ARE INTERNATIONAL TRADE FLOWS A VECTOR OF GLOBALIZATION?

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Abstract: *International commerce and regional integration have long been considered key determinants of national development. The purpose of the present paper is to answer the question whether international trade flows are a vector of globalization and economic growth. In order to achieve this, we have conducted panel data analysis on a sample consisting of members from regional economic structures, such as the E.U., NAFTA, MERCOSUR and ASEAN, and covering a time span of 24 years, from 1990 to 2013. The results of the study underline the fact that, on average and taking into account the heterogeneity of the sample, international commerce counts from around 50 % of the annual economic growth. The future research direction will aim to conduct a more thorough analysis, by focusing more on the regional perspective.*

Keywords: globalization; trade flows; panel data analysis; EU; MERCOSUR

Introduction

Considered to be the most complex and dynamic process of the last decades, globalization represents today a key research topic within the academic environment. One of the issues concerning globalization is quantifying its impact on the international economy, which can be conducted by employing alternative methods, given the fact that a direct approach raises numerous difficulties.

The process of economic globalization has reshaped the international economic framework. Taking as a starting point the definition provided by Jagdish Bhagwati (2004), which states that globalization represents the integration process of national economies within the international economy, through commercial flows, foreign direct investments, other short term capital flows, technologic flows and labor flows, the analysis can be centered on its main transmission vectors, namely trade and FDI flows.

The purpose of the present paper is to answer the question whether international trade flows represent vector of globalization and economic growth. In order to do this, we employ a panel data approach on the commercial flows between the European Union, NAFTA, MERCOSUR and ASEAN, with the

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purpose of highlighting the economic linkages and the interdependence relations which arise among these four regional economic structures.

Related to the aim of the present study, the international literature has put forward a set of interesting and somewhat opposing results. Taking into account the complexity of the analyzed process, as well as the extensive volume of literature, these contradicting opinions are related to the methodological approaches used, either qualitative or quantitative, the variables which were employed in the research and, additionally, the statistical instruments applied (De Haan *et al.*, 2008).

Starting from the issue of variables employed in the analysis, the most common one used is the GDP, which can be found in an extensive number of studies (Fidrmuc and Korhonend, 2010), (Darvas and Szapary, 2004), (Artis, 2003), (Li and Liu, 2004), (Otto *et al.*, 2001). In close connection with the purpose of the present analysis, we are more interested in the studies which have estimated the impact of globalization via the relation between the GDP and commercial flows, trade integration and trade openness. A significant part of the literature highlights the importance of international trade linkages as an explanatory variable for the effects of globalization in the international economy, taking into account the fact that an increased rate of the commercial flows between two or more countries can explain a stronger regional integration, as well as convergence patterns.

Traditionally, the international commercial component is believed to be one of the best indicators regarding the transition towards a global, interconnected economy. The international literature (Frankel and Rose, 1998), (Kose *et al.*, 2008) highlights the importance of the trade channel in explaining regional or global convergence patterns, focusing mostly on bilateral trade relations and trade integration. Frankel and Rose (1998), together with Imbs (2004), have proved the existence of a strong positive connection between the degree of bilateral trade intensity and cross-country bilateral correlation of business cycles.

In addition to the ideas underlined above, it is important to emphasize the fact that the international literature present a gap in terms of studies that have analyzed the impact of the commercial channel between regional economic structures, such as the European Union, NAFTA or MERCOSUR, and moreover, the lack of statistical approaches which can measure these effects. That is the main reason why the present article aims to estimate, by employing a statistical methodology, the economic relations which arise between the E.U., NAFTA, MERCOSUR and ASEAN, considered to be the main advocates of globalization.

The remaining part of the article is structured as follows: section 2 presents the data, the variables employed in the study and the methodological approach, section 3 displays the computed model and the implications of the results, while the last section underlines the main conclusions and the future study directions.

1. Population, data and methodological approach

1.1. Population and data

In line with the purpose of the present study, we have selected a sample comprised of all the members of the European Union, NAFTA, MERCOSUR and ASEAN, totaling 51 entities. The motivation for choosing this sample resided in the fact that four regional economic structures mentioned above represent the main advocates of international commerce, perceived as a globalization vector. The list of chosen countries can be consulted in Annex A.

