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Soviet Heritage and post-Soviet Economic Integration

— Ukrainian Export Trade Patterns Reviewed —

Statement of the Research's Nature

The author works as a researcher for the Division of International Agricultural Trade and Development at Humboldt-Universität zu Berlin, Germany. His primary research interest lies in the domain of economic theory and applied economics. In particular, he is interested in trade theory and its multifarious relations with and implications for transition economies. Once a theory is empirically verified, it is able to give practical advice on the design and implementation of economic policies. In this context, traditional economic relations and post-Soviet regional integration are of high importance and are therefore the topic of investigation in this paper.

Abstract

This paper explores the effects of the Soviet economic heritage and post-Soviet regional integration on merchandise export trade in Ukraine. Notably, exports contribute considerably to the success or failure of the Ukrainian economy. To reveal the determinants of Ukraine's trade patterns and fill in some existing scholarly gaps, a case study was conducted, spanning the period 1996-2010. An augmented gravity trade model was developed and estimated, using rigorous econometric methods. The findings confirm the hypothesis that the Soviet economic heritage and post-Soviet regional integration shape Ukraine's current trade patterns. Moreover, the paper shows trade potential and underlines the critical role of trade policies and institutions.

Key words: Transition Economies, Traditional Economic Relations, Post-Soviet Economic Integration, International Trade, Gravity Model, PPML

JEL Classification: C33, F15, O57, P33

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Introduction

During the recession crisis of 1991-1999, Ukraine experienced a deeper economic slowdown than most of the other Soviet successors, losing more than 60 percent of its gross domestic product (GDP). Due to the fall in production and consumption, trade flow, once large in volume, shrank by more than 50 percent (Steinbach and Rybak, 2012). Prior to the Soviet breakup, Ukraine had a large trade surplus, but it turned negative since 2005. The reasons for this are the strong growth in imports and the inability of the export sector to keep up. It is obvious that the Ukrainian economy is in need of implementing policies that would foster export trade if the country is aiming for sustainable economic development. Thus, based on the importance of export trade for Ukraine, I approached my research with the following questions: (1) What are the determining factors of Ukraine's export trade? and (2) How does the Soviet heritage compared to the post-Soviet economic integration contribute to the patterns of trade?

Despite the vast variety of studies concerned with the transformation process in Ukraine (see, among others, Åslund, 2008; Boss and Havlik, 1994; Brenton et al. 1997; Libman and Vinokurov, 2012; Macedo et al., 2008; Sergi, 2006), little is known about the patterns of foreign trade. De Sousa and Lamotte (2007) investigated the effects of political disintegration on trade relations in post-Soviet countries. They found no evidence that the Soviet breakup led to systematic and severe trade disintegration. Thus, one can argue that the common Soviet heritage is still of particular importance for the successor. This finds also confirmation in the work of Steinbach and Rybak (2012) who found out that the high degree of integration still determines the foreign trade of Ukraine. Notably, the country was a member of the Council for Mutual Economic Assistance (COMECON), which was disbanded on June 28, 1991. The council consisted of all Soviet republics, plus the communist European states, and Cuba, Mongolia and Vietnam. During Soviet times, Ukrainian exports directed to COMECON countries were substantial, and I claim that trade relations with these countries still are of particular importance for the country.

Funke and Ruhwedel (2005) reveal that the Ukrainian export variety is rather small compared to Western economies and major exports focused on certain commodity groups. This factor indicates the high vulnerability to foreign markets and contributed to the dramatic decline in trade during the global financial crisis. Economic success and growth in transition economies are strongly linked to export trade and trade liberalization (Nannicini and Billmeier, 2011). Notably, Ukraine is not just lagging behind in growth, but trade liberalization is also negligible compared to other transition countries like Azerbaijan or Georgia. Other scholars analysed the regional integration attempts in the post-Soviet period (Chaplygin et al., 2006; Gawrich et al., 2010a, -b; Milthorp, 1997). On the one hand, Chaplygin et al. (2006) indicated the enormous challenges related to the integration process, on the other hand, Gawrich et al. (2010a, -b) pointed to the role of the European Union (EU) and the potential benefits of integration, but also inconsistencies in the EU policies. Admittedly, the academic community is at strife about the impacts of regional trade agreements and is questioning their role as a promoter of economic integration and welfare (see, among others, Krishna, 1998; Krugman, 1991; Viner, 1950). This is raising the question whether or not current steps towards regional integration helped to expand trade. For this research, I take the view that regional integration positively contributes to the direction and magnitude of trade and is therefore a major determinant of Ukrainian export patterns. This is due to the fact that regional integration is resulting in the harmonisation of product standards, often foreign trade schemes as well, and facilitates the access to non-domestic markets.

