus overtrades with 'Russia-centric' trade bloc and does not meet its export potential with 'Euro-centric' trade bloc.

## **3. METHODOLOGY**

### **3.1. Method of the Study**

In order to determine the effects of the most common variables on Belarusian total exports, this study used the model suggested by Antti Weckström (2013), who used a similar export function in a study of Russia. Consequently, we have used the following gravity for this study:

$$\ln X_t = \beta_0 + \beta_1 \ln(\text{GDP}_{BY})_t + \beta_2 \ln(\text{GDP}_{\text{Importer}})_t + \beta_3 \ln(\text{POP}_{BY})_t + \beta_4 \ln(\text{POP}_{\text{Importer}})_t + \beta_5 \ln(\text{Distance})_t + \beta_6 \text{REER}_t + \beta_7 \text{D1}_{\text{Sl.Lang}} + \beta_8 \text{D2}_{\text{F.Soviet}} + \beta_9 \text{D3}_{\text{Border}} + \varepsilon \quad (1)$$

$\ln X_t$  = Logarithm of Belarusian exports to partner country at year t

LnGDP\_BY = Logarithm of GDP of Belarus at year t

LnGDP\_Importer = Logarithm of GDP of partner country j at year t

LnPOP\_BY = Logarithm of Belarusian population at year t

LnPOP\_Importer = Logarithm of population of partner country at year t

LnDistance = Logarithm of distance between Belarus and partner country

REER = Annual Real Effective Exchange Rate

D1\_Sl.Lang = Dummy variable for countries where a Slavic language is spoken

D2\_F\_Soviet = Dummy variable for former Soviet countries

D3\_Border = Dummy variable for common boarder

$\beta$  0-9 = Parameter values

Concerning the sixth hypothesis, the estimated coefficient was used to calculate export potential index  $x_{ijt}^{\phi}$  in the formula:

$$x_{ijt}^{\phi} = \frac{e^{x_{ijt}}}{\hat{e}^{x_{ijt}}} \quad (2)$$

(De Benedictis and Vicarelli, 2005)

In our case, an index greater than 1 illustrates that actual export flows are higher than predicted by the gravity model, while a negative value shows that actual Belarusian exports are less than expected.

### 3.3 Variables Used

**Exports.** The data for the total annual exports from Belarus to partner countries were collected from United Nations Commodity Trade Statistics Database. Exports were measured in US\$.

**GDP.** For annual GDP values, data was collected from the World Bank Development Indicators database. GDP is a time-variant variable that measures the size of a country's economy and it is measured in current US\$. It was assumed, that countries with the similar GDP value trade more with each other. In addition, we assumed that economically rich countries (with high GDP) would more likely import form Belarus.

**Population.** Population is a time-variant variable that can have either positive or negative effects on export flows. For example, it was assumed that the bigger the population, thus market size, the more likely the countries trade with each other. However, large economies are also able to provide for themselves, and are less likely to have a need for foreign trade with other countries.

The data for the population was collected from the World Bank world development indicators data set.

**Distance.** Distance is a time invariant variable that was used in the gravity model as a proxy for transportation costs (barrier to trade). Therefore, it was assumed, that the longer the distance between countries, the less bilateral trade they are likely to have. The distance was calculated in kilometers between the capitals of trading countries.

**Real Effective Exchange Rate (REER).** REER is a time variant variable that shows the deviations of the exchange rates from purchasing power parity due to impacts of different domestic price changes. The sign of REER variable was expected to be negative, since a depreciation of Belarusian ruble relative to the foreign currency, which is a decrease in REER index, would increase the volume of exports. The data was retrieved from the report *Real effective exchange rates for 178 countries: A new database* (Darvas, 2012).

**Slavic Language Dummy Variable.** This is a dummy variable for countries speaking “Slavic” languages, which can be Russian, Belarusian or Ukrainian. It was assumed that a common language has a positive impact on trade flows, as it reduces transaction costs. Thus, the dummy variable was equal to 1 if the country spoke a Slavic language, and 0 otherwise.

**Common border dummy variable.** A dummy variable for countries that share a common border with Belarus. It was assumed, that countries that share borders with Belarus (neighboring countries) would trade more due to the relatively low transportations costs. Thus, the dummy variable was equal to 1 if the country shared a common border with Belarus and 0 otherwise.

**Former Soviet Union dummy variable.** This is a dummy variable for countries that used to be part of the Former Soviet Union. It is obvious, that the former Soviet countries were very integrated and usually specialized in producing certain types of goods, and had their sales market in other Soviet republics. Thus, the dummy variable was equal to 1 if the country is a former Soviet republic, and 0 otherwise.

