

Export Product Diversification, Trade Openness and Foreign Direct Investment Inflows: An Empirical Analysis

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This article aims to contribute to the literature on the relationship between international trade and foreign direct investment (FDI) inflows by investigating whether export product diversification in host-countries influences FDI inflows to these countries, including when the latter further open-up to international trade. The analysis has been conducted on an unbalanced panel dataset comprising 143 countries over the period 1970-2010. Results, based on the two-step system Generalized Methods of Moments (GMM) approach, suggest that export product diversification exerts a positive and significant effect on FDI inflows, with this positive effect increasing as countries enjoy a higher real per capita income. This positive effect is particularly enhanced when the economic growth rate is positive in the host-country, as well as when the latter experiences greater trade openness.

Keywords: Export product diversification, Foreign direct investment, Trade openness

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INTRODUCTION

When considering the relationship between trade and foreign direct investment (FDI) inflows, many studies in the literature have examined the effect of openness to international trade on FDI inflows (e.g., Markusen, 1984; Helpman and Krugman, 1985; Markusen and Venables, 1995; Asiedu, 2002; Busse and Hefeker, 2007; Mina, 2007; Trevino et al. 2008; Asiedu and Lien, 2011; Fugazza and Trentini, 2014; Boateng et al. 2015; Gnanngnon, 2017a; Gnanngnon and Iyer, 2017). At the same time, some studies have shown at the macroeconomic level that export product diversification helps dampen export revenue instability (e.g., Athukorola, 2000; Osakwe, 2007; Prebisch, 1950; Singer, 1950; Stanley and Bunnag, 2001; United Nations, 2004, 2014). At the firm level, the few existing studies have reported that export product diversification contributes to reducing export revenue instability (e.g., Hirsch and Lev, 1971; Juvenal and Monteiro, 2013; Kramarz et al. 2020; Vannoorenberghe et al., 2016). A growing body of the literature (Cadot et al., 2011a; Falk, 2009; Grossman and Helpman, 1991; Haddad et al. 2013; Hausman et al., 2007; Neto and Romeu, 2011; Xu, 2000) has discussed the relevance of export product specialization or export product diversification (depending on the quality of the exported products) for reducing economic growth volatility, promoting economic growth and development. However, little attention has been paid to the effect of export product upgrading, in particular export product diversification, on FDI inflows. The current analysis intends to bridge this gap in the literature by investigating whether export product

diversification influences FDI inflows, and if so whether this effect depends on countries' level of openness to international trade. We are not aware of any previous study that has examined the effect of export product diversification on FDI inflows, notably when countries further open-up to international trade. While there could be multiple channels through which export product diversification could influence FDI inflows, the current paper primarily considers the effect of export product diversification on FDI inflows through the channel of economic growth in the host country. The analysis is conducted using an unbalanced panel dataset comprising 143 countries over the period 1970-2010. The empirical results, based on the two-system Generalized Methods of Moments (GMM) technique, show that higher export product diversification drives positively FDI inflows, with the magnitude of this effect being higher for advanced countries than for relatively less developed countries. Furthermore, in the context of negative real per capita income growth, it is export product concentration that is positively associated with FDI inflows, whereas countries that enjoy a positive economic growth experience a positive effect of export product diversification on FDI inflows. Finally, the size of the positive effect of export product diversification on FDI inflows rises as countries' level of trade openness increases. These findings, therefore, adds to the literature on the effect of international trade on FDI inflows by demonstrating that export product diversification also plays an important role in promoting FDI inflows to host-countries, in particular when the latter enjoy a higher (positive) economic growth rate, and greater trade openness.

The rest of the analysis is organized as follows. Section 2 discusses how export product diversification can influence FDI inflows, including when countries open-up to international trade. Section 3 presents the empirical model to address the issue at hand. Section 4 describes the econometric strategy and section 5 interprets empirical results. Section 6 concludes.

EXPORT PRODUCT DIVERSIFICATION, TRADE OPENNESS AND FDI INFLOWS

The importance of exports and in particular, export product upgrading for development prospects in developing countries has been well emphasized in the relevant literature. Export product diversification can influence FDI inflows through a variety of channels, all being ultimately conducive to higher economic growth.

The literature has well emphasized the link between exports and economic growth. For example, Grossman and Helpman (1991) have noted that exports—and a fortiori export product upgrading—could generate positive spillovers to other sectors (non-export sectors) of the economy. These could take the form of efficient management and adoption of better production techniques for both the export and non-export sectors—which would lead to innovation, drive production in all sectors, increase income, and ultimately promote economic growth (Edwards, 1993; Feder, 1983; Falk, 2009; Greenaway et al. 1999; Grossman and Helpman, 1991; Xu, 2000). Crespo-Cuaresma and Worz (2005) have also argued that exporting could also be associated with positive externalities deriving from competition in international trade markets, including in the form of increasing returns to scale, learning spillovers, increased innovation, as well as other efficiency gains. According to Herzer and Nowak-Lehmann (2006) and Naudé et al. (2010), positive spill-overs arise from moving from primary commodities into high-skilled, high-technology goods. These spillovers take the form of higher productivity gains, skills and technological upgrading (e.g., learning-by-doing and learning-by-exporting).