To answer the research questions and verify my hypotheses, I conducted a case study on Ukraine's merchandise export trade relations. The analysis covers the period 1996-2010 and I approached the problem with two different methods. The first section introduces with a brief overview of the transition process and also discusses the economic performance of Ukraine. The following section focuses on a descriptive analysis of Ukraine's export-trade patterns. The analysis helps to underpin my hypotheses and to come up with the proper instruments for the quantitative analysis. Section two deals with the applied methodology. I supplement the descriptive analysis with an empirical analysis of trade patterns. Thus, I developed an augmented trade model, building on the gravity model of international trade (Tinbergen, 1962), which allows me to quantify the impact of the Soviet heritage and post-Soviet regional integration. I also discuss the source of my data, my assumptions about the patterns of the variables and the utilised estimation procedure. Section three presents the findings of my empirical analysis and brings them into line with the academic discourse. The fourth and concluding section discusses policy recommendations which arise from my findings, reveals limitations of my results and indicates the gaps which have to be filled through further research.

1. Economic Performance and Export Trade in the post-Soviet Period

Starting in 1991, the Ukrainian government pursued policies to liberalise the price regime and to reform the market structure (Jonavicius, 2009). The aim was to tackle the spreading product shortages and maintain the former consumption level. However, the country also continued to subsidise state-run industries and the agricultural sector. The subsidisation was mainly financed by uncovered monetary emissions, letting prices soar and causing the inflation to be pushed to hyper-inflationary levels in the early 1990s. In the dumper of hyperinflation, the annual inflation rate was the highest world-wide in 1993, exceeding 4,735 percent (World Bank, 2012). This caused a huge outflow of capital and annihilated vast quantities of assets. Moreover, it initiated a persistent mass exodus of well educated and experienced labour, reducing the Ukrainian from 52 million in 1990 to almost 46 million in 2010. Solari (2000) found that this dramatically diminished the former comparative advantage of the economy.

The economic reform process rapidly decelerated and structural reform efforts were undermined by a widespread resistance within the governmental body and a significant part of the population (Kuzio, 2010). This stalled the reform process and raised the costs of maintaining subsidisation for state-owned enterprises which were exempt from the privatisation process. In the meantime, by 1999, due to the delayed reforms, an underdeveloped infrastructure and transportation system, corruption and bureaucracy, the GDP had fallen to less than 40 percent of its 1991 level.

1.1 Economic Performance

In the early 2000s, Ukraine showed strong export-based growth of 5 to 10 percent per annum. Expressed in constant 2000 US$ prices, the economy almost doubled from US$ 29,519 million in 1999 to US$ 53,467 million (plus 81.1 percent) in 2008. The growth seemed to be robust, but the financial crisis and the succeeding global economic crisis hit the country in November 2008. The economic effects were devastating as foreign direct investments (FDI) decreased and capital started to flee from the country once more. As a direct result, the GDP shrank by US$ 5,999 million (minus 11.2 percent) during 2008-2010.

The implications of the transition process for the Ukrainian economy are illustrated in **Table 1** which shows the development of GDP per capita for the period 1988-2011. The data reveals that the economic decline was dramatic. Particularly in the 1990s, the GDP per capita decreased immensely and the economy was unable to overcome this blow until today. This is surprising insofar as most other transition countries (except Belarus) increased welfare significantly in the reviewed period. Moreover, the table indicates that the global crisis of 2009 throw back the GDP per capita to 2006 levels.

TABLE 1

Evolution of the GDP per Capita and the GDP per Capita Growth Rate for the Period 1988-2011

		GDP per Capita			
Year	**Absolute Value** (Constant 2000 US$)	**Growth Rate** (Annual in Percent)	**Year**	**Absolute Value** (Constant 2000 US$)	**Growth Rate** (Annual in Percent)
1988	1435.60	2.11	2001	701.21	10.30
1989	1483.94	3.37	2002	745.04	6.25
1990	1386.6	-6.56	2003	821.71	10.29
1991	1267.33	-8.60	2004	928.16	12.95
1992	1141.12	-9.96	2005	960.23	3.46
1993	978.24	-14.27	2006	1037.31	8.03
1994	757.64	-22.55	2007	1125.96	8.55
1995	670.49	-11.50	2008	1158.11	2.86
1996	608.82	-9.20	2009	991.1	-14.42
1997	595.96	-2.11	2010	1035.84	4.51
1999	589.88	-1.02	2011	1093.63	5.58
2000	594.28	0.75			

Note. Author's Illustration, World Development Indicators (WDI) Databank (World Bank, 2012).

