Original Research Article

Factors explaining the weakness of intra-regional trade flows in the ECOWAS region

Abstract

With a GDP of over 628 billion dollars and a population of over 350 million, ECOWAS (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Mali, Niger, Nigeria, Senegal and Togo) was set to be one of Africa's most powerful economic blocs. However, at ECOWAS level, intra-community trade is still low, and its share of world trade is around 0.3%. Moreover, intra-community trade, which is estimated at 10% of the region's total trade, is also low compared with other regional blocs. The main objective of this article is to identify the main factors explaining the evolution of trade within ECOWAS. The augmented gravity model is used to show that economic and structural factors have a significant impact on intra-regional trade. Geographic, demographic and institutional factors play a key role in the evolution of intra-regional trade.

***Keywords**: Trade flows, Intra regional, Gravity model, ECOWAS*

***JEL Classification**: F14, F15, C23*

Introduction

Economic integration facilitates the development of trade through specialization in production, prompted by advantages linked to the geographical location and the personal capacity of the countries (Butorina and Borko, 2022; Sani Adamou, 2015). It therefore promotes the diversification of people's consumption. Regional economic integration helps to accelerate growth and development by bringing a host of benefits related to better political cooperation, increased intra-regional trade and job creation. Regions that are more integrated have been shown to be able to grow faster and have shown greater adaptability in times of global economic downturn (Lyes, 2022; Moulaert and Mehmood, 2008, Hugon, 2017).

The Constitution of blocks such as the European Union (UE), the North American Free Trade Agreement (NAFTA), testify to the need for countries to move forward as a group.The opportunities of integration have prompted African Countries to set up integration bodies (entities) to enable their nascent economies survive in the globalization9(Saidane ,2015;Meng,2018),

Therefore, after gaining their independence, African leaders decided to set up integrated regional spaces to transcend the administrative, linguistic or political divisions left by the mode of domination and colonial administration. In West Africa, integration institutions such as the Economic Community of West African States (ECOWAS) and the West African Economic and Monetary Union (UEMOA) were created. As part of the establishment of a common market, ECOWAS introduced a common external tariff (CET) in 2015 with a view to ensuring the free movement of goods and developing intra-community trade. Analysis of regional intra-African trade over the past five years ranks ECOWAS in 4th position (9.4%), behind the East African Community (EAC) (21.3%), Southern African Development Community (SADC) (20.8%), and the Common Market for Eastern and Southern Africa (COMESA) (10.4%). It should be noted that in terms of exports over the period 2015-2019, the locomotives at the regional level are Nigeria, Côte d'Ivoire and Senegal which, on average, provide respectively 29.4%, 23.2 % and 18.2% of total intra-community exports.

Within the framework of the problem of the weakness of healthy trade (2017) shows that if several reasons explain the weakness of intra-regional trade in Africa, the lack of infrastructure occupies a primordial factor in the explanation in this state of affairs. Indeed, Africa suffers from a lack of infrastructure (roads, electricity, railways, ports, airports). West Africa's poor performance in intra-regional trade highlights the absence of industry with strong economic potential, which is the result of low incomes. the explanation for this weak performance can be linked to high trade costs, lack of specialization and a trade based on raw materials and therefore with low added value (Kebalo et al, 2021; Agbahoungba, 2019; Suarez, 2018).

In view of the above, we ask ourselves the following research question: what are the explanatory factors for the weakness of intra-regional trade in ECOWAS? The objective of this paper is to identify the explanatory factors for the weak evolution intra-community trade in ECOWAS. The augmented gravity model is used in data over the period 2001-2019.

For the rest of the paper, we will begin with the literature review, then we present the methodology and finally the results obtained and recommendations.

1. Review of Literature

Intra-regional trade in West Africa has been the subject of numerous empirical studies since the creation of regional economic communities on the continent and the proliferation of free trade areas and customs unions. The researchers have, in fact, highlighted the existence of several explanatory factors for the evolution of trade within ECOWAS.

