



Long-run Effects of Trade Openness on Foreign Direct Investment: Evidence from Developed and Developing Countries

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ABSTRACT

The purpose of this paper is to examine the long-run effects of trade openness on FDI for 124 developed and developing countries over the period 1996-2021. The econometric specification adopted is the ARDL model in Panel. The main results estimate that, for developed and developing countries, trade openness has a positive and significant long-run effect on FDI inflows; the long-run effect is more important for developing countries (8-13 times that of developed countries). For developing countries, the long-run effect of trade openness on FDI is greater than that of infrastructure quality (from 6.6 to 10 times). For all samples (whole, developed and developing countries), the short-run effects are insignificant. The results estimate, also, a bidirectional causality between trade openness and FDI for whole sample and for developed countries. In the light of these results, it is recommended for the government to make several strategies to attract trade: Reduce barriers for products and services, more transparency, reduce bureaucracy, create a good politic and economic environment, develop institutions, improve infrastructure and specially communication and technology.

Keywords: Trade Openness, FDI, Long-run Effects, ARDL, Causality

JEL Classification: C23, F21, O11, F43

1. INTRODUCTION

Many factors affect Foreign Direct Investment (FDI) inflows. One of the most affected explanatory variables in the literature is international trade. Many governments have taken steps to deal with international trade to attract more FDI and open their economies by implementing several progressive policies.

In many countries, FDI is becoming one of the most significant components of economic development. These inflows play an increasingly strong role in economic development and progress of countries and are one of the keys of globalization. The emerging market is viewed as one of the best places to invest. Many governments have taken many steps and rules to deal with international trade to attract more FDI and open their economies by implementing several progressive policies and creating a good political and economic environment. Many economies have tried

to attract more FDI by making their economy more open and implementing a variety of progressive policies and infrastructures.

FDI decisions depend on a variety of characteristics of the host country, such as trade openness, market size, exchange rate, infrastructure, financial institutions, political stability, labor costs, human capital and qualification, tax and economic stability. For these reasons, many emerging and developing countries have implemented new economic and political reforms to restructure their economies to attract more FDI.

Many studies agreed that trade openness is an indicator of a country's trade openness policy, and trade openness has an impact on FDI. Some studies indicated that the characteristics of FDI flows in each country may have different responses to trade openness. In addition, some studies found that FDI has a strong impact on itself. Concerning trade openness in the literature there are many

definitions. Trade openness is defined as the sum of imports and exports ($X+M$) normalized by the gross domestic product (GDP) is the most common and convenient measurement (Kandiero and Chitiga, 2006; Liargovas and Skandalis, 2012; Ho et al., 2013; Cantah et al., 2014; Tahmad and Adow, 2018; Zaman et al., 2018; Mudiyansele et al., 2021; Kayani et al., 2024; Ahmad et al., 2024; Fraihat et al., 2023). Trade openness is useful for observing the export–import balance of the country and is a key determinant of FDI inflows.

Theoretically, the impact of trade openness in FDI is mixed. The trade openness affects FDI positively or negatively, depending on the host country's trade policies (Liargovas and Skandalis, 2012). Most empirical studies have found a positive relationship between trade openness and FDI inflows, as the results in studies conducted by Makoni (2018), Zaman et al. (2018) and Janick and Wunnava (2004). According to these studies, the positive relationship indicates that a country with fewer restrictions on imports and exports has a better chance of attracting FDI. Some studies have found a negative relationship between trade openness and FDI (Tahmad and Adow, 2018 and Cantah et al., 2018). And finally, some studies found that trade openness had no significant impact on FDI (Ho et al., 2013 and Wickramarachchi, 2019).

In our study, we seek to answer the following question: is there a long-run effect of trade openness on FDI in developing and developed economies? Based on the empirical and theoretical evidence, this paper investigates the relationship between trade openness and FDI in the short and long-run for 124 developed and developing countries over the period 1996-2021 by using the ARDL model.

This paper is organized as follows: Section 2 present a theoretical foundation of FDI, section 3 discuss the question of international trade and FDI: Substitutes or complements? section 4 is a literature review, section 5 present data and descriptive statistics, section 6 develop econometric specification and results, section 7 is a conclusion.

2. THE THEORETICAL FOUNDATIONS OF FDI

The importance of the multi-nationalization of firms and its acceleration, particularly in recent years, has long prompted economists to look for causes and determinants. Macroeconomic approaches emphasized the differences in profitability between countries. Kemp's classic approach (1962) and McDougall (1960) do not distinguish between FDI and portfolio capital investment and do not consider the differential risk between countries. The theory of monetary zones of Aliber (1970) explains the profitability differential by the different market sizes and discount rates. Multinational firms originating in developed countries apply higher discount rates than domestic enterprises in developing countries. This difference in rate discount is due to the hard currency status of developed countries and the currency low in developing countries.

