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The Impact of Geopolitical Risk on Portuguese Exports

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Abstract: This investigation evaluates the performance of Portuguese exports by focusing on the 11 main partners for 1990–2021, considering panel data. Country risk analysis has been frequently used to assess the determinants of international trade in recent years. Empirical studies demonstrate that country risk can affect bilateral relationships between economies, especially in economies with greater geopolitical risk. Next, we refer to the methodology used in this research. In this context, we assessed the stationarity of the variables used in this study. Subsequently, models were used to eliminate bias and endogeneity between the variables. The panel quantile regression model allows us to understand the behaviour of variables across different quartiles. The empirical study shows that countries with low country risk promote the performance of Portuguese exports. On the other hand, the size of the economies, both the exporting country (Portugal) and the importing countries (commercial partners), is decisive for increasing Portuguese exports. This finding can be explained as a monopolistic competition with the economy's scale and industrial concentration serving as theoretical support. As noted with previous studies on the gravity model, the common language of Portuguese-speaking countries reduces communication costs and increases Portuguese exports. Furthermore, the econometric model also validates the issue of geographical distance, where this variable has a negative impact on exports, demonstrating that geographical proximity reduces transport costs.

Keywords: geopolitical risk; Portugal exports; panel data

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1. Introduction

For several decades, the gravity model was used to explain international trade and investment flows. However, with the emergence of some models of monopolistic competition and the introduction of transport costs and trade (e.g., Helpman and Krugman 1985; Helpman 1987; Hummels and Levinsohn 1995), it gains theoretical foundations from microeconomics to explain international trade. In this context, Paas et al. (2008), Baier and Standaert (2020), and Chen and Novy (2022) demonstrate that new international trade theories explain the gravity model.

The theoretical and empirical models (e.g., Anderson 1979; Anderson and van Wincoop 2003) demonstrate the relevance of geographical proximity and cultural and linguistic factors to explain international trade performance between two countries (origin and destination). Then, location factors, such as the economic size of the exporting and importing countries, are determinants of the gravity model. Furthermore, geographical distance and border costs make it possible to assess the extent to which trade flows between the country of origin and destination can benefit from reduced transport and communication costs.

Another relevant issue to explain the gravity model is to understand to what extent the common language and cultural affinities make it possible to explain the gravity model and the reduction in communication costs. Leitão (2023), Ginsburgh and Weber (2020), and Grin (2003) analysed the economy of language and concluded that the common language stimulates international trade and investment flows.

The empirical studies of Fernandes and Forte (2022), Pacheco and Matos (2022), Balogh and Leitão (2019), Ramaswamy et al. (2021), and Rajesh (2018) demonstrate that a common language reduces transaction and communication costs by promoting international trade between two countries.

The insecurity and instability of countries, measured as a function of country risk, and its impacts on international trade have been evaluated by several studies, such as Anderson and Marcouiller (2002), Moser et al. (2008), Gupta et al. (2019), Wang et al. (2021), and Shi et al. (2022). Economic theory argues that countries with lower country risk stimulate bilateral trade and consequently reduce trade costs. The study by Anderson and Marcouiller (2002) also analysed the impact of corruption and lack of transparency on bilateral trade, demonstrating that these variables reduce trade flows between partners.

There are some scientific studies published on the gravity model applied to the Portuguese economy (e.g., Pacheco and Matos 2022; Fernandes and Forte 2022; Macedo et al. 2019; Gouveia et al. 2018; Gouveia et al. 2017; Proença et al. 2008), most of which are sectoral studies, such as wines produced in the Portuguese economy, which are essential for analysis of international economics.

This research focuses on the main partners of the Portuguese economy, namely 11 countries highlighted by the National Statistics Institute (INE) of the Portuguese economy, as the most relevant for the performance of Portuguese exports. The econometric study was applied to the period of 1990–2021 using recent and robust methodologies that eliminate the bias and multicollinearity of the applied gravity model. This study contributes to the literature on the gravity model since this research uses classic variables, such as geographical distance, or the dummy variable for the common language, comparing different econometric techniques, which solve the endogeneity between the variables and that are usually invariant over time. In this context, we use OLS- ordinary least square, random effects estimator, Pseudo-Poisson Maximum Likelihood estimator (PPML), and the panel quantile regression (PQR) as methods to solve these problems. Furthermore, the article presents a review of the recent literature of empirical studies performed on the Portuguese economy and other countries that used the gravity equation, allowing the hypotheses formulated under investigation to be substantiated.

Studies on international trade in the Portuguese economy use the classic variables of the gravity model, such as cultural and geographical distance and the size of economies. It is observed that the country risk variable has not yet been used frequently in empirical studies on the experience of the Portuguese economy, which is another contribution of this study.

Next, we present the research questions: (i) To what extent can reducing country risk help stimulate export performance? (ii) Does the common language reduce communication costs, thus promoting bilateral trade? (iii) To what extent do the economic dimensions of the exporting and importing countries promotes trade flows in the countries under analysis? (iv) To what extent does geographical distance allows transport costs to be reduced between the Portuguese economy and the 11 countries considered in the sample?

The study evaluates the performance of Portuguese exports using the size of the economies, cultural affinities via Portuguese-speaking countries, the issue of geographical proximity, and country risk using trading partners with different types of development.

Then, in Section 2, the literature review appears, seeking to highlight the gravity model's importance in its various research areas. Section 3 presents the methodology, information about the sample data and the theoretical hypotheses to be tested in the empirical study. The econometric results and their interpretation are found in Section 4, and finally, conclusions and some recommendations for economic policymakers are presented in Section 5.

2. Literature Review

In this section, we address the assumptions of the gravity model, considering the market size characteristics (supply and demand), the common language, geographical

distance, and country risk. The choice of these explanatory variables is related to the fact that we are considering sample countries with different types of economic development, as measured by economic dimension. In addition, the countries selected present differences in types of country risk, importance of transaction costs (geographical distance versus geographical proximity), and common language associated with reduced communication costs, as mentioned in the previous section. Nevertheless, there are empirical studies that use other strategies and select dummy variables to consider the impact of trade agreements or common currency on international trade (e.g., Paz et al. 2023; Balogh and Aguiar 2022; Fernandes and Forte 2022).

As a rule, studies on the gravity model state that the assumptions of the gravity model date back to Isard and Peck (1954), who introduced the arguments of Newton's laws to international trade.

It appears that the literature uses the gravity model to explain not only international trade but also foreign direct investment (e.g., Leitão 2023; Dorakh 2020), migratory flows (e.g., Khan et al. 2023), and tourist demand (e.g., Gouveia et al. 2017; Tavares and Leitão 2017).

Several authors, such as Tinbergen (1962), Pöyhönen (1963), and Linnemann (1966), sought to substantiate the theoretical bases of the gravity model based on arguments from international trade and microeconomic foundations. Thus, the authors introduced the principles of supply via exports and demand via the income of importing countries. This relationship was evaluated in terms of the countries' size, i.e., the exporting country's gross domestic product and the importing country's gross domestic product. More recently, models of monopolistic competition through economies of scale and price differentiation have provided new theoretical contributions to the gravity model (e.g., Krugman 1979, 1980; Lancaster 1980). In this line, Leitão et al. (2010) and Yoshida et al. (2009) evaluated intra-industry trade or two-way trade based on the arguments of the gravity model.

Then, as a rule, the size of economies (gross domestic product) is positively correlated with trade flows, demonstrating that economies must be of a specific size for exchanges between trading partners. A common language, former colonies, or a border promotes trade flows, thus reducing transport and transaction costs, and a positive impact of these variables on bilateral trade flows is expected. Regarding the geographical distance variable, a negative effect on trade flows is expected. Thus, the closer the trading partners are, the greater the probability of an increase in trade exchanges.

