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Do Trade Agreements and Economic Unions Create Clusters in Global International Trade?

Ayşe SEVENCAN *(https://orcid.org/0000-0001-8867-0874), Yeditepe University, Türkiye; ayse.sevencan@yeditepe.edu.tr*

Çağrı Levent USLU *(https://orcid.org/0000-0001-7651-8779), Yedietepe University, Türkiye; cluslu@yeditepe.edu.tr*

Ticaret Anlaşmaları ve Gümrük Birlikleri Uluslararası Ticarette Kümeleşmeye Neden Oluyor Mu?

Abstract

This paper employs a gravity model to assess the role of ex-post regional trade agreements and customs unions on trade patterns. The primary contribution of this paper to the conventional gravity modal is to embed trade agreements and determine whether they have significantly affected bilateral trade. The secondary contribution is to reveal intra and inter-union/agreement trade patterns among trade agreements and economic unions. Three dummy variables were also introduced to the conventional gravity model. Results showed a slight clustering in trade partners (a) depending on the distance and (b) depending on being a member of a trade agreement and/or economic union.

Keywords : Trade, Customs Union, Gravity Model.

JEL Classification Codes : F10, F13, F14, F15.

Öz

Bu makale, ticaret kalıpları üzerindeki ex-post bölgesel ticaret anlaşmalarının ve gümrük birliklerinin rolünü değerlendirmek için bir çekim modeli kullanmaktadır. Bu makalenin geleneksel çekim modeline birincil katkısı, ticaret anlaşmalarının ikili ticaret hacimlerini önemli ölçüde etkileyip etkilemediğini belirlemektir. İkincil katkı, ticaret anlaşmaları ve ekonomik birlikler arasındaki içi ve dış ticaret gruplaşmalarını ortaya çıkarmaktır. Bu amaçla geleneksel çekim modeline üç kukla değişken eklendi. Sonuçlar, ticaret ortakları açısından (a) mesafeye bağlı olarak ve (b) bir ticaret anlaşmasına ve/veya ekonomik birliğe üye olmaya bağlı olarak hafif bir kümelenme göstermiştir.

Anahtar Sözcükler : Ticaret, Gümrük Birliği, Çekim Modeli.

1. Introduction

This paper investigates whether trade (customs) unions have a significant role in global trade clusters. The problem with setting a clear-cut definition of a union is somewhat problematic. Numerous agreements exist between countries aiming for freer trade, yet no two unions have the same characteristics. Therefore, trade unions and agreements are transferred into customs unions. Limiting the definition of the union to customs union enables us to determine the clusters and member countries quickly. The unions considered in this paper are European Union (EU), North American Free Trade Agreement (NAFTA), Latin American Integration Association (LAIA), South African Customs Union (SACU), Southern Cone Common Market (MERCOSUR), Caribbean Community (CARICOM), Eurasian Customs Union (EACU), West African Economic and Monetary Union (UEMOA).

The magnitude and direction of trade between economies under investigation are carried through the conventional model of international trade. In addition to the variables employed in the traditional gravity model, such as GDP and exports, several control variables are included in the model, which are assumed to have a significant role in explaining the international trade flows. These variables are population, real exchange rates, and the distances between capitals of countries to represent transaction costs. In addition to these variables, which are intensively used in the trade literature, each union was introduced into the model with the help of a dummy variable. More specifically, bilateral exports between 142 countries and whether customs unions create clusters or not are being investigated by employing a modified gravity model.

The gravity model was first introduced by Tinbergen (1962). The model is important in the international trade literature. Many trade economists have used it to explain interactions between economies. Not only trade but other flows between countries, such as immigration, and Foreign Direct Investment (FDI), are topics investigated by using the gravity model. The idea is that two factors can describe geographical patterns in economic activities. One factor is economic growth, approximated by per-capita income, and the other is the distance between economic activities. The farther the country, the less bilateral trade; the more significant the country, the more it trades. In other words, the similarity in size of an economy (measured by GDP) has a positive, and the distance between trading economies has a negative effect on international trade.

The distances between capitals serve as a proxy for the ease of transportation. Although we know that absolute distance between capitals has several drawbacks in measuring the ease in transportation costs, we still believe that this is the best in hand given the scope of the data set covering 142 countries.

