

The impact of globalization and economic freedom on economic growth: the case of the Latin America and Caribbean countries

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Abstract: This study examines the impacts of globalization and economic freedom on the economic growth of a group of 24 developing countries from the Latin America and Caribbean over a time span ranging from 1995 to 2015. We have constructed two models, one with the globalization's overall value and another with the political, social and economic dimensions of globalization. Our results point out to the fact that globalization has had a positive impact on the economic growth of these countries in the long-run, as well their economic and social dimensions. Still, the political dimension of globalization did not show any statistically significant effect upon growth. In addition, we have found evidence of a negative impact resulting from economic freedom on the economic growth of these Latin American and Caribbean countries in the long-run. In the short-run, the results have indicated that electric power consumption (in all estimations) and social globalization (in only one estimation) were able to promote the economic growth of these countries. Finally, the negative and significant coefficient of the error correction mechanism in all estimations points out to the presence of cointegration/long-memory relationships between the variables. This study aims to contribute to the enrichment of the globalization-growth and economic freedom-growth literature in the way that it attempts to overcome some of the flaws identified in previous studies. In our analysis we have identified and corrected the presence of outliers, which are quite often neglected, and if not controlled can actually compromise the macro-economic analysis of this region. The results from this study should primarily contribute to guide policymakers in their decisions, thus helping them to draw growth-promoting policies in their respective countries.

Keywords: economic growth; economic freedom; globalization; Latin America and Caribbean countries; outliers.

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1. Introduction

In the last decades there has been an intensification of the globalization and economic freedom processes in most of the countries in the world (Bergh and Nilsson, 2010). This fact was accompanied by an increase in the subsequent research on these two subjects and their effects on the countries' economies (Gurgul and Lach, 2011, 2014).

Although there is a general opinion that both globalization and economic freedom have numerous advantages for the countries' economies, their effects on growth are still under debate. A main reason for this lack of consensus is the difficulty that researchers find in defining and measuring both globalization and economic freedom (Baldwin, 2003; De Haan and Sturm, 2000).

Dreher (2006, p. 1092) defines globalization as "*the process of creating networks of connections among actors at intra or multi-continental distances, mediated through a variety of flows including people, information and ideas, capital, and goods*". In turn, Miller and Kim (2016, p. vii) state that economic freedom is basically "*an individual's natural right to own the value of what he or she creates*".

Another reason for the current discussion is the ability of both processes to produce both winners and losers (Stiglitz, 2003). Although globalization has a huge positive side (it facilitates the dissemination of knowledge, technological improvement,

and the movement of both capital and people, for instance), examples of its negative effects can be found both contemporaneously and historically (see Heine and Thakur, 2011).

With reference to the process of economic freedom, the debate on the positive and negative effects of such process is similar to the one focused on globalization. The dominant prevailing idea that an economically free society is fundamental to a country's economic performance is not free of discussion, and even though most of the studies point out to a positive effect of economic freedom on economic growth (see Hall and Lawson, 2014; Doucouliagos and Ulubasoglu, 2006), negative effects of such process can also be found in the literature available (e.g. Bergh and Nilsson, 2010; Carter, 2007).

In this study, we work upon these two concepts with the purpose of understanding their impacts on the economic growth of the Latin America and Caribbean countries. The reason for using this group of countries is justified, firstly, by the fact that the region has an historical linkage with the globalization process (dating back to the arrival of the Portuguese and Spanish empires), and secondly, by the so-called Washington Consensus, a group of reforms that were especially designed for the Latin American economies aimed at increasing their levels of globalization and economic freedom.

According to this Consensus, globalization and economic freedom have always led to economic growth, through the increase of trade and investment opportunities and by reducing income inequality and poverty levels. However, this liberal vision is not consensual among economists. Some of them have stressed out that these reforms did not produce the expected positive results and have actually even increased the gap between the Latin American economies and their North American neighbors (Stiglitz, 2003).

Bearing all this in mind, the objective of this study is to examine whether globalization and economic freedom were able to promote the growth of Latin America and Caribbean countries, or if they had growth-depressing effects on these economies; and therefore, if the governments should ultimately change their policies in these two fields. In order to achieve this purpose, we have used Gross Domestic Product (GDP) as a proxy for economic growth, the KOF Index of Globalization (Gygli et al., 2018), and the Index of Economic Freedom (Miller et al., 2018) provided by the Heritage Foundation so as to measure globalization and economic freedom, respectively.

A panel of 24 Latin America and Caribbean countries was analyzed, with annual data from 1995 to 2015, by using the autoregressive distributed lag (ARDL) method. Besides dealing with the data characteristics, this method allows the evaluation of the

short and long-run impacts of those variables upon growth. Additionally, it also allows the incorporation of variables with a different order of integration, while permitting to obtain robust results with a small/moderate number of observations. Moreover, although the effects of these phenomena usually need around 30 years to be fully observed, Latin American economies have a set of characteristics which we believe lead to the acceleration of their effects and that actually let us analyze their impacts with smaller time spans.

This study aims to contribute towards the enrichment of the globalization-growth and economic freedom-growth literature in the way that it attempts to overcome some of the flaws identified in previous studies. For example, it accounts for the possible endogeneity of both economic freedom and globalization, and it also identifies and corrects the presence of outliers which, if not controlled, may compromise the macro-economic analysis of the Latin American and Caribbean region. Also, using energy variables to explain economic growth, instead of capital and labor, can be seen as a major contribution for the recognition of energy as an important production factor, and to reinforce the fact that it should not be ignored by researchers in the field of economic growth.

Finally, and in accordance with the facts that we have already stressed above, analyzing the effects of these two processes on the Latin American and Caribbean economies, and more specifically, on their growth, is extremely important and should primarily contribute to guide policymakers in their decisions, thus helping them to draw growth-promoting policies in their respective home countries.

The results stemming from the estimations highlighted that globalization has had a positive impact on the economic growth of these countries in the long-run, as well as their economic and social dimensions. Still, the political dimension of globalization did not show any statistically significant effect on growth. In addition, we have found evidence of a negative impact from economic freedom on the economic growth of the Latin American and Caribbean countries in the long-run. Finally, in the short-run, the results have indicated that electric power consumption (in all estimations) and social globalization (in only one estimation) were able to promote the economic growth of these countries.

The rest of the study is organized as follows: Section 2 presents a literature review on the globalization-growth and economic freedom-growth relationships. Section 3

describes the data, methodology and the preliminary analysis. The results and their discussion will be presented in Section 4. Section 5 provides the conclusions.