The variables employed in the study are as follows:

- GDP % growth - Annual percentage growth rate of GDP at market prices;
- Imports of goods and services - Annual percentage growth rate;
- Exports of goods and services - Annual percentage growth rate;

The motivation for choosing these variables resides in the fact that, as stated in previous studies, commercial flows represent one of the main transmission channels of economic growth in the global economy, alongside foreign direct investments. Furthermore, we have selected the two independent variables as annual growth rates in order to outline the structural changes that occur within a national economy over time.

The data was collected from the Word Bank database, as well as from the UNCTAD and OECD databases, based on their specific calculus methodology. The analysis covers a time span of 24 years, from 1990 to 2013, mainly because this period engulfs important changes that occurred within the four economic blocks, i.e. the E.U. enlargement waves, the introduction of the EURO currency, as well as the enactment of NAFTA and MERCOSUR, and also, due to the availability of the data.

1.2. Methodology

The article uses panel data analysis with the purpose of describing the dynamic behavior of the parameters and also to offer a more efficient estimation and information regarding the variables. Panel data analysis presents the advantage, over individual cross-section and time series analysis, that it diminishes the hazard of biased results and provides more observations. This in turn amplifies the degrees of freedom and the variability and offers the possibility to study the structural dynamics of the series (Hsiao, 1986), (Baltagi, 1995).

The international literature clearly states that any panel data approach has to follow 4 distinct steps, which are the stationarity check for every time series used, the panel co-integration tests, the panel data model which can present fixed and/or random effects, or no effects (sometimes called pooled models), and last off, the Granger causality relations.

From a methodological point a view, a series which is stationary implies that it has the mean, the variance and the autocorrelation constant over a given period

of time. One of the most suitable methods for testing the stationarity of a series, as regards to panel data, it the one proposed by Im, Peseran and Shin (IPS) (2003), which represents an extension of the Dickey-Fuller method.

When a series is not stationary, the following step is to test the co-integration, using the panel co-integration tests proposed by Pedroni (2004).

The panel data method proposes three methods of analysis, namely that is the fixed effect method, the random effects one, and a combination of the two, known as a mixed model. A fixed effects panel data model starts from the assumption that the constant is member of a certain group, thus permitting for different constants to belong to each group section. The equation for the fixed effects model is

$$y_{i,t} = \alpha + \beta x_{i,t} + \mu_i + \nu_{i,t}$$

where, μ_i and $\nu_{i,t}$ are the decomposition of disturbance term. Whereas μ_i incorporates the individual specific effect, $\nu_{i,t}$ denotes what remains of the disturbances, which fluctuates across the time and the entities, thus incorporating the random behavior of $y_{i,t}$.

As opposed, within the random effects model the constant is perceived as being stochastic. Each cross-sectional intercept derive from the general intercept α, which is identical across-section and time. To this we add a the random variable ε_i, which depicts the variation along the section, but is fixed across the analysis period. Within this model, the $\varepsilon_i$estimates the stochastic deviation for each individuals entity's intercept from the common term α.

The equation for the random effects model is:

$$y_{i,t} = \alpha + \beta x_{i,t} + \omega_{i,t}, \text{ where } \omega_{i,t} = \varepsilon_i + \nu_{i,t}$$

The advantage, by comparison to the fixed effect model, is that this particular model does not use dummy variables in order to estimate the variation, this being done via the ε_i term. The calculus method uses the Generalized Least Squares method, as an alternative to the OLS one.

In the panel data approach we employ the Haussman test to compare the random and the fixed effects, based on the null hypothesis that individual effects register no correlation with the other regressors of the model (Hausman, 1978). If correlation occurs, thus rejecting the null hypothesis, the model which depicts fixed effects is favored.

The Granger causality method tests to what degree the preset values of *y* can be explained by its past values, and also, to estimate if historical values of *x* can offer an additional explanation as regards to the behavior of *y*.