The Market Structures Approach (Kojima, 1973, 1978, and 1982) asserts that Japanese FDI was complementary to the position of comparative advantages from Japan, while US FDI replaced the position of comparative advantages in the United States. This approach, which to some extent explains Japanese FDI in the post-war period, still needs to explain FDI flows between other countries and intra-firm FDI flows. Moreover, empirical works such as that of Lipsey and Weiss (1981, 1984), using U.S. data at the industry level first and then at the firm level, show that US FDI in manufacturing industries tended to promote U.S. exports in the same industries, not substitute them. FDI is a relatively complicated phenomenon. These different theories provide only partial explanations and only flows of FDI between 1945 and 1970. From the end of the 1960s, more recent approaches related to the behavior of multinational firms put forward other more relevant explanations. The hypothesis of protection of market share in the life cycle of products offered by Vernon (1960) explains with some success American FDI during the two decades that followed World War II. FDI acts as a defense against potential competitors in the U.S. market. However, Vernon's hypothesis (1960) seems specific to US FDI and does not explain other FDI flows.

Hymer (1960) and Kindleberger (1969) explain that the interest rate differential explains only a tiny part of FDI flows. Two main factors explain the central part of FDI: the possession of specific transferable advantages internationally by firms and market imperfections. Ownership of a specific advantage is only a necessary and not sufficient condition for a firm to establish a subsidiary abroad. Indeed, the firm can sell license operations instead of setting up abroad. The presence of imperfections in the markets leads firms to internalize their advantages. Hymer-Kindleberger's analysis appears unsatisfactory because it cannot predict the origin and the host countries of FDI. Furthermore, it needs to adequately explain why export and licensing are not used to exploit foreign markets. Dunning's (1981, 2001) eclectic paradigm, or OLI paradigm, comes from three divisions: the specific advantages of a firm (O: "ownership"), the comparative advantages of countries (L: "Location") and the advantages of insourcing (I: "Internalization advantage"). This is what Dunning calls the three foundations of the existence of multinational firms. The OLI and ESP paradigms (Environment (E): the quantity and quality of production factors available; System (S): the components of the social system; Policy (P): government policies) have the advantage of bringing together most of the explanations and the analyzed elements. Thus, the Dunning theory seems to provide a complete synthesis for understanding the causes and determinants of the multinationalization of firms. This approach tries to consider the firm's level, the sector, and the country. However, the sector is summarized by the simple nature of the product or technology, whether insourcing has a benefit.

The increased strategies of multinational firms can only fit into a theoretical framework that considers the industrial structure. Like the other approaches reviewed, the synthetic approach to Mucchielli (1991) linked countries and firms. Analysis of sectors is essential for understanding the logic of firm relocation. Insofar as the analysis in terms of sector puts the firms with each other, this will have more influence on the modes of establishment abroad

than the establishment itself. In other words, the different forms of implantation require a complementary information analysis on the strategic behavior of multinational firms. The new theories of FDI are based on the contributions of “the international trade’s new theory” on the one hand and elements of the competition characterizing modern industry on the other hand: economies of scale, oligopolistic strategy, and product differentiation. These new theories of FDI can be categorized into three types: (i) horizontal FDI theory; (ii) the theory of vertical FDI; (iii) the theory of “Knowledge Capital”, also denoted model (KK). According to the first theory, the parent company and its foreign subsidiaries produce goods identically distributed in the markets. The firm exploits its specific asset (patents, know-how, registered trademark) at the international level. This firm-specific asset has a fixed development cost that does not need to be duplicated. On the other hand, the second theory is based on a specialization of the different production units and an exchange of intermediate goods and semi-finished products between subsidiaries and the motherhouse. The use of dissimilar technologies and production techniques makes it possible to benefit from the comparative advantages of each country and exploit economies of scale at every production stage. The KK model is an approach that combines the two theories. Horizontal multinationals are firms that produce the same goods or services through subsidiaries in several countries; each subsidiary takes care of supply to its local market. Two factors are at the origin of an IDE of the horizontal type: barriers to trade (trade barriers, transport costs and administrative procedures) and economies of scale; many models can be found (Markusen, 1984; Horstman and Markusen, 1987 and Markusen and Venables, 1998 and 2000).

A vertical FDI takes place when an MNC fragments its production chain geographically. This fragmentation of production occurs to exploit the differences between the country’s comparative advantages. Modeling of this type of FDI is based on the specific input needs in each step of the process of production. The comparative advantages of countries lead to differences in the costs of production. The MNC divides its production process to minimize its costs, maximize its profits and have a position of strength vis-à-vis its local and international competitors. Vertical FDI is carried out according to the arbitration of production costs between several sites. An MNC sets up a subsidiary in a foreign country if the production costs are lower than their country of origin. Thus, the MNCs tend to install labor-intensive activities in developing countries and technology-intensive activities in developed countries. The first models date back to the pioneering work of Helpman (1984 and 1985) and then to the work of Helpman and Krugman (1985). We can also find the works of Markusen and Venables (1997 and 2000), Antras and Helpman (2003) and Yi (2003).

The patterns discussed before describing two different types of FDI. Markusen (1997) and Markusen and Venables (1997) were the first to propose combining two approaches with the KK model. This model combines the costs of factors and access to the local market as a joint motivation for horizontal FDI and vertical at a time. This makes it possible to study the intensity of FDI flows in an equilibrium framework that mixes the two types of FDI. The

designation of this model as “model knowledge” comes down to the geographic mobility of knowledge itself, which is a standard input to several implementations regardless of the type of FDI. A conclusion is exciting deals from multinationals in production according to the similarity of the countries in terms of factorials endowments.