2. Literature Review

A vast number of studies have been produced with the purpose of analyzing the relationships between globalization, economic freedom and economic growth. Although the results of most studies point out to the positive effects that both processes seem to have on growth, these results are far from being consensual.

One reason for this dissension can be the difficulty in defining and measuring both processes. This difficulty has led to the use of proxies as trade openness, and foreign direct investment, among others, so as to measure globalization (e.g. Dollar and Kraay, 2001; Frankel and Romer, 1999; Sachs and Warner, 1995). These former studies were promptly criticized, given that, for some researchers (e.g. Rodriguez and Rodrik, 2001), they did not control some major growth indicators; besides, the openness measures that were used were far from being flawless as well.

Even though the effects of openness and foreign direct investment are usually positively correlated with growth (e.g. Kheng et al., 2017; Liu and Nishijima, 2013), and although they are often seen as synonyms of globalization (Gurgul and Lach, 2014), we do know that when studying globalization, we have to account for more than just its economic dimension. The widely accepted version is that globalization has, at least, three main dimensions (namely, economic, political, and social dimensions) that we should take into consideration (Keohane and Nye, 2000). Bearing this in mind, Dreher (2006) developed a new indicator for globalization, the KOF Index of Globalization, which comprises its economic, social and political dimensions, and uses the principal components approach so as to combine them into an overall measure. Nowadays, the KOF Index of Globalization is seen as the best way to measure globalization (Gygli et al., 2018; Potrafke, 2015; Dreher et al., 2008), with the most recent literature corroborating this fact by using this index as well (e.g. Majidi, 2017; Lee et al., 2015; Samimi and Jenatabadi, 2014).

Regarding the empirical analysis techniques used on the globalization-economic growth studies, the application of panel data techniques to address this issue is becoming far more usual, given that it presents a vast number of advantages over the cross-section and time-series analysis (see Hsiao, 2007). The increased use of panel data techniques was linked to the fact that researchers have started to be aware that the results resulting from

cross-section analysis, as explained by Dreher (2006, p. 1092), could actually “*reflect unobserved characteristics which do not vary over time instead of being the consequences of globalization or might reflect reverse causality*”.

However, even when panel data techniques are applied, some criticism does arise. The use of five years average growth rates in the estimations is an example of that, with some researchers stressing that this method does not proxy for the unobservable Steady State Growth Rate (SSGR), because it is unlikely that an economy may reach the SSGR within a small-time period (Rao et al., 2011). Still on panel data techniques, a great number of researchers use dynamic estimators, as the system GMM estimator developed by Arellano and Bover (1995), and Blundell and Bond (1998), considering globalization as a dynamic phenomenon and treating it as an endogenous variable (e.g. Ali and Imai, 2013; Villaverde and Maza, 2011; Rao and Vadlamannati, 2011).

In general, the literature points out to a positive relationship between globalization and economic growth, but still it is important to highlight that not all its dimensions seem to show the same positive effects (e.g. Kilic, 2015; Rao and Vadlamannati, 2011; Dreher et al., 2008). Although its economic dimension usually shows a positive impact on growth (e.g. Kilic, 2015; Ying et al., 2014; Ali and Imai, 2013), the results from its social and political dimensions are not so clear at all. While some researchers find positive effects of social globalization on growth (e.g. Marques et al., 2017; Gurgul and Lach, 2014), others conclude that this dimension has a growth hampering effect (e.g. Kilic, 2015; Ying et al., 2014; Rao and Vadlamannati, 2011). Similarly, regarding the political dimension of globalization, some researchers conclude that it has a positive impact on growth (e.g. Kilic, 2015), while others state that it has a negative impact (e.g. Ying et al., 2014), and even that it has no impact at all (e.g. Gurgul and Lach, 2014). There are few cases where globalization and all the dimensions involved in this phenomenon actually reveal a positive effect on growth (e.g. Villaverde and Maza, 2011). Therefore, we can conclude that their results are heterogeneous regarding this matter.

Some of the reasons given for such diversity of results can be the econometric techniques used, the period and sample chosen by researchers, the country specific effects, the dimensions of globalization chosen by researchers to be included in their estimations, and whether they have decided to use levels or growth rates (Potrafke, 2015). Additionally, the countries’ income levels can also be mentioned as another reason for the difference found in the results (e.g. Majidi, 2017; Samimi and Jenatabadi, 2014).

Turning now to the economic freedom-growth relationship, we would like to start by mentioning some good review articles that have examined a large group of previous economic freedom-growth studies (e.g. Hall and Lawson, 2014; Doucouliagos and Ulubasoglu, 2006; Doucouliagos, 2005). The conclusions stemming from most of these studies actually favor the role of economic freedom as a growth promoting factor (e.g. Pattanaik and Nayak, 2014). Still, it is also important to mention that increased liberalization by itself is not able to grant the long-run prosperity of the countries (e.g. Khandker, 2016).

In the Doucouliagos (2005) review article, the possible existence of a “publication bias” was discussed. According to Doucouliagos (2005) remark, the studies in which the economic freedom effects turned out as negative were more difficult to be published. The underlying reasons for this to happen were mainly two: namely, the fact that reviewers expect a positive effect of economic freedom on growth; and the fact that researchers sometimes think that their negative results can be incorrect.

Still discussing the negative effects of economic freedom on growth, one finds that the volatility of the process is often stressed in the literature as a reason for its growth depressing effect (Pitlik, 2002). Problems with the model specification, with the parameter heterogeneity, and with outliers, were also pointed out as causes for such negative results (De Haan, 2003).

Another debatable question is whether or not researchers should use levels or changes in the estimations. While some authors state that only changes are expected to have a robust relationship with economic growth (e.g. De Haan et al., 2006), others disagree and insist that both should be used (e.g. Lawson, 2006).

The econometric method chosen, together with the problems which can arise from ignoring the possible economic freedom endogeneity, are also highlighted as factors capable of producing biased results (Kacprzyk, 2016).

Another set of studies point out to the difference on the economic freedom effects when the sample is composed by developing or developed countries. While most of the studies seem to show that economic freedom has positive effects on the economic growth of developed countries, when it comes to developing countries, the conclusions over this relationship are not so clear (e.g. Santhirasegaram, 2007). Nevertheless, positive effects of economic freedom can also be found in studies carried out with developing countries samples (e.g. Coetzee and Kleynhans, 2017).