### **3.4. Participants and Time Horizons**

The time horizon of the current study was both cross-sectional and longitudinal. According to a previous study by D Kryk, I. Tochitskaja & G. Shimanovitch, where 43<sup>2</sup> countries were selected

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<sup>2</sup>Armenia, Austria, Azerbaijan, Belgium, Brazil, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, India, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, The Netherlands, Norway, Poland, Portugal, Moldova, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Macedonia, Turkey, Turkmenistan, Ukraine, The United Kingdom, Uzbekistan.

for the study on the potential of Belarusian exports, the researcher chose the same countries, which represented almost 94%<sup>3</sup> of total exports in 2012 (Kanhro,2013). The period from 1998-2013 (16 years) was included in this study.

Finally, the data was obtained with the help of secondary sources, and was analyzed in R-studio. Keeping in mind that this study involved many countries and a long period of time, a panel data analysis was implemented, and an OLS model was used to test hypotheses.

#### **4. EMPIRICAL FINDINGS**

The estimation of the gravity equation was based on Belarusian exports to 43 countries for the period of 16 years from 1998 to 2013 (See Appendix Table 1A for list of sample countries). It should be noted that the data for Belgium exports for 1998 was missing in UN Comtrade, and thus was excluded from the study. As a result, there were 687 observations (43\*16-1).

##### **4.1. Data Analysis**

**Fixed Effects.** The Fixed Effects model assumes that specific individual effects, in this case the specific country and the time effects, correlate with the independent variables. Thus, even if there is an explanatory variable that was not included in the model, though it correlates with other variables, there will be no omitted variable bias. This approach only addresses time-variant variables, and therefore, does not take into account time-invariant independent variables, which in our model, include three dummy variables and distance.

Table 1 presents the results from the FEM estimation, where we can see the p-value is less than 0.05 (in our case it is  $<2.22e-16$ ). Thus, the model is sufficiently good enough to predict Belarusian exports, and also has some fixed effects present in the model.

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<sup>3</sup>94% was calculated by the researcher using the data from statistical book “Foreign Trade of the Republic of Belarus”(2013).

**Table 1: Results for the Fixed Effects Model for Belarusian Exports**

**Coefficients :**

X	Estimate	Std. Error	t-value	Pr(> t )
lnGDP_BY	0.1848691	0.2002672	0.9231	0.35630
lnGDP_Importer	0.9129537	0.1061142	8.6035	< 2e-16 ***
lnPOP_BY	-2.9379144	5.9299451	-0.4954	0.62046
lnPOP_Importer	1.1430019	0.6711696	1.7030	0.08905.
lnREER	-0.0028797	0.0024874	-1.1577	0.24741

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

R-Squared : 0.56406  
 Adj. R-Squared : 0.52465  
 F-statistic: 165.358 on 5 and 639 DF, p-value: < 2.22e-16

**Random Effects model.** The REM approach differs from the FEM model in that unlike the FEM approach, the REM model assumes that individual specific effects are *not* correlated with independent variables, and it takes into account time-invariant variables. Table 2 presents the output of REM for total Belarusian exports.

**Table 2: Results for the Random Effects Model for Belarusian Exports**

**Coefficients :**

X	Estimate	Std. Error	t-value	Pr(> t )
(Intercept)	50.5382194	100.0376842	0.5052	0.6135885
lnGDP_BY	0.2887011	0.1974377	1.4622	0.1441397
lnGDP_Importer	0.7710044	0.0913974	8.4357	< 2.2e-16 ***
lnPOP_BY	-3.5644915	5.9453090	-0.5995	0.5490089
lnPOP_Importer	0.3838959	0.1632983	2.3509	0.0190146 *
lnDistance	-1.2331285	0.3665645	-3.3640	0.0008115 ***
lnREER	-0.0032128	0.0024871	-1.2918	0.1968741
D1_Sl.lang	1.2904042	0.8322153	1.5506	0.1214732
D2_F.Soviet	2.0084968	0.8730047	2.3007	0.0217133 *
D3_Border	0.0015318	0.8563907	0.0018	0.9985734

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

R-Squared : 0.57385  
 Adj. R-Squared : 0.56549  
 F-statistic: 101.292 on 9 and 677 DF, p-value:< 2.22e-16

As in the previous model, the p-value ( $<2.22e-16$ ) of REM is less than 0.05, implying that there are, as well, some random effects present in our gravity model. However, in order to determine which model to use in this study, the Hausman specification test was run.

**Hausman Test.** The results of the Hausman Test below shows that the p-value (0.1595) is greater than 0.05, therefore, REM is a more consistent and efficient model for the gravity equation employed here.

(Table 3).