Luqman et al. (2015) analyze the structure of bilateral trade and the level of openness of ECOWAS through a gravity model using three techniques: Pseudo Poisson maximum likelihood (PPML), Fully Modified Ordinary Least Squares (FMLOS) and Regression Canonical Co-integration (CCR), for the period from 1981 to 2003. Trade openness was negatively significant under PPML, while financial openness was negatively significant under FMOLS and CCR. The contiguity of (common border) and distance have had a strong effect on ECOWAS, while the negative effect of trade flows between ECOWAS members. Alemayehu and Haile (2008) reproduced the gravity model using a Tobit formulation to test the determinants of bilateral trade flows and assess the prospects and challenges of regional integration in the Common Market for Eastern and Southern Africa (COMESA). The results show that the standard variables of the gravity model such as GDP of exporting and partner countries, bilateral distance and contiguity have the expected signs, except for the common language variable. This reinforces the hypothesis that trade between similar countries tends to be higher. However, the coefficient of the regional integration dummy variable is negative and not significant, implying that regional trading blocs in Africa fail to promote intra-regional trade.

Studies have shown variables infrastructures into gravity models to capture their impact on bilateral trade in Africa, particularly given that the continent faces a significant deficit in terms of infrastructure provision, which at in turn acts as an obstacle to the whole process of regional integration. An integration of financial and monetary infrastructures leads to the elimination of foreign exchange costs, the reduction of the cost of capital and the improvement of price accounting and could constitute an important axis for the mobilization of regional resources for the financial of infrastructures.

Deen-Swarray et al. (2011) study the effect of infrastructure development on intra-regional flows of ECOWAS member countries using a modified gravity model and based on both time series and cross-sectional analysis for the period from 1990 to 2008. They developed an index

for different types of infrastructure (road, rail, airport, etc.) to analyze how they individually influence trade.

Deen Swaray et al. (2011) used three estimation methods, namely a pooled model, a fixed effects model and a random effects model. They found that the GDP, language, common currency and distance variables have a significant and expected effect on total trade in ECOWAS, while the infrastructure index variable has a puzzling negative impact on total trade.

Akpan (2014) examines the effect of improving **the quality of regional road infrastructure within ECOWAS** if it were at the level of roads in South Africa. It uses a traditional gravity model that includes variables for adjacency, common language and road quality as well as GDP per capita differences between exporting and partner countries. Akpan (2014) used a Tobit estimate and found that improving road infrastructure leads to an increase in the intra-regional gap between the GDP per capita of exporting countries and that of partner countries compared to the level of 2012, i.e. 5.3%.

Infrastructures tend to be particularly important during the process of structural transformation as developing countries move from primary to secondary and tertiary economic sectors. Thus in the case of Africa, N'Guessan (2010) shows that road transport costs represent respectively 23% and 24% of all transport costs for Mali and Niger. They force companies to keep their stocks of goods with them, thus increasing production. This reduces the competitiveness of companies while limiting the exploitation of opportunities.

Indeed, the reduction **in transaction costs resulting from the integration of financial and monetary infrastructures** is corroborated by empirical results, in particular the study by Diandy (2007) which analyzes the member countries of ECOWAS over the period from 1997 to 2004. This study shows that membership of a monetary union has a decisive influence on bilateral trade. In this case, the fact of belonging to WAEMU multiplied by an environment factor of 3 the value of the average bilateral transactions. Diandy (2007) points out that this result obtained in the context of ECOWAS is in line with the conclusion of the study of Frankel and Rose (2000), established on a world scale, according to which monetary unions on average triple the trade intra-zone.

Sané (2016), in his article analyzes the factors explaining the attractiveness of FDI in the 15 countries of the Economic Community of West African States (ECOWAS), through the estimation of an econometric model panel data over the period 1985-2015. Thus, he finds that the stability of the macroeconomic environment, domestic credit to the private sector,

government consumption expenditure, gross fixed capital formation, market size, index of economic openness and resources are the main factors of attractiveness of international direct investment flows in ECOWAS.