Like in the case of globalization, an additional point of contention is the difficulty in choosing the right measure of economic freedom. The economic freedom indexes that are most commonly used by researchers include: The Economic Freedom of the World Index (Gwartney et al., 2017). published by the Fraser Institute, and The Index of Economic Freedom (Miller et al., 2018), by The Heritage Foundation. Both indexes comprise a group of economic freedom categories which are aggregated so as to create an overall measure of economic freedom. With reference to the characteristics and the categories of these two indexes, some researchers have described the first one (namely The Economic Freedom of the World Index) as the more ambitious attempt of measuring economic freedom (Berggren, 2003), while others, who prefer to use the one from The Heritage Foundation, defend its use by arguing that this index is mostly based on policy measures that governments can actually control (Heckelman, 2000). Based on the updates of the index provided by the Fraser Institute, which have added more institutional measures in its categories, the difference between them has actually decreased. Another fact that is similar to the globalization case is that, in some aspects, not all categories of economic freedom present a significant or positive relationship with growth (e.g. Panahi et al., 2014; Justesen, 2008; Carlsson and Lundström, 2002).

Following the available literature, we can see that there is still a vigorous discussion over the impacts of globalization and economic freedom upon growth. The countries characteristics, the econometric techniques that researchers are expected to use, as well as some other factors that have already been stressed out, seem to foster this debate, with researchers failing to give a general conclusion on the effects of both processes upon growth.

Despite the difficulty in reaching an indisputable conclusion, we think that these issues should be studied more intensively, so that researchers could, at least, be closer to the factual answer to the question about whether globalization, and economic freedom, actually hamper or promote economic growth.

3. Data and Methodology

The main purpose of this study is to assess the impacts of globalization and economic freedom upon the economic growth of the Latin America and Caribbean countries. In order to achieve this purpose, we have used annual data from 1995 to 2015, for a panel of 24 countries: Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras,

Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela. The criteria for choosing both time horizon and countries was exclusively related to the data availability. The econometric analysis was performed using STATA 14. Table 1 presents the name, definition, and sources of our raw variables.

Table 1. Variables description

Variable	Definition	Source
Y	Gross Domestic Product in constant local currency unit	World Bank
P	Total population in total number of persons	World Bank
EC	Electric power consumption in gWh	CEPALSTAT
EF	Economic Freedom overall	The Heritage Foundation
G	Globalization overall	KOF Index of Globalization
PG	Political Globalization	KOF Index of Globalization
SG	Social Globalization	KOF Index of Globalization
EG	Economic Globalization	KOF Index of Globalization

Our dependent variable will be the Gross Domestic Product in constant local currency unit per capita (YPC), actually our proxy for economic growth. We have used per capita values since they are capable of removing distortions produced by population variations. We have used local currency units so as to avoid the influence of exchange rates. We should like to state that exchange rates often move away from their fundamental equilibriums, for long periods of time. Considering that the phenomenon that we are studying is, in its essence, one that relates domestic variables, and given that one of such variables (namely, globalization) already accounts for the information about the relationship of these economies with the exterior, measuring every variable in US dollars would only add one exogenous disturbance to our panel, thus compromising the results from our estimations. The purchasing power parity approach could also be a valid alternative, considering that, in several cases, it is capable of producing excellent results. However, we have decided not to follow this method in this study.

Economic freedom will be measured using the Index of Economic Freedom (Miller et al., 2018) provided by The Heritage Foundation. This index comprises the following categories: (i) rule of law: composed by property rights, government integrity, and judicial effectiveness; (ii) government size: composed by government spending, tax burden, and fiscal health; (iii) regulatory efficiency: composed by business freedom, labor freedom, and monetary freedom; and (iv) open markets: composed by trade freedom, investment freedom, and financial freedom. These dimensions show us the extent of

economic freedom, by covering various aspects of a country's economic activity. The Index of Economic Freedom (Miller et al., 2018) is composed of annual data since 1995 until 2018, for 186 countries. We have chosen this index in order to get more observations, considering that the Economic Freedom of the World Index, published by the Fraser Institute, has only started to be updated on an annual basis since 2000.

Looking at the progression of this process in the Latin America and Caribbean countries, we can say that economic freedom has increased in the region between 1995 and 2000, something which is in accordance with the shift that occurred in these economies during the “lost decade” of the 1980's, following the increase of economic liberalization, open trade, and private enterprise in the 1990's. Between 2000 and 2005, the region's levels of economic freedom have decreased, possibly due to the disappointing results that the previous reforms had on these countries, and which led to a rethinking of the role of the State in these economies. Between 2005 and 2015, the levels of economic freedom were more or less constant, with ups and downs of small magnitude. See Figure A1 in the Appendix to check the evolution of the economic freedom levels in Latin America and Caribbean.

In order to measure globalization, we shall be using the KOF Index of Globalization (Gygli et al. 2018). When Dreher (2006) firstly developed this index, he followed the idea that globalization has at least three dimensions: economic dimension, social dimension, and political dimension. The Dreher (2006) index was then composed of an overall globalization measure disaggregated into: i) economic globalization; ii) social globalization; and iii) political globalization. The data set of this index was later updated by Dreher et al. (2008), and more recently by Gygli et al. (2018).

In the last update, the KOF Globalization Index has suffered major changes in relation to the previous versions. First, this update introduced the distinction between “de facto” and “de jure” measures, with the first ones representing variables linked to flows and activities, while the second ones account for variables linked to policies leading to flows and activities. In addition, further dimensions were also introduced in the new version of the KOF Globalization Index. The overall measure of globalization is now composed of the following dimensions (and sub-dimensions): i) economic globalization (composed of trade globalization and financial globalization); ii) social globalization (composed of interpersonal globalization, informational globalization, and cultural globalization); and iii) political globalization. In all the above-mentioned cases, researchers are able to use the dimensions and sub-dimensions of globalization actually

based on “de facto” or “de jure” measures. It is also possible to use the dimensions and sub-dimensions together with the combinations of both “de facto” and “de jure” measures. Currently, this index is composed by annual data ranging from 1970 to 2015, available for more than 200 countries. In this study, we did not make the division between “de facto” and “de jure” measures of globalization.

As in the case of economic freedom, we have also conducted an analysis of the globalization progress in Latin America and Caribbean (Figure A2). The conclusion is that the globalization process seems to have accelerated in the region in the 1990’s, probably due to the consolidation of this process worldwide in that same period. In the following decade, the globalization levels have continued to increase, although a break was registered in 2002. From 2007 to 2015, the globalization levels seem to have stagnated, with relatively small ups and downs. This fact can derive from the financial crisis of 2008, which probably led to a globalization slowdown.

The electric power consumption per capita (ECPC), stated in kilowatts-hour per capita, will be our control variable accounting for the level of sophistication of a given economy. We have also chosen this variable because the countries energy use (electricity in particular) has proven to be correlated with its economic output (Kumar et al., 2015; EIA, 2013). In order to achieve the electric power consumption per capita (ECPC), we have transformed the variable electric power consumption in gigawatts-hour from the CEPALSTAT into kilowatts-hour, and then we have divided it by the total population (P).