The Granger causality computes, taking into account all possible pairs of (*x,y*) series in the group, bi-variate regressions of the form:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \cdots + \alpha_i y_{t-i} + \beta_1 x_{t-1} + \cdots + \beta_i x_{t-1} + \varepsilon_t$$
$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \cdots + \alpha_i x_{t-i} + \beta_1 y_{t-1} + \cdots + \beta_i y_{t-1} + \nu_t$$

Following the null hypothesis, we can imply that *x* does not Granger-cause *y*, or, as regards to the second equation, the *y* does not Granger- cause *x*. If the results reject the null hypothesis, then there is a causal link between the two series, which manifests itself with a certain, predetermined time lag.

The computations for the present analysis were done using the EVIEWS 7.0 statistical software.

2. Results and discussions

The result in Table 1, computed for the 3 series, highlight the fact that they are all stationary. Thus, there is no need to test for co-integration.

Table 1. IPS panel unit root test result

Variable	IPS panel unit root test result (Level) Null: Unit root (assumes individual unit root process)
%GDP	-10.8873, (0.0000)***
%IMPT	-14.9874, (0.0000)***
%EXPT	-14.4155, (0.0000)***
	P-values are in parentheses.*** shows significance at 1%.

Source: author's computation in Eviews 7.0

Following the stationary test, the next step is to conduct the panel data analysis. In order to do this, we calculate the parameters' estimation and their significance by employing the Ordinary Least Squares (OLS) method. The results in Table 2 present the estimations for all the possible models. For this particular analysis, the model with no effects has not been taken into account, because it is not accordance with the purpose of the study. Thus, we propose the following model, which depicts cross-time fixed effects and cross-section random effects:

$$\%GDP_{i,t} = \alpha_0 + \alpha_1 IMPT_{i,t} + \alpha_2 EXPT_{i,t} + \omega_{i,t},\ \omega_{i,t} = \varepsilon_i + \nu_{i,t}$$

Table 2. Equation parameters estimations

Variable	Fixed/Fixed	Fixed (country) Random (year)	Random (country) Fixed (year)	Random / Random
IMPT	0.039515 0.0000	0.040246 0.0000	0.039458 0.0000	0.040162 0.0000
EXPT	0.086805 0.0000	0.095781 0.0000	0.095747 0.0000	0.103973 0.0000
c	2.302080 0.0000	2.236398 0.0000	2.242380 0.0000	2.181945 0.0000
R^2	0.444200	0.323103	0.322432	0.154292
Idiosyncratic random		3.307057	3.307057	3.307057
Cross-section random			1.171272	1.171272
Period random		0.965105		0.965105

Source: author's computation in Eviews 7.0

The results in Table 2 highlight the fact that only one model reports a significant value for R^2, namely the one with fixed effects across both dimensions.

It is important to underline the fact that, even though the statistics theory clearly states that the value for R^2 needs to be equal or greater than 50 in order for the model to be considered valid (Jaba, 2002), from an economic perspective, the results can be perceived as normal. To be more exact, it is unrealistic to state that, on average, the commercial vector can explain more than 50% of the annual growth rate of the GDP, bearing in mind the fact that every economy relies also on national production and consumption. This situation also highlights the heterogeneity of the sample.

Hence we propose the fixed effects model for both the cross-section and cross-time dimensions. This result comes to supports previous findings in the literature (Enea and Palasca, 2012), which underline the fact the randomness of the process can be reduced by using less independent variables.

Therefore, the proposed model is:

$$\widehat{\%GDP}_{i,t} = \alpha_0 + \alpha_1 IMPT_{i,t} + \alpha_2 EXPT_{i,t} + \mu_i + \nu_{i,t}$$

which becomes

$$\widehat{\%GDP}_{i,t} = 2.3020 + 0.0395 IMPT_{i,t} + 0.0868 EXPT_{i,t} + \mu_i + \nu_{i,t}$$

A quick glance at the proposed model highlights a few basic rules from the international economics theory, namely the fact that, within one year, the international commercial channel acts as a catalyst, determining economic growth. Furthermore, as regards to the result for the constant, or *c*, the implication is that if it registers a 1% increase, this will determine a 2.30 % increase of the annual GDP growth rate. Now it is important to understand the fact that this situation occurs if international commercial linkages are non-existent, meaning that a national economy is autarchic and self-sufficient. This of course is an unrealistic scenario, but the value of *c* highlights the importance of the endogenous characteristics of a national economy (production, market size, consumption etc.), which determine economic growth.

