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Causal Interactions between FDI, and Economic Growth: Evidence from Dynamic Panel Co-Integration

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Abstract

In all countries, especially developing, foreign direct investment (FDI) plays a very important role, they are even considered as the engine of economic growth and development. Engaged in good conditions, foreign capital can help reduce the gap between capital requirements and national saving, raise skill levels in the host economy, improve market access and contribute to technology transfer and good governance. Foreign investment comes in many forms. In what follows, we will show through theoretical and empirical studies the effect of the investment on economic growth of countries. This study analyzes the relationship between foreign direct investment and economic growth in 65 countries, using co-integration and panel Granger causality tests in panel data. The results show a disparity in terms of the relationship between the co-integration of the panel study. The results also indicate a unidirectional causality from FDI to GDP, which could be a good tool to prioritize the allocation of resources across sectors to promote foreign direct investment.

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Keywords: Panel Co-integration, Long-term, foreign direct investment and economic growth, Fmols and Dols Estimators, Panel Granger Causality

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1. Introduction

In the 50s and 60s, Foreign Direct Investment (FDI) was regarded with great suspicion by most developing countries. He was considered a threat to national sovereignty and multinational companies were suspected of reducing social welfare by manipulating transfer prices and the formation of enclaves.

Faced with the current globalization of markets, globalization and internalization of production and monetary policies, there has been a radical change in the attitude of developing countries that are forced today to seek sources of non-traditional and non-generating investment in debt. That is why they have turned to FDI. They are stable and less susceptible to financial crises investments. They must be able to create additional funding opportunities, without increasing the external debt of a country.

Indeed, FDI is now increasingly sought both by developed countries by developing countries and are no longer considered as a factor of dominance, but as a major channel for technology transfer and innovation.

Thus, the global economy has been completely transformed in recent years. It operates in an environment increasingly Entangled as free trade, free movement of capital and goods become hallmarks, where FDI is increasingly qualified as a new way to finance economic growth.

In order to increase their investment capacity to positively affect the balance of the balance of payments, make up for the shortfall in national savings, create new opportunities for better jobs with better pay and better conditions work, several countries are trying to make IDE one of the most powerful in the economic development strategy pillars.

These countries have a significant production potential, they have everything for the effective take-off of their economy. These states have focused their actions on the economic and social recovery considering FDI as a by-product of economic development, which explains the great importance attached to the attractiveness of foreign investment flows, by implementing a series of measures to make these countries more attractive.

Beyond assessing the attractiveness of different regions in terms of FDI, the whole point of this study lies in the analysis of the causal link between foreign direct investment and their real impact on economic growth different countries. A major issue is, is there a long-term relationship between direct foreign investment and economic growth?

2. Literature review

The correlation between the FDI inflow into host countries and economic development has been subject to rigorous research for years. In theory, the causal relation between FDI and GDP growth can run in either direction. On the one hand, according to the "FDI-led growth hypothesis", FDI inflows can stimulate growth for the host countries by increasing the capital stock, creating new job opportunities, and easing the transfer of technology (Borensztein et al., 1998; De Gregorio, 2003; de Mello, 1997). On the other hand, according to the "market size hypothesis", a rapid GDP growth creating new investment opportunities in the host country can also cause larger inflows of FDI (Mah, 2010; Rodrik, 1999). In addition, although the existing studies generally suggest a positive impact of FDI on economic growth, it is also possible that FDI has negative effects on economic growth by crowding out domestic investment, increasing external vulnerability, and causing dependence (Aitken and Harrison, 1999; Lipsey, 2002). Last but not least, it is also possible that a causal relationship between FDI and economic growth does not exist, supporting the so-called "neutrality hypothesis". The empirical studies in identifying the relationship between inward FDI and economic growth have been studied extensively. The work of Herzer (2008) found that outward FDI has positive long-run effects on domestic output in 14 industrialized countries over the period 1971 to 2005 using panel analysis. The results also pointed out that the long-run causality is bidirectional between outward FDI and domestic output.

Based on panel co-integration and causality tests, Basu et al. (2003) found that there is a bidirectional causality between economic growth and FDI in 23 developing countries over the period between 1978 and 1996. Basu et al. (2003) further argued that for relatively open economies causality runs in both directions, while for relatively closed economies long-run causality mainly runs from growth to FDI. Nair-Reichert and Weinhold (2001) have found that FDI on average has a significant and positive impact on economic growth in a sample of 24 developing countries. In

another widely cited recent study Carkovic and Levine (2005) have found that FDI does not exert a significant, positive impact on economic growth in developing countries. Carkovic and Levine's (2005) study, however, was based on the unlikely assumption of the homogeneity on the coefficients of the lagged dependent variables. In a heterogeneous panel data context. Blomstrom et al. (1994) and Coe et al. (1997) find that, for FDI to have positive impacts on growth, the host country must have attained a level of development that helps it reap the benefits of higher productivity. In contrast, De Mello (1997) finds that the correlation between FDI and domestic investment is negative in developed countries.

Li and Liu (2005) found that FDI not only affects growth directly but also indirectly through its interaction with human capital. In the same paper, Li and Liu (2005) also found a negative coefficient for FDI when it is interacted with the technology gap between the source and host economies. Using an equally large sample, Borensztein et al. (1998) found similar results—i.e., that inward FDI has positive effects on growth with the strongest impact through the interaction between FDI and human capital. De Mello (1999) founds positive effects of FDI on economic growth in both developing and developed countries but conclude that the long-term growth in host countries is determined by the spillovers of technology and knowledge from the investing countries to host countries.