1.2 Ukrainian Merchandise Export Trade

Ukraine was an important industrial and agricultural component of the Soviet Union's planned economy and inherited a well-developed industrial base. The country has rich fertile farmlands and produces numerous mineral resources. This allows the Ukrainian exporters to be global players on the market for basic resources and provides the country with a strong base to produce semi-manufactured and manufactured goods.

Ukraine was highly integrated in the Soviet economy as production was extremely linked horizontally and vertically among Soviet republics and COMECON member states. Therefore, subsequent to the dissolution of the Soviet Union (SU), the restructuring and partial liberalisation of the country's industrial and agriculture sector were difficult, causing significant changes in the direction, structure and magnitude of exports. Notably, the main part of Ukraine's exports still consists of fabricated ferrous and non-ferrous metals, chemicals, machinery, fuel, transport equipment, and food products.

To reveal the preferences in the Ukrainian foreign trade, the trade intensity index was calculated for certain regions in the period 1996-2010 (see **Table 2**). Developed by Kojima (1964) and refined by Drysdale and Garnaut (1982), the index measures the uniform export share of a country in a certain country or region. Values greater than 1 indicate an intense trade relationship. The index reveals that Ukraine has intense trade relations with most countries in the world. Furthermore, there exists a strong preference towards trade with the former Soviet Union (FSU) and COMECON while it is lower for the European Union. The category COMECON includes all former members minus East Germany.

TABLE 2

Ukrainian Trade Intensity Index for Groups of Trading Partner (World, COMECON, FSU and EU27) in the Period 1996-2010

	Regional Country Group			
Year	World	COMECON	FSU	EU27
1996	4.31	18.95	30.96	2.75
1997	4.51	17.40	27.42	2.61
1998	4.24	17.30	26.24	3.14
1999	4.31	17.03	26.30	3.20
2000	4.10	18.44	28.50	3.58
2001	3.38	14.00	21.33	3.21
2002	3.42	14.11	21.48	3.19
2003	3.46	13.45	20.49	3.24
2004	3.68	11.71	17.78	2.69
2005	3.07	11.83	18.12	2.07
2006	2.90	11.41	17.29	1.91
2007	2.88	11.13	17.53	1.56
2008	2.62	9.36	14.57	1.56
2009	2.67	10.46	16.66	1.35
2010	2.28	9.04	14.25	1.44
Average	3.40	13.70	21.26	2.50

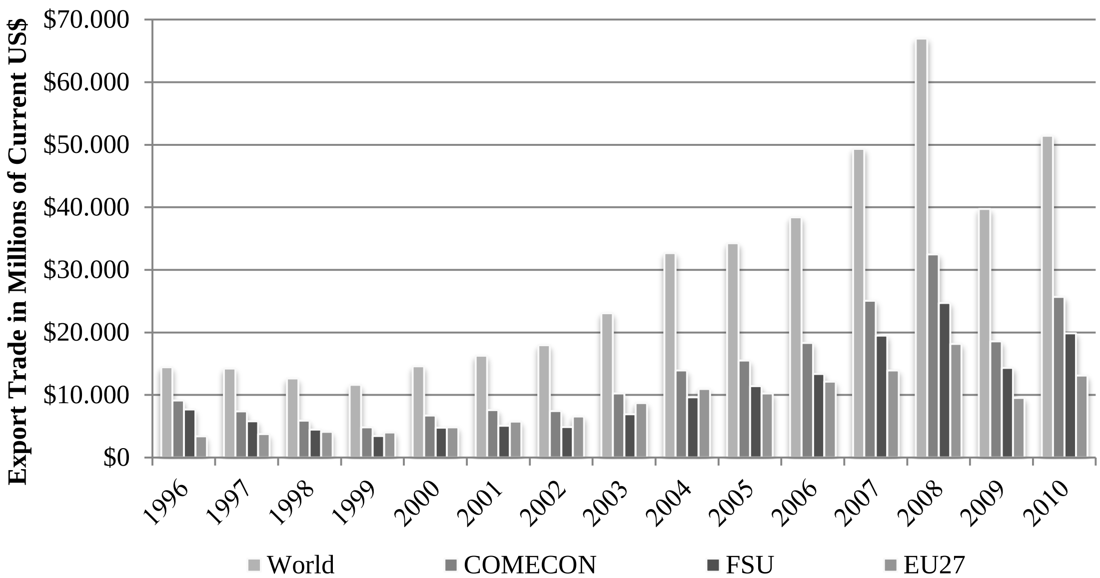
Note. Author's Calculation, Comtrade Database (United Nations, 2012).