In order to assess to long term linkages between the GDP, the imports and the exports, we have tested the Granger causality amid the three variables, taking into consideration 3 lags.

Table 3. Granger causality

Causality relations	Lag 1	Lag 2	Lag 3
IMPT – %GDP	0.1197	0.1815	0.4559
%GDP – IMPT	**0.0001**	**0.000004**	**0.0000000000000003**
EXPT – %GDP	0.1655	0.3572	0.3610
%GDP – EXPT	**0.0079**	**0.0004**	**0.00006**
EXPT – IMPT	0.0003	0.0284	0.0000000004
IMPT – EXPT	0.0077	0.0048	0.0012

Source: author's computation in Eviews 7.0

The results of the Granger causality test, depicted in Table 3, highlight a series of interesting insights as regards to the linkages between the three variables, confirming ideas previously underlined by the international literature and also offering some new pieces of information.

First of all, in terms of the relationship between the gross domestic product and the international commercial flows, there is little new information. The annual growth rate of the GDP has an important impact on future growth rates of imports and exports, even after 3 years (lag 3), thus highlighting a continuous trend of sustainable development among the countries comprising the sample. This is in line with the theory of international commerce, which states that when a country develops itself, it becomes more active within the international economy.

On the other hand, we find it curious that historic import and export flows have little effect on the annual growth rate of the GDP. This situation contradicts previous findings from the literature and it can seem rather bizarre. A plausible explanation for this particular result can be the heterogeneity of the sample. Even though all the countries included in the analysis are members of regional economic blocks, their participation in the international economy is distinctive. Some rely heavily on imports to support their national production and consumption processes, while others are more balanced in terms of commercial flows. Take for example the case of Croatia, which registered an average growth rate for imports of 24%, and only 5.5% average growth rate for exports, throughout the entire period of analysis, or Argentina (13% / 5.6 %), compared to Germany (5.27% / 5.90%), or the United States (5.59% / 5.57%).

Finally, we have the causal relation between imports and exports, which can be best explained by referring to the international activity MNCs. If take into account the operations of a foreign subsidiary of affiliate, which requires imports of raw materials or intermediate products and subassemblies for the production of various commodities, which are later exported to different international markets, we find that these commercial flows depict a continuous linkage between them. This situation is in accordance with the theory multinational corporations, as well the one regarding foreign direct investments.

Conclusions

The present paper aimed to answer the question whether international trade flows represent vector of globalization and economic growth, further wanting to highlight the economic linkages and the interdependence relations which arise among these four regional economic structures.

The research has conducted a regional study on a sample of 51 countries, comprising all of the members of the European Union (28), NAFTA (3), MERCOSUR (10) and ASEAN (10), covering a time span of 24 years. The choice regarding the time span was dictated by the wish to encapsulate the important events and changes that have occurred, especially the enlargement waves of the European Union, the enactment of the NAFTA and MERCOSUR Agreements, the introduction of the EURO currency, as well as by the availability of the data.

In close connection with the purpose of the study to assess the quality of the commercial transmission channel as a vector of the globalization process, over the proposed period of analysis, we have employed panel data approach. The

computed results have offered only one valid model, namely the one depicting fixed cross-section and cross-time effects.

The fixed effects model that we have proposed and tested presented very interesting results as regards to the relationship between the GDP and the import and export flows. First of all, the results have reemphasized the importance the international commercial channel for a country, acting as a determinant of economic growth. What is more, the model underlined that the national characteristics of an economy, such as production, market size, consumption etc., represent a key component of sustainable development.

The results of the Granger causality test have underlined the existence of a unidirectional and continuous relation between the gross domestic product and the international commercial flows. More accurately, the annual growth rate of the GDP has an important time effect on imports and exports, thus highlighting the fact that national economic development represent a key condition for being competitive on the international commercial market.

The reversed situation is somewhat peculiar, namely that the trade channel has no impact on the annual growth rate of the GDP. This situation is closely related to the heterogeneity of the analyzed sample, which underlines the fact that countries, depending on their national economic characteristics, take part differently in the international economy. Some are depict a balance in terms of commercial flows, while other are more focused on fulfilling their internal consumption needs.