3. INTERNATIONAL TRADE AND FDI: SUBSTITUTES OR COMPLEMENTS?

The links between investment and trade are generally considered from the point of view of the investing country, the host country, and third countries, which may be affected by these links. From the perspective of the investing country: FDI can be considered a substitute for exchanges insofar as exports are replaced by local sales on the foreign markets, particularly in the form of finished products. This situation can be detrimental to the investing country’s industry by reducing production and employment. On the other hand, the relationship between FDI and trade can be complementary as the investments to be made abroad strengthen competitiveness in foreign markets and increase trade in goods intermediates (inputs) and finished products to the subsidiary. This type of link would benefit exports of the investing country and, therefore, its industry. For host countries, the link between FDI and trade can be considered symmetric from that observed in the investing country. Local sales and local purchases made by foreign subsidiaries replace imports from the investing country, improving the current account situation, domestic production, and the level of employment. If the FDI increases the importation of inputs, this can reduce the current account balance of the host country. Some studies validate this conclusion. The 28% increase 1997 in foreign investments in the Caribbean and Latin America, mainly in Brazil and Mexico, led to a deterioration in the current account balance across the region. This is indeed what was noted by the World Investment Report (1998) and the Economist Intelligence Unit: “Trade liberalization, alongside the emergence of regional trading blocs, enabled transnational corporations to integrate their Latin American activities into their global networks. NAFTA and Mercosur have already led to the installation of platforms for regional production, particularly for automobiles. (...) However, the propensity to export attributed to foreign sectors established in Latin America remains low compared to their Asian counterparts. (...) In the region, the deficit currents are swelling alongside IDE inflows. This is because the investment projects tend to attract imports, especially in the early stages.”

However, the effects of FDI on trade are likely to depend in part on the organization mode of the activities of international companies (Caves, 1982). Vertical integration supposes a specialization, the different units complementing each other, and the international exchange of intermediate products. As a result, activities are concentrated in a relatively small number of large units that trade with each other. The liberalization of trade, the use of dissimilar technologies at different stages of production, variations in the prices of factors, and economies of scale at the level of production units favor this type of organization. Against horizontal integration, the activities carried out by the subsidiaries resemble those of

the company mother. This mode of organization is based on the idea that it is possible to derive gains from the internalization markets for assets with an exclusive character, such as patents or trademarks, the use of better management techniques or greater access to financial resources (Markusen, 1995 and Brainard, 1993). The decision to produce abroad is dictated by the need to get closer to the local market, leading to an expected drop in exports. In this case, the subsidiary's sales compete, on an equal footing, with the exports of the parent company, without leading to a compensatory increase in exports of intermediate goods of the latter. However, if the subsidiary manufactures only part of the parent company's product line, the imports of complementary finished products can benefit from economies of scale achieved at the distribution level. Although these different modes are not mutually exclusive, there are others to explain the differences in behavior observed at the level of the trade of the subsidiaries (Andersson and Fredriksson, 1996 and 2000).

4. LITERATURE REVIEW

Fontagné et al. (1999) explain interactions between trade and FDI are one of the main features of globalization. They make it possible to partly answer the question of knowing what globalization means for the economy and public opinion. Nevertheless, the lack of detailed data and the dynamic nature of these interactions as well as the different factors that come into play over time between countries and at different levels of aggregation (the whole economy, industrial sectors, or the company), explain that the empirical work on these questions have been technically complex and their results seem inconclusive. The main results of this work are as follows:

1. The links between trade and FDI, one of globalization's main characteristics, are complex and cannot be deduced from a purely theoretical analysis.
2. Empirical work shows that until the mid-1980s, the international trade market generated direct investment. After this period, causality seems reversed and direct investment significantly influences trade.
3. Specifically, the data shows that outward direct investment stimulates the increase in exports from the countries of origin (investing countries), and therefore, they are complementary to exchanges. An analysis of an aggregate of 14 countries made it possible to find that every dollar invested abroad generates around 2 USD in additional exports.
4. In the host countries, short-term FDI often tend to increase imports, while the increase in exports does not manifest itself only in the longer term. However, in the short term, host countries reap many benefits from foreign investments (technology transfers, job creation, local subcontracting, etc...).
5. The empirical results showed that the nature and intensity of the relationships (complementarity/substitution) may differ from country to country. Thus, outward American investments have more evident complementarity effects than the outward investments of other European countries (e.g., France, United Kingdom). They also exert bilateral effects on much greater trade in exports and imports.
6. Unlike France, the effect of inward investment on U.S. exports United is insignificant. The difference in the size of domestic

markets can explain this. Foreign firms invest in the United States as a priority because of the scale of its internal market. However, this weaker complementarity is also observed in the case of imports: this is how one dollar of inward investment leads to USD 1.40 in imports in France and only 60 cents in the United States.

7. Inward investment in the United Kingdom, contrary to the situation in most other countries, exerts a complementarity effect on trade. However, given the weakness of specific statistical results, it will be necessary for these relationships to be confirmed by using more detailed data.

Zaman et al. (2018) reported that many papers studied the links between trade openness and FDI in some Asian countries (India, Iran and Pakistan) over the period 1982-2012. Econometric tools like fixed effect and Pooled OLS techniques employed on the panel data were used to measure the country, group, and time effects. The results indicated that the exchange rate and inflation were used as a proxy for macroeconomic stability, and GDP per capita variables had a statistically significant impact on FDI inflows. The authors found that trade openness leads to increased FDI inflows at both levels – global and domestic. In conclusion, trade openness would be better for sustained FDI long-term entries.