Baharom Shah and Thanoon (2006) used in dynamic panel model to examine the link between FDI and growth in East Asian economies. The authors have confirmed that FDI promotes growth and that its impact is felt both in the short and long term. this study has shown that countries that have succeeded in attracting FDI may consider a more rapid increase in economic growth than those that discourage foreign direct investment. Based on a number of determinants of the linkage between FDI and economic growth (such as human capital, learning by doing, exports, macroeconomic stability, level of financial development, public investment and other determinants).

D. Gomes Neto, FJ Veiga (2013), use a panel data set covering 139 countries over the period 1970 to 2009, they studied empirically the role of foreign direct investment on growth through the diffusion of technology and innovation. the authors found that these two mechanisms have a positive effect on productivity growth and GDP growth. These results are consistent with an open economy model, in which foreign direct investment affects growth through diffusion of technology and innovation.

Borensztein et al. (1998). Test the effect of foreign direct investment (FDI) on economic growth in a context of panel regression, using data on FDI flows from 69 industrialized countries. their results suggest that FDI is an important vehicle for the transfer of technology, contributing relatively more to the growth of domestic investment. However, the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. Thus, FDI contributes to economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host economy.

Vu and Noy (2009). using industry data for a group of six member countries of the OECD. Their work is the first to identify the sectoral impact of FDI on growth in developed countries. Their results show that FDI has a positive effect on economic growth directly and through its interaction with the work. Moreover, they find that the effects appear to be very different in different countries and economic sectors.

Azman-Saini et al. (2010). In this article, they examine the systemic link between economic freedom, foreign direct investment (FDI) and economic growth in a panel of 85 countries. Their empirical results, based on the generalized method of time-system estimator, show that FDI by itself has no direct effect (positive) impact on output growth. Instead, the effect of FDI depends on the level of economic freedom in the host country. This means clustering the countries Promote Greater freedom of economic activities significantly gain from the presence of multinational corporations (MNCs).

Basu and Guariglia (2007). This paper examines the interactions between foreign direct investment (FDI), inequality and growth, the authors use a panel of 119 developing countries, they observe that FDI promotes both inequality and growth, and tends to reduce the share of agriculture in GDP of the recipient country. They then set up a growth model of a dual economy in which the traditional (agricultural) sector uses a diminishing returns technology, while FDI is the engine of growth in the modern sector (industrial). The main predictions of the model are consistent with the stylized facts observed in the data.

Adams (2009). This study analyzes the impact of foreign direct investment (FDI) and domestic investment (DI) on economic growth in sub-Saharan Africa for the period 1990-2003. The results show that DI is positive and significantly correlated with economic growth in both the OLS and fixed effects estimation, but FDI is positive and significant only in the OLS estimation. The study also found that FDI has a negative effect on the initial positive

effect DI and after subsequent periods for the group of countries studied. The sign and magnitude of the current and lagged FDI coefficients suggest a net crowding out effect. The literature review and the results of the study indicate that the continent needs a targeted approach to FDI, increasing absorptive capacity of local firms, and cooperation between the government and multinational companies to promote their mutual benefit.

Alfaro et al. (2004). In this article, the authors examine the links between foreign direct investment (FDI), financial markets and economic growth. They explore if countries improve financial systems can exploit FDI more efficiently. Using cross-country data between 1975 and 1995, the empirical analysis shows that FDI alone plays an ambiguous role in contributing to economic growth. However, countries with well-developed financial markets gain significantly from FDI. The results are robust to different measures of financial market development.

Herzer et al. (2008). This paper challenges the widespread belief that FDI generally has a positive impact on economic growth in developing countries. This paper discusses the limitations of the literature and re-examines the FDI-led growth hypothesis in 28 developing countries using co-integration techniques on a country by country basis. The authors of this paper find that the vast majority of countries, there exists neither a long-term nor a short-term effect of FDI on growth; in fact, there is not a single country where a positive effect on long-term way of FDI to GDP is found. In addition, the results indicate that there is no clear association between the impact of FDI growth and the level of per capita income, level of education, the degree of openness and level of development of financial markets in developing countries.

Bengoa and Sanchez-Robles (2003). This paper explores the interaction between economic freedom, foreign direct investment (FDI) and economic growth, the authors of this paper uses the analysis of panel data for a sample of 18 Latin American countries for 1970 - 1999. Their results show that economic freedom in the host country is a positive determinant of FDI flows. Their results also suggest that FDI is positively correlated with economic growth in host countries. The host country, however, requires the adequate human capital, economic stability and the liberalization of capital flows benefit from the long term.

3. Data and methodology

3.1. Data analysis

The data set consists of cross-country observations for 65 countries over the 1980–2010 period obtained from the data base of United Nations Conference on Trade and Development CNUCED (UNCTADstat)2013 . Data on FDI into Dollard (United States) at current prices and current exchange rates in millions. The GDP data into dollars (United States) at constant prices (2005) and exchange rates (2005) in millions .Our database includes 65 countries. We classified the countries into seven panels depending on the region and continents to examine whether there are structural differences. Groups of countries are listed as follows Asia and oceanic countries (Australia, China, India, Japan ,Malaysia , New Zealand, Thailand, Vietnam, Philippines, Singapore),Middle Eastern countries(Iran, Emirates, Bahrain, Jordan, Lebanon, Oman, Qatar, Saudi Arabia),North America countries(United States Canada, Mexico),Latin America countries(Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, Jamaica, Chile),Europe countries (Austria ,Albania, Belgium, Denmark, Finland ,France, Germany Greece, Iceland, Ireland, Italy, Netherlands, Norway, Poland Portugal, Romania, Spain, Sweden, Switzerland, Turkey, United Kingdom),North Africa countries (Algeria, Egypt, Libya, Morocco, Tunisia),and centre Africa countries(Angola, Cameroon, Côte d'Ivoire, Nigeria, Senegal, Ghana ,South Africa).