In this study, we will only be analyzing the impacts of the overall measure of economic freedom upon growth since its disaggregated data have shown some issues which would require a different approach from the one that we have used in our models to be overcome. In contrast, in the case of globalization, we will not restrict our study to its overall value, and therefore we shall be also analyzing the impacts of its political, social and economic dimensions on growth.

The use of an ARDL model allows the decomposition of the total effects of our variables into both its short and long-run components. Also, the ARDL model seems to deal properly with cointegration and has the ability to incorporate $I(0)$, $I(1)$ and fractionally integrated variables in the same estimation. Besides these properties, this model also produces efficient parameter estimates and is robust and consistent with the variables being endogenous. The variables are presented in natural logarithms and first differences, so the prefixes “L” and “D” denote natural logarithms and first differences

respectively. Eq. (1) and Eq. (2) give us the ARDL specifications for our two models, the first one with the globalization overall (Model I), and the second with the economic, social, and political dimensions of globalization (Model II):

$$LYPC_{it} = \alpha_i + \beta_{1i1}LYPC_{it-1} + \beta_{1i2}LECPC_{it} + \beta_{1i3}LECPC_{it-1} + \beta_{1i4}LEF_{it} + \beta_{1i5}LEF_{it-1} + \beta_{1i6}LG_{it} + \beta_{1i7}LG_{it-1} + \varepsilon_{1it}. \quad (1)$$

$$LYPC_{it} = \alpha_i + \beta_{2i1}LYPC_{it-1} + \beta_{2i2}LECPC_{it} + \beta_{2i3}LECPC_{it-1} + \beta_{2i4}LEF_{it} + \beta_{2i5}LEF_{it-1} + \beta_{2i6}LPG_{it} + \beta_{2i7}LPG_{it-1} + \beta_{2i8}LSG_{it} + \beta_{2i9}LSG_{it-1} + \beta_{2i10}LEG_{it} + \beta_{2i11}LEG_{it-1} + \varepsilon_{2it}. \quad (2)$$

In order to capture the dynamic relations among our variables, we can re-parameterize Eq. (1) and Eq. (2) as:

$$DLYPC_{it} = \alpha_i + \beta_{3i1}DLECPC_{it} + \beta_{3i2}DLEF_{it} + \beta_{3i3}DLG_{it} + \gamma_{3i1}LYPC_{it-1} + \gamma_{3i2}LECPC_{it-1} + \gamma_{3i3}LEF_{it-1} + \gamma_{3i4}LG_{it-1} + \varepsilon_{3it}. \quad (3)$$

$$DLYPC_{it} = \alpha_i + \beta_{4i1}DLECPC_{it} + \beta_{4i2}DLEF_{it} + \beta_{4i3}DLPG_{it} + \beta_{4i4}DLSG_{it} + \beta_{4i5}DLEG_{it} + \gamma_{4i1}LYPC_{it-1} + \gamma_{4i2}LECPC_{it-1} + \gamma_{4i3}LEF_{it-1} + \gamma_{4i4}LPG_{it-1} + \gamma_{4i5}LSG_{it-1} + \gamma_{4i6}LEG_{it-1} + \varepsilon_{4it}. \quad (4)$$

In Eq. (3) and Eq. (4), the α_i represents the intercept, β_{ki} and γ_{ki} , with $k=1, \dots, 6$, denote the estimated parameters, while ε_{it} represents the error term.

In order to define a well-suited estimator for our models we need to understand the characteristics of our series and cross sections. Therefore, the descriptive statistics, the presence of cross-sectional dependence and the order of integration of our variables had to be analyzed accordingly. The descriptive statistics and the cross-sectional dependence tests are shown in Table A1. in the Appendix.

We should like to stress that the variables LYPC, LEF, DLYPC, and DLEF have less observations than the other variables due to the lack of data for Gross Domestic Product in the cases of Haiti, in 1995, and Venezuela, in 2015, and for Economic Freedom in the cases of Barbados, Suriname, and Trinidad and Tobago, all in 1995. Despite this fact, the STATA 14 still assumes our panel as a “strongly balanced” panel.

After carrying out an analysis of the results of the Pesaran CD test (Pesaran, 2004), we have concluded that they actually support the presence of cross-sectional dependence for both variables in natural logarithms, and in first differences. This means that there is a correlation between our series across countries. The reason for this interdependency is

associated with the common shocks that our crosses do share. However, if we do not pay attention to this characteristic it may lead to inconsistent and incorrect conclusions in the econometric approach (Eberhardt et al., 2011).

In order to check the presence of collinearity and multicollinearity we have computed both the correlation matrix and the Variance Inflation Factor (VIF). The results of both tests can be seen in Table A2. (for Model I) and Table A3. (for Model II) of the Appendix.

The correlation between the variables is not cause for concern, except for the one between the logarithm of social globalization and the logarithm of electric power consumption, which is relatively high. This fact is quite understandable since social globalization includes a group of components that are possibly linked with energy (electricity) consumption (e.g. internet users/bandwidth, television, telephone subscriptions, high technology exports, among others). The lower VIF and mean VIF values indicate that multicollinearity is not a concern.

In order to access the order of integration of the variables we have carried out the cross-sectionally augmented IPS (CIPS) test (Pesaran, 2007). We have only used the 2nd generation unit root test because of the presence of cross-sectional dependence in all variables; this implies that the 1st generation panel unit root tests of LLC (Levin, Lin, and Chu, 2002), ADF-Fisher (Maddala and Wu, 1999), and ADF-Choi (Choi, 2001) have ceased to be efficient. The results of the CIPS test can be seen in Table A4. of the Appendix.

The CIPS test shows that none of our the variables are I(2), although some of them are on the borderline between the orders of integration I(0)/I(1), thus confirming that the ARDL model is the best approach for our study. It is also important to state that some of the variables denote a trend behavior and, therefore, we will not be using a time trend variable in our models.

4. Results and Discussion

When working upon panel data, we need to test for the presence of individual effects. The Hausman test, which confronts random and fixed effects, allows us to choose the most adequate estimator, depending on the test results. The null hypothesis of the Hausman test is that the difference in coefficients is not systematic or that the random effects is the best model. In our case, the null hypothesis is rejected (Table A5), both in the case of Model I and Model II (p-value < 0.05). Therefore, the conclusion is that the

countries individual effects are significant and must be taken into account, and that the fixed effects model is the most suitable to be adopted. The `sigmamore` option (of Stata command Hausman) was used to correct the situations where the covariance matrix has not been positively defined, a practice that has already been used in previous studies (e.g. Fuinhas et al., 2015; Levie and Autio, 2008).