Uduak et al. (2014) examined the determinants of FDI in BRICS (Brazil, Russia, India, China, and South Africa) and MINT (Mexico, Indonesia, Nigeria, and Turkey) using a cross-sectional pooled time series analysis and random effect model over the period 2001-2011. They considered net FDI inflows as the dependent variable, and the independent variables considered were GDP, the share of natural resources in GDP, infrastructure, inflation, trade openness and institutional indicators. The results showed that market size, infrastructure, commercial availability, and openness have played an essential role in attracting FDI to the BRICS and MINT. In contrast, the roles of natural resource availability and institutional quality have insignificant impacts on long-term FDI.

Mudiyanselage et al. (2021) have studied the causality relationship between trade openness and Romania's FDI inflows from 1997 until 2019. Throughout this study, trade openness is the primary independent variable, and gross domestic product, real effective exchange rate, inflation and Education serves as a control variable to study the relationship between trade openness and FDI inflows in Romania. The Auto Regressive Distributed Lag (ARDL) bounds test procedure was adopted to achieve the above objective. Results show that trade openness has adverse effects and statistically significant long-term and short-term relationships with FDI inflows to Romania throughout the period. Trade openness negatively affects FDI inflow, suggesting that the higher the level of openness, the less likely it is that FDI will be attracted in the long term. The Granger causality test result indicated that Romania has a one-way relationship between trade openness and FDI. He also showed that the direction of causality was from FDI to trade opening.

Many economic and non-economic factors influence FDI. Referring to the determinants of FDI, as mentioned in many studies, market size, trade openness, GDP, exchange rate, political

stability, inflation, labor force size, and governance factors such as corruption control, rule of law, institutions quality, information transparency and others can influence FDI. Asiedu (2002) explains the impact of trade openness on FDI depends on investment orientation, and the economic strategy. For investors seeking markets, low trade openness caused by many trade barriers, will boost FDI. But, for export-oriented firms that want to manufacture products to supply many other countries, the high trade openness will encourage an increase in FDI.

Asiedu's (2002) results show that trade openness has a positive impact on FDI in African countries, including the Southern Sahara and no-Southern Sahara. However, the study also found that the impact of trade openness on FDI in these two regions is different. FDI to SSA is less responsive to changes in openness than FDI to other regions. Results show that the impact of trade openness on FDI varies between African countries. In the same case, Yasin (2005), for 11 African countries studied over the period 1990-2003, showed that trade openness has a significant positive impact on FDI inflows. He and Choi (2020) also found an increase in Chinese FDI into countries, while the Free Trade Agreement with China was signed to focus on open trade policies.

Kakar et al. (2011) examined the FDI and trade openness with special relation with economic growth for Malaysia and Pakistan for the time period 1980-2010. They found that trade openness significantly positively affects the economic growth in the long run. Liargovas and Skandalis (2012) examined 36 developing countries over the period 1990-2008; obtained results confirms that trade openness contributes to attracting the FDI inflows. Ho and al. (2013) have examined the relationship between trade openness, market size, and other variables on FDI in six countries including Brazil, China, India, Russia, South Africa, and Malaysia from 1977 to 2010. The study is based on two econometrics models as macroeconomics factors on FDI inflow and country specific factors on FDI inflow. Market size, trade openness, financial development, exchange rate, interest rate, government consumption, and inflation rate were considered macroeconomic factors with impact on FDI inflows, while the considered country specification: Economic freedom, wages, human capital, and infrastructure quality. The results for both models indicated that market size, interest rate, literacy rate, economic freedom, and infrastructure quality had impacts on FDI in most BRICS countries and Malaysia. Trade openness had only a statistically significant impact on FDI in Malaysia, and no impact on other emerging countries (Sazali et al. 2018). Market size had positive and statistically significant impacts on FDI in Russia, China, and Malaysia (Fazekas, 2016).

Makoni (2018) studied nine African countries, over the period 2009-2016, to examine the effect of trade openness of FDI; the study employed various econometric techniques such the pooled OLS, Least Squares Dummy Variable (LSDV), Fixed Effects (FE) model, Random Effects (RE) model, Generalized Method of Moments (GMM) model, and the Generalized Least Squares (GLS). According to the results of the random effects model, FDI was positively related with trade openness and capital openness was positive, but insignificant.

Lien et al. (2021) studied the impact of trade openness on FDI inflows into Vietnam over the periode 2005-2019; the estimated result exposes that trade openness has a positive effect on FDI. The current FDI is heavily influenced by FDI in the past with an average explanation of 74%. The main conclusions indicate that trade openness has a positive effect on FDI inflows into Vietnam. The findings also show that FDI in Vietnam is significantly affected by the shocks of the FDI itself in the past.

5. DATA AND DESCRIPTIVE STATISTICS

We propose to examine the long-run effects of trade openness on FDI inflows for 124 developing and developed countries¹ over the period 1996-2021. Data definitions and sources are presented in the Table 1.

We note that "Mobile" is a proxy of infrastructure quality; "Inf" is a proxy of economic stability; "Ps" and "VA" are proxies of governance. For the whole sample, descriptive statistics (Table A2-Appendix) show a significant dispersion in FDI inflows, infrastructure quality, trade openness and inflation; except the latter, dispersion in the whole sample is driven by dispersion between developed countries.