3.2. Methodology

In the analysis of the relationship in long-term of the data panel, the choice of the appropriate technique is an important theoretical and empirical question. Co-integration is the most appropriate technique to study the long-term relationship between our FDI and GDP variables. The empirical strategy used in this paper can be divided into four main stages. First, unit root tests in panel series are undertaken. Second, if they are integrated of the same order, the Co-integration tests are used. Third, if the series are co-integrated, the vector of Co-integration in the long-term is estimated using the methods (FMOLS) and (DOLS). Finally, the Granger causality test in panel will be undertaken.

4. The approach of the Co-integration

The concept of co- integration can be defined as a systematic co-movement between two or more variables in the long term. According to Engle and Granger (1987), if X and Y are both non-stationary, it was expected that a linear combination of, X and Y is a random step. However, the two variables can have the propriety that a particular combination of them $Z = X - By$ is stationary. If this propriety is true, we say that Xand Yare co-integrated.

4.1 Panel Co-integration

It is now acknowledged in the econometric literature that the best methods for testing unit roots and co-integration are to use methods based on a panel. These methods greatly increase the power of the tests and often involve a two-step procedure.

The first step is to test the unit roots panel; the second is the co-integration tests in panel.

For the countries in our empirical study, heterogeneity may arise due to differences in the degree of economic and development conditions of each country. To ensure wide applicability of any co-integration panel test, it is important to take into account as much as possible heterogeneity between group members. Pedroni (1997, 1999, 2004) has developed a method of co-integration panel based on residues that can take into account the heterogeneity in individual effects, the slope coefficients and individual linear trends between countries. Pedroni (2004) considers the following type of regression:

$$y_{it} = a_i + \delta_i t + \beta_i X_{it} + e_{it} \tag{1}$$

We consider for each panel, time series y_{it} and X_{it} for the members $i = 1, \ldots, N$ and for periods of time $t = 1, \ldots T$. The variables y_{it} and X_{it} are supposed to be integrated of order one, denoted I (I). the parameters a_i and δ_i they allow the opportunity to observe the individual effects and individual linear trends, respectively. The β_i slope coefficients are allowed to vary from one member to another, so in general, the co-integration vectors may be heterogeneous among the panel members. Pedroni (1997) proposes seven statistics to test the null hypothesis of no co-integration in heterogeneous panels. These tests include two types of tests. The first is the Co-integration tests panel (within-dimension). Within tests dimensions consist using four statistics, namely panel v-statistic, panel ρ-statistic, panel PP-statistic, and panel ADF-statistic. These statistics pool the autoregressive coefficients across different members for the unit root tests on the estimated residues, and the last three test statistics are based on the "between" dimension (the "Group"). These tests are group ρ, group PP, and group ADF statistics.

All seven tests are conducted on the estimated residuals from a model based on the regression in (1). Following, Pedroni (2004), heterogeneous panel and heterogeneous group mean panel Co-integration statistics are calculated as follows:

Panel $v - $ Statistics
$$Z_v \equiv T^2 N^{\frac{3}{2}} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{\widehat{11}_i^2} \hat{e}_{i,t-1}^2 \right)^{-1} \tag{2.a}$$

Panel $\rho - $ Statistics
$$Z_\rho = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{\widehat{11}_i^2} \hat{e}_{i,t-1}^2 \right) \tag{2.b}$$

Panel PP $-$ Statistic
$$Z_t = \left(\bar{\sigma}_{N,T}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{\widehat{11}_i^2} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{\widehat{11}_i^2} (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \tag{2.c}$$

Panel ADF $-$ Statistic
$$Z_t^* \equiv \left(\bar{S}_{N,T}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{\widehat{11}_i^2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{\widehat{11}_i^2} \hat{e}_{i,t-1}^{*} \Delta \hat{e}_{i,t}^{*} \tag{2.d}$$

Group $\rho - $ Statistics
$$\tilde{Z}_\rho \equiv T N^{-\frac{1}{2}} \sum_{i=1}^{N} (\sum_{t=1}^{T} \hat{e}_{i,t-1}^2)^{-1} \sum_{t=1}^{T} (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \tag{2.e}$$

Group PP $-$ Statistic
$$\tilde{Z}_t \equiv N^{-\frac{1}{2}} \sum_{i=1}^{N} (\hat{\sigma}_i^2 \sum_{t=1}^{T} \hat{e}_{i,t-1}^2)^{-\frac{1}{2}} \sum_{t=1}^{T} (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \tag{2.f}$$

$$\text{Group ADF} - \text{Statistic} \qquad \tilde{Z}_t^* \equiv N^{-\frac{1}{2}} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{S}_i^{*2}\, \hat{e}_{i,t-1}^{*2} \right)^{-\frac{1}{2}} \sum_{t=1}^{T} \hat{e}_{i,t-1}^{*}\, \Delta \hat{e}_{i,t}^{*} \qquad (2.g)$$

Where, $\hat{e}_{it}$ is the estimated residue from (1) and $\hat{L}_{\overline{11}_i^2}$ is the estimated long-run covariance matrix for $\Delta\, \hat{e}_{i,t}$.The other terms are properly defined in Pedroni (1999) with the appropriate lag length determined by the Newey–West method.