**Table 3: Results for the Hausman Test for the Total Exports of Belarus**

<b>chisq = 7.9417, df = 5, p-value = 0.1595</b> <b>alternative hypothesis: one model is inconsistent</b>
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#### 4.2. Hypotheses Testing

Since the Hausman Test showed that the RE model should be used, we tested the hypotheses based on the outcome of this regression.

**Hypothesis 1:** The GDP of importer and distance have the greatest explanatory power on Belarusian exports.

According to our model, the standard variables of the gravity equation, both GDP\_ Importer and Distance, were very highly statistically significant with p-values  $< 2.2e-16$  and 0.00 respectively (Table 2). The GDP-Importer had the lowest p-value in this estimation, meaning that it has strong explanatory power on our dependent variable. Thus, Belarus is likely to export to countries with higher GDP (proxy for income). Keeping in mind the positive sign of the coefficient (0.77), when the GDP of the importer increases by 10 %, ceteris paribus, we can expect 7.62 %<sup>4</sup> increase in Belarusian exports. As a result, hypothesis 1 is supported.

**Hypothesis 2:** The distance variable is negatively correlated with Belarusian exports.

From Table 2 we can see that distance has a negative coefficient (-1.23), meaning that Belarus tends to trade with countries that are nearby rather than far away. Specifically, when distance increases by 10%, ceteris paribus, we can expect 11.09 % decrease in Belarusian exports. This is a large effect, and cannot be explained by transportation costs only, implying that the variable could account for other trade barriers. Thus, hypothesis 2 is supported.

<sup>4</sup>  $1)(w2/w1)^{\beta_1} = 1.10^{0.7702830} = 1.076177931$ ;  $2)(1.076177931 - 1) * 100 = 7.6177931 \%$

**Hypothesis 3:** Common Border and common language have a positive effect on Belarusian exports.

Even though both dummy variables, common border and common language, were shown to have positive coefficients of 0.00 and 1.29 respectively, they were found to be insignificant (see Table 2). Thus, hypothesis 3 is not supported.

**Hypothesis 4:** The former Soviet Republic dummy variable has a positive effect on the volume of Belarusian exports.

The dummy variable for former Soviet Republics was found to be statistically significant with a 1% level of confidence with a p-value of 0.02 despite the fact that 22 years have passed since the collapse of the Former Soviet Union. (Table 2). The coefficient of this explanatory variable is positive with a value of 2.01; thus, if Belarus exports to the former Soviet Republic, *ceteris paribus*, the export flow to post soviet countries will be double that of any other country. Therefore, hypothesis 4 is supported.

**Hypothesis 5:** Real Effective Exchange Rate is negatively correlated with Belarusian exports.

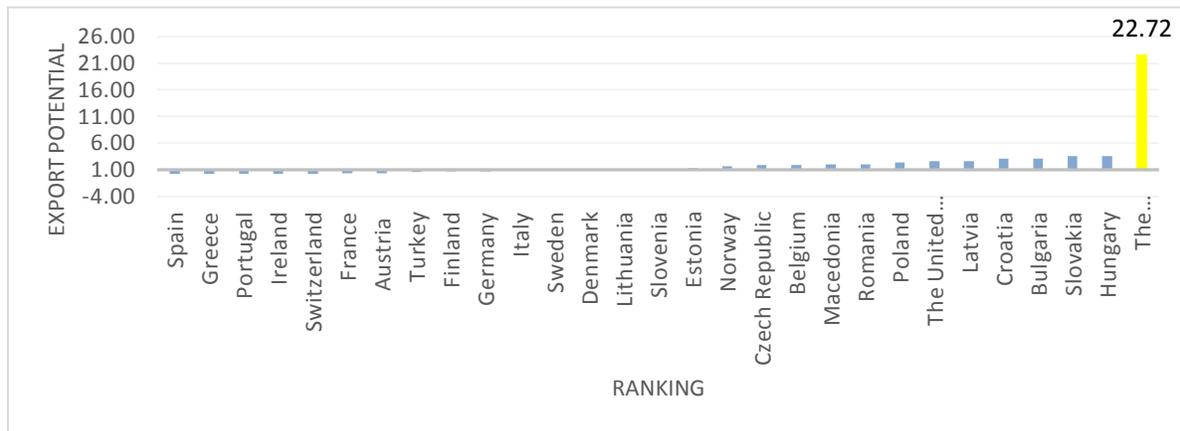
Although REER had negative coefficients of -0.003, this variable was found to be insignificant with a p-value of 0.20 (Table 2). Hence, despite the hyperinflation of the Belarusian ruble in 2011, the data panel analysis shows that depreciation of the Belarusian ruble in recent years has not helped to boost Belarusian exports noticeably. Therefore, hypothesis 5 is *not* supported.