In the last 12 years, there has been a considerable increase in the openness of the Ukrainian economy and in the volume of its export trade. After the collapse of the SU in 1991, export growth exhibited strong positive dynamics and the number of Ukrainian exporting firms has risen sharply. Raw materials and semi-processed products that constituted the largest part of the Ukrainian export during the 1990s have been partially replaced by the manufactured products of higher levels of processing. In the reviewed period, the country's export trade grew by 364.3 percent, exceeding US$ 51.43 billion in 2010. However, as Ukraine was dramatically affected by the global economic crisis, the volume of export trade decreased in 2009 and merely picked up in 2010. This had dramatic effects for the economy (Lane, 2011).

The structure of Ukrainian merchandise export trade underwent several significant changes during the reference period, both in terms of the commodities and their destinations. **Figure 1** examines the geographical export structure of Ukraine for the period 1996-2010. While the countries of FSU remained the most important destination for the Ukrainian products between 1996 and 2010, their value share in total exports dropped from 53.1 percent to 38.5 percent.

FIGURE 1

Ukraine's Geographical Export Structure for Groups of Trading Partner (World, COMECON, FSU and EU27) for the Period 1996-2010



Note. Author's Computation and Illustration, Comtrade Database (United Nations, 2012).

With the overall expansion of trade, the volume of exports to FSU countries increased from US$ 7.64 billion in 1996 to US$ 19.82 billion in 2010. Not surprisingly, the EU27 emerged as an important trade partner during the reference period and the export trade volume increased from US$ 3.36 billion in 1996 to US$ 13.06 billion in 2010. Notably, the Russian Federation remains the most important destination for Ukraine's products, importing almost 23.8 percent of export commodities in the period of 2008-2010. In recent years, Egypt and India appeared on the scene, importing large parts of Ukraine's agricultural production.

In the 1990s, Ukraine mainly exported metals, mineral products and cereals. During the reviewed period, the share of those export commodities declined to 42.8 percent in 2010. The transport sector grew significantly, amounting recently to more than 7.2 percent of exports. Furthermore, agricultural commodities remained important as their share persisted on the same level. However, growth in agriculture export trade is still smaller than in other sectors.

The correlation between Ukraine's export and economic growth is consistent with exports playing an important part in Ukraine's takeoff, subsequent to the economic struggle in the 1990s. The observed growth and changing export structure reflect the structural transformation of Ukraine's economy. Some sectors became more prominent than others (Lane, 2011). As already noted, the data shows that Ukraine's trade partner structure has recently become more diverse, shadowing the importance of FSU as the recipient of Ukraine's exports. Furthermore, Ukraine's exports have expanded to the emerging markets in Asia and Africa (Bojcun, 2011).

2. Methodology

To model the impact of the Soviet heritage and reveal the role of regional integration for Ukraine's export trade, I developed a trade model which is based on the gravity model of international trade (GMIT). In the following section, I clarify the analytical framework and discuss the reason for the specification of my model. Also I discuss estimation, specify the sources of my data and indicate the estimation procedure.

2.1 Gravity Model of International Trade

The gravity model is considered to be one of the most reliable models for empirical studies explaining trade flows between countries. In this model, economic entities are considered to be bodies which depend on pushing and pulling factors. Such entities might be countries, regions or greater communities like free trade blocs. The involved economies are characterised by varying parameters and interact by exchanging people, goods and information. The pioneering gravity model of Tinbergen (1962) determines trade flows, represented as the sum of imports and exports, T_{ij}, by the size of each economy, denoted by X_i for home and X_j for foreign. Furthermore, the distance, D_{ij}, negatively affects the volume of trade. In its simplest form, the stochastic version of the gravity model is used in empirical studies as follows:

$$T_{ij} = \alpha_0 X_i^{\alpha_1} X_j^{\alpha_2} D_{ij}^{\alpha_3} \eta_{ij} \quad \textbf{(1)}$$

where α_0, α_1, α_2 and α_3 are unknown parameters and η_{ij} reflects an error factor which is assumed to be statistically independent from the estimators. Due to its multiplicative form, the model can be estimated by econometric methods. This is made possible by log-linearising the equation and estimating the parameters by least squares procedures. However, recent studies questioned the log-linearization as several severe econometric issues rise with it (Santos Silva and Tenreyro, 2006).