In order to test the group-wise heteroscedasticity of the fixed effects we have computed the modified Wald test. This test showed that heteroscedasticity was present in both of our models. The Pesaran test was computed so as to check for the presence of contemporaneous correlation, with its results confirming the presence of contemporaneous correlation for both Model I and Model II. The Breusch-Pagan Lagrangian multiplier test checks if the variances across individuals are not correlated. However, given that the correlation matrix of residuals was singular, this test could not be applied to our case. This problem seems to occur because the number of countries under study is higher than the number of years, and therefore the vectors for our crosses cannot be linearly independent. Lastly, we have performed the Wooldridge test for autocorrelation so as to assess the presence of serial correlation in our models. The results arising from this test pointed out to the existence of first-order autocorrelation in both models. These tests had to be conducted to select an estimator capable of producing a valid statistical inference. The modified Wald test, the Pesaran test, and the Wooldridge test outputs, as their respective null hypothesis, can be seen in Table A6 of the Appendix.

Given these results, with the purpose of dealing with the presence of cross-section dependence, heteroscedasticity, contemporaneous correlation and first order autocorrelation, we have concluded that the most suitable estimator to use on both models was the Driscoll and Kraay one (1998). This estimator is capable of producing standard errors robust to the disturbances being cross-sectionally dependent, heteroskedastic and autocorrelated up to some lag.

In the case of Model I, the effects of globalization and economic freedom in the short-run were not statistically significant, as well as the effects of electric power consumption in the long-run. Following the principle of parsimony, we have retrieved them from the estimations. For the same reasons, in Model II, we had to retrieve the political and economic globalization, as well as economic freedom, in the short-run, as well as the political globalization and electric power consumption, in the long-run. We can now replace the models from Eq. (3) and Eq. (4) for:

$$DLYPC_{it} = \alpha_i + \beta_{5i1} DLECPC_{it} + \gamma_{5i1} LYPC_{it-1} + \gamma_{5i2} LEF_{it-1} + \gamma_{5i3} LG_{it-1} + \varepsilon_{5it}. \quad (5)$$

$$DLYPC_{it} = \alpha_i + \beta_{6i1} DLECPC_{it} + \beta_{6i2} DLSG_{it} + \gamma_{6i1} LYPC_{it-1} + \gamma_{6i2} LEF_{it-1} + \gamma_{6i3} LSG_{it-1} + \gamma_{6i4} LEG_{it-1} + \varepsilon_{it}. \quad (6)$$

These equations, Eq. (5) and Eq. (6), represent the most parsimonious models that we have achieved. The results are presented in Table 2.

Table 2. Estimation Results

Dependent Variable: DLYPC	Model I	Model II
Constant	0.4240862***	0.4522412***
DLECPC	0.1076488***	0.10782***
DLSG		0.116824*
LYPC (-1)	-0.0569727***	-0.0580309***
LEF (-1)	-0.0767336**	-0.0833768***
LG (-1)	0.1265956***	
LSG (-1)		0.083168***
LEG (-1)		0.0474759**
Diagnostic statistics		
N	475	475
R²	0.1523	0.1628
F	F(4, 19) = 13.76***	F(6, 19) = 8.40***

Notes: ***, ** denote statistical significance at 1% and 5% level, respectively; to estimate the models the Stata command *xtsc* was used.

With reference to Model I, the results show that, in the short-run, only electric power consumption seems to have a positive and significant relationship with growth, but that both globalization and economic freedom have a statistically significant effect on growth in the long-run, positive in the case of globalization and negative in the case of economic freedom.

The results from Model II confirm the ones that were achieved in the previous model for electric power consumption and economic freedom, with an improvement in the significance level of the latter. When analyzing the globalization dimensions, we can see that social globalization has a positive effect on growth both in the short and long-run, and that economic globalization only demonstrates a positive and significant effect on growth in the long-run.

The long-run elasticities are not shown in Table 2, since to achieve them we had to calculate a ratio between the variables coefficient and the LYPC coefficient, both lagged once, and multiply this ratio by -1. Table 3 shows the long-run elasticities, the short-run semi-elasticities, and the models adjustment speed.

Table 3. Elasticities and speed of adjustment

Dependent Variable: DLYPC	Model I	Model II
Short-run semi-elasticities		
DLEPC	0.1076488***	0.10782***
DLSG		0.116824*
Long-run (computed) elasticities		
LEF	-1.346849	-1.436767**
LG	2.222039***	
LSG		1.433168***
LEG		0.818114***
Speed of adjustment		
ECM	-0.0569727***	-0.0580309***

Notes: ***, **, * denote statistical significance at 1%, 5%, and 10% level, respectively, the ECM denotes the coefficient of the variable LYPC lagged once.

The results above show that, in the short-run, electric power consumption is the only driver of growth in both models, and that, in the long-run, the main drivers are globalization (Model I), social globalization, and economic globalization (Model II). The results for economic freedom are more dubious, bearing in mind that its negative long-run elasticity is statistically significant only in the case of Model II.

One thing that we should also consider when analyzing the growth in Latin America and Caribbean countries are the shocks which have certainly occurred in their economies during the period under analysis.

The most worrying cases were noticed in: Argentina, with the great depression that occurred in the country between 1998-2002 and which affected some of its neighbor countries; Venezuela, with the oil strike in 2002-2003, followed by an impressive rise in the oil prices in 2004; Uruguay, with a banking crisis in 2002, mostly due to the Uruguay over-dependence on Argentina; Paraguay, in 2013, with one unusually productive harvest, i.e. a bumper harvest in the crop-farming sector. Another important shock that we must take into consideration is the one deriving from the world financial crisis of 2008 followed by a world recession in the subsequent years.

The residuals analysis that we have computed for both of our models corroborates what we have previously stated and points out to the existence of outliers in Argentina (2002), Uruguay (2002), Venezuela (2002, 2003, 2004), Paraguay (2013) and a generalized break in 2009. Therefore, we have added dummy variables to both of our models, representing these events, in order to correct the detected outliers. The dummy ARG2002 represents the break that we noticed in Argentina, in the year 2002; URY2002 represents the same, but for Uruguay; VEN2002, VEN2003, and VEN2004, represent the breaks and the peak observed in Venezuela in 2002, 2003 and 2004, respectively; and PRY2013 represents the peak observed in Paraguay, in 2013. Finally, the ID2009 dummy

represents the generalized break that has occurred in 2009 in all countries from our sample.