Moreover, the economy of language (Leitão 2023; Ginsburgh and Weber 2020; Grin 2003) allows us to complement the assumptions of the gravity model. According to these studies, the common language and common surrounding spaces make it possible to reduce trade, transport, and communication costs.

Next, we present a selection of studies applied to the Portuguese economy and others that illustrate the importance of the gravity model. The criterion used was the publication of studies in scientific articles. Thus, for the Portuguese economy, we highlight the studies by Pacheco and Matos (2022), Fernandes and Forte (2022), Macedo et al. (2019), Gouveia et al. (2018), Gouveia et al. (2017), and Proença et al. (2008).

Testing the performance of exports and their relationship with diplomacy, the empirical study of Pacheco and Matos (2022) considered an econometric methodology OLS and random effects from 2008 to 2017. The econometric results generally showed that economic size, common language, and diplomacy positively correlate with Portuguese exports, indicating that these variables stimulate competitiveness and decrease transaction costs. Moreover, geographical distance aims to reduce transport costs. This variable negatively affects Portuguese exports, reflecting that closer partners promote international trade.

Regarding Portuguese export performance, Fernandes and Forte's (2022) research applied a gravity equation for 2008–2018 using an OLS estimator. The authors used cultural, historical proximity, and affinities as explanatory variables and geographical and economic dimensions. The empirical results showed that economic dimension, geographical distance, common language, and trade agreements are the main determinants of Portuguese exports.

The empirical study of Macedo et al. (2019) evaluates the effect of exports on Portuguese wine for the period from 2006 to 2016. Considering the results with OLS, random effects, fixed effects, and the Hausman and Taylor estimator presented in the appendix section of their paper (Macedo et al. 2019, p. 18), they showed that economic size measured by income per capita positively impacts Portuguese wine. The variables of tariffs and geographical distance present a negative effect on exports. The common language is positively correlated with exports, revealing that the Portuguese language is crucial to decreasing transport and communication costs. The actual exchange rate positively affects exports only with fixed effects. In this line, Gouveia et al. (2018) studied the gravity model applied to port wine exports between Portugal and 20 partners using the Hausman and Taylor estimator. The results showed that income per capita influenced the port wine export, and geographical distance, common language, and Portuguese emigration community promote the Portuguese wine exports. These results are in accordance with gravity assumptions.

From a different view, i.e., applying the gravity model to tourism demand based on a passenger's cruises of Douro River, Gouveia et al. (2017) used OLS, fixed effects, and random effects estimators, and the econometric results found that income per capita, geographical distance, and population are the expected signs and discussed in the literature review of the gravity model.

Considering the pseudo-Poisson maximum likelihood (PPML) model and the determinants of trade potential, the empirical work of Proença et al. (2008) demonstrated that the population of exporters and importers and the income per capita of exporters and importers are positively correlated with trade. Furthermore, the variable of geographical distance showed, as noted in the previous studies, that geographical proximity promotes bilateral trade.

A meta-analysis on the gravity model demonstrated that it has been used over the decades by economists in different countries and continents. The studies we presented above demonstrate why we decided to emphasise the roles of supply (per capita income of the exporter), demand (per capita income of the importer), the common language, and geographical distance on Portuguese export performance. However, some studies use imports as a dependent variable, such as the study by Paz et al. (2023), which applied this to the agriculture, textile, and manufacturing sectors. The article discusses the arguments of the gravity model following Santos Silva and Tenreyro's (2006) warnings regarding the use of the fixed effects estimator when time-invariant variables in logarithmic form are used. Thus, the estimations in the article by Paz et al. (2023) are obtained through the pseudo-Poisson maximum likelihood (PPML) model and demonstrate that the dummy variable for member countries of the World Trade Organization has a positive impact on new member countries. As shown throughout this section, Paz et al. (2023) also state that geographical distance, trade agreements, and a common language are the main determinants of the gravity model.

Several articles about the gravity model, such as those by Moser et al. (2008), Gupta et al. (2019), Wang et al. (2021), and Shi et al. (2022), studied the impact of country risk on trade flows. The literature on international economics states that the country's risk of an economy can affect the flows of international trade and investment, particularly if this economy has a high country risk. Thus, it can be seen that country risk assesses the stability of a country in economic, financial, and political terms (Moser et al. 2008).

More recent studies, such as those by Sun et al. (2022), Hassan (2022), Goswami and Panthamit (2022), and Wang et al. (2021), demonstrate that country risk affects international trade and international investment. However, the studies above show that reducing country risk makes it possible to decrease trade or investment costs and consequently promote the exports or foreign direct investment performance.

Studies typically use the ICR (International Country Risk Guide) composite index to assess the country's geopolitical risk. In this context, the study by Wang et al. (2021) considers country risk for China and its partners. Using random effects estimators, the authors demonstrate that reducing country risk promotes bilateral trade. As noted in the

studies mentioned previously, Wang et al. (2021) show that the economic dimension and the common language stimulate international trade, and the geographical distance reduces transport costs.

The empirical study by Hassan (2022) using cointegrated panel data for four Visegrad countries demonstrates that the country risk composite decreases FDI inflows when political risk presents a positive sign on FDI inflows.

The relationship between political risk and agricultural trade was studied by Sun et al. (2022). The authors show a positive association between country risk and trade, demonstrating instability with trade partners.

The study by Gupta et al. (2019) considered fixed effects, random effects, the Hausam-Taylor estimator, and the PPML estimator, and they found that international trade negatively impacts risk. In addition, geographical distance aims to decrease the transport costs. The variables of economic dimensions (exporter gross domestic product and importer gross domestic product) and trade agreements are positively correlated with international trade, showing that these stimulate the bilateral trade flows.

The cobalt trade was investigated by Shi et al. (2022), who considered exports and imports. The variables of political and economic risk are negatively correlated with imports. The results of the equation of exports showed that political risk is negatively associated with exports.

Moser et al. (2008) investigated Germany's experience using a random effects estimator, and they concluded that when political risk decreases, exports increase. The other variables usually considered in the gravity model, such as economic dimension and geographical distance, exhibited the expected signs as discussed in previous studies.

Below, we present a list of recent empirical studies that generally validate the gravity model's assumptions. Of studies listed in Table 1, it is observed that the majority of authors use the pseudo-Poisson maximum likelihood (PPML) estimator, and these articles justify the use of this model based on the arguments presented by Santos Silva and Tenreyro (2006).

Table 1. Gravity studies selection.

Studies	Period	Methodology	Results
Ramaswamy et al. (2021)	2007–2014	OLS and PPML estimator	The gravity equation is valid in Asian countries.
Shahriar et al. (2021)	1989–2015	PPML estimator and Heckman models	The gravity equation is valid for Bangladesh's experience.
Masood et al. (2023)	2000–2019	PPML estimator	The gravity equation is valid for OIC countries' experience.
Ayuda et al. (2020)	1848–1938	PPML estimator	The World Wine Gravity equation is partially valid.
Abdullah et al. (2021)	1995–2019	SFA estimator	The gravity equation is partially valid.
Balogh and Aguiar (2022)	1995–2019	PPML estimator	The Latin American and Caribbean agricultural trade gravity model is valid.
Abbas and Bhutto (2022)	2003–2019	Panel data	The Pakistan gravity model is valid.
Li et al. (2020)	2000–2018	OLS and Fixed Effects	The gravity equation is valid for BRI countries' experience.
Rajesh (2018)	2001–2013	Pooled OLS estimator	The gravity equation is valid for the recession in India's trade.
Dadakas et al. (2020)	2002–2016	PPML estimator	The gravity model is valid for UAE countries.
Balogh and Leitão (2019)	1996–2017	PPML estimator	The gravity model is valid for ACP countries.
Proença et al. (2017)	2007–2011	PPML estimator	Zimbabwe's gravity model is partially valid.

