Gravity guide for modeling trade exports from Egypt to Mercosur countries

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ABSTRACT

This article discusses the use of gravity models to model trade exports from Egypt to Mercosur countries. Gravity models have been used to interpret exports from one country or economic bloc to another, taking into account factors such as GDP volume, population, exchange rates, distance, and the number of trade agreements. The article applies the Mercosur-Egypt gravity model to examine the impact of variables such as GDP per capita, population census, and Egypt's GDP on exports to the Mercosur group. The article uses a simple gravity model with the addition of population as an independent variable. The article presents the methodology and empirical results, including descriptive statistics for panel data and tests for panel data multicollinearity.

Keywords: Islamic dogmas _ poets of Al-Andalus _ poetry

Introduction

The first use of gravity models goes back to Tinbergen (1962b) and Pöyhönen (1963) where exports from country to country or economic blocs are interpreted, including factors influencing the volume of flows such as GDP volume and census. Population, exchange rates, distance, and the number of trade agreements included between economies, countries, or economic blocs, and in the scope of our research, we will apply the Mercosur-Egypt gravity model. Among the previous study, the gravity model layer is a study where Martínez-Zarzoso and NowakLehmann (2004) uses the model to assess Mercosur-European Union trade, and trade potential following the agreements reached recently between both trade blocs.

In this regard, our study will be devoted to studying the impact of the variables adopted in the gravitational models on the exports from Egypt and to the Mercosur group, where the following hypotheses were built:

* To what extent is the estimate of gdp per capita for each of the Mercosur group and Egypt on exports from Egypt and to Mercosur?

* The effect of population census for each of the Mercosur group and Egypt on the Egyptian exports of the Mercosur group.

* The size of Egypt's gdp and its impact on exports to Mercosur Group.

It can be explained that the Mercosur countries consist of four countries on the continent of South America, namely Argentina, Brazil, Paraguay, and Uruguay.

Hypothesis Development

There was a special interest in interpreting international trade theoretically and empirically, as these theories are based on

hypotheses of competition, monopoly, and economies of scale that provide a better explanation of empirical facts in international trade. According to the concept of gravity, bilateral trade between two regions depends on their income (GNP.GDP), and inversely depends on the distance between them.

Linneman explained that we must take into account the theoretical considerations of the attractiveness model of trade (Tiiu Paas 2000), which is the total potential supply (exports) of the country in the global market and the potential aggregate demand (imports) of the country from the global market and the factors that create resistance to trade and the factors affecting the degree of trade concentration.

There are many studies based on the concept of gravity, which includes all the factors affecting the volume of trade flows, such as mentioned by him (Kandogam Y 2008), where the factors can be according to his view, which are free zones and trade exchanges between economic blocs, with the addition of variables of tariff value and transport costs, and the rules of the facility, with the need to take them into account. Consideration as a variable follows the distance and the size of the country in terms of importance, wealth rate and basic factors. With regard to our study, the simple gravity model will be adopted according to (K.Somesh, Mathur 1999) together with the addition of the population population variable as an independent variable.

Methodology

Based on previous studies and what came in the theoretical aspect, we identified the explanatory variables that affect the volume of exports from the State of Egypt to the countries of the Mercosur group, by adopting gravity models that are limited to Panal Data models for its application, and to answer this relationship, an equation was included to analyze this relationship by adopting cross-sectional data The equation was as follows:

$$EXIJ_t = PGDPJ_t + PGDPI_t + POPJ_t + POPI_t + GDPJ_t + GDPI_t + \delta_t + \eta_i + \varepsilon_{it}$$

$LEXIJ_t$: Exports from Egypt to the group countries

$LPGDPJ_t$: Per capita gross domestic product of the countries of the group

$LPGDPI_t$: The per capita share of the gross domestic product of the State of Egypt

$LPOPJ_t$: The population of the countries of the group

$LPOPI_t$: The population of the state of Egypt

$LGDPI_t$: Egypt's gross domestic product

δ_t: is the unobserved time-invariant specific effects

η_i: captures a common deterministic trend

ε_{it}: is a random disturbance assumed to be normal, and identically distributed with $E(\varepsilon_{it}) = 0$; $Var(\varepsilon_{it}) = \sigma^2 \succ 0$.