5. Estimating the long run co-integration relationship in a panel context

After confirmation of the existence of a Co-integration relationship between the series, it must be followed by the estimation of the long-term relationship. There are different estimators available to estimate a vector Co-integration panel data, including with and between groups such as OLS estimates, fully modified OLS (FMOLS) estimators and estimators dynamic OLS (DOLS).

6. Panel granger causality

Panel Co-integration method tests whether the existence or absences of long-run relationship between GDP and FDI for the seven panel. It doesn't indicate the direction of causality. When Co-integration exists among the variables, the causal relationship should be modeled within a dynamic error correction model Engle and Granger (1987).

The main purpose of our study is to establish the causal linkages between GDP and FDI, the Granger causality tests will be based on the following regressions:

$$(1-L)\begin{bmatrix} GDP_{it} \\ FDI_{it} \end{bmatrix} = \begin{bmatrix} a_{i\,GDP} \\ a_{i\,FDI} \end{bmatrix} + \sum_{i=1}^{P} (1-L) \begin{bmatrix} \vartheta_{11ip} & \vartheta_{12ip} \\ \vartheta_{21ip} & \vartheta_{22ip} \end{bmatrix} \begin{bmatrix} GDP_{it-p} \\ FDI_{it-p} \end{bmatrix} + \begin{bmatrix} \beta_{GDP_i} \\ \beta_{FDI_i} \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (3)$$

ECT_{t-1} is the error-correction term, p denotes the lag length and $(1-\mathrm{L})$ is the first difference operator and ECT_{t-1} stands for the lagged error correction term derived from the long run Cointegration relationship. An error correction model enables one to distinguish between the long run and short run Granger causality. The short term dynamics are captured by the individual coefficients of the lagged terms. Statistical significance of the coefficients of each explanatory variable are used to test for the short run Granger causality while the significance of the coefficients of ECT_{t-1} gives information about long run causality. It is also desirable to test whether the two source of causation are jointly significant.

7. Empirical results

The general specification of the model which we estimate can be written as follows:

$$y_{it} = a_{0i} + b1iX_{it} + \varepsilon_{it} \qquad (4)$$

With: y is the gross domestic product of country i, for the period t, X is also the Foreign direct investment of country i, given at the period t, ε is an error term. This equation is considered as a balanced long-term relationship if she has cointegration relations. The data must then be integrated in the same order.

We will test the stationarity and the relationship of long-term series of GDP and FDI, the technical unit root and co-integration panel data require a minimum of homogeneity in order to draw more general conclusions. It is for this reason that we break our sample into seven sub-groups, to draw more appropriate conclusions.

For precision variables are abbreviated as follows:

GDP: gross domestic product.

FDI: Foreign direct investment.

* Significance at 1%.

Δ is the first difference operator.

7.1 Panel approach

7.1.1 Unit root tests:

To investigate the stationarity of the series used, we use the unit root tests on panel data (LLC, IPS, BRT, and MW). The results of these tests are presented in the following tables:

Table 1: Unit root tests for the variables of the first panel

Null: unit root							Null: NO	unit root
Methods		Levin, Lin and Chu (LLC)	Breitung t-stat	Im, Pesaran And Shin (IPS) W-stat	MW–ADF Fisher Chi-square	MW–PP Fisher Chi-square	Hadri Z-stat	Heteroscedastic consistent Z-stat
Variables								
Level	LOGGDP	0.18245 (0.5724)	2.36148 (0.9909)	0.80664 (0.7901)	19.9797 (0.4592)	7.85918 (0.9928)	6.89313 (0.0000)*	5.28631 (0.0000)*
	LOGTS	-1.16983 (0.1210)	-0.09122 (0.4637)	-1.24815 (0.1060)	30.3929 (0.0637)	23.8856 (0.2474)	5.59569 (0.0000)*	4.44380 (0.0000)*
First difference	ΔLOGGDP	-6.69471 (0.0000)*	-2.59663 (0.0047)*	-7.44921 (0.0000)*	87.4328 (0.0000)*	71.9264 (0.0000)*	2.17829 (0.0147)	2.11256 (0.0173)
	ΔLOGTS	-6.62408 (0.0000)*	-7.01993 (0.0000)*	-8.25013 (0.0000)*	96.4859 (0.0000)*	145.935 (0.0000)*	0.83061 (0.2031)	0.44990 (0.3264)

Table 2: Unit root tests for the variables of the second panel

Null: unit root							Null: NO	unit root
Methods		Levin, Lin and Chu (LLC)	Breitung t-stat	Im, Pesaran And Shin (IPS) W-stat	MW–ADF Fisher Chi-square	MW–PP Fisher Chi-square	Hadri Z-stat	Heteroscedastic consistent Z-stat
Variables								
Level	LOGGDP	4.76037 (1.0000)	3.35277 (0.9996)	7.99381 (1.0000)	6.01027 (0.9880)	4.61397 (0.9974)	6.63507 (0.0000)*	5.87860 (0.0000)*
	LOGTS	2.91304 (0.9982)	-0.28172 (0.3891)	0.90812 (0.8181)	11.1908 (0.7976)	42.6623 (0.0003)*	4.93848 (0.0000)*	5.65964 (0.0000)*
First difference	ΔLOGGDP	-5.95121 (0.0000)*	-4.71429 (0.0000)*	-5.30568 (0.0000)*	59.8443 (0.0000)*	160.528 (0.0000)*	6.74271 (0.0000)*	6.07715 (0.0000)*
	ΔLOGTS	-23.5555 (0.0000)*	-1.59257 (0.0556)	-14.8370 (0.0000)*	317.571 (0.0000)*	336.566 (0.0000)*	5.96003 (0.0000)*	6.32997 (0.0000)*