The analysis of shocks through residuals was also used by Fuinhas et al. (2017) in their study on renewable energy and dioxide emissions in Latin America. This method consists in identifying the events that may have produced “out-of-normal” results, followed by the analysis of the regression residuals. After such analysis, we include a set of dummies in the regression in order to correct for the shocks that were identified. Additionally, we have also used the blocked adaptive computationally efficient outlier nominators (BACON) algorithm, as proposed by Billor, Hadi, and Velleman (2000), as a way to confirm the robustness of the analysis of shocks through residuals. The results produced by this algorithm were similar to the ones that were produced by the first method that was used in the outlier’s detection.

The estimation results of Model I and Model II, together with the correction of shocks, are shown in Table 4.

Table 4. Estimation Results (corrected for shocks)

Dependent Variable: DLYPC	Model I	Model II
Constant	0.3191617***	0.3933828***
DLECPC	0.0784121***	0.0787609***
LYPC (-1)	-0.0547694***	-0.0513749***
LEF (-1)	-0.0651024**	-0.0778555***
LG (-1)	0.1357536***	
LSG (-1)		0.0662417**
LEG (-1)		0.057254***
ARG2002	-0.1438552***	-0.1435788***
URY2002	-0.1123255***	-0.1112763***
VEN2002	-0.1223544***	-0.1202131***
VEN2003	-0.1133404***	-0.1080498***
VEN2004	0.1213509***	0.126326***
PRY2013	0.0963378***	0.099322***
ID2009	-0.0405919***	-0.0408605***
Diagnostic statistics		
N	475	475
R²	0.3993	0.4035
F	F(11, 19) = 1053.66***	F(12, 19) = 664.83***

Notes: ***, ** denote statistical significance at 1% and 5% level, respectively; to estimate the models the Stata command *xtscc* was used.

With the inclusion of dummies to control for shocks, we can see that, in the case of Model I, the results seem to remain similar to the previous estimation, with minor changes in the coefficients. Regarding Model II, we can see that some important changes were detected when we dummies were included. In the long-run, economic globalization has shown an increase in its significance, while the social globalization significance has decreased. In the short-run, social globalization has ceased to be significant.

Table 5, which followed the same procedure applied in Table 3, shows the long-run elasticities, the short-run semi-elasticities, and the models adjustment speed.

Table 5. Elasticities and speed of adjustment (corrected for shocks)

Dependent Variable: DLYPC	Model I	Model II
Short-run semi-elasticities		
DLEPC	0.0784121***	0.0787609***
Long-run (computed) elasticities		
LEF	-1.188664*	-1.515438**
LG	2.478641***	
LSG		1.289378**
LEG		1.114434***
Speed of adjustment		
ECM	-0.0547694***	-0.0513749***

Notes: ***, **, * denote statistical significance at 1%, 5%, and 10% level, respectively; the ECM denotes the coefficient of the variable LYPC lagged once.

When comparing these results with the ones from Table 3, we can see that, besides the small changes in the electric power consumption and globalization coefficients, the main change in Model I was that the economic freedom long-run elasticity turned out to be quite significant. Regarding Model II, there were small changes in the electric power consumption, economic freedom, and economic globalization coefficients, and a decrease in the social globalization long-run elasticity significance. Also, as we have already stressed, social globalization has ceased to be significant in the short-run.

With reference to our ECM values, they are all negative and statistically significant in all of our estimations, which indicates the presence of cointegration/long-memory between our variables. The small ECM coefficients from our models indicate that the speed at which our dependent variable returns to equilibrium after changes in our explanatory variables is relatively slow; therefore, because of this fact, a longer period is needed so as to achieve such goal. The small change that has occurred in the value of its coefficient when dummies were include indicates that the models speed of adjustment does not seem to be especially affected by the presence of shocks.

Discussing our main results and answering the central question of our study, our estimations indicate that globalization has had a positive impact on the economic growth of the Latin America and Caribbean countries, which suggests that they should stay on path to globalization and their governments should implement policies that will ultimately allow to increase their levels of globalization. Following the same line of thought, the social and economic dimensions of globalization also seems to have had positive effects on growth. The exploitation of comparative advantages by these countries, the gains associated with specialization, the stimulation of innovation and efficient production, the

increase in information flows, and the reduction of transaction costs (Potrafke, 2015) can possibly be stressed as some of the reasons for these positive results. By contrast, the political dimension of globalization did not show any significant effect on the growth of these countries, something which can be linked to the constant advances and setbacks in the political integration of the region, the need for institutional reforms, and the political instability that is still present in some countries of the region.

The positive effects of globalization and of its social and economic dimensions on growth have already been pointed out in the conclusions of some previous studies (e.g. Marques et al., 2017; Gurgul and Lach, 2014), as also the statistically not significant effect of the political dimension of globalization on growth (e.g. Marques et al., 2017; Gurgul and Lach, 2014; Dreher, 2006). Regarding this issue, it is clearly recommended that these countries continue on the path to globalization, with policies that allow to take advantage of the best aspects of the process (which have been already stressed). These aspects will ultimately allow for the improvement of these economies and, consequently, for the well-being of their populations. Still, Latin American and Caribbean governments should not neglect the vulnerability of their economies to global disturbances, which can have adverse effects on them. Since these economies are mainly characterized by the exploitation and exportation of natural resources, together with low levels of activity diversification, it is of their special interest to ultimately change these features. This could ultimately reduce the negative impacts that international shocks can possible have on them.

As we move along on trying to answer our central question, and although the results are not fully clear on to this variable, economic freedom seems to have a negative impact on the economic growth of the sample (in the long-run). This depressing effect has not been statistically significant in the case of Model I, when we have corrected for the presence of shocks. One reason that may explain this negative result is the volatility that this process seems to suffer in Latin America and Caribbean countries, with decades of increased economic freedom (e.g. 1990s), and other periods with a decrease in economic freedom levels (e.g. 2000s). As we have previously discussed, the volatility of the economic freedom process can be pointed by some researchers as a reason for the negative effect of this variable on growth (e.g. Pitlik, 2002).

Although a certain level of economic freedom is recommended for these economies, we should stress that due to the region's idiosyncratic characteristics (e.g. old/non-existing infrastructures, high population growth, high poverty levels, high

inequality levels, health and education system's problems, etc.), the government still plays a key role in the region's development. Its economic intervention should not be demonized given that a vast number of the region's problems may be only eventually solved through government action and public investment, and not through private agents alone. However, these cannot be solely and exclusively accomplished at the expense of their populations and businesses, with exaggerated and counterproductive fiscal burdens. Additionally, it is also known that excessive State control can often lead to a set of negative effects on the country's economies; for example, it can negatively affect its corporate performance (e.g. Kocenda and Hanousek, 2012). That is why these countries should be very cautious in the domains where they may promote/hamper economic freedom. In order for this to work, it is strongly recommended that Latin America and Caribbean countries increase their fight against corruption, a problem that is present (on a large scale) in the majority of these countries and that may probably skew the results of the policies applied by their governments.