The negative effect of distance on trade is one of the best-known facts in international trade studies (Leamer & Medberry, 1993; Disdier & Head, 2008). In addition to distance barriers, trade is also subject to border barriers. Even though these two are highly correlated, they have different effects on trade. It is a well-known fact that neighbouring economies tend to trade more, leading to a phenomenon known as the adjacency or contingency effect (McCallum, 1995; Nitsch, 2000; Anderson & Van Wincoop, 2003). These empirical studies show that because of adjacency, intra-national trade exceeds international trade, and intra-continental trade exceeds inter-continental trade.

The importance of distance in determining bilateral trade volume may be explained by several obstacles that distance places against smooth trade. In other words, by distance effect, is not only the increase in the cost of transportation but also different costs that traders may face when transporting a good to a customer in the partner economy. Distance could account for consumers’ tastes, and tastes can lower the magnitude of trade even in online products that are assumed to have zero transaction costs.

The distance effect on trade is assumed to be equal to one. Empirical evidence also verifies this theoretical conclusion. According to Disdier and Head (2008) which the authors investigated the distance effect based on 1467 estimates from 103 different papers, the distance effect is close to 0.9. Yet, this “average” value agrees with theoretical predictions. The analysis of sub-groups, (i.e., different scaled economies, different geographical regions, different periods) may show a variation from this average value. On the other hand, the world is no longer as large as in former decades due to technological advances, namely communication and transportation. Thus, it is fair to expect a shrinking distance coefficient effect over time. Yet, empirical studies measuring the progress of trade elasticities concerning distance do not strictly verify this assumption. Some authors find a minimal change in trade elasticity (Leamer & Medberry, 1993). A similar result was found by (Disdier & Head, 2008). Authors argue that the distance effect rises during the mid-1900s then remains constant afterwards. Besides these studies that mainly propose that the distance effect is somewhat stable over time, some studies find an increasing distance effect on one side and a decreasing distance effect on the other. For instance, Soloaga and Winters (2001) and Brei and Goetz (2018) have concluded that the distance effects are increasing throughout time and are now getting closer to 2. On the contrary, Eichengreen and Irwin (1998), Brun et al. (2005), Felbelmayr and Kohler (2006), and Lin and Sim (2012) found a decreasing trend in the distance effect over time.

One may think about several reasonable explanations for these contradictory results. From a methodological point of view, we can argue that the variables considered in the model may have created these results. For instance, Brun et al. (2005) intercalate infrastructure into the conventional gravity model and argue that the infrastructure causes a reduction in the distance effect. Felbermayr and Kohler (2006) say that omitting the impact of extensive margin of trade is the main reason for the questionable results of the non-decreasing distance effect in previous studies. The final explanation comes from Berthelon and Freund (2008). The authors argue that changes in distance coefficients across industries increase the overall distance coefficient. Two possible reasons for these changes arise. First, in some sectors, goods have become more substitutable. Second, trade costs have changed too. Lin and Sim (2012) argue that initial evidence of the distance effect gathered from regressions employing annual data may be a misleading indicator of the true impact of distance on trade.

The novelty of this paper is the introduction of trade agreements from almost all continents into the gravity model. There are a couple of attempts to introduce trade unions to the conventional gravity model; however, primarily due to lack of data and secondarily, due to the scope of the study, most of the trade unions and/or agreements were left outside the analysis. This paper aims to introduce trade unions/agreements as much as possible into the model. By doing so, we can distinguish the difference in trade volumes between unions formed by developing countries and unions formed by developed countries.

2. Customs Unions

Trade unions and agreements have complex structures. Such agreements aim to increase economic efficiency, affecting member countries' trade volumes. It may be argued that such agreements aim to establish a customs union. Thus, to bypass the possible struggle while classifying numerous types of trade agreements, only customs unions are considered in this paper. As mentioned above, 7 of these trade unions were taken into consideration. As of 2016, these unions constituted 59% of the world's GDP. Not surprisingly, NAFTA and the EU constitute most of this volume; thus, one may regard these unions as established by developed countries. Developing countries formed other trade unions.