Notes: Our composition considers the literature review.

3. Econometric Strategy and Data

Regarding the assumptions of the gravity model and the literature review presented previously, we applied the gravity model to Portuguese international trade for the 11 main partners, namely Germany, Angola, Brazil, China, Spain, the United States of America, France, Italy, Japan, Netherlands, and the United Kingdom, for the period between 1990 and 2021. The sample considers the effects of country risks, cultural and linguistic affinities, and different levels of development of countries on the performance of Portuguese exports. Regarding econometric methodology, the OLS estimator is compared with the random

effects estimator (RE), and pseudo-Poisson maximum likelihood (PPML) estimator. The panel quantile regressions (PQR) are also used in this research.

Static panel data are analysed using three estimators: ordinary least squares method (OLS), fixed effects (FE), and random effects (RE). The Hausman test allows us to compare random effects versus fixed effects. As a rule, empirical studies use random effects (RE) since there are time-invariant variables, such as geographical distance, or dummy variables, such as trade agreements, common language, or common currency. Using these independent variables in the fixed effects estimator demonstrates that the coefficients for these variables are omitted, which does not allow the Hausman test to be applied. In this context, the studies by Gupta et al. (2019), Wang et al. (2021), and Moser et al. (2008) use the random effects estimator (RE) since some variables, such as geographical distance and common language, are constant through the fixed effects estimator.

As referred to by Santos Silva and Tenreyro (2006), Egger and Staub (2016), and Santos Silva and Tenreyro (2022), when using the gravity model, the PPML estimator and GLM (generalised linear models, e.g., Gaussian and gamma pseudo maximum likelihood) are more suitable than the OLS estimator and fixed effects.

Using the panel quantile regression (PQR) proposed by Koenker and Bassett (1978) makes it possible to evaluate the heterogeneity between the variables used in the regressions and the results for different quantiles.

As analysed in the literature review, some gravity model studies use dummy variables, such as trade agreements or the common currency, to assess their impact on bilateral trade. Given the specificity of the sample, it was decided to use location factors, such as geographical distance and country risk, and just one dummy variable for the common language (Portuguese-speaking countries) to understand the impact of Portuguese-speaking countries on export performance.

According to the literature review (Pacheco and Matos 2022; Fernandes and Forte 2022; Abbas and Bhutto 2022; Wang et al. 2021; Balogh and Leitão 2019; Gupta et al. 2019), we formulated the following model:

$$LogX_{it} = \alpha_0 + \alpha_1 LogINC_{it} + \alpha_2 LogINC_{Kit} + \alpha_3 Language_{it} + \alpha_4 LogDIST_{it} + \alpha_5 LogRISK_{it} + \mu_{it} \quad (1)$$

The dependent variable is Portuguese Exports (X_{it}) in millions of euros, and the following explanatory variables are used in the equation:

α_1—Portuguese income per capita (INC_{it}).

α_2—Partner's income per capita ($INCk_{it}$).

α_3—Common language (language, dummy variable 1—ex-colonies of Portugal that speak Portuguese, and 0—the other countries, i.e., Portuguese is not the mother language).

α_4—Geographical distance (*LogDIST*).

α_5—Country risk (*LogRISK*).

The error or random residual is represented by μ_{it}. The variables are defined by logarithm form, except the dummy variable (Language). The estimates that we present in the empirical results section use robust standard errors.

Next, we present the hypotheses to be tested in the empirical study. These were formulated considering the literature review presented in the previous section.

H_1: *The size of countries stimulates trade between two trading partners.*

According to empirical studies (Balogh and Aguiar 2022; Eshetu and Goshu 2021; Fernandes and Forte 2022), the relationship between the gravity model and international trade usually refers to a positive effect of economic dimension ($LogINC_{it}$, $LogINCK_{it}$) and exports: $\alpha 1 > 0$, $\alpha 2 > 0$. These variables are collected from World Bank Development Indicators in US dollars.

H_2: *Linguistic and cultural factors encourage bilateral trade and reduce communication costs.*

Then, the common language promotes bilateral trade, i.e., the reductions of communication cots: $\alpha 3 > 0$. The empirical studies of Paz et al. (2023), Abbas and Bhutto (2022), and Balogh and Leitão (2019) support this hypothesis.

H_3: *Geographical proximity reduces transport and internationalisation costs*.

The geographical distance (*LogDIST*) is negatively associated with trade $\alpha 4 < 0$. The variable measures the relationship between Lisbon and the capital of the trading partner. Based on the literature (Pacheco and Matos 2022; Macedo et al. 2019; Gouveia et al. 2018), this result allows us to infer that there is geographical proximity. Following the works of Leitão (2023), Fernandes and Forte (2022), Abdullah et al. (2021), and Gouveia et al. (2018), we used the CEPII (*Centre d'etudes prospectives et d'informations internationale*) database for the variables of geographical distance (*DIST)* and common language (Language). The various studies mentioned used the CEPII database because it presents value in bilateral terms.

H_4: *Reducing country risk increases the probability of more trade occurring at less cost*.

The variable of country risk (*LogRISK*) comprises political, financial, and economic risks. The variable was collected from the International Country Risk Guide (ICRG) database. Thus, countries without country risk assume the value of 1 or 100. Countries with greater risk take values of 0 and 49.9 (0; 0.49).

According to the literature review, risk control or reduction reduces trade costs, promoting bilateral international trade. Thus, according to Hassan (2022), Sun et al. (2022), Shi et al. (2022), Goswami and Panthamit (2022), Wang et al. (2021), Moser et al. (2008), and Gupta et al. (2019), a negative association is expected between the country's risk and Portuguese exports: $\alpha 5 < 0$.

Following the studies mentioned, we introduced the country risk of countries that import Portuguese exports into the equation to understand whether controlling country risk promotes the performance of Portuguese exports.

Table 2 shows the variables used in this investigation, the statistical sources, and the expected signs based on the literature review.

Table 2. Details of variables.

Dependent Variable	**Explanation**		**Source**
$LogX_{it}$	Monetary values of exports		INE [a] (2023)
Explanatory Variables	Explanation	Expected Signs	Source
LogINC	Portuguese GDP per capita	+	World Bank (2023)
$LogINC_K$	GDP per capita of partners	+	World Bank (2023)
Language	Portuguese language	+	CEPII [b] (2023)
LogGDIST	Geographical Distance	−	CEPII [b] (2023)
LogRISK	Country Risk	−	ICRG [c] (2023)

Notes: [a] INE—National Institute of Statistics, a Portuguese organisation that compiles and disseminates statistical information about the Portuguese economy (2023). [b] Centre for prospective studies and international information, French research organisation (2023). [c] *ICRG*—International Country Risk Guide produced by PRS group (2023).

4. Empirical Results

In this section, we present the econometric results for the performance of Portuguese exports with the 11 main partners (Germany, Angola, Brazil, China, Spain, the United States of America, France, Italy, Japan, Netherlands, and the United Kingdom) for the period between 1990 and 2021.

We begin the analysis with the general statistics for the equation formulated, followed by the unit root and multicollinearity tests to validate whether the variables under study present problems in their properties. The OLS estimator, the random effects (RE), the pseudo-Poisson maximum likelihood (PPML) estimator, and panel quantile regressions

(PQR) with robust standard errors were used to evaluate the determinants of Portuguese export performance. These results can be compared with the gamma pseudo maximum likelihood model shown in Appendix A Table A1.

In Figure 1, it is possible to observe Portuguese exports to the 11 main partners used in the sample in logarithmic form.