The gravity model has made it possible to describe phenomena such as the movement of populations (migratory flows), the exchange of information, the circulation of capital, the flow of transport, foodstuffs or other types of goods. It has been known since the founding work of Tinbergen (1962) that the size of bilateral trade flows between the two countries can be approximated by a law called the “gravity equation”. Gravity patterns can derive from a range of trade theories. In particular, Bergstrand (1985 and 1989) shows that the gravity model is a direct consequence of a trade model based on monopolistic competition developed by Krugman (1980). Moreover, Krugman (1980), Helpman and Krugman (1985) demonstrated the existence of a positive proportionality relationship between the level of trade and the level of GDP in partner countries.

2. Methodology

The methodology that we intend to use is essentially based on the gravity model, which is a model whose use in international trade is largely justified with solid theoretical foundations.

In its general formulation, the gravity equation has the following multiplicative form:

$$X_{ij} = GS_jM_j\emptyset_{ij}$$

Which Xij is the monetary value of exports from i to j; Mj denotes the set of import-specific factors that make up the importer's total demand (such as the importing country's GDP) and Sj includes the export-specific factors (such as the exporter's GDP) that represent the total amount that exporters are ready to supply. G is a variable that does not depend on i or j such as the level of world liberalization. Finally, φij represents the ease of exporter i to access j's market (ie the inverse bilateral trade costs).

Given that the multiplicative nature of the gravity equation, the standard procedure for estimating a gravity equation is simply to take the natural logarithms of all the variables and obtain a log-linear equation that can be estimated by ordinary least squares regression (much easier than nonlinear estimation methods). We get the estimating equation:

$$lnX_{ij} = lnG + lnS_i + lnM_j + ln\emptyset_{ij}$$

Where more precisely, in the case of the model of Anderson and Van Wincoop: (1)

$$lnX_{ij} = a_0 + a_1 lnY_i + a_2 lnY_j + a_3 lnt_{ij} + a_4 ln\Pi_i + a_5 lnP_j + \varepsilon_{ij} \quad (2)$$

Which is a constant, = 1 - σ and ε is the error term

In practice, the gravity equation relates to the natural logarithm of the monetary value of trade between the two countries in the log of their respective GDP, a composite measure of tariff barriers and incentives to trade between them, and the measurement terms trade barriers. between each of them and the rest of the world.

In this research, our model connects countries with very similar levels of development and belonging to the same trading bloc, namely ECOWAS. The standard gravity model can be supplemented with additional variables and dummy variables to examine the effects of other factors on bilateral trade flows (Augier et al, 2003).

As part of our work, we intend to use an augmented gravity model to integrate as many variables as possible to better identify the explanatory factors of the evolution of intra-regional trade within ECOWAS.

$$lntrade = \alpha_0 + \alpha_1 \ln(dist_{ij}) + \alpha_2 \ln(Y) + \alpha_3 \ln(E) + \alpha_4 \ln(df_i) + \alpha_5 \ln(df_j) + \alpha_6 \ln(pop_i) + \alpha_7 \ln(pop_j) + \alpha_8(cl_{ij}) + \alpha_9(cf_{ij}) + \alpha_{10}(col_{ij}) + \alpha_{11}(acr_{ij}) + \alpha_{12}(Ldlk_i) + \alpha_{13}(Ldlk_j) + \alpha_{14}(stpol_i) + \alpha_{15}(stpol_j) + \alpha_{16}(tariff_i) + \alpha_{17}(tariff_j) \quad (3)$$

The estimation method is that the Pseudo Poisson Maximum Likelihood in Panel (PPML).