The oldest customs union is the South Africa Customs Union, established in 1910, and the most recent one is the Eurasian Economic Union established in 2015. Although the first customs union dates to the early 1900s, one may argue that it gained momentum during 1990 with the establishment of the EU and NAFTA. The unique property of each customs union is that member countries are of the same geographical region (continents in most cases).

Table: 1
Customs Unions, Their Shares in World GDP and Year of Establishment

UNION	% of World GDP	Established
NAFTA	27.97%	1994
EU	19.61%	1993
LAIA	5.74%	1980
MERCOSUR	3.20%	1991
EAEU	1.96%	2015
SACU	0.43%	1910
UEMOA	0.13%	1975
CARICOM	0.10%	1973
	59.14%	

Source: World Bank Data, Customs Unions' websites.

At this point, we should put a remark concerning the causality between a customs union and trade volumes. The question to be answered is: Are these customs unions established to increase inter-country trade of the members, or were the members of these customs unions already large trade partners of each other? The answer is "both". It is almost impossible to classify the gain in terms of trade from being a customs union member. It is evident that, unsurprisingly, by the goal of establishing a customs union, a customs union tends to increase trade between member countries. However, it has also been argued that the trade volume between members and non-members will decrease.

3. Methodology

The gravity model for trade was employed in this paper. Tinbergen (1962) and Pöyhönen (1963) are the first authors who introduced the gravity model to the literature. Since then, the model has gained increasing popularity in testing empirical trade analysis. Trade literature and topics concerning international flows, migration, Foreign Direct Investment, Banking sector have benefited from the gravity model’s logic. The main assertion of the gravity model is that exports from country “i” to country “j” are determined by the economic sizes of the trade partners measured in terms of GDP or GNP, populations, and geographical distances between these partners. In addition to these fundamental variables, most scholars tend to include additional control variables to the model like infrastructure endowments, social and economic variables, and dummy variables to assess the importance of different institutional characteristics of the countries.

Initially, the model was not theoretically improved; however, after the second half of the 1970s, several authors contributed, and the model started to be more complex and able to explain the trade flows between different countries of the same kind. Anderson (1979) made the first significant contribution to the model. The author used properties of expenditure systems with identical homothetic preferences across regions. The products are differentiated by place of origin. Bergstrand (1985) made another significant contribution to the model. Instead of perfectly substitutable international goods, the author introduced monopolistic competition and product differentiation to the model. Helpman and Krugman (1985) used a differentiated product with increasing returns to scale and presented a concrete theory of international trade where there is a lack of perfect competition. Anderson and Van Wincoop (2003) also agreed that each region’s product differentiation specialised in a particular good. Further authors derived a model based on manipulating the CES expenditure system. These different approaches and contributions to the conventional gravity model enabled us to explain other specifications and some diversity in the outcomes of the empirical analysis.

When we turn our attention to the empirical studies, we see numerous of them in the international trade literature, which at the same time contributed to the improvement of the gravity model. Among those studies, some are like our work. These studies may be classified into two: (a) improvements in the model specification (i.e., Matyas, 1997; Cheng & Wall, 2005; Breuss & Egger, 1999; Egger, 2000) and (b) restating the existing variables and addition of new control variables (i.e., Bergstrand, 1985; Helpman, 1987; Wei, 1996; Soloaga & Winters, 2001; Limao & Venables, 2001; Bougheas et al., 1999).

The conventional gravity model asserts that the volume of exports between trading partners, X_{ij}, is a function of their incomes, populations, geographical distance between countries and a set of dummies to capture the institutional differences.

$$X_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\mathrm{B}_2} N_i^{\beta_3} N_j^{\beta_4} D_{ij}^{\beta_5} A_{ij}^{\beta_6} u_{ij} \tag{1}$$

where the subscript "i" denotes exporter country, subscript "j" *denotes importer country*, *"Y"* is the GDP, *"N"* is the population, *"D"* is the distance between exporter and importer, and *"A"* is the set of dummy variables and *"u"* is the random error term.