Moreover, Anderson and van Wincoop (2003) showed that the traditional specification of the gravity model suffers from omitted variable bias. This is because the effect of relative prices is not taken into account. They proposed a country-specific fixed-effects specification of the GMIT. These effects absorb time-invariant factors which affect the patterns of trade and the model yields more consistent estimates. The major problem of the method of Anderson and van Wincoop (2003) is that zero trade events cannot be adequately modelled. Moreover, the log-linearisation of the model causes biases if heteroskedasticity is present. I will not follow Anderson and van Wincoop (2003) and will stick with the traditional gravity model. Thus, I augment the traditional gravity model and apply a superior estimation procedure.

2.2 Specification and Data

To reveal the characteristics of export trade in the countries under examination, I modified the traditional gravity model and analysed it with a panel approach. I assume that the traditional formulation needs some improvement. Thus, I included a parameter which reflects the Burenstam-Linder effect (Burenstam Linder, 1961). He supposed that 'the more similar the demand structures of two countries, the more intensive, potentially, is the trade between these two countries' (Burenstam Linder, 1961, p. 94). Various empirical studies confirmed that the effect is persistent and capable to explain North-North trade (see, for instance, McPherson et al., 2000). For this study, I follow the suggestions of Hallak (2010) and model the Burenstam-Linder effect as $(\ln XN_{it} - \ln XN_{jt})^2$. Moreover, to identify the effects of the Soviet heritage and post-Soviet regional integration, I introduced a dummy vector Z_{ijt} which includes these two measures. This leads to the following stochastic version of my augmented gravity model:

$$\mathrm{E}\left(EXP_{ijt}\middle| X_{it}, X_{jt}, D_{ij}, Linder_{ijt}, Z_{ijt}\right) = \alpha_0 X_{it}^{\alpha_1} X_{jt}^{\alpha_2} DW_{ij}^{\alpha_3} Linder_{ijt}^{\alpha_4} Z_{ijt}^{\alpha_5} \eta_{ij} \quad \textbf{(2)}$$

where Ukraine is represented by i while j stands for its trading partners and t is the time period (t = 1996, 1997, ..., 2010). EXP_{ijt} denotes Ukraine's merchandise exports to each country j and is measured in current US$. The data are from the Comtrade Database and based on the SITC Rev. 3 classification (United Nations, 2012). Notably, trade data for the period prior to 1996 are not available because the country was not reporting such data to the United Nations. EXP_{ijt} is a positive defined parameter as a negative sign would reflect an import situation. I will analyze two different cases. **Model A** will include zero trade events, while I dropped all such events from **Model B**.

The GDP of the trading partner, Y_{jt}, reflects the potential demand of foreign and Y_{it} the production possibility of home. Both variables are measured in current US$ and I expect the signs to be positive. To derive data for each variable, I used the WDI databank (World Bank, 2012).

The endogenous distance measure, D_{ij}, is derived from the database of the *Centre d'Etudes Prospectives et d'Informations Internationales* (CEPII) and measured in kilometres (Mayer and Zignago, 2011). I follow the critique of Mayer and Zignago (2011) and assume that distance is better reflected by a measure of a multi-core infrastructure. I anticipate the effect to be negative. This is because, with larger distance between trading partners, the costs to trade increase significantly.

To calculate the variable for the Burenstam-Linder effect, I derive the data for the income per capita from the WDI databank (World Bank, 2012). I expect the sign of the estimator to be negative. This would confirm Burenstam-Linder's hypothesis and reflect my assumption that export trade follows also demand-oriented growth.

The parameter Z_{ijt} includes two dummy variables for the Soviet heritage and post-Soviet regional integration. RTA_{ijt} is equal to one if the partner j has a regional trade agreement (RTA) with Ukraine, otherwise zero. The dummy variable is added to the model to see whether the membership to an RTA has a positive impact on Ukrainian merchandise export flows. RTAs are mainly constructed from the

Regional Trade Agreements Information System (RTA-IS) (WTO, 2012). The variable includes bilateral and multilateral agreements. COM_{ij} accounts for a former membership in the COMECON. It equals one if both countries were members of the COMECON and zero if that is not the case. The variable represents the impact of traditional and continuing trade relations. As the Soviet Union and its partner were highly integrated economically, the sign of this variable is expected to be positive.