**Hypothesis 6:** Belarus overtrades with the Russia-centric trade bloc, and does not meet its export potential with Euro-centric bloc.

The trade potential used in this study is the average of the country's ratios (Actual Exports/Predicted Exports) for the whole timeframe. The results are reported in Appendix B. Out of the sample of 43 importers, Belarus did not meet its export potential with 18 countries, while it overtraded with 25 partners (Appendix Tables 2A & 3A). Generally, we can observe large deviations between actual and potential export flows, especially in the case of the Netherlands and Brazil, with such abnormal export potential at 22.72 and 9.46 respectively (Appendix B).

When we look specifically at the Euro and Russia-centric trade blocks represented by countries mentioned in Appendix Tables 4A & 5A, we notice some very interesting findings. The estimate of Belarusian export potential with the Euro-centric trade block illustrates that Belarus's trade potential is the highest with countries such as Spain (0.23) and Greece (0.24), while on the other side of the axis the Netherlands is shown to be a vivid outsider (Figure 3).

**Figure 3: Export Potential for Euro-Centric Trade Block**

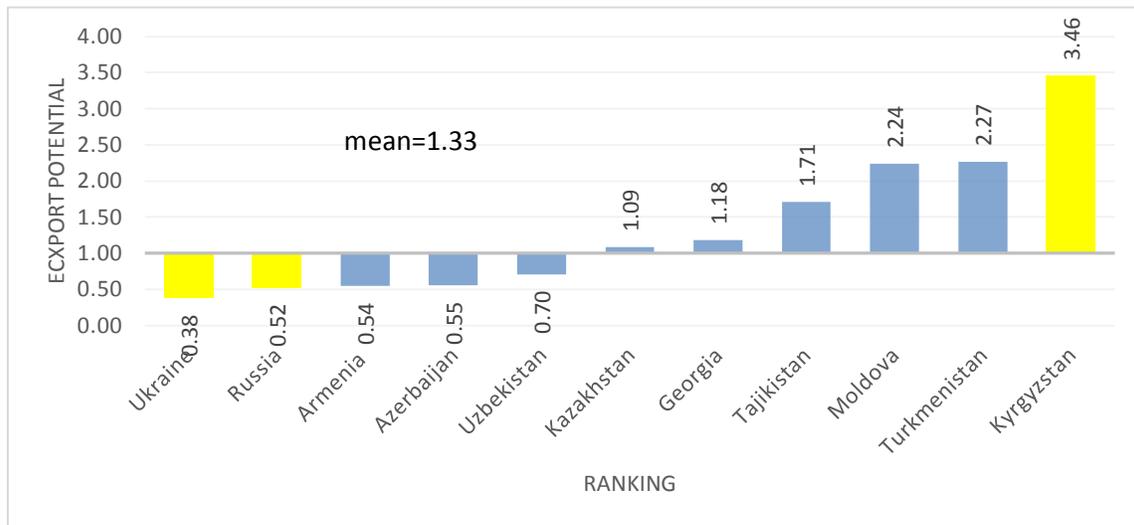


Source: authors' calculations

The estimate shows that The Netherlands imports almost 23 times more of Belarusian goods, than our gravity model predicts. As a result of such an abnormal level of penetration from one country, Belarus, as a whole, overtrades with the Euro-centric block with a mean of export potential of 2.20 for the block. This conclusion goes against our assumption stated in the hypothesis.

The findings from the estimate of Belarusian trade potential with the Russia-centric trade block are equally as interesting as the findings from the Euro-Centric block. The results identify surprisingly high export potential with the neighboring countries of Ukraine and Russia (Figure 4). Keeping in mind such factors as the existence of common borders, relatively small distance between capitals, historical ties, and the fact that both Russia and Ukraine are the top two Belarusian importers, we would expect Belarus to overtrade with these countries. However, the estimates from our gravity model showed that Belarusian export flows to Russia had to double in order to reach its potential, while Ukraine could have imported 62% more goods form Belarus (Figure 4).

**Figure 4: Export Potential for Russia-Centric Trade Block**



Source: authors’ calculations

Overall Belarus meets its export potential with the Russia-centric trade block with a mean value of export potential of 1.33 for the region, supporting the sixth hypotheses in some aspects. As a result, we can conclude that hypothesis six is not supported.