Alternately, one can also write the above equation by using Per-Capita GDPs rather than GDP itself. This approach leads us to re-state the equation as

$$X_{ij} = \gamma_0 Y_i^{\gamma_1} Y_j^{\gamma_2} YH_i^{\gamma_3} YH_j^{\gamma_4} D_{ij}^{\gamma_5} A_{ij}^{\gamma_6} u_{ij} \tag{2}$$

where YH_i and YH_j are Per-Capita GDPs of exporter and importer countries respectively. Equation (1) and (2) are identical given that $\beta_1 = \gamma_1 + \gamma_3$, $\beta_2 = \gamma_2 + \gamma_4$, $\beta_3 = -\gamma_3$ and $\beta_4 = -\gamma_4$. The choice between two specifications depends on the scope of the study. If the model is employed to study bilateral trade of a specific product, then the second specification is used (see Bergstrand, 1985). If the model is employed to study aggregated exports, then the first specification is generally used (see Endoh, 1999). For estimation purposes, the first specification is expressed as,

$$lX_{ij} = \beta_0 + \beta_1 lY_i + \beta_2 lY_j + \beta_3 lN_i + \beta_4 lN_j + \beta_5 lD_{ij} + \sum_h \delta_h P_{ijh} + u_{ij} \tag{3}$$

where l denotes the natural logs, $\sum_h \delta_h P_{ijh}$ is the set of dummies and P_{ijh} takes on value one when a country satisfies a certain criterion (i.e., belonging to a customs union), and zero otherwise. Our model includes a distinct set of dummies that captures whether a country is a member of a customs union or not. Each customs union has its own dummy; therefore, there are 7 dummies in our model. The theory suggests that being a member of the same customs union and sharing a common border are characteristics that should increase the bilateral trade between these two countries: thus, all the coefficients on dummy variables (δ_h) to be positive.

When β coefficients are considered, β_1 and β_2 are expected to be positive. The signs of β_3 and β_4 are ambiguous. Finally, the coefficient on distance, β_5 is expected to be negative. A high GDP of the exporter country implies that the production in that country is also high; thus, it has a higher potential to export, implying that β_1 is expected to be positive. On the other hand, high GDP for the importing country implies that the income level in this country is also high, implying that they have the financial sufficiency to import. The coefficient on the population of the exporting and importing country, β_3 and β_4, may be positive or negative depending on the export and import figures and their population. More specifically, relatively small countries in terms of population may be exporting (importing) more than populated countries. If that is the case, we expect β_3 (β_4) to be negative. It may also be that in terms of population, are exporting (importing) more than small countries, leading to a positive expected β_3 (β_4).

The coefficient over distance is expected to be negative since it closely approximates any cost associated with trade, yet there is more to say. Bougheas et al. (1999) argue that public infrastructure is another determinant of transportation costs. Using a simple index, the authors introduced differences in countries' infrastructures to the gravity model. Using data from European countries, the authors conclude a positive relationship between trade volume and infrastructure level. Unfortunately, this is not an option for us since our data covers 142 countries and creating an index that proxy's infrastructure is merely impossible. Thus, even though we know the importance of public infrastructure in the volume of trade, it is not even an option to introduce it in our model.

Finally, we also introduced the exchange rate since it is one of the most important determinants of international trade.

4. Findings

Our data contains 142 countries and 12 years between 2009 and 2020. 66[1] of these countries are members of a customs union; however, due to lack of data, not every member country of customs unions under consideration was taken into the data set[2]. There are 20.022 possible trading pairs per year, yet not all countries in the sample export to the entire countries in the sample set; thus, this number fluctuates between 14.212 (2018) and 11.964 (2013) per year.

Following the common practice in literature, we have estimated the gravity model in a panel data framework. This estimation has some advantages over cross-section analysis. First, panel data makes it possible to capture the relationships among variables over time. Second, the panel data set can capture and reflect the possible unobservable trading partner pair's personal effects. When these effects are omitted, OLS estimates will be biased if individual results are correlated with regressors.