In terms of the relationship between imports and exports, this is bi-directional and continuous. Both types of flows act as catalyst for each other, mainly due to the activities of MNCs' manufacturing capacities. These subsidiaries act either as inter-firm trade agents, or direct links to national markets.

The limitations of the study derive mostly from the size of the sample, as well as the type of variables employed in the analysis. That is why the further research direction will aim to develop a more thorough analysis, by focusing on regional perspectives, and furthermore, to use commercial flows perceived as percentage of the GDP.

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References

Artis, M. (2003), "Is there a European business cycle?", CESIFO Working Paper.
Baltagi, B. H. (1995), *Econometric Analysis of Panel Data*, Wiley, New York.
Bhagwati, J. (2004), *In Defence of Globalization*, Oxford University Press, New York.
Darvas, Z. and Szapary, G. (2004), "Business cycle synchronization in the enlarged EU: comovements in the new and old members", MNB Working Paper.

De Haan, J., Inklaar, R. and Jong-A-Pin, R. (2008), "Will business cycles in the euro area converge? A critical survey of empirical research", *Journal of Economic Surveys*, Vol. 22, Issue 2, pp. 234-273.

Enea, S. and Palasca, S. (2012), "Globalization versus Segregation - Business Cycles Synchronization in Europe", *CES Working Papers*, Vol. 4, Issue 4, pp. 668-692.

Fidrmuc, J. and Korhonend, I. (2010), "The impact of the global financialcrisis on business cycles in Asian emerging economies", *Journal of Asian Economics*, Vol. 21, Issue 1, pp. 293-303.

Frankel, J. and Rose, A. (1998), "The Endogenity of the Optimum Currency Area Criteria", *The Economic Journal*, Vol. 108, No. 449, pp. 1009-1025.

Hausman, J.A. (1978), "Specification tests in econometrics", *Econometrica*, Vol. 46, Issue 6, pp. 1251-1271.

Hsiao, C. (1986), *Analysis of Panel Data*, Cambridge University Press, Cambridge.

Im, K., Pesaran, H. and Shin, Y. (2003), "Testing for Unit Roots in Heterogeneous Panels", *Journal of Econometrics*, Vol. 115, pp. 53-74.

Imbs, J. (2004), "Trade, Finance, Specialization and Synchronization", *Review of Economics and Statistics*, Vol. 86, No. 3, pp. 723-734.

Jaba, E. (2002), *Statistica* (3 ed.), Editura Economica, Bucuresti.

Kose, A., Otrok, C., Prasad, E. (2008), "Global business cycles: convergence or decoupling?", paper presented at 10th Bundesbank Spring Conference - Central Banks and Globalisation.

Li, X., and Liu, X. (2004), "Foreign Direct Investment and Economic Growth: An Increasingly Endogenous Relationship", *World Development*, Vol. 33, Issue 3, pp. 393-407.

Otto, G., Voss, G., Willard, L. (2001), "Understanding OECD output correlations", Reserve Bank of Australia.

Pedroni, P. (2004), "Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis", *Econometric theory*, Vol. 20, pp. 597-625.

World Bank. (n.d.). World Bank Databank, available at: http://databank.worldbank.org/data/home.aspx.

Apendix

Analysed countries

No.	Country	No.	Country
1.	Argentina	27.	Cambodia
2.	Austria	28.	Lao PDR
3.	Belgium	29.	Lithuania
4.	Bulgaria	30.	Luxembourg
5.	Bolivia	31.	Latvia
6.	Brazil	32.	Mexico
7.	Brunei Darussalam	33.	Malta
8.	Canada	34.	Myanmar
9.	Chile	35.	Malaysia
10.	Colombia	36.	Netherlands
11.	Cyprus	37.	Peru
12.	Czech Republic	38.	Philippines
13.	Germany	39.	Poland
14.	Denmark	40.	Portugal
15.	Ecuador	41.	Paraguay
16.	Spain	42.	Romania
17.	Estonia	43.	Singapore
18.	Finland	44.	Slovak Republic
19.	France	45.	Slovenia
20.	United Kingdom	46.	Sweden
21.	Greece	47.	Thailand
22.	Croatia	48.	Uruguay
23.	Hungary	49.	United States
24.	Indonesia	50.	Venezuela
25.	Ireland	51.	Vietnam
26.	Italy		