A detail that needs to be further explained is why globalization and economic freedom seem to only have long-run effects on economic growth. As far as one knows, the explanation seems to be that changes in both do take a long time to show adequate tangible effects on growth, i.e., the effects of measures applied today so as to increase or decrease the intensity of both processes will not be felt immediately; actually, they will only be felt in the years to come. Despite this fact, when we did not correct for shocks in Model II, the social globalization showed a positive impact on growth in the short-run, something which indicates that shocks were probably a response from the populations to untenable situations.

With reference to the positive impact of electric power consumption on growth, we can say that it is not a surprise at all, given that energy is seen as a driving force of economic growth (Abdulnasser and Irandoust, 2005), and energy consumption is considered crucial to growth, directly and indirectly, thus complementing capital and labor in the production (Toman and Jemelkova, 2003; Templet, 1999; Ebohon, 1996). Studying a panel of South American countries, quite similar to ours, Apergis and Payne (2010) also found evidence of the promoting effect associated with the growth in energy consumption. However, according to our estimations, the positive impact of energy consumption on economic growth was only confirmed in the short-run. In this case, the implementation of energy conservation policies can be harmful to the short-run economic growth of the Latin America and Caribbean countries assessed.

5. Conclusion

In this study, we have applied the autoregressive distributed lag (ARDL) model so as to allow the analysis of the short and long-run impacts of globalization and economic freedom on the economic growth of 24 Latin American and Caribbean countries. The confirmation of heteroscedasticity, contemporaneous correlation, first order autocorrelation, and cross-sectional dependence in the panel under analysis, led us to conclude that the most suitable estimator to use was the Driscoll-Kraay with fixed effects. The negative and statistically significant coefficient of the error correction mechanism (ECM) in all estimations points out to the presence of cointegration/long-memory relationships between the variables.

Given the flaws and suggestions that have been previously pointed out in the available literature, we have used panel data techniques in this study, alternatively to cross-section and time-series techniques, with annual observations, instead of the traditionally used five-year averages. The problem with the measurement of both globalization and economic freedom was not a concern at all, due to the use of the KOF Index of Globalization and the Economic Freedom Index, which are regularly updated in order to better measure these processes, and which have been widely used in the more recent literature. Additionally, the autoregressive distributed lag (ARDL) model is robust to the variables being endogenous, and therefore, it allows to deal with the possible endogeneity of both globalization and economic freedom that has been previously mentioned in the literature. The estimations with the correction of outliers were also important so as to overcome the problems with the outliers (also pointed out in the literature). Lastly, due to the fact that our sample is composed by countries with similar characteristics, there was no need to divide the countries in sub-samples (e.g. income levels, development levels). Nevertheless, although we recognize that a larger time span could be beneficial to our work, the data availability did not allow this to be feasible.

The results indicate that globalization, together with its social and economic dimensions, has had a positive impact on the economic growth of the Latin America and Caribbean countries, whereas the political dimension of globalization did not show any short or long-run significant effect. In terms of economic freedom, the results seem to indicate that this variable has had a negative impact on the long-run economic growth of these countries. Lastly, our estimations also show the positive impact of electric power consumption on growth in the short-run.

According to the results presented, it seems that the Latin American and Caribbean economies should remain on the path to globalization, given the positive results arising from this variable and from most of its dimensions (social and economic). Given the lack of statistically significant results in the case of political globalization, we suggest that the Latin America and Caribbean countries should increase their levels of political integration, starting by their own regional integration. Regarding the results from economic freedom, it is recommended that the governments from this region do outline the areas where more and less economic freedom is required and develop a well-designed plan in accordance with these inferences. Indeed, planning can help these countries bypass the possible negative effects that the volatility of the process of economic freedom may have had on their growth.

For future research, we think that it would be interesting to study the effects of economic freedom on these countries' growth in a more in-depth way, with a framework capable of handling the properties of its disaggregated data.

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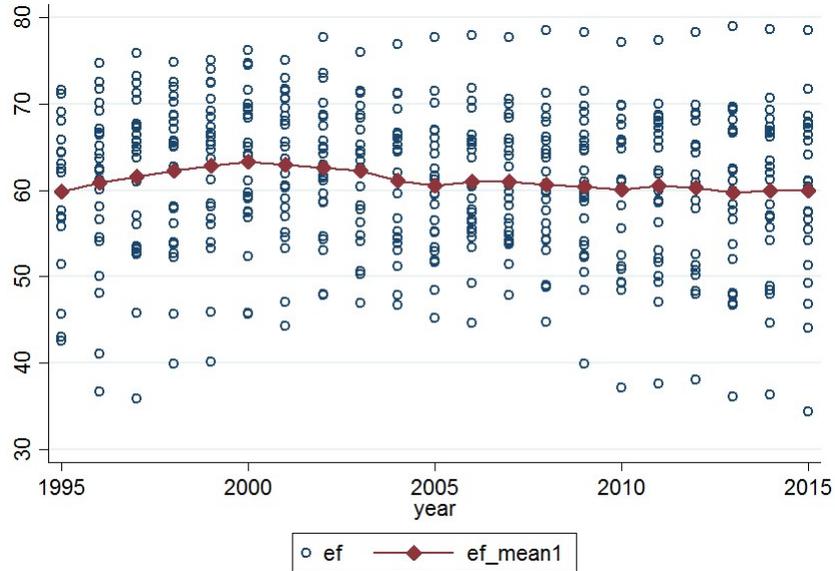
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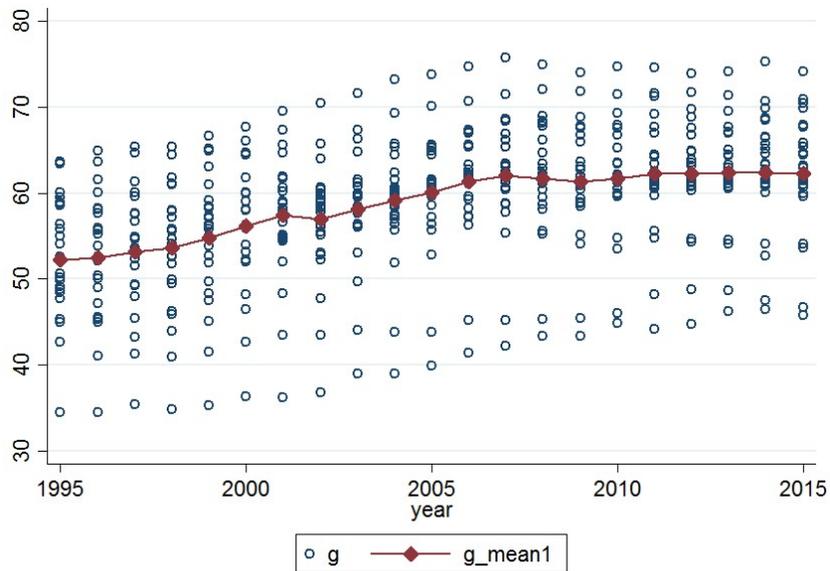
Appendix

Figure A1. Economic Freedom in Latin America and Caribbean



Notes: To achieve this graph the Stata command *twoway scatter* was used; The blue dots represent the Economic Freedom Index overall values of each country in the respective year, while the red “diamonds” represent the mean of the Economic Freedom Index overall value for the region.