The estimated gravity models for each trading pair are as follows,

$$lX_{ij} = \alpha_{ij} + \beta_1 lY_{it} + \beta_2 lY_{jt} + \beta_3 lN_{it} + \beta_4 lN_{jt} + \beta_5 lD_{ij} + \sum_h \delta_h P_{ijh} + u_{ijt} \quad (4)$$

$$lX_{ij} = \alpha_{ij} + \beta_1 lY_{it} + \beta_2 lY_{jt} + \beta_3 lN_{it} + \beta_4 lN_{jt} + \beta_5 lD_{ij} + \beta_6 lER_{ijt} \sum_h \delta_h P_{ijh} + u_{ijt} \quad (5)$$

where the coefficient α_{ij} is the individual effects. Equation 4 corresponds to the conventional gravity model and equation 5 corresponds to the augmented gravity model.

1 *Since Turkey and Andorra are members of the customs union, they are considered as EU members.*

2 *Cuba from LAIA, Lesotho and Swaziland from SACU, Antiqua and Barbuda, Grenada, Haiti, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines from CARICOM, Guinea-Bissau from UEMOA are excluded from the data set due to lack of data.*

lER_{ijt} is the natural log of exchange rate between trading partners' currencies and takes on the value of 1 if both countries use the same currency?

From the basics of panel data estimation, we should decide whether these effects are fixed or random as we introduce the personal impact. The random effects model would be suitable when trade flows are estimated using a sample randomly drawn from a large population. On the contrary, the fixed effects model would produce better estimates than the random effects model if the question estimates typical trade flows between pre-determined selections of nations (Egger, 2000). Our sample includes almost all members of customs unions but not whole countries in the world; we intended to use fixed effect estimation. Yet, we still conducted the Housman test to check whether the random effect model was more suitable than the fixed effect model.

We estimated equations 4 and 5 using four different methodologies (OLS, OLS Cross-Section Means, Fixed Effects and Random Effects). First, to compare estimation results, data were pooled, and the OLS method was used ($\alpha_{ij} = \alpha$) and the results are presented in the second and third columns of Table 2. Secondly, regression is also applied to the cross-section means. The fourth and fifth columns of Table 2 are devoted to the results of OLS (cross-section means).

OLS and OLS (Cross-Section Means)

Both estimation techniques and model specifications Importer Income, Exporter Income and Distance variables have the anticipated signs, and the coefficients are significant. When the Customs Union dummies are considered, it is evident that being a member of NAFTA, EU, LAIA, EACU, and UEMOA positively contributes to exports; however, coefficients on LAIA, EACU and UEMOA are not significant. An interesting result from the OLS estimation was obtained for the SACU members. The coefficient on the SACU dummy is negative and statistically significant, indicating that being a SACU member reduces the exports from the country. From both estimations, except for NAFTA and the EU, we see no positive and significant relationship between customs union membership and exports. Furthermore, for SACU and CARICOM, the coefficient has a negative sign.

The OLS on estimates with cross-section means reveal the differences between individuals; yet ignore any information within individuals. As one can easily see from Table 2, the coefficient estimates for the standard gravity model are close to those of the pooled data. The only difference between the two estimations is the significance of the dummy coefficient on SACU. The sign of the coefficient did not change; however, in the second model, the coefficient lost its relevance.

Table: 2
OLS Results for the Basic and Augmented Gravity Equations

	OLS Estimates		**OLS (Cross-Section Means) Estimates**	
Independent Variables	Standard Gravity Model	Augmented Gravity Model	Standard Gravity Model	Augmented Gravity Model
Constant	0.28 (0.89)	0.81 (1.61)*		
Exporter Income	1.21 (18.36)*	1.42 (18.24)*	1.22 (11.36)*	1.29 (18.42)*
Importer Income	1.26 (13.45)*	1.40 (23.60)*	1.20 (14.52)*	1.44 (28.60)*
Exporter Population	- 0.46 (0.26)	-0.40 (0.196)	-0.44 (0.18)	-0.38 (0.196)
Importer Population	0.25 (3.18)	0.32 (3.59)	0.32 (3.63)	0.37 (3.78)
Distance	-1.02 (23.16)*	-0.99 (26.15)*	-1.09 (24.18)*	-0.94 (24.15)*
Exchange Rate	---	0.028 (4.65)	---	0.028 (4.66)
NAFTA Dummy	0.09 (1.98)**	0.11 (1.99)**	0.11 (2.34)*	0.13 (2.09)*
EU Dummy	0.52 (6.42)*	0.54 (6.55)*	0.55 (5.39)*	0.50 (5.55)*
LAIA Dummy	0.42 (0.026)	0.41 (0.036)	0.41 (0.038)	0.55 (0.07)
SACU Dummy	-0.15 (2.16)*	-0.16 (2.32)*	-0.12 (0.48)	-0.19 (0.56)
EACU Dummy	0.32 (1.18)	0.35 (1.22)	0.30 (1.19)	0.33 (1.16)
UEMOA Dummy	0.53 (0.61)	0.53 (0.96)	0.65 (0.65)	0.56 (0.80)
CARICOM	-0.13 (0.06)	-0.14 (0.06)	-0.23 (0.16)	-0.31 (0.12)
Adjusted R^2	0.69	0.67	0.70	0.73
F-Test	43.26	43.18	---	---
SSR	3.882	3.458	3.916	3.614
n	116.412	116.412	116.412	116.412