## 5. DISCUSSION AND CONCLUSION

### 5.1. Discussions

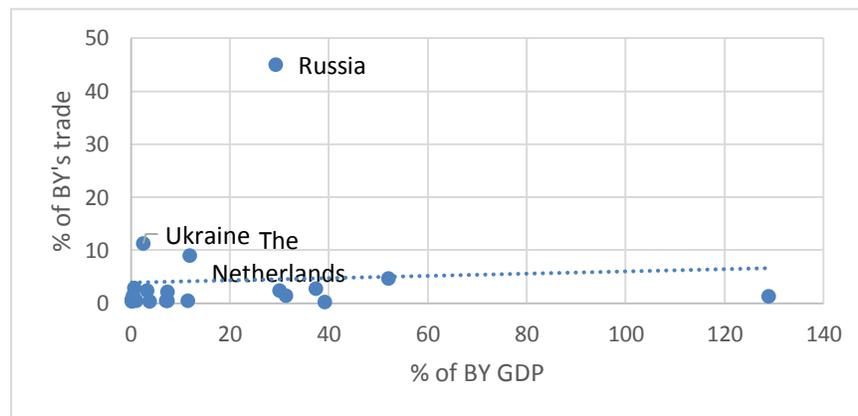
In order to answer the research question “to what extent does Belarus meet its export potential?” the gravity model approach was implemented. The results showed that out of nine independent variables, four were statistically significant; these being GDP\_Importer, POP\_Importer, Distance and D2\_F.Soviet. The remaining variables including GDP, the population of Belarus, REER and the dummy variables for Slavic language and common borders proved to be insignificant. Tests of hypotheses demonstrated that out of six hypotheses, three were supported and three were not.

Even though, one of the three standard variables of the gravity model GDP\_BY was shown to be insignificant in our study, hypothesis one demonstrated that the other two core variables GDP\_Importer and Distance had the greatest explanatory power on Belarusian exports. Therefore, we can conclude that in our study, the gravity model (the workhorse for empirical studies in International Economics) is largely theoretically justified. Thus, the higher the economic size of a country and the closer the geographical proximity, the more likely that Belarusian exports will flow to the sample countries.

However, interesting findings were discovered when the trade potential with the Euro-centric and Russia-centric trade blocks were estimated. For the given period, the results showed, consistent with Lubas’ study, significant divergence of predicted export flows from the actual data. Specifically, large deviations were found for such countries as The Netherlands, Brazil, Ukraine, Russia, Spain, and Greece. The estimations showed astonishing results for The Netherlands, which exceeded export potential 23 times (Figure 1)! This county is an outlier in our study, and it is surprising that the relatively large distance between Minsk and Amsterdam did not have the expected negative effect on Belarusian export flows as predicted.

**Distance.** Consistent with the gravity model, the economic size, together with distance, have the greatest explanatory power on trade flows. The empirical results from our gravity model showed that the variable for distance was found to be highly statistically significant ( $p= 0.00$ ). Figure 6 illustrates that despite the relatively low national income of Ukraine and Russia, they have the highest share of Belarusian exports, suggesting that trade barriers (distance) matter.

**Figure 6: GDP's Impact on Export Flow for Top 20 Belarusian Importers**



Source: UN Comtrade Data & World Bank

**Overtrading countries (The Netherlands and Brazil).** The third outlier in Figure 5, The Netherlands, indicates that there must be other influential factors, which can offset the effect of long distances. This fascinating finding brings us back to Anderson & Wincoop’s classic paper on trade costs, which pointed out that transportation costs measured by distance accounts only for 21% out of 170% of the total trade costs, while international trade costs, local distribution costs and border effects account for 74%, 55% and 44% respectively (2004, p. 718). For example, the Belarusian political observer, Raman Yakauleuski, stressed the efficiency and competence of Belarusian diplomats in The Netherlands as one of the key reasons for unexpected high export flows (Nielsen, 2012).

Anderson & van Wincoop argued that trade costs are lower for smaller countries trading homogeneous goods, since the differentiation of goods is economically expensive (2004, p. 691). If we look at the structure of Belarusian exports to The Netherlands, we find that 97% of them are fuels, particularly refined petroleum, crude petroleum and petroleum gas (UN Comrade, 2013). It is observed that Belarus does not produce much oil but imports heavily subsidized crude oil from Russia, which is only later refined or simply sold off at competitive prices to its key trade partners. Apparently, Belarus has a comparative advantage in petroleum products mainly due to the relatively cheap raw material and labor costs.

The key customers of Belarusian oil products are such international companies as Glencore, Trafigura, and Vitol, which import and transship the goods all over Europe as well as to North America through the major harbor in Europe being the port of Rotterdam (CIC, 2013, p.11). In addition, Belarusian high-quality petroleum products are in demand in Latvia and England, countries with well-developed platforms for trading fuels (OEC, 2012). This appears to explain why Belarus overtraded with them (Appendix B).