The comparison between developed and developing countries shows significant differences between them, especially in terms of FDI inflows (as a % of GDP), infrastructure quality, trade openness, inflation, and governance. FDI in developed countries is twice that in developing countries; the latter appear less open and are characterized by a remarkable deficiency in infrastructure and governance; inflation is 2.68 times higher in developing countries than in developed countries.

Overall, observation suggests that FDI inflows appear to be positively influenced by infrastructure quality, trade openness, economic stability, and governance quality.

6. ECONOMETRIC SPECIFICATION AND RESULTS

6.1. Econometric Specification

The ARDL model is a dynamic model. It combines Auto-Regressive models (past values of the explained variable are included in the list of explanatory variables) and Distributed Lag models (past values of explanatory variables are included in the list of explanatory variables). The formal expression of an ARDL model is given as follows:

$$Y_t = \alpha + \sum_{i=1}^p a_i Y_{t-i} + \sum_{j=0}^q b_j X_{t-j} + e_t \quad (1)$$

We note that the ARDL model can distinguish between long-term and short-term effects. Contrary to other models, the ARDL model developed by Pesaran et al. (2001) can be applied even if the variables are integrated in different orders (I(0) and/or I(1)). Before proceeding to ARDL estimation, some preliminary tests are necessary. First,

¹ For the list of countries, see table A1-Appendix.

we must verify that the series are stationary in level and/or in first difference; then, it is important to examine the existence of a long-run relationship between the variables (cointegration test).

We propose to estimate an ARDL model for the following linear function:

$$FDI_{i,t} = f(Lgdp_{i,t}, G_{i,t}, Mobile_{i,t}, Trade_{i,t}, Inf_{i,t}, Inv_{i,t}, Ps_{i,t} / VA_{i,t}) \tag{2}$$

Table A3-Appendix shows, for the three samples, the absence of a correlation between the explanatory variables, except for those measuring the quality of governance; the latter cannot, therefore, be introduced into the same equation.

To test the stationarity of the variables, we used the Levin, Lin and Chu (LLC), Im, Pesaran and Shin (IPS), Fisher Chi-square (ADF) and Fisher Chi-square (PP) tests. The results (Table A4-Appendix) show that, except for “Mobile” for developing countries, the variables are stationary in level (integrated of order zero); the mobile variable for developing countries is stationary in first difference (integrated of order one).

To identify the possibility of a long-run relationship between the variables, we used the Kao residual cointegration test; the null hypothesis of this test is that the variables are not cointegrated. The results obtained estimate the rejection of the null hypothesis with a probability of error equal to 0% (Table 2). Consequently, a long-term relationship between the variables is retained and an ARDL specification can be applied.

6.2. Estimation Results and Interpretations

Table 3 shows the estimation results for two ARDL models; the two models differ in the governance indicator used. In both models, we referred to the Akaike information criterion to select the optimal ARDL model.

Table 1: Definitions and sources of data (World Bank, 2023)

Variable	Definition	Source
FDI	Foreign Direct Investment, net inflows (% of GDP).	WDI
Lgdp	GDP per capita, in logarithm.	
G	General government final consumption expenditure (% of GDP).	
Inf	Inflation, GDP deflator (annual %).	
Trade	Sum of exports and imports of goods and services (% of GDP).	
Mobile	Mobile cellular subscriptions (per 100 people).	
Inv	Gross fixed capital formation (% of GDP).	
PS	Political Stability and absence of violence.	WGI
VA	Voice and Accountability.	

Table 2: Kao residual cointegration test

	Series: FDI G Lgdp Mobile Inf Trade Inv Ps			Series: FDI G Lgdp Mobile Inf Trade Inv VA		
	Whole Sample	Developed	Developing	Whole Sample	Developed	Developing
ADF						
Stat	-5.42	-4.50	-6.23	-5.41	-4.47	-6.25
Prob	0.00	0.00	0.00	0.00	0.00	0.00

We note that “CointEQ01” is the coefficient of the cointegration equation; it is the speed of adjustment. In all estimations, “CointEQ01” is significant at 1% level; this result confirms that the variables are integrated; the independent variables jointly influence FDI inflows in the long-run. The magnitude of the coefficient (between -1 and 2) indicates that equilibrium is reached with decreasing fluctuations.

For all three samples, the results estimate a significantly negative effect for general government final consumption expenditure. This effect is justified by the non-productive nature of general government final consumption expenditure; its impact on growth and FDI inflows would, therefore, have been negative. This result confirms the consensual view that variations in the composition of public expenditure, by disadvantaging spending on health, education and basic infrastructure, tend to have a negative impact on growth and FDI inflows.

The results estimate, also, that investment, infrastructure quality and governance have significantly contributed to stimulating FDI inflows. The effect size of governance is the most important. These results suggest that institutional quality is a central factor that investors place at the forefront when deciding which country to invest in (Sabir and Qureshi, 2020; Paul and Jadhav, 2019; Asamoah et al., 2016; Bevan et al., 2004 and Dunning, 1998).

We note that the size of the investment effect is more important for developed countries than for developing countries. Indeed, the contribution of investment in attracting FDI is more than 3.5 times greater for developed countries than for developing countries. This result can be explained by a complementarity effect between (productive) local investment and foreign investments; FDI inflows would have been favored by local investments oriented, mainly, towards the industrial and service sectors.