*Notes: Time dummies are not reported; all variables except dummies are expressed in natural logarithms; estimations use White's heteroscedasticity consistent covariance matrix estimator, t-statistics are in parenthesis, *, **, *** denote significance at 1%, 5% and 10% levels respectively.*

After this brief look at the OLS estimations, we should focus on the last two estimation techniques since the OLS results in the panel data may be biased. To solve the problem, the model with personal effects should be estimated.

Fixed Effects Random Effects Model

Table 3 monitors the estimation results of the primary and augmented specifications of the Fixed and Random Effects Models. After estimating the Fixed Effects Model, using a Housman test, we test for the null hypothesis where explanatory variables and the individual effects are uncorrelated to discriminate between the two models (Fixed Effects vs Random Effects). Under both the null and alternative hypotheses, the fixed effects estimates are consistent. On the other hand, the random effects models are consistent under the null hypothesis. Therefore, if the null hypothesis holds, the Random Effects Model will be used; otherwise, the Fixed Effects Model will be preferred.

Table: 3
Regression Results for the Fixed Effects and Random Effects Models

	Fixed Effects Model		**Random Effects Model**	
Independent Variables	Standard Gravity Model	Augmented Gravity Model	Standard Gravity Model	Augmented Gravity Model
Constant	---	---	0.42 (1.01)	0.83 (1.56)
Exporter Income	1.27 (12.18)*	1.65 (17.42)*	1.28 (11.04)*	1.28 (19.62)*
Importer Income	1.44 (14.66)*	1.65 (24.60)	1.35 (13.27)*	1.52 (25.15)*
Exporter Population	- 3.42 (3.26)*	- 3.45 (3.36)	-3.14 (5.22)*	-3.14 (3.26)*
Importer Population	3.86 (3.47)	3.48 (4.22)	3.12 (3.57)*	2.28 (3.65)
Distance	---	---	-1.34 (23.18)*	-1.32 (27.19)*
Exchange Rate	---	0.22 (3.68)*	---	0.26 (2.66)*
NAFTA Dummy	0.16 (3.52)*	0.18 (3.28)*	0.19 (3.68)*	0.26 (4.42)*
EU Dummy	0.43 (4.65) *	0.72 (7.48)*	0.51 (5.75)*	0.18 (4.25)*
LAIA Dummy	0.52 (0.45)	0.44 (0.68)	0.48 (0.48)	0.46 (0.62)
SACU Dummy	-0.17 (2.34)*	-0.26 (2.65)*	-0.25 (3.42)*	-0.36 (2.85)*
UEMOA Dummy	0.78 (0.44)	0.77 (0.62)	0.61 (0.42)	0.76 (0.43)
CARICOM	-0.35 (0.63)	-0.33 (0.54)	-0.76 (0.64)	-0.42 (0.65)
Adjusted R^2	0.86	0.89	0.92	0.93
SSR	322.16	345.92	336.16	326.26
Hausman Test	742.6	775.7	---	---
n	116.412	116.412	116.412	116.412

*Notes: Time dummies are not reported; all variables except dummies are expressed in natural logarithms; estimations use White's heteroscedasticity consistent covariance matrix estimator, t-statistics are in parenthesis, *, **, *** denote significance at 1%, 5% and 10% levels respectively, The Housman test follows a $\mathcal{X}^2$ with 1o and 11 degrees of freedom in models respectively.*