On the other hand, the key export goods to distant countries such as Brazil and China are mostly chemical products, particularly potash fertilizers, which accounted for 99% and 68% of total Belarusian exports to these countries, respectively (OEC, 2012). Since mineral products are not easily substituted, Belarusian product importers do not have many choices, but import the goods from high-distance Belarus. It is no wonder that estimates showed that Belarus overtrades with Brazil more than 9 times (Appendix B).

Lastly, it is important to mention that the study only included 43 importers, and many important high-distance trade partners such as Vietnam, Venezuela, and Bangladesh were excluded from the sample which could have significantly increased distance elasticity and caused unrealistically high coefficients of this variable (Anderson & Wincoop, 2004, p. 730).

***Under trading countries (Russia, Ukraine).*** In contrast, Russia and Ukraine, irrespective of their relatively large economic size, geographical proximity, common borders, Slavic language, and historical trade ties with Belarus, did not succeed to import Belarusian exports to its full potential (Appendix B). So what are the possible reasons for this enormous underperformance?

To start with, usually in empirical studies on gravity trade model, distance is calculated between capitals, which are theoretically core commercial centers. However, Anderson & Wincoop called attention to the importance of multiple commercial centers in trade, which are especially relevant in larger countries such as Russia (2004). For example, the transportation cost for the transfer of exports from Minsk to Smolensk would be much lower than from Minsk to Krasnoyarsk. Therefore, the assumed short distance between these countries can be deceiving.

Along with Anderson & van Wincoop's theory on trade costs, border effects account for 44% of total trade costs (170%); however, the authors stressed that the border effect is significantly higher for a smaller country like Belarus than for a bigger country like Russia (2003). With this in mind, the unexpected, untapped Belarusian export potential with Russia and Belarus justified the significance of border effects, highlighted earlier in Wall's study on the USA and Canada. In addition, compared to The Netherlands, Russia and Ukraine lack well-developed institutions and infrastructure, which according to Anderson & van Wincoop, can increase trade costs considerably (p.693, 2004).

Moreover, leading studies on trade costs demonstrated that trade barriers are different for different sectors, and nontariff barriers (NTB) are more challenging than tariffs especially in the agricultural sector and for developing countries (Anderson & van Wincoop, 2004, p.696). According to Anderson & van Wincoop's estimates NTB are as high as 100.3 % for dairy, 71.3 % for mining and 64.8 % for meat products (2004). Keeping in mind that the top Belarusian exports to Russia are animal products, accounting for 19 % of total export share, and food products has the share of 6%; NTB could be a sound reason to prevent Belarus to reach its export potential with the first importer (UN Comrade, 2013).

The constant increase in export potential for the given timeframe probably indicates the loss of competitiveness of Belarusian goods in Russian and Ukrainian markets caused by expensive costs of trade and relatively expensive labor (Anderson & van Wincoop, 2004, p.710). It also reveals that the strong historical trade ties that existed during the Soviet era are not relevant in today's globalized economy, opposing Anderson & van Wincoop's assumption (2004, p.721). However, the structure of exports remains similar among former Soviet countries as it was in the USSR.

This information helps to explain why despite all the favorable conditions for Belarus to reach its full export potential with its two neighbors, it failed to do so. Concerning the previous studies on Belarusian export potential by Lubas (2008) and Kryk (2009), they demonstrated similar findings about overtrade with The Netherlands, Brazil and Latvia, but did not show the immense underperformance with Russia and Ukraine at the time of their studies.

## **5.2. Policy Implications**

This empirical study should be valuable for Belarusian policy-makers, because they could take into account the country's propensities to export in order to create more comprehensive and effective trade policy for Belarus. Because economic policy is closely related to trade costs, the better the trade policy, the lower the Belarusian trade costs (Anderson & van Wincoop, 2004). Moreover, Broadman pointed out that policy-related and institutional variables in trade models for such countries as Belarus had the greatest explanatory power for trade volumes (2005).

This study demonstrated the untapped export potential not only with European countries like Spain, Greece and Portugal, but also with Belarusian key trade partners, such as Russia and Ukraine (Appendix B). This finding highlights the urgent need for behind-the-border (domestic) reforms in Belarus that aim at boosting FDI. The reforms entail trade liberalization, simplifying business entry and exit, strengthening institutions, improving state's accountability and transparency, and improving domestic infrastructure. In addition to macro-level reforms, Belarus should also implement micro-firm reforms, where innovation plays a major role. Accordingly, Belarusian firms should improve their cooperation with foreign firms, strive to export their goods, invest in R&D and update and upgrade technology.