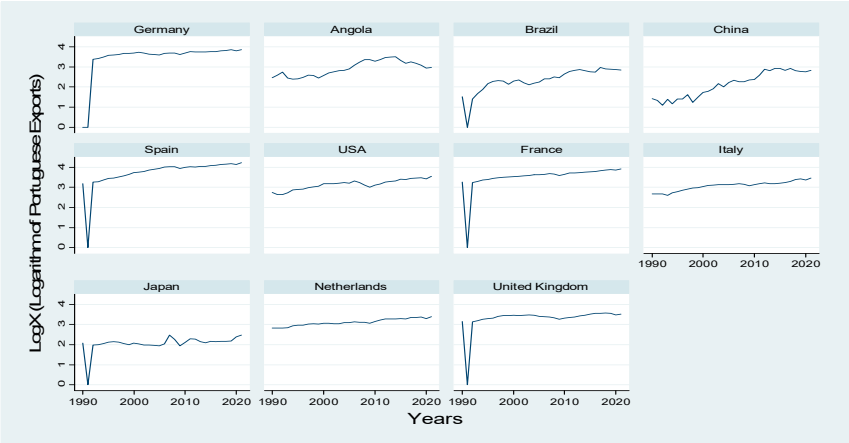

Figure 1. Portuguese exports to 11 main partners in logarithm form. Source: Own composition from INE (international trade database).

At the beginning of the 1990s, it was seen that Portuguese exports, namely with Brazil, Spain, Japan and the United Kingdom, showed lower values when compared to other partners, as can be seen in Figure 1. However, in the mid-1990s, they gained dynamism, demonstrating the importance of these partners in our sample.

As can be observed, Germany, Spain, the USA, France, the Netherlands and the United Kingdom are the partners that stand out the most in terms of Portuguese exports.

Table 3 shows the values obtained for the descriptive statistics. Thus, the income of importing countries ($LogINC_k$), the income of the Portuguese economy (*LogINC*), and Portuguese exports (*LogX*) are the variables that present the highest maximum values. The variables of export ($LogX_{it}$), income (Portuguese and Trade partners), geographical distance (*LogDIST*), and country risk *(LogRISK*) present negative values for Skew.

Table 3. General statistics.

Variables	Mean	Median	St. Dev.	Min.	Max.	Skewness	Kurtosis	Obs.
$LogX_{it}$	3.0335	3.179	0.649	1.097	4.231	−0.699	2.991	352
LogINC	4.211	4.279	0.153	3.897	4.397	−0.436	1.709	352
$LogINC_K$	4.217	4.445	0.563	2.401	4.845	−1.468	4.174	352
LogDIST	3.489	3.277	0.412	2.698	4.048	−0.215	1.961	352
Language	0.182	0.000	0.386	0.000	1.000	1.650	3.722	352
LogRISK	−0.154	−0.104	0.137	−0.515	0.000	−0.959	2.657	352

The unit root tests (e.g., Maddala and Wu 1999; Phillips and Moon 1999) are described in Table 4. Using only the Levin et al. (2002) test, it is observed that all variables are stationary except country risk (*LogRISK*). However, we cannot validate stationarity for the remaining tests (Im et al. 2003, ADF—Fischer Chi-square and PP—Fisher Chi-square). For this reason, tests were carried out on first differences, where it is observed that the variables in studies are integrated with first differences.

Table 4. Panel unit root test.

Variables	Levin, Lin & Chu	Im, P. Shin	ADF	PP
LogX	−3.625 *** (0.000)	−0.842 (0.199)	25.849 (0.258)	19.970 (0.585)
LogINC	−2.449 *** (0.007)	0.351 (0.637)	12.836 (0.937)	21.334 (0.507)
$LogINC_K$	−1.698 * (0.045)	0.311 (0.622)	17.539 (0.733)	16.634 (0.783)
LogRISK	−0432 (0.333)	−0.937 (0.174)	29.0134 (0.145)	21.406 (0.496)
First Differences: Variables				
DLogX	−9.880 *** (0.000)	−10.104 *** (0.000)	136.465 *** (0.000)	201.902 *** (0.000)
DLogINC	−14.569 *** (0.000)	−13.286 *** (0.000)	185.306 *** (0.000)	165.851 *** (0.000)
DLogINCk	−8.167 *** (0.000)	−8.948 *** (0.000)	118.749 *** (0.000)	145.335 *** (0.000)
DLogRISK	3.234 (0.999)	−5.487 *** (0.000)	77.321 *** (0.000)	101.958 *** (0.000)

The unit root tests applied are Levin, Lin and Chu t-stat. Im, P. Shin- Im, Pesaran and Shin W-stat; ADF–ADF–Fisher Chi-square; and PP–PP–Fisher Chi-square. The probabilistic value (*p*-values) is significant at 1% (***), and the probabilistic value (*p*-value) is statistically significant at 10% level (*).

The variance inflation factor (VIF) multicollinearity tests are considered in Table 5. As can be seen, the multicollinearity values are low when looking at the Mean VIF test described in Table 5.

Table 5. Multicollinearity test.

Variables	VIF	1/VIF
LogINC	1.62	0.62
$LogINC_K$	3.61	0.28
Language	2.69	0.37
LogDIST	1.27	0.79
LogRISK	4.67	0.214
Mean VIF	2.77	

In Table 6, we can observe the estimates considering the arguments of the gravity model using the OLS estimator and random effects estimator. All explanatory variables introduced in the equation are statistically significant regarding OLS, random effects, and pseudo-Poisson maximum likelihood (PPML) estimator. The quality of adjustment (Adj.R^2) is high in all estimators. The Hausman test in Table 6 compares the random effects estimator versus the fixed effects. To make this executable, the geographical distance variable (*LogDIST*) was excluded, as this is invariant over time. In addition, the common language dummy variable (*Language*) was excluded. As can be seen, when this procedure is carried out, the results are similar between the estimators.

Table 6. Country risk and Portuguese exports performance with OLS, RE and PPML estimator.

Variables	OLS	Random Effects (RE)	PPML Estimator
LogINC	0.924 *** (0.000)	0.321 *** (0.000)	0.260 *** (0.000)
$LogINC_K$	0.434 *** (0.000)	0.949 *** (0.000)	0.1995 *** (0.000)
Language	0.233 *** (0.000)	0.594 ** (0.047)	0.127 *** (0.000)
LogDIST	−1.159 *** (0.000)	−1.025 *** (0.000)	−0.378 *** (0.000)
LogRISK	−0.693 *** (0.000)	−0.911 *** (0.000)	−0.268 *** (0.007)
Constant	1.209 ** (0.013)	1.004 (0.286)	0.4108 ** (0.017)
Adj. R^2	0.778	0.802	0.752
Obs	352	352	352
Hausman test: Chi^2 (4)=	0.10 (0.998)		

The probabilistic value (*p*-value) is statistically significance at the 1% level (***); the probabilistic value (*p*-value) is statistically significant at the 5% level (**).

The variables of economic dimension (Portuguese income per capita—*LogINC* and Trade partner income per capita—$LogINC_K$) positively affect Portuguese export performance. This result showed that economic size is essential to promote Portuguese compet-

itiveness. The previous studies of Proença et al. (2008), Pacheco and Matos (2022), and Fernandes and Forte (2022) also found a positive impact on Portuguese exports.

The common language (speaking Portuguese countries, namely, Angola and Brazil) promotes international trade. This result showed that common language aims to decrease communication costs. The studies of language economics, such as those by Ginsburgh and Weber (2020) and Grin (2003), support our results. The empirical studies of Gouveia et al. (2017) and Macedo et al. (2019) applied to the Portuguese economy also found a positive impact of this variable on exports.

The variable of geographical distance (*LogDIST*) is according to the hypothesis formulated, i.e., geographical proximity decreases transport costs and stimulates international trade. The empirical studies of Paz et al. (2023), Pacheco and Matos (2022), Fernandes and Forte (2022), Macedo et al. (2019), Gouveia et al. (2018), and Proença et al. (2008) also found the same results.