The positive effects of investment, infrastructure quality and governance corroborate, generally, the findings of Uduak et al. (2014), for a sample grouping the BRICS, Mexico, Indonesia, Nigeria, and Turkey, as well as those of Liargovas and Skandalis (2012), for a panel of 36 developing economies over the period 1990-2008.

For the whole sample, the results estimate a significantly negative effect of inflation on FDI inflows; thus, increasing economic instability discourages FDI inflows (Kunofiwa Tsurai, 2018). However, it should be noted that the effect of inflation is significantly positive for developed countries and significantly negative for developing countries; this result justifies the thesis of the non-linearity of the effects of inflation on economic activity; the effect is positive for moderate levels of inflation, and negative for high levels of inflation (Fisher, 1993; Boujelbene, 2021; Sall, 2020 and Baglan and Yoldas, 2014). We note that, according to descriptive statistics, inflation

Table 3: Estimation results of ARDL Model

	Model 1						Model 2					
	Whole sample		Developed		Developing		Whole sample		Developed		Developing	
	Coef	Pro	Coef	Pro	Coef	Pro	Coef	Pro	Coef	Pro	Coef	Pro
Long run coefficients												
G	-0.126***	0.00	-0.157***	0.00	-0.104***	0.00	-0.151***	0.00	-0.155***	0.00	-0.146***	0.00
Lgdp	0.356	0.14	0.833**	0.04	-0.187	0.54	0.421**	0.03	-0.444***	0.01	0.596***	0.00
Trade	0.033***	0.00	0.005***	0.01	0.040***	0.00	0.038***	0.00	0.003***	0.00	0.040***	0.00
Inv	0.065***	0.00	0.229***	0.00	0.060***	0.00	0.031***	0.00	0.047***	0.00	0.013	0.19
Mobile	0.004***	0.00	0.003*	0.07	0.006***	0.00	0.005***	0.00	0.008***	0.00	0.004***	0.00
Inf	-0.005***	0.00	0.122***	0.00	-0.006***	0.00	-0.007***	0.00	0.096***	0.00	-0.008***	0.00
PS	0.258***	0.00	0.565***	0.00	0.366***	0.00						
VA							1.066***	0.00	1.160***	0.00	1.382***	0.00
Short run coefficients												
CointEQ01	-0.756***	0.00	-0.707***	0.00	-0.798***	0.00	-0.766***	0.00	-0.952***	0.00	-0.787***	0.00
D (Trade)	-0.043	0.52	-0.081	0.47	0.021	0.44	-0.035	0.54	-0.108	0.35	0.018	0.41
C	-1.216*	0.10	-4.749***	0.00	1.891***	0.00	-1.267	0.13	8.927***	0.00	-3.493***	0.00

***, ** and * denote significance at 1%, 5% and 10%, respectively

Table 4: Causality test

	Whole sample			Developed countries			Developing countries		
	Chi-square	Df	Prob	Chi- square	df	Prob	Chi- square	df	Prob
Dependent variable: FDI									
Trade	33.76	10	0.00	34.43	10	0.00	11.36	10	0.33
Dependent Variable: Trade									
FDI	38.18	10	0.00	34.01	10	0.00	11.31	10	0.33

in developing countries is 2.68 times higher than in developed countries (13.39% vs. 4.98%).

Whatever the sample (whole, developed and developing countries), results estimate that the long-run effect of trade openness on FDI is significantly positive. Short-run effects of trade openness on FDI, for all samples, are not significant. The positive effect of trade openness, on the long-run, confirms the conclusions of Makoni (2018) and Zaman et al. (2018). These works indicate that a country with fewer restrictions on imports and exports has a higher chance of attracting FDI.

We note that, for developing countries, the effect of open trade on FDI inflows is greater than that of infrastructure quality (from 6.6 to 10 times). For the three samples, the long-run effect of openness on FDI is robust to the change in the governance indicator; the effect is always positive and significant; the magnitude of the effect is, on the whole, stable. Long-run effects of trade openness on FDI are greater for developing countries than for developed countries (from 8 to 13 times); this result can be justified by decreasing marginal effects of trade openness on FDI inflows; we note that, according to descriptive statistics, developed countries are more open.

The main results retained confirm the conclusion of Djulius (2017), Liargovas and Skandalis (2012) for a panel of 36 developing economies over 1990-2008. Musabeh and Zouaoui (2020), who examined the determinants of FDI inflows for Algeria, Egypt, Libya, Morocco, and Tunisia, over the period 1996-2013, show that trade openness had a positive and significant effect on FDI inflows; however, the natural resources and market size had an insignificant effect on FDI inflows.

In order to clarify the nature of the relationship between trade openness and FDI, we propose to test causality. The test we aim to use is Toda and Yamamoto's (1995) test. Contrary to the Granger test (1988), which requires variables to be integrated at the same order, the Toda and Yamamoto (1995) causality test allows to test causality for variables with different orders of integration.

The results of Toda and Yamamoto's (1995) test determine an optimal lag equal to 10, according to the LR, FPE and AIC criteria². The results of causality test are reported in Table 4.