Figure A2. Globalization in Latin America and Caribbean



Notes: To achieve this graph the Stata command *twoway scatter* was used; The blue dots represent the KOF Index of Globalization overall values of each country in the respective year, while the red “diamonds” represent the mean of the KOF Index of Globalization overall value for the region.

Table A1. Descriptive statistics and cross-sectional dependence

Variables	Descriptive statistics					Cross section dependence (CD)		
	Obs	Mean	Std. Dev.	Min.	Max.	CD-test	Corr	Abs(corr)
LYPC	502	10.64085	2.676215	7.051526	16.21481	51.99***	0.688	0.792
LECPC	504	7.011614	1.005805	3.130782	8.872688	46.63***	0.618	0.738
LEF	501	4.102734	0.1495756	3.535145	4.369448	1.82*	0.024	0.398
LG	504	4.06398	0.1434041	3.539924	4.328353	47.47***	0.627	0.787
LPG	504	4.14493	0.2698519	3.205186	4.538132	50.88***	0.672	0.802
LSG	504	4.026331	0.1932046	3.318065	4.424203	68.43***	0.907	0.907
LEG	504	3.963611	0.206354	3.305513	4.368786	15.68***	0.206	0.502
DLYPC	478	0.0203972	0.0334623	-0.1264381	0.1503634	23.78***	0.322	0.356
DLECPC	480	0.0291869	0.0824762	-0.5642476	0.6476755	4.12***	0.056	0.202
DLEF	477	0.000464	0.0367378	-0.159946	0.2413301	4.40***	0.060	0.210
DLG	480	0.0089187	0.0236566	-0.0903857	0.1128163	13.79***	0.187	0.253
DLPG	480	0.0076185	0.0471099	-0.3398006	0.2577481	4.90***	0.066	0.198
DLSG	480	0.0162291	0.0270417	-0.0832176	0.1584835	12.76***	0.172	0.242
DLEG	480	0.0029049	0.0468014	-0.2406602	0.2013593	13.36***	0.182	0.256

Notes: To achieve the results of descriptive statistics and to test the presence of cross section dependence, the Stata commands *sum* and *xtcd* were used, respectively. The CD test has N(0,1) distribution under the H0: cross section independence, ***, ** denote statistical significance at 1% and 5% level, respectively.

Table A2. Correlation matrices and VIF statistics for Model I

	LYPC	LECPC	LEF	LG		DLYPC	DLECPC	DLEF	DLG
LYPC	1.0000				DLYPC	1.0000			
LECPC	0.2645	1.0000			DLECPC	0.2924	1.0000		
LEF	0.3387	0.2902	1.0000		DLEF	0.0104	0.0327	1.0000	
LG	0.2667	0.5595	0.5320	1.0000	DLG	-0.0076	0.0140	0.0742	1.0000
VIF		1.45	1.39	1.84			1.00	1.01	1.01
Mean VIF		1.56					1.00		

Table A3. Correlation matrices and VIF statistics for Model II

	LYPC	LECPC	LEF	LPG	LSG	LEG		DLYPC	DLECPC	DLEF	DLPG	DLSG	DLEG
LYPC	1.0000						DLYPC	1.0000					
LECPC	0.2645	1.0000					DLECPC	0.2924	1.0000				
LEF	0.3387	0.2902	1.0000				DLEF	0.0104	0.0327	1.0000			
LPG	0.1062	0.1703	0.2883	1.0000			DLPG	-0.0422	-0.0012	0.0034	1.0000		
LSG	0.2883	0.8092	0.3293	0.1234	1.0000		DLSG	0.0437	0.0623	0.1197	-0.0393	1.0000	
LEG	0.1810	0.0604	0.5083	0.0286	0.2903	1.0000	DLEG	0.0172	-0.0113	0.0818	0.0456	0.0734	1.0000
VIF		3.33	1.60	1.12	3.43	1.59			1.01	1.02	1.00	1.02	1.01
Mean VIF		2.21							1.01				

Table A4. Panel Unit Root test (CIPS)

	CIPS ($Z_t\text{-bar}$)	
	without trend	With trend
LYPC	1.405	2.593
LECPC	0.247	0.893
LEF	-1.037	-0.512
LG	-1.541*	0.134
LPG	-4.993***	-3.216***
LSG	-2.229**	-0.740
LEG	-0.409	-0.698
DLYPC	-3.102***	-2.071**
DLECPC	-5.015***	-4.070***
DLEF	-5.827***	-3.487***
DLG	-4.920***	-2.107**
DLPG	-7.177***	-5.782***
DLSG	-6.789***	-4.845***
DLEG	-5.515***	-3.234***

Notes: ***, **, * denote statistical significance at 1%, 5%, 10% level, respectively; Pesaran (2007) Panel Unit Root Test (CIPS) assumes that cross-sectional dependence is in form of a single unobserved common factor and H_0 : series is $I(1)$; To compute this test, the Stata command *multipurt* was used.

Table A5. Hausman test

Hausman test	Model I	Model II
	FE vs. RE	FE vs. RE
	Chi2(7) = 46.18***	Chi2(11) = 42.59***

Notes: *** denotes significance at 1% level; In both models, the Hausman test was performed with the *sigmamore* option.

Table A6. Specification tests

	Model I	Model II
	Statistics	Statistics
Modified Wald test	349.51***	485.01***
Pesaran's test	18.432***	17.642***
Wooldridge test	57.672***	64.032***

Notes: H_0 of Modified Wald test: $\sigma(i)^2 = \sigma^2$ for all i ; H_0 of Pesaran's test: residual are not correlated; H_0 of Wooldridge test: no first-order autocorrelation; *** denotes statistical significance at 1% level.