Table 3: Unit root tests for the variables of the third panel

Null: unit root							Null: NO	unit root
Methods		Levin, Lin and Chu (LLC)	Breitung t-stat	Im, Pesaran And Shin (IPS) W-stat	MW–ADF Fisher Chi-square	MW–PP Fisher Chi-square	Hadri Z-stat	Heteroscedastic consistent Z-stat
Variables								
Level	LOGGDP	0.67954 (0.7516)	0.58127 (0.7195)	-0.35528 (0.3612)	6.24952 (0.3958)	2.95665 (0.8143)	6.38691 (0.0000)*	6.38288 (0.0000)*
	LOGTS	6.07724 (1.0000)	1.11223 (0.8670)	-23.7979 (0.0000)*	0.28763 (0.9996)	0.35423 (0.9992)	4.08705 (0.0000)*	4.21464 (0.0000)*

First difference	ΔLOGGDP	-5.99719 (0.0000)*	-2.56740 (0.0051)*	-4.74958 (0.0000)*	30.0763 (0.0000)*	28.3804 (0.0001)*	-0.00629 (0.5025)	0.26325 (0.3962)
	ΔLOGTS	-41.0678 (0.0000)*	-0.97839 (0.1639)	-31.5635 (0.0000)*	295.292 (0.0000)*	296.579 (0.0000)*	3.59396 (0.0002)*	2.04928 (0.0202)

Table 4: Unit root tests for the variables of the fourth panel

Null: unit root							Null: NO	unit root
Methods		Levin, Lin and Chu (LLC)	Breitung t-stat	Im, Pesaran And Shin (IPS) W-stat	MW–ADF Fisher Chi-square	MW–PP Fisher Chi-square	Hadri Z-stat	Heteroscedastic consistent Z-stat
Variables								
Level	LOGGDP	3.55615 (0.9998)	-0.36530 (0.3574)	7.12587 (1.0000)	2.06494 (1.0000)	1.66068 (1.0000)	4.80862 (0.0000)*	3.68196 (0.0001)*
	LOGTS	0.95427 (0.8300)	2.65693 (0.9961)	2.74044 (0.9969)	14.4434 (0.8850)	10.3991 (0.9823)	4.88032 (0.0000)*	5.03932 (0.0000)*
First difference	ΔLOGGDP	-7.69112 (0.0000)*	-5.89464 (0.0000)*	-7.90949 (0.0000)*	96.9286 (0.0000)*	99.8774 (0.0000)*	2.06159 (0.0196)	1.83756 (0.0331)
	ΔLOGTS	-9.74759 (0.0000)*	-6.74023 (0.0000)*	-8.28488 (0.0000)*	101.633 (0.0000)*	102.338 (0.0000)*	1.87717 (0.0302)	2.46386 (0.0069)*

Table 5: Unit root tests for the variables of the fifth panel

Null: unit root							Null: NO	unit root
Methods		Levin, Lin and Chu (LLC)	Breitung t-stat	Im, Pesaran And Shin (IPS) W-stat	MW–ADF Fisher Chi-square	MW–PP Fisher Chi-square	Hadri Z-stat	Heteroscedastic consistent Z-stat
Variables								
Level	LOGGDP	1.49849 (0.9330)	2.31182 (0.9896)	0.00166 (0.5007)	36.6354 (0.6225)	17.8376 (0.9991)	9.34114 (0.0000)*	6.75363 (0.0000)*
	LOGTS	7.62369 (1.0000)	4.25045 (1.0000)	0.82042 (0.7940)	48.7667 (0.1611)	51.4066 (0.1068)	6.72008 (0.0000)*	5.72350 (0.0000)*
First difference	ΔLOGGDP	-7.08514 (0.0000)*	-1.30838 (0.0954)	-7.64291 (0.0000)*	138.959 (0.0000)*	128.025 (0.0000)*	1.12017 (0.1313)	0.73621 (0.2308)
	ΔLOGTS	-11.0836 (0.0000)*	0.12371 (0.5492)	-12.5475 (0.0000)*	229.849 (0.0000)*	654.592 (0.0000)*	0.07037 (0.4720)	1.26499 (0.1029)

Table 6: Unit root tests for the variables of the sixth panel

Null: unit root							Null: NO	unit root
Methods		Levin, Lin and Chu (LLC)	Breitung t-stat	Im, Pesaran And Shin (IPS) W-stat	MW–ADF Fisher Chi-square	MW–PP Fisher Chi-square	Hadri Z-stat	Heteroscedastic consistent Z-stat
Variables								
Level	LOGGDP	-0.32135 (0.3740)	0.55743 (0.7114)	3.57091 (0.9998)	3.68599 (0.9604)	3.20722 (0.9761)	4.77064 (0.0000)*	4.49263 (0.0000)*
	LOGTS	0.22360 (0.5885)	1.25494 (0.8953)	1.06715 (0.8570)	4.84897 (0.9010)	4.84757 (0.9011)	4.66907 (0.0000)*	4.20307 (0.0000)*
First difference	ΔLOGGDP	-8.13799 (0.0000)*	-4.45352 (0.0000)*	-9.22952 (0.0000)*	133.424 (0.0000)*	152.569 (0.0000)*	1.34088 (0.0900)	6.09390 (0.0000)*