Table 1: Definition of the variables

	Wording of the Variable
Country i	ISO code of the Importing Country (country member of ECOWAS)
Country j	ISO code of the Exporting Country.
Year	Flow Year
Trade	Import in value (in US dollars). Ln trade import is the dependent variable, country import from country in current value (US dollars). The choice of imports to explain the volume is justified by the fact that according to WTO (2016), the volume of trade can be explained either by imports, or by exports, or by total trade. In addition, imports are preferred to exports or total trade, as they are generally reported more accurately, due to the duties and taxes to be collected (Career, 2004)
Distance (Dist ij)	Geographical distance between the economic capitals of the importing country and the exporting country. It was measured for each pair of countries, as being the distance between the two capitals. The greater the distance between importing country i and exporting country j, the more transport costs tend to increase, thus reducing the volume of trade. It is therefore expected to have a negative sign (Berthelon and Fruend, 2008). Its expected sign is positive.
Commlanguage (cl ij)	Common official language (Dichotomous variable, take 1 if the language is common to both countries, 0 otherwise). Countries that share favorably the same language of trade.

Collink (Col ij)	Colonial link (Dichotomous variable, take 1 if the two countries have a common colonial past, 0 otherwise). Countries that share the same colonial characteristics trade favorably.
sea access_i (Ldlk i)	Access of the importing country to the sea (Dichotomous variable, take 1 if the importing country has access to the sea, 0 otherwise). Countries with sea frontages have trade facilities.
sea_access_i (Ldlk j)	Access of the exporting country to the sea (Dichotomous variable, take 1 if the exporting country has access to the sea, 0 otherwise). Countries with sea frontages have trade facilities.
gdp_i (Y)	GDP per Inhabitant of the importing country. A positive sign is expected, because the more the inhabitants have a high purchasing power, the more their exchanges are important.
gdp_j (E)	GDP per Inhabitant of the exporting country. The economic weight of the country has a significant impact on its trade.
population_i (pop i)	Population size of the importing country. The greater the population is, the more the States import goods, which increases the volume of trade. Population is therefore positively correlated with trade volume. Its expected sign is positive.
population (popj)	Population size of the exporting country. The greater the population, the more the States export goods, which increases the volume of trade. Population is therefore positively correlated with trade volume. Its expected sign is positive.
stability_i (st pol i)	Political stability index of the importing country. The stability of the importing country has a significant impact on the volume of trade
stability_j (st pol j)	Political stability index of the exporting country. The stability of the exporting country has a significant impact on the volume of trade.
Tariff i	Customs tariffs of the importing country. Tariff barriers have a significant impact on trade transactions of the importing country.
tariff_j	Customs tariffs of the exporting country. Tariff barriers have a significant impact on trade transactions in the exporting country.

Ecowas (acr ij)	Membership of ECOWAS (Dichotomous variable, take 1 if the importing country and the exporting country both belong to ECOWAS, 0 otherwise). Belonging to the same RCA tends to increase the volume of trade between the two countries.

The data collected comes from the UN Comtrade and World Development Indicators databases. Due to the unavailability of data for some countries in the region and their low trade weight, only data for 10 countries could be collected for the time horizon of 2001-2019.

3. Results and Discussion

3.1. Descriptive analysis of exchanges within ECOWAS

As Figure 1 (in the appendix) shows, imports in all ECOWAS countries experienced an increasing trend over the entire period. Nigeria dominates the share of imports in the community area. Even though overall imports are growing, we can observe remarkable dips for some countries in some years. In particular, in 2009, imports experienced a remarkable drop compared to the previous year, in Togo, Senegal, Nigeria and Niger.

Following Nigeria, come Côte d'Ivoire, Ghana and Senegal in the ranking of the largest ECOWAS importing countries (see Figure 2). It should also be noted that in 2016 (see figure 2), imports fell remarkably in certain countries of the region, notably Togo, Senegal, Niger, Mali, Guinea, Ghana and Côte d'Ivoire.