The country risk (*LogRISK*) showed a reduction of country costs at 1%, promoting the performance of the Portuguese export in (0.693%) and (0.911%) with OLS and the random effect estimator, respectively. Previous studies by Shi et al. (2022), Wang et al. (2021), Hassan (2022), and Goswami and Panthamit (2022) also found similar results.

The PPML estimator (pseudo-Poisson maximum likelihood) demonstrates that all independent variables (economic dimension—*LogINC*; *LogINCk*, *Language*; geographical distance—*LogDIST*, and country risk *LogRISK*) have statistical significance at 1%.

As we previously noted and according to Santos Silva and Tenreyro (2006), Egger and Staub (2016), and Santos Silva and Tenreyro (2022), this estimator allows us to resolve the bias and endogeneity between the variables used in the gravity model. The results in the table above can be compared with the generalised linear models, including GLM (gamma pseudo maximum likelihood), presented in Appendix A Table A1.

We introduced panel quantile regressions (PQR) to the gravity model as noted Huseyni et al. (2019) and Leitão (2023). This estimator makes it possible to identify the heterogeneity between the quantiles of the variables in studies presented in Table 7.

Table 7. Country risk and Portuguese exports performance with panel quantile regression.

Variables	(tau = 0.10)	(tau = 0.20)	(tau = 0.25)	Median (0.50)	(tau = 0.75)	(tau = 0.90)	(tau = 0.99)
LogINC	1.104 ***	1.009 ***	0.971 ***	1.140 ***	0.711 ***	0.618 ***	0.122
$LogINC_K$	0.393 **	0.356 ***	0.333 ***	0.239 ***	0.682 ***	0.647 ***	0.564 ***
Language	0.214 **	0.300 ***	0.319 ***	0.354 ***	0.520 ***	0.468 ***	0.397 ***
LogDIST	−1.316 ***	−1.329 ***	−1.316 ***	−1.268 ***	−0.877 ***	−0.779 ***	−0.809 ***
LogRISK	−0.477 *	−0.273	−0.350	−0.206	−0.592 *	−0.534 *	−0.382 *
C	0.825	1.531 **	1.795 **	1.505 *	0.305	0.621	3.347 ***
Pseudo R^2	0.636	0.604	0.596	0.500	0.498	0.530	0.548
Obs	352	352	352	352	352	352	352

The probabilistic value (*p*-value) is statistically significance at the 1% level (***), the probabilistic value (*p*-value) is statistically significant at the 5% level (**), and the probabilistic value (*p*-value) is statistically significant at 10% level (*).

The variable of the economic dimension of Portugal (*LogINC*) and trading partners ($LogINC_k$) have positive signs in the literature. The studies by Ramaswamy et al. (2021), Shahriar et al. (2021), Masood et al. (2023), Balogh and Aguiar (2022), and Eshetu and Goshu (2021) also find a positive impact of the economic dimension on export performance. As seen in Table 7, the size of the markets, which evaluate supply and demand, demonstrates that economies of scale are essential to improve the performance of Portuguese exports.

The common language (*Language*) has a positive effect on exports, demonstrating that the language makes it possible to reduce asymmetries between trading partners by reducing communication costs. Previous studies by Balogh and Aguiar (2022), Abbas and Bhutto (2022), and Balogh and Leitão (2019) support our results.

Regarding geographical distance (*LogDIST*), geographical proximity is essential to explain Portuguese export performance. The result is in line with the empirical studies

by Abbas and Bhutto (2022), Balogh and Leitão (2019), Li et al. (2020), Rajesh (2018), and Dadakas et al. (2020), validating once again that geographical proximity promotes the reduction of trade and transport costs. The monopolistic competition models (e.g., Krugman 1979; Krugman 1980; Lancaster 1980; Chen and Novy 2022) argue that geographical proximity allows the creation of preferred zones known as the internal (single) market, where there is a reduction of costs trade and transport costs.

The country risk variable (*LogRISK*) finds statistical significance at 10% for the (tau = 0.10), (tau = 0.75), (tau = 0.90), and (tau = 0.99) quartiles. As noted in the studies by Moser et al. (2008), Wang et al. (2021), Hassan (2022), Goswami and Panthamit (2022), and Shi et al. (2022), we observe that the reduction of the partner country risk stimulates Portuguese exports. The results demonstrate that economies with lower risks have low trade costs, helping to promote competitiveness between countries. These results have theoretical support in monopolistic competition models with increasing returns to scale and where product differentiation occurs via economies of scale and industrial concentration.

Figure 2 demonstrates the estimates for the panel quantile regression (PQR). Each figure presents the confidence points for estimates of the coefficients.

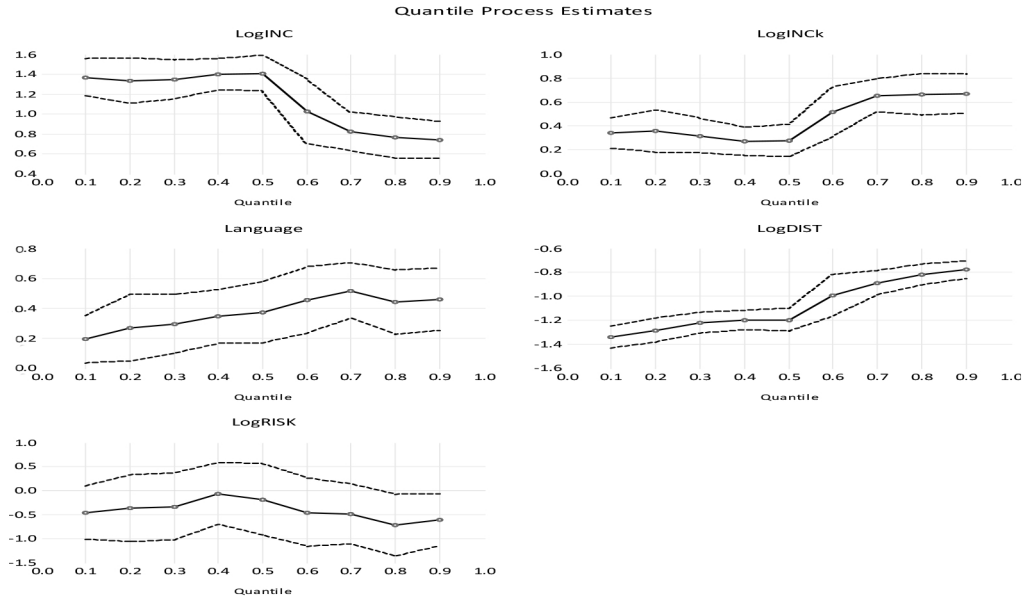

Figure 2. The quantile estimates by each variable.

Figure 2 can be complemented with Table 8, which presents the values for each coefficient between the 10% and 90% quantiles.

Table 8. Country risk and Portuguese exports performance with quantile processes estimates.