	ΔLOGTS	-5.31184 (0.0000)*	-3.63004 (0.0001)*	-6.53438 (0.0000)*	57.9281 (0.0000)*	57.8449 (0.0000)*	1.00364 (0.1578)	2.28399 (0.0112)

Table 7: Unit root tests for the variables of the seventh panel

Null: unit root							Null: NO	unit root
Methods		Levin, Lin and Chu (LLC)	Breitung t-stat	Im, Pesaran And Shin (IPS) W-stat	MW–ADF Fisher Chi-square	MW–PP Fisher Chi-square	Hadri Z-stat	Heteroscedastic consistent Z-stat
Variables								
Level	LOGGDP	4.26922 (1.0000)	1.41980 (0.9222)	6.33950 (1.0000)	0.92017 (1.0000)	0.51117 (1.0000)	6.68075 (0.0000)*	5.96662 (0.0000)*
	LOGTS	-0.48591 (0.3135)	1.05470 (0.8542)	0.52859 (0.7015)	9.39101 (0.8052)	9.81893 (0.7753)	5.36275 (0.0000)*	4.80087 (0.0000)*
First difference	ΔLOGGDP	-4.18601 (0.0000)*	-4.08446 (0.0000)*	-5.48039 (0.0000)*	56.2758 (0.0000)*	63.3233 (0.0000)*	1.55321 (0.0602)	2.43131 (0.0075)
	ΔLOGTS	-8.84835 (0.0000)*	-5.86712 (0.0000)*	-8.18544 (0.0000)*	80.6747 (0.0000)*	125.847 (0.0000)*	2.77174 (0.0028)*	3.48344 (0.0002)*

From the results of the unit root tests performed for the seven panel of the study, we can draw the following conclusions: All statistics are not significant at the 1% level for both variables (GDP and FDI). After differentiation into first degree data we notice a significant way that all data are stationary for both variables. These results led us to a logical way to test for the presence or absence of a long-term relationship between GDP and FDI by applying Co-integration

7.1.1.2 Co-integration:

Co-integration requires that all the variables are integrated of the same order. The results of panel unit root test indicate that GDP and FDI are first-order integrated, we proceed to test co-integration panel, and that by relying on tests Pedroni. The results are as follows:

Table 8: Co-integration tests for the first panel

Methods	Within dimension (panel statistics)			Between dimension (individuals statistics)		
	Test	Statistics	Prob	Test	Statistics	Prob
LOGGDP LOGFDI						
Pedroni (1999)	Panel v-statistic	11.63558	0.0000	Group ρ-statistic	1.849537	0.9678
	Panel rho-statistic	0.898737	0.8156	Group pp-statistic	1.492133	0.9322
	Panel PP-statistic	0.357576	0.6397	Group ADF-statistic	-0.340679	0.3667
	Panel ADF statistic	0.286729	0.6128			
Pedroni (2004) (Weighted statistic)	Panel v-statistic	6.560702	0.0000			
	Panel rho-statistic	1.313603	0.9055			
	Panel PP-statistic	0.832962	0.7976			
	Panel ADF statistic	0.986135	0.8380			

Table 9 Co-integration tests for the second panel

Methods	Within dimension (panel statistics)			Between dimension (individuals statistics)		
	Test	Statistics	Prob	Test	Statistics	Prob
LOGGDP LOGFDI						
Pedroni (1999)	Panel v-statistic	0.605129	0.2725	Group ρ-statistic	1.419543	0.9221
	Panel rho-statistic	0.901758	0.8164	Group pp-statistic	-0.413962	0.3395
	Panel PP-statistic	-0.430464	0.3334	Group ADF-statistic	-2.465062	0.0068
	Panel ADF statistic	-3.785485	0.0001			
Pedroni (2004) (Weighted statistic)	Panel v-statistic	1.438370	0.0752			
	Panel rho-statistic	0.549199	0.7086			
	Panel PP-statistic	-0.776101	0.2188			
	Panel ADF statistic	-3.306933	0.0005			

Table 10 Co-integration tests for the third panel

Methods	Within dimension (panel statistics)			Between dimension (individuals statistics)		
	Test	Statistics	Prob	Test	Statistics	Prob
LOGGDP LOGFDI						
Pedroni (1999)	Panel v-statistic	6.314757	0.0000	Group ρ-statistic	0.103942	0.5414
	Panel rho-statistic	-0.970580	0.1659	Group pp-statistic	-0.165377	0.4343
	Panel PP-statistic	-1.035722	0.1502	Group ADF-statistic	-1.347510	0.0889
	Panel ADF statistic	-2.090142	0.0183			
Pedroni (2004) (Weighted statistic)	Panel v-statistic	6.673220	0.0000			
	Panel rho-statistic	-0.695699	0.2433			
	Panel PP-statistic	-0.686597	0.2462			
	Panel ADF statistic	-1.781467	0.0374			

Table 11 Co-integration tests for the fourth panel

Methods	Within dimension (panel statistics)			Between dimension (individuals statistics)		
	Test	Statistics	Prob	Test	Statistics	Prob
LOGGDP LOGFDI						
Pedroni (1999)	Panel v-statistic	2.041538	0.0206	Group ρ-statistic	1.109390	0.8664
	Panel rho-statistic	0.300959	0.6183	Group pp-statistic	1.097551	0.8638
	Panel PP-statistic	0.695883	0.7567	Group ADF-statistic	0.781525	0.7828
	Panel ADF statistic	0.560920	0.7126			
Pedroni (2004) (Weighted statistic)	Panel v-statistic	2.140809	0.0161			
	Panel rho-statistic	0.058932	0.5235			
	Panel PP-statistic	0.327091	0.6282			
	Panel ADF- statistics	0.260595	0.6028			