Furthermore, we assent that Belarus, with its strong state control, poor business environment and weak integration in the world's economy, could benefit significantly from these reforms, thus preventing welfare loss for thousands of Belarusians in the future.

In contrast to the earlier study on Belarusian export potential by Lubas, this study reveals that Belarus actually over performs with European countries, mainly due to anomalous volume of exports to the Netherlands. Moreover, it underperforms with its two top importers Russia and Ukraine. One ponders that Belarus should first focus on reaching its export potential with its neighboring countries as this is easier and less expensive to do. In addition, assuming the importance of ports for overtrade with The Netherlands and Belgium, this study questions why Belarus under trades with Germany, which has the third biggest port in Europe after Rotterdam (Holland) and Antwerp (Belgium). Consequently, Belarus should learn from its past success stories, such as in the Netherlands, and make sure that there are competent diplomats in countries with evident export propensity such as Germany, Spain and Greece (Appendix B).

At any rate, it is important to emphasize the need for diversification of Belarusians exports and trade partners for the long-term prosperity and stability of Belarus. To illustrate, the major Belarusian exports are petroleum and chemical products, which are sold to countries with high demand for these goods. However, countries relying heavily on low-value primary goods cannot enjoy the same level of economic growth, as it would be in the case of high-value manufactured goods. Thus, Belarusian firms should diversify their products and strive to become more innovate to ensure the country's economic stability in the long-term. Bearing in mind that the two top importers from Belarus, Russia and Ukraine, are in conflict and experience economic slowdown, the country would be better off if it secures its suppliers and consumers by diversifying trade partners as well.

### **5.3. Limitations and Further Research**

This empirical study has four limitations. First, the gravity model could add more explanatory variables, such as government effectiveness, trade freedom, FDI and regional trade agreements to make the estimates of export potential more accurate.

Second, the gravity model for Belarusian exports could have been better adjusted to the nature of goods. Thus, it would be interesting to study how the coefficients for the most common gravity model variable would be different for different commodity groups (mineral products, chemical products as well as for machinery & equipment).

Third, the sample in this study consisted only of 43 countries, a clear limitation of the study, which could have affected its empirical results. Thus, including more importers in the study could result in more robust and sound estimates of the export potential.

Lastly, additional statistical tests should be applied to the gravity model to add to its robustness. They are left for further research and investigation.

### **5.4. Conclusion**

We conclude that, the research question “To what extent does Belarus meet its export potential measured by the gravity model?” was answered and the goal of the study was accomplished. The present study was one of the few studies on this topic and the most recent one, since the last study was conducted five years ago. The study revealed surprising high propensity to export to Ukraine and Russia, emphasizing the importance of border effects between Belarus and Russia/Ukraine, and an astonishing overtrade of 23 times with The Netherlands complementing the professionalism of Belarusian officials. It is important to note, that none of the previous studies in the area has revealed similar empirical findings. We believe that the above-stated recommendations will be of great value for Belarusian policy-makers, economists and politicians, who are striving to reduce the current account deficit by increasing the volume and value of Belarusian exports.

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**Appendix A**

Table 1A: List of Sample Countries

Armenia	Finland	Latvia	Spain
Austria	France	Lithuania	Sweden
Azerbaijan	Georgia	The Netherlands	Switzerland
Belgium	Germany	Norway	Tajikistan
Brazil	Greece	Poland	Macedonia
Bulgaria	Hungary	Portugal	Turkey
China	India	Moldova	Turkmenistan
Croatia	Ireland	Romania	Ukraine
Czech Republic	Italy	Russia	The United Kingdom
Denmark	Kazakhstan	Slovakia	Uzbekistan
Estonia	Kyrgyzstan	Slovenia	

Table 2A: Countries where Belarus has not meet its Export Potential (A/P)

<i>Country</i>	<i>A/P</i>
Spain	0.23
Greece	0.24
Portugal	0.24
Ireland	0.28
Switzerland	0.30
France	0.31
Ukraine	0.38
Austria	0.39
Russia	0.52
Armenia	0.54
Azerbaijan	0.55
Turkey	0.57
Uzbekistan	0.70
Finland	0.74
Germany	0.77
Italy	0.89
Sweden	0.94

Table 3A: Countries where Belarus has exceeded its Export Potential (A/P)

Country	A/P	Country	A/P
Denmark	1.01	Romania	2.04
India	1.05	Moldova	2.24
Kazakhstan	1.09	Turkmenistan	2.27
Lithuania	1.18	Poland	2.45
Georgia	1.18	The United Kingdom	2.62
Slovenia	1.19	Latvia	2.65
Estonia	1.28	Croatia	3.07
China	1.49	Bulgaria	3.13
Norway	1.66	Kyrgyzstan	3.46
Tajikistan	1.71	Slovakia	3.54
Czech Republic	1.86	Hungary	3.57
Belgium	1.95	Brazil	9.46
Macedonia	2.00	The Netherlands	22.72