	Quantile	Coefficient	Std. Error	*t*-Statistic	*p*-Value
C	0.10	0.825	0.613	1.346	(0.179)
	0.20	1.531 **	0.725	2.113	(0.035)
	0.30	1.647 **	0.737	2.235	(0.026)
	0.40	1.362 *	0.787	1.730	(0.085)
	0.50	1.505 *	0.800	1.881	(0.061)
	0.60	0.980	0.810	1.209	(0.228)
	0.70	0.271	0.562	0.483	(0.629)
	0.80	0.137	0.506	0.270	(0.786)
	0.90	0.622	0.501	1.241	(0.215)

Table 8. *Cont.*

	Quantile	Coefficient	Std. Error	*t*-Statistic	*p*-Value
LogINC	0.10	1.104 ***	0.211	5.233	(0.000)
	0.20	1.009 ***	0.218	4.6298	(0.000)
	0.30	1.040 ***	0.181	5.729	(0.000)
	0.40	1.112 ***	0.173	6.448	(0.000)
	0.50	1.140 ***	0.176	6.492	(0.000)
	0.60	0.818 ***	0.211	3.879	(0.000)
	0.70	0.753 ***	0.1619	4.650	(0.000)
	0.80	0.734 ***	0.154	4.753	(0.000)
	0.90	0.618 ***	0.154	4.012	(0.000)
$LogINC_k$	0.10	0.393 ***	0.071	5.571	(0.000)
	0.20	0.356 ***	0.085	4.170	(0.000)
	0.30	0.292 ***	0.073	4.007	(0.000)
	0.40	0.275 ***	0.059	4.623	(0.000)
	0.50	0.240 ***	0.065	3.673	(0.000)
	0.60	0.510 ***	0.124	4.113	(0.000)
	0.70	0.658 ***	0.072	9.123	(0.000)
	0.80	0.663 ***	0.090	7.384	(0.000)
	0.90	0.647 ***	0.096	6.7510	(0.000)
Language	0.10	0.214 **	0.083	2.579	(0.010)
	0.20	0.300 ***	0.099	3.013	(0.003)
	0.30	0.326 ***	0.111	2.937	(0.004)
	0.40	0.354 ***	0.099	3.546	(0.000)
	0.50	0.355 ***	0.099	3.562	(0.000)
	0.60	0.402 ***	0.136	2.962	(0.003)
	0.70	0.514 ***	0.096	5.333	(0.000)
	0.80	0.435 ***	0.112	3.888	(0.000)
	0.90	0.468 ***	0.118	3.956	(0.000)
LogDIST	0.10	−1.316 ***	0.045	−29.129	(0.000)
	0.20	−1.330 ***	0.047	−28.528	(0.000)
	0.30	−1.289 ***	0.049	−26.486	(0.000)
	0.40	−1.259 ***	0.052	−24.033	(0.000)
	0.50	−1.268 ***	0.058	−21.670	(0.000)
	0.60	−1.019 ***	0.1053	−9.6738	(0.000)
	0.70	−0.893 ***	0.055	−16.124	(0.000)
	0.80	−0.826 ***	0.047	−17.672	(0.000)
	0.90	−0.779 ***	0.041	−18.908	(0.000)
LogRISK	0.10	−0.477 *	0.276	−1.727	(0.085)
	0.20	−0.273	0.312	−0.876	(0.382)
	0.30	−0.218	0.318	−0.685	(0.494)
	0.40	−0.274	0.326	−0.841	(0.401)
	0.50	−0.206	0.343	−0.601	(0.548)
	0.60	−0.528	0.4108	−1.287	(0.199)
	0.70	−0.555 *	0.335	−1.655	(0.098)
	0.80	−0.727 **	0.341	−2.132	(0.033)
	0.90	−0.534 *	0.306	−1.745	(0.082)

The probabilistic value (*p*-value) is statistically significance at the 1% level (***); the probabilistic value (*p*-value) is statistically significant at the 5% level (**), and the probabilistic value (*p*-value) is statistically significant at 10% level (*).

The results shown in Table 8 demonstrate the size of economies and the common language's role in promoting exports. The literature on international economics shows from neoclassical theories (Heckscher-Ohlin) that the size of economies is essential to explain the specialisation of economies. Therefore, the new theories of international trade in monopolistic competition and price differentiation explain that economies with similar relative factor endowments and similar cultural factors, such as common language, stimulate bilateral trade between trading partners. Furthermore, geographical distance allows us to conclude that geographic proximity reduces transaction costs across the various quartiles. As previously mentioned, previous studies carried out on the Portuguese economy by Pacheco and Matos (2022), Macedo et al. (2019), and Gouveia et al. (2018) validate the results found. The theoretical models of Krugman (1979, 1980) and Lancaster (1980) present arguments associated with horizontal differentiation, where international trade is encouraged by economies of scale, industrial concentration, and geographical proximity. On the other hand, speaking

the same language, in this case, Portuguese, makes it possible to reduce trade barriers with particular emphasis on reducing communication costs. Studies on the economy of language and its impacts on international trade and international investment, such as Leitão (2023), Ginsburgh and Weber (2020), and Grin (2003), support the results found.

Regarding political risk, only the 70th, 80th, and 90th quartiles validate the hypothesis that reducing political risk allows export performance to be promoted. However, based on the analysis of the PQR estimator, there are signs that prove the tendency for country risk to decrease. As previously stated in this research, recent studies by Sun et al. (2022), Hassan (2022), and Wang et al. (2021) support our results, demonstrating that reducing the instability of the economies used in this research contributes to stimulating the performance of Portuguese exports.

In the next section, we present the conclusions, implications for economic policy, and some perspectives for future work.

5. Conclusions

This research evaluated the performance of exports applied to the 11 main trade partners of the Portuguese economy. As in previous studies, we assess the determinants of exports based on the OLS, the random effects (RE), the pseudo-Poisson maximum likelihood estimator (PPML), and panel quantile regressions (PQR). As referred to in the methodology section and following the arguments of Santos Silva and Tenreyro (2006), Egger and Staub (2016), and Santos Silva and Tenreyro (2022), it is desirable to use the estimators above when there are time-invariant variables and logarithmic variables, instead of the fixed effects estimator.

In terms of empirical studies on the performance of Portuguese exports, we revisit the studies by Pacheco and Matos (2022), Fernandes and Forte (2022), Macedo et al. (2019), Gouveia et al. (2018), Gouveia et al. (2017), and Proença et al. (2008). The econometric results show the same trend across the different estimators used. However, our study introduces the country risk variable into the equation, which has not been used in the Portuguese experience.

The variables used to assess the size of the market (Portuguese per capita income—*LogINC* and trade partner income per capita—$LogINC_K$) demonstrate that the dimension economies of scale are essential to promote export performance. The result obtained through the various estimators is reported in studies by Proença et al. (2008), Pacheco and Matos (2022), and Fernandes and Forte (2022). The study by Baier and Standaert (2020) evaluates the importance of the gravity model in the context of monopolistic competition, both from a theoretical and empirical point of view. From an empirical point of view, the authors also compared the gravity model with different estimation techniques. In this context, we observe that the size of economies is essential to differentiate products and to gain competitiveness.

The variable common language (*Language*) demonstrates that the introduction of Portuguese-speaking countries into the equation allows communication costs to be reduced. This result is confirmed by the most diverse studies that use gravity model hypotheses, such as Balogh and Aguiar (2022), Abbas and Bhutto (2022), and Balogh and Leitão (2019). This result is also supported by studies on the economy of language (Ginsburgh and Weber 2020; Grin 2003). The result demonstrates that the common language is a factor of convergence between countries, which makes it possible to reduce cultural and linguistic asymmetries between economies that speak the same language.

Geographical distance (*LogDIST*) had a negative value in the literature (e.g., Abbas and Bhutto 2022; Balogh and Leitão 2019; Li et al. 2020; Rajesh 2018; Dadakas et al. 2020), demonstrating that geographical proximity promotes Portuguese bilateral trade. This variable has been used frequently in empirical studies on the gravity model, as it allows us to understand how geographical proximity explains the reduction in transport and logistics costs. Similar results are observed in this study.

Regarding the country risk variable assessed through different estimators (OLS, RE, PPML, and PQR), it improves Portuguese exports, demonstrating that risk reduction stimulates export performance. The studies by Moser et al. (2008), Wang et al. (2021), and Shi et al. (2022) also find a negative relationship between country risk and international trade. The result found in our empirical study allows us to validate the research hypothesis formulated, demonstrating that the lower the political risk, the greater the probability of reducing the risk of trade costs and consequently stimulating bilateral trade between the exporting and importing countries.