Table 12 Co-integration tests for the fifth panel

Methods	Within dimension (panel statistics)			Between dimension (individuals statistics)		
	Test	Statistics	Prob	Test	Statistics	Prob
LOGGDP LOGFDI						
Pedroni (1999)	Panel v-statistic	5.135849	0.0000	Group ρ-statistic	2.449749	0.9929
	Panel rho-statistic	1.698624	0.9553	Group pp-statistic	1.472500	0.9296
	Panel PP-statistic	0.668651	0.7481	Group ADF-statistic	-0.321958	0.3737
	Panel ADF statistic	0.011621	0.5046			
Pedroni (2004) (Weighted statistic)	Panel v-statistic	6.757188	0.0000			
	Panel rho-statistic	1.191267	0.8832			
	Panel PP-statistic	0.631391	0.7361			
	Panel ADF-statistics	-0.16637	0.4339			

Table 13 Co-integration tests for the sixth panel

Methods	Within dimension (panel statistics)			Between dimension (individuals statistics)		
	Test	Statistics	Prob	Test	Statistics	Prob
LOGGDP LOGFDI						
Pedroni (1999)	Panel v-statistic	4.066190	0.0000	Group ρ-statistic	0.161379	0.5641
	Panel rho-statistic	-1.223777	0.1105	Group pp-statistic	-1.266516	0.1027
	Panel PP-statistic	-2.360630	0.0091	Group ADF-statistic	-1.156480	0.1237
	Panel ADF statistic	-0.266651	0.3949			
Pedroni (2004) (Weighted statistic)	Panel v-statistic	3.720234	0.0001			
	Panel rho-statistic	-1.102594	0.1351			
	Panel PP-statistic	-2.217077	0.0133			
	Panel ADF statistic	-0.653903	0.2566			

Table 14 Co-integration tests for the seventh panel

Methods	Within dimension (panel statistics)			Between dimension (individuals statistics)		
	Test	Statistics	Prob	Test	Statistics	Prob
LOGGDP LOGFDI						
Pedroni (1999)	Panel v-statistic	1.745070	0.0405	Group ρ-statistic	1.463216	0.9283
	Panel rho-statistic	0.929496	0.8237	Group pp-statistic	0.167388	0.5665
	Panel PP-statistic	0.244741	0.5967	Group ADF-statistic	-0.599086	0.2746
	Panel ADF statistic	-0.073127	0.4709			
Pedroni (2004) (Weighted statistic)	Panel v-statistic	2.011974	0.0221			
	Panel rho-statistic	0.909176	0.8184			
	Panel PP-statistic	-0.176913	0.4298			
	Panel ADF statistic	-0.268055	0.3943			

The tables above reports both the within and between dimension panel co-integration test statistics for each panel data set about panel 1, 2,3,4,5,6 and 7. These statistics are based on averages of the individual autoregressive coefficients associated with the unit root tests of the residuals for each country in the panel. These results suggest

that the null of no co-integration cannot be rejected at a significance level of 5%, so there exist at least one probability values are less than 5 %, It is mainly (Panel pp-Statistic in the case of Asian and oceanic, North America, Latin America, North African and centre Africa) and (Panel ADF-Statistic in the case of Middle east and North America) and (Panel PP-statistic in the case of North Africa) regarding intra-individual tests, and we have (Group ADF-Statistic in the case of Middle east) for testing inter-individual. Thus, the evidence suggests that in all panel data sets there is a co-integration long run relationship between GDP and Foreign direct investment FDI for our panel of continents. In this step, we estimate the long-term relationships using FMOLS methods and DOLS estimators proposed by Pedroni, Kao and Chiang and Mark and Sul.

7.1.1.3 The FMOLS and DOLS estimations:

Having established that the variables are stationary and exhibit long-run co-integration panel in the previous sub-sections, we now estimate the long-run impact of Foreign direct investment FDI on economic growth GDP of North Africa ,African, Asian and Oceanic, Middle east, North America and Latin America countries . The results of panel method FMOLS are similar to DOLS estimators, all results are presented in following:

Table 15 FMOLS and DOLS Long-Run FOR Panel1

Dependent Variable	FMOLS	DOLS
" GDP "	Independent Variables	Independent Variables
Variables	*FDI*	*FDI*
Within Results	[0.289796 19.70964 (0.0000)*	[0.268313 17.79293 (0.0000)*
Between Results	[0.320776 42.11718 (0.0000)*	[0.317298 33.89467 (0.0000)*

Table 16 FMOLS and DOLS Long-Run FOR Panel 2

Dependent Variable	FMOLS	DOLS
" GDP "	Independent Variables	Independent Variables
Variables	*FDI*	*FDI*
Within Results	[0.200086 12.14772 (0.0000)*	[0.228159 17.26208 (0.0000)*
Between Results	[0.263782 17.44576 (0.0000)*	[0.273756 14.99210 (0.0000)*

Table 17 FMOLS and DOLS Long-Run FOR Panel 3

Dependent Variable	FMOLS	DOLS
" GDP "	Independent Variables	Independent Variables
Variables	*FDI*	*FDI*
Within Results	[0.191848 8.281192 (0.0000)*	[0.219631 17.50114 (0.0000)*
Between Results	[0.228159 17.26208 (0.0000)*	[0.242992 23.73601 (0.0000)*