Exploratory analyzes reveal that all ECOWAS imports of goods represent more than 560 million US dollars between 2001 and 2019. On average these imports amount to 211,097 US dollars per year for the entire region and should we note that Nigeria, Côte d'Ivoire and Ghana have respectively as annual average imports of goods, 1017545, 274132 and 236634, import averages higher than the overall average . It should also be noted that disparities are observed in these three countries where the standard deviations are higher than the means: imports experience large fluctuations in these countries.

3.2. Analysis of explanatory factors of intra-regional trade in the ECOWAS region.

The estimation method is that of Pseudo Poisson Maximum Likelihood in panel (PPML panel).

Table 2: Summary Table of the significance or not of the variables

	Positive factor	Negative factor
significant	GDP importing country; GDP exporting country;	Distance; Common language;

	Financial development importing country; Exporting country financial development; Population size of the importing and exporting country; Common border ; Common colonial past; exporting coastal country.	Regional agreements (ECOWAS membership); Importing coastal country; Political stability of the exporting country.
Non-significant	Political stability of the importing country; customs tariff of the importing country and the exporting country.	

More specific,

Ln dist: the natural logarithm of the distance between the capitals of the countries has a negative and significant coefficient, which would lead us to say that the distance has a negative effect on trade between ECOWAS countries

Ln Y: the natural logarithm of the GDP of the ECOWAS countries has a positive and significant coefficient, which leads us to say that the GDP of the ECOWAS countries has a positive impact on the imports of these countries.

Ln E: the natural logarithm of the GDP of the partner countries has a positive and significant coefficient, which means that the GDP of the ECOWAS partner countries has a positive impact on trade (imports).

cl ij: binary variable which translates the fact that two countries, exporters and importers, have in common or not the official language. The coefficient of this variable being negative and significant, we can deduce that the fact that countries share the same language does not favor their exchanges.

col ij: binary variable reflecting the fact that two countries have a common colonial past showed by its positive and significant coefficient that the colonial relationship between ECOWAS countries and their settlers has a positive impact on imports.

Ln df i and ln df j: these variables respectively represent the level of financial development of ECOWAS countries and that of partner countries. In both cases, the variables have positive and

significant coefficients following the estimations. The more the level of financial development increases, the more imports grow.

Ln pop i and ln pop j: variables measuring the evolution of the population of countries have positive values. The more the population grows, the more the demand increases and therefore the imports too.

cf ij: this variable reflects the sharing of a common border between each ECOWAS country and its trading partner. Estimates show that sharing a common border has a positive impact on imports from the region.

Conclusion

The problem of this research is the weakness of intra-community trade in the Economic Community of West African States (ECOWAS). From 1960, many African countries gained their independence but remained largely fragile politically and economically. The West African States which are generally part of this dynamic will quickly perceive the strategic need to regroup within the sub-regional organization that is ECOWAS.

The Main objective is to examine the explanatory factors of the dynamics of intra-regional trade within ECOWAS. We have identified the factors affecting regional trade flows in this regional integration space, using the augmented gravity model.

We have shown in this article, through descriptive statistics and model estimates that imports in all ECOWAS countries have experienced an increasing evolution over the entire period 2001 - 2019. Nigeria dominates the share of imports in the community area are from Ivory Coast, Ghana and Senegal in the ranking of the largest importers countries of ECOWAS.

By making the estimates, we have shown that the distance between the capitals of the countries has a negative effect on trade between ECOWAS countries. The GDP of ECOWAS countries has a positive impact on the imports of these countries. The GDP of ECOWAS partner countries has a positive impact on imports. The fact that countries share the same language does not favor their exchanges. The colonial relationship between ECOWAS countries and their settlers has a positive impact on imports. The more the level of financial development increases, the more imports increase. The same relationship holds between population size and demand for imported products. Estimates show that sharing a common border has a positive impact on imports from the region.

These results lead us to formulate the following recommendations, addressed to the authorities of the integration structures of the sub-region:

- Accelerate the rationalization process of all ECOWAS entities, a reform necessary for the implementation of real RECs in West Africa. Indeed, multi-membership, by providing financial resources, strongly handicaps the implementation of the reforms necessary for the development of trade.