The results found allow us to advance some implications for economic policy. The economies of scale in the exporting and importing countries make it possible to stimulate the performance of Portuguese exports. The common language and Portuguese-speaking countries allow for reductions in transaction and transaction costs (Leitão 2023). In turn, geographical proximity reduces transport costs, helping to stimulate Portuguese exports. Also, geopolitical risk demonstrated that trade partners with low country risk boost exports. Thus, the Portuguese economy should continue to promote cooperation agreements with Portuguese-speaking countries and invest in countries with low country risk, namely countries with lower political, economic, and social instability, to gain competitiveness.

Considering future work, evaluating the impact of the economic complexity index and economic diplomacy on total and intra-industry trade will be interesting. In the Portuguese economy, several studies assess intra-industry trade, or two-way trade, via the gravity model, such as studies by Leitão et al. (2010), Faustino and Leitão (2011), and Leitão and Faustino (2013). However, having a perspective from more recent years would be interesting. In this context, the characteristics of monopolistic competition, such as price differentiation, economies of scale, and industrial concentration, make it possible to explain intra-industry trade.

Furthermore, it is essential to note that, like any research work, this article has some limitations. However, the country risk indicator addresses the stability versus instability of countries. Therefore, some variables, such as the corruption index, transparency, and democratisation, were not introduced into the equation. Thus, in future research, these variables should be considered. In addition, other countries, such as EU-27 and BRICS countries, and other explanatory variables, such as trade agreements and the common currency, should be considered.

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Appendix A

Table A1. Country risk and Portuguese exports performance with GLM estimator.

Variables	Gamma
LogINC	0.878 *** (0.000)
$LogINC_K$	0.525 *** (0.000)
Language	0.181 *** (0.000)
LogDIST	−1.259 *** (0.000)
LogRISK	−1.261 *** (0.000)
Constant	1.294 ** (0.011)
AIC	0.778
Obs	352

The probabilistic value (*p*-value) is statistically significance at 1% level (***), and the probabilistic value (*p*-value) is statistically significant at 5% level (**). Note: All independent variables present the expected signs, and they validate the hypotheses formulated.

References

Abbas, Shujaat, and Sindhu Bhutto. 2022. Macroeconomic determinants and potential markets for Pakistani textile-clothing and apparel industries: Evidence from gravity model analysis. *The Journal of The Textile Institute*, 1–11. [CrossRef]

Abdullah, Nazir Muhammad, Olufemi Adewale Aluko, and Xuexi Huo. 2021. Determinants, Efficiency and Potential of Agri-Food Exports from Nigeria to the EU: Evidence from the Stochastic Frontier Gravity Model. *Agricultural Economics–Czech* 67: 337–49. [CrossRef]

Anderson, James, E. 1979. A Theoretical Foundation for the Gravity Equation. *American Economic Review* 69: 106–16.

Anderson, James E., and Douglas Marcouiller. 2002. Insecurity and the Pattern of Trade: An Empirical Investigation. *Review of Economics and Statistics* 84: 342–52. [CrossRef]

Anderson, James E., and Eric van Wincoop. 2003. Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review* 93: 170–92. [CrossRef]

Ayuda, María-Isabel, Hugo Ferrer-Pérez, and Vicente Pinilla. 2020. Explaining World Wine Exports in the First Wave of Globalization, 1848–938. *Journal of Wine Economics* 15: 263–83. [CrossRef]

Baier, Scoot, and Samuel Standaert. 2020. Gravity Models and Empirical Trade. In *Oxford Research Encyclopedia of Economics and Finance*. Oxford: Oxford University Press. [CrossRef]

Balogh, Jeremiás Máté, and Giovanna Maria Borges Aguiar. 2022. Determinants of Latin American and the Caribbean agricultural Trade: A Gravity Model Approach. *Agricultural Economics–Czech* 4: 127–36. [CrossRef]

Balogh, Jeremiás Máté, and Nuno Carlos Leitão. 2019. A Gravity Approach of Agriculture Trade: The Nexus of EU and African, Caribbean and Pacific Countries. *Agricultural Economics-Czech* 65: 509–19. [CrossRef]

CEPII (Centre d'Etudes Prospectives et d´Informations Internationales). 2023. Dataset for the Variables of Geographical Distance, and Common Language. Available online: http://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele.asp (accessed on 30 August 2023).

Chen, Natalie, and Dennis Novy. 2022. Gravity and Heterogeneous Trade Cost Elasticities. *The Economic Journal* 132: 1349–77. [CrossRef]

Dadakas, Dimitrios, Salim Ghazvini Kor, and Scott Fargher. 2020. Examining the Trade Potential of the UAE using a Gravity model and a Poisson Pseudo Maximum Likelihood Estimator. *The Journal of International Trade & Economic Development* 29: 619–46.

Dorakh, Alena. 2020. A Gravity Model Analysis of FDI across EU Member States. *Journal of Economic Integration* 35: 426–56. [CrossRef]

Egger, Peter, H., and Kevin E. Staub. 2016. GLM Estimation of Trade Gravity Models with Fixed Effects. *Empirical Economics* 50: 137–75. [CrossRef]

Eshetu, Fassil, and Degye Goshu. 2021. Determinants of Ethiopian Coffee Exports to Its Major Trade Partners: A Dynamic Gravity Model Approach. *Foreign Trade Review* 56: 185–96. [CrossRef]

Faustino, Horácio C., and Nuno Carlos Leitão. 2011. Fragmentation in the Automobile Industry: Evidence from Portugal. *Journal of Economic Studies* 38: 287–300. [CrossRef]

Fernandes, Ana, and Rosa Forte. 2022. The Impact of Economic Diplomacy on Exports: The Portuguese Case. *International Journal* 77: 216–47. [CrossRef]

Ginsburgh, Victor, and Shlomo Weber. 2020. The Economics of Language. *Journal of Economic Literature* 58: 348–404. [CrossRef]

Goswami, Gour Gobinda, and Nisit Panthamit. 2022. Does Political Risk Matter for China's Trade with ASEAN and MENA Countries? A Belt Road Initiative Perspective. *The Chinese Economy* 55: 188–207. [CrossRef]

Gouveia, Sofia, João Rebelo, and Lina Lourenço-Gomes. 2018. Port Wine Exports: A Gravity Model Approach. *International Journal of Wine Business Research* 30: 218–42. [CrossRef]

Gouveia, Sofia, João Rebelo, Lina Lourenço-Gomes, and Alexandre Guedes. 2017. International Demand for the Douro (Portugal) River Cruises: A Gravity Model Approach. *Tourism Economics* 23: 1679–86.

Grin, François. 2003. Language Planning and Economics. *Current Issues in Language Planning* 4: 1–66. [CrossRef]

Gupta, Rangan, Giray Gozgor, Huseyin Kaya, and Ender Demir. 2019. Effects of Geopolitical Risks on Trade Flows: Evidence from the Gravity Model. *Eurasian Economic Review* 9: 515–30. [CrossRef]

Hassan, Adewale Samuel. 2022. Does Country Risk Influence Foreign Direct Investment Inflows? A Case of the Visegrád Four. *Economies* 10: 221. [CrossRef]

Helpman, Elhanam. 1987. Imperfect competition and international trade: Opening remarks. *European Economic Review* 31: 77–81. [CrossRef]

Helpman, Elhanam, and Paul Krugman. 1985. *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy*. Cambridge: MIT Press.

Hummels, David, and James Levinsohn. 1995. Monopolistic Competition and International Trade: Reconsidering the Evidence. *Quarterly Journal of Economics* 110: 799–836. [CrossRef]

Huseyni, Ibrahim, Ali Kemal Çelik, and Miraç Eren. 2019. Application of Panel Quantile Regression and Gravity Models in Exploring the Determinants of Turkish Automotive Export Industry. In *Understanding the Role of Business Analytics*. Edited by Hardeep Chahal, Jeevan Jyoti and Jochen Wirtz. Singapore: Springer, pp. 31–44.