Concerning the direct effect of export product diversification on FDI inflows, we argue that resource-seeking multinational enterprises (MNEs) might not be willing to set up plants in countries with a high degree of export product diversification (unless these countries are highly endowed with natural resources), but rather in countries highly endowed with natural resources such as Least Developed Countries (LDCs). This applies to those MNEs that intend to invest in the natural resource sectors of the host-countries, with a view to either extracting raw materials and sending them back to their home-countries for processing, or extracting them and processing them in the host-countries, eventually for export. In this context, we could expect lower export product diversification to be associated with higher FDI inflows, notably resource-seeking FDI inflows. At the same time, MNEs could be willing to engage in FDI in host-countries that experience higher export product diversification, with a

view to leveraging the related positive spillovers highlighted above, and produce exportable goods and domestically consumable goods of higher quality. Furthermore, host-countries with higher degrees of export product diversification could reflect, for example, the existence of a pool of relatively skilled labour, some relatively good quality hard infrastructure, as well as institutional quality, and a relatively sound macroeconomic environment. All are factors that could incentivize MNEs that intend to engage in FDI in host-countries in order to produce and/or export goods and services. In this context, higher export product diversification would be associated with higher FDI inflows, and countries that experience lower levels of export product diversification would experience lower FDI inflows. As the analysis uses aggregate FDI inflows, it would be difficult to anticipate at this stage of the analysis the direction of the effect of export product diversification on FDI inflows.

On the other hand, many studies have underlined the importance of export product upgrading for economic growth (e.g., Hummels and Klenow, 2005; Redding, 1999; Arezki and Van der Ploeg, 2007; Hausman et al., 2007; Cadot et al., 2011a; Sannasse et al., 2014). However, the empirical evidence on the effect of export product diversification on economic growth is mixed. According to De Pineres and Ferrantino (1997), export product diversification in the Chilean economy has resulted in higher economic growth during periods of severe structural change. Herzer and Nowak-Lehmann (2006) have found that export product diversification plays an important role in economic growth. Hess (2008) has provided empirical evidence that export product diversification exerts a nonlinear effect on real per capita income growth. Developing countries enjoy a positive effect of export product diversification on economic growth, while for most advanced countries, it is rather export specialization that is positively associated with economic growth. Along the same lines, Aditya and Acharyya (2013) have uncovered empirically that export product concentration promotes economic growth only when export specialization exceeds a certain threshold. Otherwise, below this critical threshold, it is rather export diversification that is positively associated with economic growth. Hodey and Senadza (2015) have obtained a positive effect of export product diversification on economic growth in Sub-Saharan African countries. In contrast, Matthee et al. (2016) have shown for South Africa that exporting goods that are further from the country's comparative advantage does not promote economic growth. Can and Gozgor (2017) have found that export product diversification promotes economic growth. Mania and Rieber (2019) have investigated the effect of product export diversification on sustainable economic growth in developing countries, and obtained heterogeneous results across three samples of developing countries, including Latin America, Sub-Saharan Africa and Developing Asia. Overall, export product diversification could be associated with economic growth rate, in particular below a certain threshold of export product diversification, as higher export product specialization, including in sophisticated products (i.e., products of high quality) promotes economic growth (e.g. Hausmann et al., 2007). Therefore, it remains unclear whether it is export product diversification or export product specialization that would promote FDI inflows through higher economic growth. The uncertainty about this relationship is compounded by the fact that it is also not clear whether higher economic growth rates always drive FDI inflows into the host-country. In fact, economic growth could exert a positive effect, a negative effect or a statistically nil effect on FDI inflows. According to Torrissi (1985) and Zhang (2001), economic growth might be unrelated to FDI inflows, as the main drivers of FDI inflows in the host-country include factor-price differentials, such as labor cost, and transportation cost from host countries to other countries in the region. This is particularly the case for mineral-rich African countries where natural resources rather than the market size and the economic growth rate attract FDI inflows (e.g., Akinlo, 2004). Other empirical works (e.g., Buchanan et al., 2012; Jensen, 2003; Wint and Williams, 2002) have reported a negative effect of economic growth on FDI inflows. One explanation of such a negative effect has been that a host-country experiencing a recession might attract some types of FDI inflows, especially mergers and acquisitions, which can expand during the recession, as the latter would be associated with lower labor and capital costs, which improve the cost structure of the firm. Likewise, a lower economic growth rate could be associated with greater opportunities for future profits and hence attract FDI inflows. This could be the case for a country that is relatively capital poor but has a relatively abundant supply of cheap (underemployed or unemployed) labor and natural resources. Such a country can attract FDI inflows that aim to take advantage of the un-