- Encourage Member States to implement the reforms necessary for a transition to an effective customs union, then to a real common market that ensures the mobility of factors. Furthermore, it will be necessary to invest in infrastructural capital through the promotion of major integrating projects and to build better institutions capable of compelling governments to apply community decisions;

- States must develop relevant economic policies to promote a high level of development for all member countries.

- Encourage the authorities to ensure compliance with the countries' commitments within the framework of the liberalization of intra-regional trade;

- Encourage the authorities to develop regional production and processing plants in order to reduce dependence on imports;

- Encourage the authorities to support modernization programs and the development of the fabric of SMEs in the region.

- Encourage authorities to promote the development of the local value chain.

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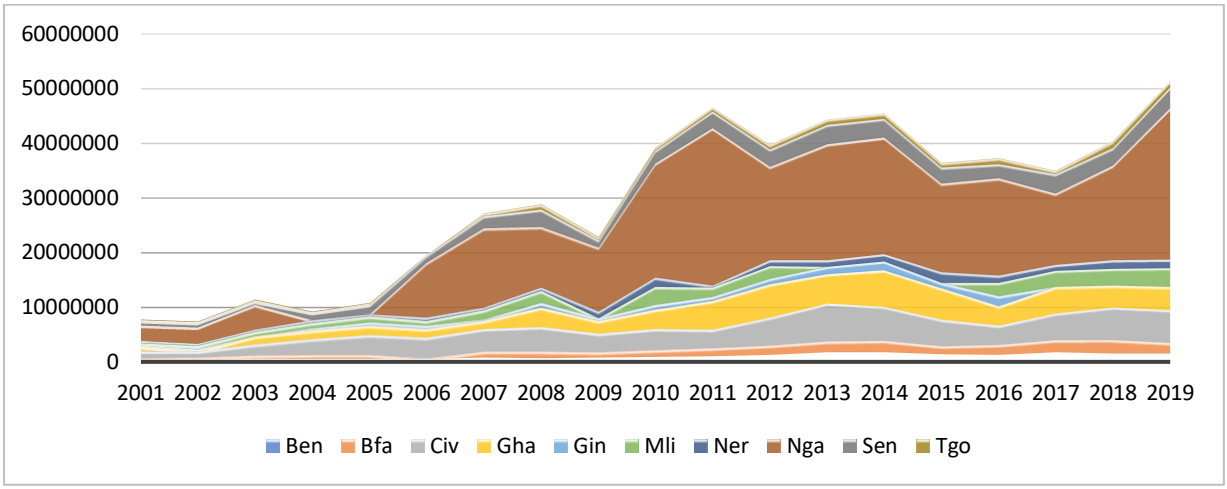
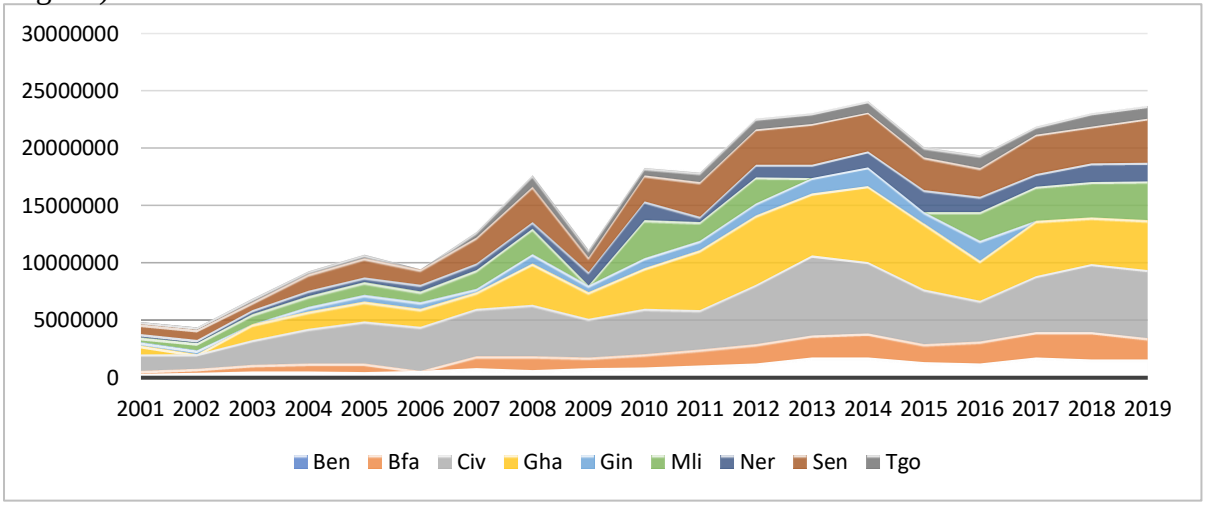
APPENDICES