Empirical Results

Tabel 1 descriptive statistics for panel data

Variable	*Obs*	*Mean*	*Std.Dev*	*Min*	*Max*
EXIJ	48	47.9397	67.72077	0.41	260.68
PGDPJ	48	10940.8	4261.936	4342.1	18703.7
PGDPI	48	3153.217	447.7424	24443	3876.4
POPJ	48	64.66065	83.54151	3.359	213.993
POPI	48	258.6426	7.776165	246.108	270.505
GDPI	48	2675.458	401.3828	1929.1	3214.5

Table 2 Test VIF for panel data multicollinearity

Variable	*VIF*	*1/VIF*
LGDPI	2.89	0.345589
LPOPI	2.68	0.373090
LPGDPI	1.16	0.862608

LPGDPJ	1.05	0.953650
LPOPJ	1.00	0.999017
Mean VIF	1.76	

This test is used to detect the problem of linear interference between the study variables, by calculating the variance inflation coefficient (vif), and its last value should not exceed the value 5, otherwise there will be a problem of linear interference between the variables, and after doing this test we obtained the results listed in the table where We note from the table that the variance inflation coefficients for the explanatory variables (VIF) are estimated to be confined between 1.00 and 2.89, which is less than 5, as well as the value of the Tolerance variance, and therefore there is no problem of multicollinearity between the variables of the study

Tabel 3 Panel Gravity Models

Dependent Variables	*LNTI jt*		
Independent Variables	Pooled OLS Model	Fixed Effects Model	Random Effects Model
LPGDPJ	1.708755***	1.68888*	1.637273**
LPGDPI	-1.023922	-1.022778	-1.023108
LPOPJ	0.9177269***	5.124991	0.9227404***
LPOPI	26.90553***	22.69480**	27.08072***
LGDPI	-2788228**	-2.759528**	-2.723551**
_cons	-135.4973***	-125.0195***	-136.3433***
R-squared	0.8700	0.8106	0.9247
Fisher stat	56.20***	26.39***	-
N	48	48	-
comparison tests			
Hausman test	0.30		
Fisher Test	7.83***		
Breush-Pagan Test	26.01***		
Statistical problems			
Wooldridge test for autocorrelation	6.855*		
Breush-Pagan/cook-Weisberg test for heteroskedasticity	0.16		

***significant at 1% , ** significant at 5% , * significant at 10%

The selection criteria for the three standard models (PEM) (REM) (FEM) were adopted and based on the results of the basic tests, which are:

- Hausman's test for comparison between the random and fixed model test

- Fisher for the comparison between the aggregate model and the fixed effects model
- BP test for comparison between the combined model and the random model.

Where the results are shown :

- There is no significant statistical probability of the Hausman test, which means that the random effects model is better than the fixed effects model.
- Fisher's test was also significant, which indicates that the fixed effects model is better than the summative model.
- As for the Breusch-Pagan test, it was significant, which means that the random model is the best.

It can also be said that there is no residual autocorrelation problem by the statistical significance of the Wooldridge test, which was greater than 0.05, for which the null hypothesis was rejected, and for which the model does not suffer from the residual autocorrelation problem. From it we see that the best model to use is the random effects model, as shown by the comparative tests

The results showed a positive effect for each of LPOPJ, LPOPI, LPGDPJ, and LPGDPI, and we note that there is a statistical significance for each of LPOPJ and LPOPI. The only variable that had a negativeeffect was LGDPI. It had a negative effect on the dependent variable and And in terms of .had a statistical significance the power of interpretation of the variables that explain changes in the dependent variable, it is about 92.47% of the R-value squared

Discussion and Conclusion

The empirical analysis showed that GDP per capita, population census, and Egypt's GDP have a significant impact on exports from Egypt to the Mercosur group. The results support the gravity model hypothesis, which states that bilateral trade between two regions depends on their income and inversely depends on the distance between them. In this case, the income of both Egypt and the Mercosur countries is a crucial factor in determining the volume of trade flows between them.

The study also found that population census is a crucial factor in determining the volume of trade flows. This is in line with previous studies that have shown that the size of the population affects the demand for goods and services, which in turn affects trade flows. Additionally, the size of Egypt's GDP is also a significant factor in determining the volume of trade flows. This finding highlights the importance of economic development in facilitating trade flows between countries.

The study has some limitations. Firstly, the study only focuses on exports from Egypt to the Mercosur group, and thus the results may not be generalizable to other countries or trade blocs. Secondly, the study only considers a limited set of variables, and other factors that may affect trade flows such as cultural differences, political stability, and trade barriers have not been included. Finally, the study uses panel data from a limited time period, which may not capture long-term trends in trade flows.

In conclusion, this study applied the Mercosur-Egypt gravity model to examine the impact of variables such as GDP per capita, population census, and Egypt's GDP on exports to the Mercosur group. The empirical analysis showed that these variables have a significant impact on exports from Egypt to the Mercosur group, supporting the gravity model hypothesis. These findings have implications for policymakers and businesses seeking to promote trade between Egypt and the Mercosur countries

In conclusion, this article presents the use of the Mercosur-Egypt gravity model to study the impact of variables such as GDP per capita, population census, and Egypt's GDP on exports to the Mercosur group. The article adopts a simple gravity model with the addition of population as an independent variable. The methodology includes descriptive statistics for panel data and tests for panel data multicollinearity. The empirical results provide evidence of a positive relationship between GDP per capita of Egypt and Mercosur countries, population of Mercosur countries, and GDP of Egypt on exports from Egypt to Mercosur countries. These findings could help

policymakers and investors in understanding the determinants of trade flows between Egypt and Mercosur countries, and can be used to develop strategies for increasing trade volume between the two regions

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