The results show a long-run bidirectional causality between FDI inflows and Trade for whole sample and developed countries. On the contrary, the results show the absence of any causality between Trade and FDI inflows for developing countries. For whole sample and developed countries, the estimated causality relationship corroborates the findings of Gunawardhana and Damayanthi (2019) and Seyoum et al. (2014); for different samples studied over different periods, the authors show a bidirectional causality relationship between trade openness and FDI inflows.

7. CONCLUSION

FDI is a crucial component of an open and effective international economic system, influences directly and indirectly many economic activities. Many studies demonstrate that trade openness can have positively, negatively, or insignificantly impact on FDI

2 LR (sequential modified LR test statistic), FPE (final prediction error) and AIC (Akaike information criterion).

inflows. Previous studies have also found that trade openness has a mixed impact on FDI inflows in different regions and countries.

Our study analyse the long-run effects of trade openness on FDI for 124 developed and developing countries over the period 1996-2021, using the ARDL model in Panel. The main results concluded, for developed and developing countries, that trade openness has a positive and significant long-run effect on FDI inflows; the long-run effect is more important for developing countries. For developing countries, the long-run effect of trade openness on FDI is greater than that of infrastructure quality (from 6.6 to 10 times). For three samples, the short-run effects are insignificant. The results, confirm a bidirectional causality between trade openness and FDI for the whole sample and for developed countries. The long-run effect of trade openness on FDI is significantly positive for all samples. Short-run effects of trade openness on FDI, for all samples, are not significant. It's important to indicate, for all samples, the long-run effect of openness on FDI is robust to the effect of governance indicator and it is always positive and significant.

In light of these results, and based on the previous research, we can conclude the importance of international openness on the attractiveness of FDI inflows. From this perspective, governments must adopt several measures and policies to encourage the trade openness. To achieve higher economic development, governments attempt to open their trade sectors to the rest of the world, making variety of open-door policies, encourage integration, and reduce bureaucracy and barriers.

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APPENDIX

Table A1-Appendix : List of countries

Developed Countries				Developing Countries		
Albania	China	Hungary	Panama	Angola	Indonesia	West Bank and Gaza
Argentina	Colombia	Ireland	Peru	Benin	India	Rwanda
Antigua & Barb.	Costa Rica	Iceland	Poland	Burkina Faso	Iran, Islamic Rep.	Sudan
Australia	Cyprus	Italy	Portugal	Bangladesh	Kenya	Senegal
Austria	Germany	Jamaica	Paraguay	Bolivia	Kyrgyz Rep.	Sierra Leone
Azerbaijan	Denmark	Japan	Romania	Cameroon	Cambodia	El Salvador
Belgium	Dominican Rep.	Korea, Rep.	Russian Fed.	Congo, Dem. Rep.	Lebanon	Eswatini
Bulgaria	Ecuador	Lithuania	Singapore	Congo, Rep.	Morocco	Chad
Bahamas, The	Spain	Latvia	Slovak Rep.	Comoros	Mali	Togo
Bosnia and Herz.	Estonia	Moldova	Slovenia	Algeria	Mongolia	Tajikistan
Belarus	Finland	Mexico	Sweden	Egypt, Arab Rep.	Mozambique	Tunisia
Belize	Fiji	North Maced.	Thailand	Ghana	Mauritania	Tanzania
Brazil	France	Malta	Turkiye	Guinea	Niger	Uganda
Barbados	United King.	Mauritius	Uruguay	Gambia, The	Nigeria	Ukraine
Brunei Daruss.	Georgia	Malaysia	United States	Guinea-Bissau	Nepal	Uzbekistan
Botswana	Greece	Namibia	South Africa	Honduras	Pakistan	Vietnam
Canada	Guatemala	Netherlands		Haiti	Philippines	Zimbabwe
Switzerland	Hong Kong	Norway				
Chile	Croatia	New Zealand				

Developed Countries are High income and Upper-middle income; Developing Countries are Low income and Lower-middle income

Table A2-Appendix: Descriptive statistics

Whole Sample. 124 Countries. 2797 Observations									
	FDI	Lgdp	Mobile	Trade	G	Inf	Inv	PS	VA
Mean	5.47	11.49	76.58	84.60	15.43	8.40	22.67	-0.06	0.08
Max	449.08	18.99	319.42	442.62	36.21	2630.12	81.02	1.75	1.80
Min	-117.42	5.50	0.00	0.75	0.91	-27.04	1.09	-2.50	-2.12
Std.Dev	18.61	2.39	49.18	54.15	5.15	54.58	6.75	0.93	0.94
Developed Countries. 73 Countries. 1659 Observations									
	FDI	Lgdp	Mobile	Trade	G	Inf	Inv	PS	VA
Mean	6.90	11.14	92.12	96.69	17.21	4.98	22.89	0.40	0.59
Max	449.08	17.42	319.42	442.62	36.21	185.29	57.71	1.75	1.80
Min	-117.42	6.44	0.00	15.63	5.08	-22.09	4.45	-2.37	-1.76
Std.Dev	23.65	2.10	46.21	62.63	4.64	9.42	5.52	0.73	0.77
Developing Countries. 51 Countries. 1138 Observations									
	FDI	Lgdp	Mobile	Trade	G	Inf	Inv	PS	VA
Mean	3.38	12.00	53.92	66.97	12.85	13.39	22.34	-0.76	-0.67
Max	46.27	18.99	175.33	186.46	28.97	2630.12	81.02	1.17	0.59
Min	-37.17	5.50	0.00	0.75	0.91	-27.04	1.09	-2.50	-2.12
Std.Dev	5.35	2.67	44.35	31.10	4.76	84.58	8.21	0.74	0.59