Figure 1: Evolution of the flow of imports (in US dollars) in ECOWAS countries from 2001 to 2019



Source : UN Comtrade, World Development Indicators, Calculs de l'auteur

Figure 2 : Evolution of the flow of imports (in US dollars) in ECOWAS countries (excluding Nigeria) from 2001 to 2019



Source : UN Comtrade, World Development Indicators, Calculs de l'auteur

Table 3: Results on trade factors within ECOWAS

Ln trade	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
Ln dist	-0,095***	0,011	-8,700	0,000	-0,116	-0,073

Ln Y	0,068***	0,014	4,790	0,000	0,040	0,096
Ln E	0,042***	0,007	6,030	0,000	0,028	0,055
Ln df i	0,009**	0,004	2,180	0,029	0,001	0,017
Ln df j	0,010**	0,005	1,960	0,050	0,000	0,021
Ln pop i	0,059***	0,009	6,350	0,000	0,041	0,077
Ln pop j	0,054***	0,006	8,620	0,000	0,042	0,067
cl ij	-0,055***	0,014	-3,980	0,000	-0,082	-0,028
cf ij	0,103***	0,016	6,580	0,000	0,073	0,134
col ij	0,151***	0,015	10,320	0,000	0,123	0,180
acr ij	-0,177***	0,025	-7,120	0,000	-0,225	-0,128
Ldlk i	-0,047***	0,012	-3,820	0,000	-0,071	-0,023
Ldlk j	0,378***	0,017	22,480	0,000	0,345	0,411
st pol i	0,010	0,006	1,600	0,109	-0,002	0,022
st pol j	-0,030***	0,008	-3,640	0,000	-0,046	-0,014
tariff i	0,003	0,002	1,490	0,136	-0,001	0,008
tariff j	0,001	0,002	0,690	0,489	-0,002	0,004
_cons	-0,150	0,180	-0,830	0,404	-0,503	0,202

Note: *** significance at the 1% threshold, ** significance at the 5% threshold, * significance at the 10% threshold

The interpretation of the coefficients α of the variables is done by the following calculation:

$$\beta = (\exp \alpha - 1) * 100$$

	Coef.	**B**
Ln dist	-0,095	-9,022
Ln Y	0,068	7,051
Ln E	0,042	4,248
Ln df_i	0,009	0,911
Ln df j	0,010	1,042
Ln pop i	0,059	6,069
Ln pop j	0,054	5,572
cl ij	-0,055	-5,372
cf ij	0,103	10,901
col ij	0,151	16,344

acr ij	-0,177	-16,197
Ldlk i	-0,047	-4,570
Ldlk j	0,378	45,886
St pol i	0,010	0,977
st pol j	-0,030	-2,961
tariff i	0,003	0,349
tariff j	0,001	0,115
cons	-0,150	-13,945

Source : Authors' calculations

Table 4. Interpretation of the coefficients α of the variables