Table 3 presents the results of the Fixed and Random Effects estimations. The Housman test rejects the null hypothesis. We selected fixed effects estimations since selecting random effects will lead to inconsistent estimates. Yet, results are still presented for the sake of information. If the pooled estimates are compared with Fixed Effects estimations, we see that some variables have increased in value while some have decreased. The signs of non-dummy variables are as expected. We see that the incomes of both exporters and importers significantly affect the trade volume. Thus, we can argue that highly producing countries export more, and again highly producing countries have enough financial sources to import. The signs of exporter and importer countries' populations exhibit an interesting result. In all estimations, the sign of the coefficient on the importer population is positive, whereas the sign turns out to be negative for the exporter country. This result may infer that highly exporting countries have higher productivity; therefore, even with a relatively lower population, they can produce exportable goods. On the importer side, however, the story is different. Apparently, at the global level, the domestic demand is satisfied with imports; thus, a higher population leads to higher import levels.

Unsurprisingly, the sign of the coefficient on distance is negative, which is no different from than expectations and results of the previous studies cited above; as the distance between countries increases, bilateral trade decreases.

5. Discussion

Typical trade union actions include providing know-how and services to their members and collectively bargaining for better trade contracts. The main question is whether customs unions tend to increase exports and whether these unions create trade clusters. The results are complicated. The results of all four estimations show that the EU and NAFTA members are highly exporting countries. This may be due to the proximity between the member countries' cultures and social and economic structures. Looking at the EU, we see that member countries share the same history, jurisdiction, administration and culture to some degree. Thus, it is no surprise that intra-trade among the EU countries shows evidence of severe clustering. EU policymakers see the promotion of international trade with the rest of the world as one of the most important deriving factors that enhance economic growth and welfare. Except for the length of historical background, one can easily argue that the same factors also determine the clustering at NAFTA. On the contrary, other customs unions have no significant effect on member countries' exports. Except for SACU, all the dummies for other trade unions in all four regression results are insignificant, indicating no evidence that member countries benefit from being a member of these trade/customs unions. An interesting result is the sign of the coefficient on the SACU dummy. The coefficient is negative, indicating that being a SACU member negatively affects the exports.

Typical trade union actions include providing know-how and services to their members and collectively bargaining for better trade contracts.

6. Conclusion

This paper investigates whether trade (customs) unions have a significant role in global trade clusters. The unions considered in this paper are the European Union (EU), North American Free Trade Agreement (NAFTA), Latin American Integration Association (LAIA), South African Customs Union (SACU), Southern Cone Common Market (MERCOSUR), Caribbean Community (CARICOM), Eurasian Customs Union (EACU), West African Economic and Monetary Union (UEMOA). The data covers 142 countries and eight years between 2009 and 2016. The gravity trade model was used to investigate the relationship between the volume and direction of exports and the formation of regional trade blocs. The conventional gravity model asserts that the volume of exports between trading partners, X_{ij}, is a function of their incomes, GDP_{ij}, their populations, geographical distance between countries and a set of dummies to capture the institutional differences. Our model includes incomes of exporter and importer counties, populations of exporter and importer countries, and distance and customs union dummies. Even though we admit that the infrastructure of both exporting and importing countries is an important determinant in explaining the trade between countries, due to the high number of countries included in the sample and the lack of data, we omitted the infrastructure dummy from the analysis.

The model was estimated using four different techniques, yet they estimated similar results. The methods used were OLS, OLS (cross-section means), Fixed Effects Model, and

Random Effects Model. The first two techniques were estimated for comparison since the OLS estimations in panel data would lead to biased results. The Housman test statistics indicated that a Fixed Effects Model is appropriate for the dataset.

Results indicate similar results to those of the literature. The GDP of exporter and importer countries positively affects the trade between nations. Another variable estimated by the other empirical analyses is the distance variable. The coefficient is negative, verifying the argument that the distance negatively affects the trade between countries. Population variables have interesting results. The variable on exporter and importer population has negative and positive signs, indicating that the labour productivity of highly importing countries is higher than those with a low export volume. The dummies on customs unions dummies exhibit interesting results. Three of the seven dummies are statistically significant, and two of these three dummies (EU and NAFTA) have a positive sign indicating that members of these customs unions are highly exporting countries. The third customs union dummy with a statistically significant dummy is the SACU. However, interestingly, the coefficient is negative, indicating that SACU members have a disadvantage in exports.