ICRG (International Country Risk Guide). 2023. Available online: https://www.prsgroup.com/explore-our-products/icrg/ (accessed on 29 September 2023).

Im, Kyung So, M. Hashem Pesaran, and Yongcheol Shin. 2003. Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics* 115: 53–74. [CrossRef]

INE (National Institute of Statistics of the Portuguese Economy). 2023. Statistics on International Trade in Goods and by Main Trading Partners in Millions of Euros. Available online: http://www.pordata.pt (accessed on 29 September 2023).
Isard, Walter, and Merton J. Peck. 1954. Location Theory and International and Interregional Trade Theory. *The Quarterly Journal of Economics* 68: 97–114. [CrossRef]
Khan, Mohammad Azeem, Zeenat Fatima, and Sumbul Fatima. 2023. Revisiting the Gravity Model of Migration. *Foreign Trade Review* 58: 329–49. [CrossRef]
Koenker, Roger, and Gilbert Bassett, Jr. 1978. Regression Quantiles. *Econometrica* 46: 33–50. [CrossRef]
Krugman, Paul R. 1979. Increasing Returns, Monopolistic Competition, and International Trade. *Journal of International Economics* 9: 469–79. [CrossRef]
Krugman, Paul. 1980. Scale Economies, Product Differentiation and the Pattern of Trade. *American Economic Review* 70: 950–59.
Lancaster, Kelvin. 1980. Intra-Industry Trade under Perfect Monopolistic Competition. *Journal of International Economics* 10: 151–75. [CrossRef]
Leitão, Nuno Carlos. 2023. A Gravity Model Analysis of Portuguese Foreign Direct Investment. *Economies* 11: 237. [CrossRef]
Leitão, Nuno Carlos, and Horácio C. Faustino. 2013. Intra-industry trade in the medical and optical instruments industry: A panel data analysis. *Economic Research- Ekonomska Istrazivanja* 26: 129–40. [CrossRef]
Leitão, Nuno Carlos, Horácio C. Faustino, and Yushi Yoshida. 2010. Fragmentation, Vertical Intra-Industry Trade, and Automobile components. *Economics Bulletin* 30: 1006–15.
Levin, Andrew, Chien-Fu Lin, and Chia-Shang James Chu. 2002. Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics* 108: 1–24. [CrossRef]
Li, Enkang, Mengqiu Lu, and Yu Chen. 2020. Analysis of China's Importance in "Belt and Road Initiative" Trade Based on a Gravity Model. *Sustainability* 12: 6808. [CrossRef]
Linnemann, Hans. 1966. *An Econometric Study of International Trade Flows*. Amsterdam: North Holland Publishing Co.
Macedo, Anthony, Sofia Gouveia, and João Rebelo. 2019. Horizontal Differentiation and Determinants of Wine Exports: Evidence from Portugal. *Journal of Wine Economics* 15: 163–80. [CrossRef]
Maddala, G. S., and Shaowen Wu. 1999. A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics* 61: 631–52. [CrossRef]
Masood, Shah, Nabila Khurshid, Maqsood Haider, Jamila Khurshid, and Arif Masih Khokhar. 2023. Trade Potential of Pakistan with the South Asian Countries: A Gravity Model Approach. *Asia Pacific Management Review* 28: 45–51. [CrossRef]
Moser, Christoph, Thorsten Nestmann, and Michael Wedow. 2008. Political Risk and Export Promotion: Evidence from Germany. *The World Economy*, 781–803. [CrossRef]
Paas, Tiiu, Egle Tafenau, and Nancy J. Scannell. 2008. Gravity Equation Analysis in the Context of International Trade: Model Specification Implications in the Case of the European Union. *Eastern European Economics* 46: 92–113. [CrossRef]
Pacheco, Luís Miguel, and André Pereira Matos. 2022. Foreign Presence and Export Performance: The Role of Portuguese Commercial Diplomacy. *The International Trade Journal* 36: 147–69. [CrossRef]
Paz, Loureço S., Magnus dos Reis, and André Filipe Zago de Azevedo. 2023. New Evidence on WTO Membership After the Uruguay Round: An Analysis at the Sectoral Level. *Open Economies Review*. [CrossRef]
Phillips, Peter C. B., and Hyungsik R. Moon. 1999. Linear Regression Limit Theory for Nonstationary Panel Data. *Econometrica* 67: 1057–11. [CrossRef]
Pöyhönen, Pentti. 1963. A Tentative Model for the Volume of Trade between Countries. *Weltwirtschaftliches Archiv* 90: 93–100.
Proença, Isabel, Enrique Martínez-Galán, and Maria Paula Fontoura. 2017. Trade Potential Revisited: A Panel Data Analysis for Zimbabwe. *Applied Econometrics and International Development* 17: 113–30.
Proença, Isabel, Maria Paula Fontoura, and Enrique Martínez-Galán. 2008. Trade in the Enlarged European Union: A New Approach on Trade Potential. *Portuguese Economic Journal* 7: 205–24. [CrossRef]
Rajesh, Raj. 2018. Assessing the Impact of Great Recession on India's Trade in Gravity Model Framework. *Foreign Trade Review* 53: 239–70. [CrossRef]
Ramaswamy, Sunder, Abishek Choutagunta, and Santosh Kumar Sahu. 2021. Evaluating Asian Free Trade Agreements: What Does Gravity Model Tell Us? *Foreign Trade Review* 56: 60–70. [CrossRef]
Santos Silva, J. M. C., and Silvana Tenreyro. 2006. The Log of Gravity. *Review of Economics and Statistics* 88: 641–58. [CrossRef]
Santos Silva, J. M. C., and Silvana Tenreyro. 2022. The log of gravity at 15. *Portuguese Economic Journal* 21: 423–37. [CrossRef]
Shahriar, Saleh, Sokvibol Kea, Nazir Muhammad Abdullahi, Redwanur Rahman, and Rajib Moshfequl Islam. 2021. Determinants of Bangladesh's Leather Exports to Its Major Trade Partners: A Panel Gravity Model Approach. *Global Business Review*, 1–22. [CrossRef]
Shi, Shuaiwei, Qingru Sun, Zenglei Xi, Meiyi Hou, and Jiaoyun Guo. 2022. The Impact of Country Risks on the Dependence Patterns of International Cobalt Trade: A Network Analysis Method. *Frontiers in Energy Research* 10: 951235. [CrossRef]
Sun, Qingru, Meiyi Hou, Shuaiwei Shi, Liwei Cui, and Zenglei Xi. 2022. The Influence of Country Risks on the International Agricultural Trade Patterns Based on Network Analysis and Panel Data Method. *Agriculture* 12: 361. [CrossRef]
Tavares, Jean Max, and Nuno Carlos Leitão. 2017. The Determinants of International Tourism Demand for Brazil. *Tourism Economics* 23: 834–45. [CrossRef]
Tinbergen, Jan. 1962. *Shaping the World Economy; Suggestions for an International Economic Policy*. New York: Twentieth Century Fund.

Wang, Zhengwen, Yunxiao Zong, Yuwan Dan, and Shi-Jie Jiang. 2021. Country Risk and International Trade: Evidence from the China-B&R countries. *Applied Economics Letters* 28: 1784–88.
World Bank Indicators. 2023. Available online: https://data.worldbank.org/indicator (accessed on 30 August 2023).
Yoshida, Yushi, Nuno Carlos Leitão, and Horácio Faustino. 2009. Vertical Intra-Industry Trade and Foreign Direct Investment between Japan and European Countries. *Atlantic Economic Journal* 37: 351–65. [CrossRef]

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