2.3 Econometric Model and Estimation Procedure

One can argue that – due to the panel structure of the GMIT – a fixed effects model (FEM) or a random effects model (REM) outperform the ordinary least squares (OLS) estimates because country-specific and time-specific effects are appropriately taken into consideration. Most scholars also agree that the FEM is superior to the REM. This is because it is likely that country-specific effects and the error term are correlated, which makes the REM yield biased estimation results. Moreover, statistical test like the Hausman test mostly ends in favour of the FEM. In contrast to the REM, the FEM is not able to consider time-invariant effect, which makes it difficult to apply in the context of this study. This makes it necessary to use a different estimation procedure.

In their recent paper, Santos Silva and Tenreyro (2006) raised further concerns about biases of the traditional econometric approach. They identified three problems of the log-linearised gravity model which normally result in severely biased results. Above all, the log-model is based on the assumption that the error terms do not exhibit heteroskedasticity. Also the log-linearisation creates biases as the transformation has an effect on the nature of the estimation procedure. Lastly and most severe, the log model cannot deal with zero trade flows. Most scholars cope with the problem by dropping zero trade flows or modifying the dependent variable. Notably, this modifications lack any theoretical justification.

To avoid these problems, Santos Silva and Tenreyro (2006) proposed using levels instead of lags for the dependent variable. They suggest applying the Poisson pseudo-maximum-likelihood (PPML) estimation procedure. Among others, Siliverstovs and Schumacher (2009) confirm that PPML outperforms traditional estimation procedures. According to Santos Silva and Tenreyro (2006) and based on **Equation 2**, I developed an augmented gravity model and specified it as follows:

$$EXP_{ijt} = \ln \alpha_0 + \ln X_{it}^{\alpha_1} + \ln X_{jt}^{\alpha_2} + \ln DW_{ij}^{\alpha_3} + Linder_{ijt}^{\alpha_4} + RTA_{ijt}^{\alpha_5} + COM_{ij}^{\alpha_6} + \eta_{ijt} \tag{3}$$

This relation is estimated by the Poisson pseudo-maximum-likelihood (PPML) estimator. The form of **Equation 3** makes clear that the data does not have to be Poisson or integer to receive consistent estimators. Particularly in the presence of heteroskedasticity, the Poisson regression estimates are more efficient and consistent than the least squares regression estimates. Moreover, the PPML method provides a natural way to cope with zero trade. To obtain a robust variance estimate that adjusts for within-cluster correlation, I clustered the data by the partner country. This allows for a heteroskedasticity-robust variance estimator (Williams, 2000).

Furthermore, to check for the adequacy of the estimated model, I perform a heteroskedasticity-robust version of the Ramsey Regression Equation Specification Error (RESET) test (Ramsey, 1969). It tests for the correct specification of the conditional expectation. If the RESET test p-value is insignificant, the test provides no evidence of misspecification. Moreover, I performed the LINK test to detect model specification errors. The idea behind this test is that if the model is properly specified, then it should not be possible to find any additional independent variable that is significant. The test constructs two new variables, a variable of the prediction (*hat*) and a variable of the square prediction (*hatsq*). The model is then refitted using these new variables as predictors. The former should be significant since it is the predicted value and the squared predictions should not have much explanatory power if the model is correctly specified. Lastly, I conducted the variance inflation factor (VIF) test to test for multicollinearity of the independent variables. According to a common rule of thumb, multicollinearity is high and the variable has to be excluded from the analysis if the VIF-index is larger than five.

3. Results and Discussion

The model is estimated for the period 1996-2010 and I used two different specifications. While **Model A** includes zero trade events (N = 2,793), **Model B** only comprises trade events above zero (N = 2,258). For both models, the number of actual entries is substantially lower than the number of potential entries (N = 3,046). This is because of lags in the WDI databank. Notably, the estimation comprises 98.5 percent of all countries and on average 99.7 percent of all export trade of Ukraine. Most entries are missing for countries with zero trade and I was able to include on average 78.6 percent of zero trade events. The collected data was inserted into processing software, and then the models were estimated by PPML. **Table 3** presents a summary report for the estimation results of **Model A** and **Model B**. The table consists of the estimated coefficients, the robust standard errors and the significant levels. All standard errors are robust to heteroskedasticity and each model explains more than 92 percent of variance. Moreover, all the estimated parameters are statistically significant ($p < 0.01$). The estimates of the zero-trade model are almost equal to the estimates of **Model B**.