Table 4A: List of countries from Euro-centric Trade Block

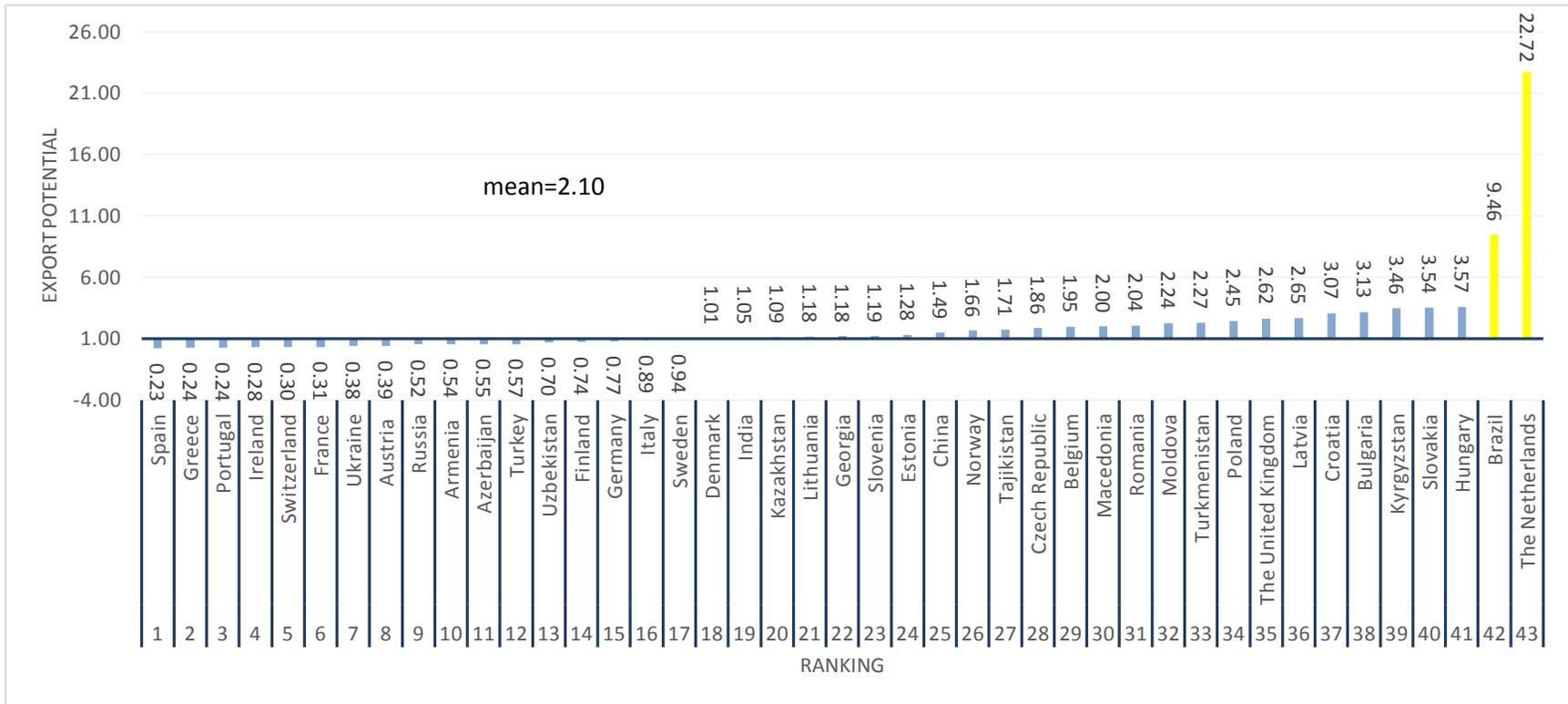
Austria	France	Macedonia	Sweden
Belgium	Germany	Norway	Switzerland
Bulgaria	Greece	Poland	The Netherlands
Croatia	Hungary	Portugal	The United Kingdom
Czech Republic	Ireland	Romania	Turkey
Denmark	Italy	Slovakia	
Estonia	Latvia	Slovenia	
Finland	Lithuania	Spain	

Table 5A: List of countries from Russia-centric Trade Block

Armenia	Russia
Azerbaijan	Tajikistan
Georgia	Turkmenistan
Kazakhstan	Ukraine
Kyrgyzstan	Uzbekistan
Moldova	

Appendix B

Belarusian Export Potential



Source: authors' calculation