References

Anderson, J.E. & E. Van Wincoop (2003), “Gravity with Gravitas: A Solution to the Border Puzzle”, *American Economic Review*, 93(1), 170-192.

Anderson, J.E. (1979), “A theoretical foundation for gravity model”, *American Economic Review*, 69(1), 106-116.

Bergstrand, J.H. (1985), “The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence”, *The Review of Economics and Statistics*, 67(3), 474-481.

Berthelon, M. & C. Freund (2008), “On the conservation of distance in international trade”, *Journal of International Economics*, 75(2), 310-320.

Bougheas, S. et al. (1999), “Infrastructure, transport costs and trade”, *Journal of International Economics*, 47(1), 169-189.

Brei, M. & V. Goetz (2018), “The distance effect in banking and trade”, *Journal of International Money and Trade*, 81, 116-137.

Breuss, F. & P. Egger (99), “How Reliable Are Estimations of East-West Trade Potentials Based on Cross-Section Gravity Analyses?”, *Empirica*, 26(2), 81-94.

Brun, J.-F. et al. (2005), “Has Distance Died? Evidence from a Panel Gravity Model”, *World Bank Economic Review*, 19(1), 99-119.

Cheng, I.-H. & H.J. Wall (2005), “Controlling for Heterogeneity in Gravity Models of Trade and Integration”, *Federal Reserve Bank of St. Louis Review*, 87(1), 49-63.

Disdier, A.C. & K. Head (2008), “The Puzzling Persistence of the Distance Effect on Bilateral Trade”, *Review of Economics and Statistics*, 90(1), 37-48.

Egger, P. (2000), “A note on the proper econometric specification of the gravity equation”, *Economics Letters*, 66(1), 25-31.

Eichengreen, B. & D. Irwin (1998), "The Role of History in Bilateral Trade Flows", in: J. Frankel (ed.), *The Regionalization of the World Economy* (33-62), National Bureau of Economic Research.

Endoh, M. (1999), "The transition of postwar Asia-Pacific trade relations", *Journal of Asian Economics*, 10(4), 571-589.

Felbelmayr, J.G. & W. Kohler (2006), "Exploring the Intensive and Extensive Margins of World Trade", *Review of World Economics*, 142(4), 642-674.

Helpman, E. & P.R. Krugman (1985), *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy*, MIT Press.

Helpman, E. (1987), "Imperfect competition and international trade: Evidence from fourteen industrial countries", *Journal of the Japanese and International Economies*, 1(1), 62-81.

Leamer, E.E. & C.J. Medberry (1993), "U.S. Manufacturing and an Emerging Mexico", *The North American Journal of Economics and Finance*, 4(1), 51-89.

Limao, N. & A.J. Venables (2001), "Infrastructure, geographical disadvantage, transport costs, and trade", *The World Bank Economic Review*, 15(3), 451-479.

Lin, F. & N.C. Sim (2012), "Death of distance and the distance puzzle", *Economics Letters*, 116(2), 225-228.

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

McCallum, J. (1995), "National Borders Matter: Canada-U.S. Regional Trade Patterns", *The American Economic Review*, 85(3), 615-623.

Nitsch, V. (2000), "National Borders and International Trade: Evidence from the European Union", *The Canadian Journal of Economics*, 33(4), 1091-1105.

Pöyhönen, P. (1963), "A tentative model for the volume of trade between countries", *World Economic Archive, 90*, 93-100.

Soloaga, I. & A.L. Wintersb (2001), "Regionalism in the nineties: what effect on trade?", *The North American Journal of Economics and Finance*, 12(1), 1-29.

Tinbergen, J. (1962), "Shaping the World Economy: An Analysis of World Trade Flows", *New York Twentieth Century Fund*, 5(1), 27-30.

Wei, S.J. (1996), "Intra-National versus International Trade: How Stubborn are Nations in Global Integration?", *NBER Working Paper* No. 5531.