TABLE 3

PPML Estimation Results for Ukraine's Merchandise Export Trade in the Period 1996-2010

	PPML	
Variable	**Model A** (EXP_{ijt})	**Model B** ($EXP_{ijt} > 0$)
X_{it}	0.228***	0.235***
	(0.061)	(0.058)
X_{jt}	0.727***	0.710***
	(0.030)	(0.029)
D_{ij}	-0.815***	-0.785***
	(0.102)	(0.101)
$Linder_{ijt}$	-0.107***	-0.106***
	(0.022)	(.0.022)
RTA_{ijt}	0.926***	0.936***
	(0.158)	(0.154)
COM_{ij}	0.557**	0.569***
	(0.177)	(0.175)
Observations	2,793	2,258
R-squared	0.92	0.92

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note. Author's Estimations, Regression is Based on the Developed Panel Dataset.

The signs of all explanatory variables clearly depict the real situation. The production ability in home and the demand abroad positively affect the country's merchandise export trade. Moreover, the two dummy variables for the Soviet Heritage and post-Soviet economic integration have also a positive impact on trade. On the other hand, the weighted distance and the Burenstam-Linder effect have the expected negative signs. This confirms my hypotheses about the patterns of the parameters.

Table 4 presents the results of the conducted statistical tests. The RESET test confirms that the conditional expectation is correctly specified. Both *p*-values indicate that PPML outperforms other estimation procedures and is the right procedure for this estimation. Also the LINK test ends in favour of the specified model. The variable of the prediction is highly significant, while the variable of the square prediction is insignificant. This indicates that the model is properly specified. Moreover, the VIF-test confirmed that multicollinearity is not a problem as the value for all independent variables is below 5 (see **Appendix A**).

TABLE 4

Statistical Tests for the PPML Estimation

Test	**Model A** (EXP_{ijt})	**Model B** ($EXP_{ijt} > 0$)
RESET Test		
p-Values	0.76	0.38
LINK Test		
Hat	1.051***	0.845***
	(0.192)	(0.202)
Hatsq	-0.001	0.004
	(0.005)	(0.005)
Constant	-0.518	1.568
	(1.887)	(2.004)

* p < 0.05, ** p < 0.01, *** p < 0.001

Note. Author's Calculation, Analysis is Based on the Results of the PPML Estimation.

The productivity effect of the home market, X_{it}, is rather small, implying that a 10 percent increase in Ukraine's GDPs will raise exports by 2.3 percent. Traditional gravity estimations indicated the effect to be around 10 percent or higher, while PPML estimations showed that the effect is much lower (Hoekman and Nicita, 2011). This shows that the domestic growth in GDP is not increasing the production ability as strongly as in other countries and thus the effect on merchandise exports is significantly smaller.

On the other hand, the growth in the demand abroad has a considerable effect on the direction and magnitude of Ukraine's export trade. My findings are confirmed by other studies which found the estimator to be roughly 0.7 (see, among others, Santos Silva and Tenreyro, 2006). This shows that – due to the reduced growth in the EU27 – the direction of Ukraine's exports will shift more and more to the emerging markets of Asia and Africa.

The estimated coefficient of D_{ij} indicates the weighted distance effect of the economies. A 10 percent increase in the distance will decrease export trade by 7.6-8.2 percent. The value of the estimator is not located within the usual negative range (Overman et al., 2003). However, Head and Mayer (2010) showed that the traditional distance measure analyzed by Overman et al. (2003) is biased. This claim is backed by Santos Silva and Tenreyro (2006) who found out that the distance effect is -7.8 percent.

Moreover, the estimate of the Burenstam-Linder effect shows that Ukraine's exports are also determined by the demand structures abroad. According to Burenstam-Linder's hypothesis, trade is decreasing with diminishing similarity of the countries' demand structures. The effect is more pronounced than in Hallak (2010) who conducted a multi-sector analysis of the Linder effect and found that the median effect is -0.071 or -0.043. This indicates a higher importance of similar preferences for the Ukrainian economy.

The results confirm my hypothesis that exports are larger to countries which have an RTA with Ukraine. An RTA with the partner increases Ukraine's export trade by 152.4 - 154.3 percent. My results find not only confirmation in the economic theory, but are also verified by the work of Cipollina and Salvatici (2010). Their meta-analysis of 75 published papers with 1,460 estimates indicates that the average effect of a RTA is positive, with a mean coefficient of 0.61 and a median of 0.41. Notably, their conclusion is bound to FEM estimates (10 percent more trade) and REM estimates (72 percent), largely ignoring PPML estimates. Thus, my findings contradict traditional estimation and indicate that RTAs have a more severe effect than prior estimated. I assume that the difference in results can be explained by the fact that Ukraine is lagging behind in trade liberalisation and only recently entered the World Trade Organization (WTO) (Nannicini and Billmeier, 2011).