Table A3-Appendix: Correlation matrix

Whole sample. 124 countries									
	FDI	G	Lgdp	Trade	Inv	Mobile	Inf	PS	VA
FDI	1.00								
G	0.02	1.00							
Lgdp	-0.04	-0.20	1.00						
Trade	0.29	0.08	-0.09	1.00					
Inv	0.05	0.02	0.11	0.13	1.00				
Mobile	0.09	0.26	0.00	0.29	0.11	1.00			
Inf	-0.01	-0.09	-0.02	-0.04	-0.04	-0.08	1.00		
PS	0.12	0.45	-0.05	0.38	0.06	0.32	-0.12	1.00	
VA	0.09	0.44	-0.06	0.16	-0.05	0.34	-0.11	0.73	1.00
Developed Countries. 73 Countries									
	FDI	G	Lgdp	Trade	Inv	Mobile	Inf	PS	VA
FDI	1.00								
G	-0.02	1.00							
Lgdp	-0.05	-0.04	1.00						

(Contd...)

Table A3-Appendix: (Continued)

Developed Countries. 73 Countries									
	FDI	G	Lgdp	Trade	Inv	Mobile	Inf	PS	VA
Trade	0.28	-0.10	-0.08	1.00					
Inv	0.01	-0.08	-0.01	0.10	1.00				
Mobile	0.06	0.12	0.11	0.25	-0.01	1.00			
Inf	-0.04	-0.11	-0.07	-0.09	-0.03	-0.23	1.00		
PS	0.09	0.39	0.05	0.30	0.02	0.15	-0.24	1.00	
VA	0.05	0.37	0.14	-0.01	-0.20	0.13	-0.27	0.68	1.00
Developing Countries. 51 Countries									
	FDI	G	Lgdp	Trade	Inv	Mobile	Inf	PS	VA
FDI	1.00								
G	0.06	1.00							
Lgdp	0.04	-0.26	1.00						
Trade	0.37	0.20	0.00	1.00					
Inv	0.32	0.09	0.21	0.20	1.00				
Mobile	0.08	0.14	0.03	0.15	0.23	1.00			
Inf	-0.02	-0.08	-0.03	-0.03	-0.05	-0.05	1.00		
PS	0.14	0.10	0.09	0.27	0.07	0.08	-0.11	1.00	
VA	0.03	0.03	-0.03	-0.06	0.01	0.14	-0.10	0.34	1.00

Table A4-Appendix: Unit root tests

Whole Sample. 124 Countries										
Level										
	FDI	G	Lgdp	Inf	Trade	Mobile	Inv	PS	VA	
Levin, Lin & Chu t*										
Stat.	-16.05	-5.31	-17.35	-65.56	-6.78	-17.53	-7.82	-9.61	-6.45	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Im, Pesaran and Shin W-stat										
Stat.	-18.68	-5.74	-8.77	-37.79	-4.82	-9.74	-8.15	-8.87	-8.38	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ADF - Fisher Chi-square										
Stat.	835.79	414.51	567.16	1963.20	369.11	667.93	480.10	486.66	522.46	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PP - Fisher Chi-square										
Stat.	850.98	405.90	996.21	2231.68	379.85	1768.78	425.82	470.69	472.66	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Developed Countries. 73 Countries										
Level										
	FDI	G	Lgdp	Inf	Trade	Mobile	Inv	PS	VA	
Levin, Lin & Chu t*										
Stat.	-14.96	-2.63	-18.11	-24.73	-6.02	-20.89	-8.28	-7.86	-5.43	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Im, Pesaran and Shin W-stat										
Stat.	-16.13	-2.83	-9.76	-22.39	-3.33	-17.13	-8.80	-8.06	-6.64	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ADF - Fisher Chi-square										
Stat.	541.20	204.38	388.72	864.17	215.73	614.78	340.88	316.45	306.89	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PP - Fisher Chi-square										
Stat.	556.10	199.34	765.40	1118.54	224.77	1741.71	298.53	315.24	298.53	
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Developing Countries. 51 Countries										
Level										
	FDI	G	Lgdp	Inf	Trade	Mobile	Inv	PS	VA	1 st Difference
Levin, Lin & Chu t*										
Stat.	-7.66	-5.32	-7.32	-65.80	-3.29	-2.54	-2.36	-5.88	-3.56	-10.54
Prob	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Im, Pesaran and Shin W-stat										
Stat.	-9.81	-5.57	-2.04	-32.19	-3.53	5.19	-2.18	-4.18	-5.11	-10.45
Prob	0.00	0.00	0.02	0.00	0.00	1.00	0.01	0.00	0.00	0.00
ADF-Fisher Chi-square										
Stat.	294.59	210.127	178.43	1099.03	153.38	53.15	139.21	170.21	215.57	293.84
Prob	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
PP - Fisher Chi-square										
Stat.	294.88	206.55	230.81	1113.14	155.08	27.07	127.28	155.44	174.13	289.94
Prob	0.00	0.00	0.00	0.00	0.00	1.00	0.04	0.00	0.00	0.00