Table 18 FMOLS and DOLS Long-Run FOR Panel 4

Dependent Variable	FMOLS	DOLS
" GDP "	Independent Variables	Independent Variables
Variables	*FDI*	*FDI*
Within Results	[0.221887 17.59899 (0.0000)*	[0.211712 17.74678 (0.0000)*
Between Results	[0.244959 31.94903 (0.0000)*	[0.241003 24.56753 (0.0000)*

Table 19 FMOLS and DOLS Long-Run FOR Panel 5

Dependent Variable	FMOLS	DOLS
" GDP "	Independent Variables	Independent Variables
Variables	*FDI*	*FDI*
Within Results	[0.043935 7.371102 (0.0000)*	[0.039732 6.546812 (0.0000)*
Between Results	[0.175068 38.19761 (0.0000)*	[0.179563 32.80197 (0.0000)*

Table 20 FMOLS and DOLS Long-Run FOR Panel 6

Dependent Variable	FMOLS	DOLS
" GDP "	Independent Variables	Independent Variables
Variables	*FDI*	*FDI*
Within Results	[0.331989 13.01731 (0.0000)*	[0.362835 11.64776 (0.0000)*
Between Results	[0.359936 29.62731 (0.0000)*	[0.355923 22.27507 (0.0000)*

Table 21 FMOLS and DOLS Long-Run FOR Panel 7

Dependent Variable	FMOLS	DOLS
" GDP "	Independent Variables	Independent Variables
Variables	*FDI*	*FDI*
Within Results	[0.288297 12.28570 (0.0000)*	[0.283059 9.814394 (0.0000)*
Between Results	[0.295858 14.15120 (0.0000)*	[0.305385 11.13152 (0.0000)*

The tables reports the long-run elasticity estimates from FMOLS and DOLS for the seven panels (coefficients can be interpreted as elasticity, because the variables are expressed in natural logarithms).

It is interesting to note that the within-dimension results do not differ from between-dimension results.

Modeling the within-dimension allows us to take into account the heterogeneity of individuals in their temporal and/or individual dimension. The within estimation eliminates the individual specific effects (persistent differences between countries over the period); it favors the temporal information.

All of the estimated coefficients indicate that FDI is correlated positively and significantly with economic growth at the 1% level. Overall, the results of FDI and growth regression panel demonstrate a strong long-term relationship between both, and show the importance of foreign direct investment for economic growth in the analysis of these regions.

The results obtained for all panel Asia and oceanic, Middle east, north America ,Latin America ,Europe ,North Africa, Africa indicate that a 1% increase in foreign investment increases the GDP , respectively 0.32% ,0.26% ,0.22% ,0.24% ,0.17%, 0.35% ,0.29%.It should be noted that all continents have positive results and statistically significant at the 1% significance whatsoever for FMOLS method or the DOLS, these results presented above indicate that the flow of FDI have a positive and significant long-run effect on economic growth in our overall sample and also in the different geographical regions under consideration.

7.1.1.4 Panel Granger causality results

The existence of co-integration implies the existence of causality at least in one direction. Having found that there is a long-run relationship between FDI and GDP the next step is done to objectively test the causality between these variables by using the test of Panel Granger causality.

This paper focus on the relationship between FDI and economic growth. A Granger-causality analysis is carried out in order to assess whether there is any potential predictability power of one indicator for the other.

The results of Granger-causality test for all panels are summarized in following Table. It should be noted that optimal lag was established using the Akaike and Schwarz information criteria.

Table 22 panel granger causality test results

				FDI			
Lags [1-3]	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP	1.0408 (0.3545)	1.0162 (0.3864)	2.0114 (0.1193)	3.4631* (0.0167)	9.9977* (0.0000)	0.5383 (0.6568)	0.69897 (0.5538)
	3.0767* (0.0476)	2.536* (0.0576)	13.160* (0.0000)	4.3513* (0.0051)	4.0472* (0.0179)	7.4164* (0.0001)	4.0142* (0.0085)

From the Granger causality test results in table shows null hypothesis— FDI does not Granger Cause GDP is rejected for all panels at 10% level, this suggests that flows FDI, Granger-cause GDP in the long-run.

The results indicate that unidirectional causality exists between foreign direct investment and economic growth for Asia and oceanic, Middle East, North America North Africa and central Africa. Furthermore, there is bidirectional causality FDI and GDP for Latin America and Europe. The conclusion can be drawn is that causality running from foreign direct investment to economic growth is stronger compared to causal relationship from economic growth to foreign direct investment in all panel.

8. Conclusions and policy implications

This paper empirically tests the validity of the TLG hypothesis for 49 countries by using panel cointegration test and panel causality. Results suggest that the TLG hypothesis has been approved in a meaningful way. The FMOLS and DOLS tests have confirmed the long-term equilibrium relationship between tourism spending and economic Growth (GDP per capita). As well as Holzner (2011) and Narayan Sharma and Bannigidadmath (2013), this study validates the TLG hypothesis for 49 countries. Finally, these results are of great importance for policy makers and academics.

These results may help a government to establish priorities regarding to the assignment of the resources for national strategies to economic Growth and development of tourism. In addition, the results for the uncertainty effects can provide information on the impact of news, especially bad news on tourism demand. Future research should focus upon the modeling of the relationship between various characteristics of a country that influence tourism's contribution to Economic Growth.

Although it appears to have no evidence that the destination competitiveness, as measured by the WEF, plays a role in influencing tourism contribution of tourism to economic development.

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