Traditional trade relation and the aftermath of the economic integration within the scope of COMECON still play a considerable role for the Ukrainian economy. My findings indicate that such trade is 74.5-77.6 percent higher than with other countries. This confirms the findings of Steinbach and Rybak (2012) and underpins them with empirical evidence. Not only was the economic integration a huge burden in the aftermath of the Soviet breakup, but rather trade with those countries has more potential for Ukraine than trade with other countries. This indicates the role of similar preferences and demand structures.

I solved **Model B** in order to determine export trade potentials. For the period 1996-2010, the predicted trade is compared with the actual trade. Among the top 5 percent of trading partners with developable trade relations are almost exclusively African and Central American countries. This indicates that the Ukrainian exporters do not focus enough on these regions and miss out on the chance to benefit from trade with these countries. Moreover, my findings prove that trade with Middle East and North Africa (MENA) countries entails huge potentials, which need to be more exploited.

Conclusion

This study aimed at revealing the characteristics of Ukraine export trade patterns in the period 1996-2010. I also intended to quantify the role of the Soviet heritage and post-Soviet regional integration on trade. A modified gravity model was developed and I estimated two models with rigorous econometric methods, using the PPML estimator and confirming the adequacy and correct specification of the model with the help of statistical tests. While **Model A** included zero trade events, I excluded such events from **Model B**. Both models have a high explanatory power (R-squared > 0.92) and all estimators are highly significant. The results confirm the role of traditional variables of gravity estimations and indicate that trade is also driven by similar preferences and demand structures.

My findings clearly expose the role of traditional economic relations. Ukraine's exports to COMECON countries are more than 74 percent larger than to other countries. This confirmed my hypothesis and shows that Ukraine has enormous potential in trade with these states. Notably, the effect of the post-

Soviet regional integration is more pronounced, leading to 152 percent more trade. This indicates the role of integration policies, which result in a harmonisation of product standards and trade schemes. An extension of the free access to foreign market would have huge implications for Ukraine's exporters, demonstrating a demand for further economic integration polices. Thus, my empirical findings carry some important policy implications for Ukraine. For instance, Kiev should enhance trade integration with its neighbours, not only focusing on the EU and the Russian Federation but also considering its Black Sea neighbours. Especially trade with Turkey and the Caucasus countries showed a strong growth performance in recent years. This would help to decrease Ukraine's vulnerability, caused by the struggling EU or market shocks in Russia. Thus, trade policies which ease the access to these markets would allow Ukraine's exporters to profit even more from regional trade. But not only Ukraine would profit from such policies. Also the EU would be well-advised to support the economic integration between the Eastern Partnership (EaP) countries. This is because the political and economic future of the EU is also dependent on the stability and welfare in the neighbouring countries. The partners reflect the EU's future markets and also provide the EU with a lot of necessary resources, being it oil or agricultural raw materials.

The author knows about the limitations of his research and would like to propose several aspects which need further investigation. Firstly, I assume that a more disaggregated analysis would give a better understanding of sub-sector specific characteristics and allow for sector-specific conclusions. Secondly, it would be interesting to compare the role of the Soviet heritage and post-Soviet integration in different transition countries. Thirdly, a closer look at the erosion of traditional trade relations and the role of regional integration policies in this period would allow getting a better understanding of their relation and would provide the chance to give more concrete policy recommendations.

* * *

APPENDIX A

VIF-Test for Multicollinearity of Independent Variables

Variable	**Model A** (EXP_{ijt})	**Model B** ($EXP_{ijt} > 0$)
X_{it}	1.07 (0.06)	1.06 (0.05)
X_{jt}	1.26 (0.20)	1.23 (0.19)
D_{ij}	1.68 (0.41)	1.60 (0.38)
$Linder_{ijt}$	1.34 (0.26)	1.38 (0.28)
RTA_{ijt}	1.65 (0.39)	1.62 (0.38)
COM_{ij}	2.02 (0.50)	2.07 (0.52)
Mean-VIF	1.50	1.49

Note. Author's Calculations, Analysis is Based on the Developed Panel Dataset, R-squared Values in Parenthesis

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