derutilized resources and obtain higher profits (e.g., Iamsiraroj and Doucouliagos, 2015). In the meantime, some other studies have shown that FDI flows could be motivated to locate in countries that perform better, including in terms of economic growth (e.g., Al Nasser, 2007; Blonigen et al., 2007; Greenaway et al., 2007; Jiménez, 2011; Mohamed and Sidiropoulos, 2010). One explanation of the positive effect of the economic growth rate on FDI inflows is the cost efficiency of production and the economies of scale and scope in production associated with higher economic growth in the host-country (e.g., Agosin and Machado, 2007; Carstensen and Toubal, 2004). These provide multinationals with signals that the host-country's market is growing, in particular as the rise in aggregate demand generates greater opportunities for making profits (e.g., Lim, 1983; Torrissi, 1985; Zhang, 2005).

On another note, the empirical macroeconomic literature has shown that export product diversification results in lower aggregate volatility, including lower economic growth volatility (e.g., Balavac and Pugh, 2016; Caselli et al., 2014; di Giovanni and Levchenko, 2009; di Giovanni et al., 2014; Haddad et al., 2013; Lee and Zhang, 2019; McIntyre et al., 2018). As lower output volatility is associated with higher economic growth (e.g. Acemoglu et al., 2003; Badinger, 2010; Berument et al., 2012; Fata, 2002; Hnatkovska and Loayza, 2005; Ramey and Ramey, 1995), we would expect that export product diversification would affect FDI inflows through its negative effect on output volatility, and hence its positive effect on economic growth. Nevertheless, as discussed above, the direction of the effect of export product diversification on FDI inflows through the economic growth channel is still unclear.

As for the effect of trade openness on FDI inflows, we expect from the theoretical perspective¹ that this effect could be positive or negative, depending on the types of FDI undertaken by multinational enterprises (MNEs), including horizontal FDI models, vertical FDI models, export platform FDI models, and complex-vertical FDI models. While restrictive trade policies are conducive to horizontal-type FDI (tariff-jumping hypothesis) (e.g., Markusen, 1984; Markusen and Venables, 1995), trade policy liberalization induces higher vertical FDI (e.g., Helpman and Krugman, 1985), higher export platform FDI and higher complex-vertical FDI (e.g., Fugazza and Trentini, 2014). Incidentally, authors such as Busse and Hefeker (2007) have underlined that restrictive trade measures, including in developing countries, along with other forms of policy restrictions such as exchange-rate controls, could induce lower FDI inflows. Several empirical analyses (e.g., Asiedu, 2002; Mina, 2007; Trevino et al., 2008; Asiedu and Lien, 2011; Boateng et al., 2015; Gnanngnon, 2017a; Gnanngnon and Iyer, 2017) have found a positive and significant effect of host-countries' trade openness on FDI inflows. Against this backdrop, we may find a positive or a negative effect of trade openness on FDI inflows. In particular, it would be difficult to predict at this stage of the analysis whether trade openness induces higher (aggregate) FDI inflows, as the issue is an empirical one. We discuss now how export product diversification and trade openness could interact in influencing FDI inflows. On the one hand, as greater trade openness could facilitate export product diversification (Agosin et al., 2012; Amighini and Sanfilippo, 2014; Harding and Javorcik, 2012; Saggi 2002), it would benefit MNEs that are willing to establish in host-countries with a high degree of export product diversification, in order to produce and export more sophisticated products. In this context, higher levels of export product diversification would induce higher FDI inflows to countries that further open-up to international trade. On the other hand, MNEs could be motivated by the host-countries' high level of natural resource endowment, with a view to extracting and exploiting natural resources. Thus, host-countries that are specialized in low-value added products (i.e., countries with a high export product concentration) that further open-up to international trade would attract higher FDI inflows. In contrast, if firms are only motivated by exploiting host-countries' resources and send them back to their home countries for processing, then it is not the degree of export product diversification in the host-countries that would matter for FDI inflows, but rather their level of trade openness. Overall, the extent to which the effect of export product diversification on FDI inflows depends on host-countries' degree of openness is unknown, notably in the context of using aggregate FDI inflows in the analysis.

¹A more detailed literature review could be found for example in Gnanngnon (2017a).

MODEL SPECIFICATION

To address the questions under analysis, we draw from the literature on the macroeconomic determinants of FDI inflows and consider as control variables the size of the domestic market of the host-country (proxied by the real per capita income, the economic growth rate and the population size); the degree of openness to international trade; the host-country's human capital accumulated, proxied by the education level; the inflation rate; the dependence on natural resources, and the institutional quality proxied by the constraints on the executive. Many studies (e.g., Noorbakhsh et al., 2001; Asiedu, 2002; Asiedu, 2006; Uddin and Boateng, 2001; Busse and Hefeker, 2007; Vo and Daly, 2007 and Boateng et al., 2015) have shown evidence of a positive impact of the host-country's market size on FDI inflows into that country. However, if the multinational firms that engage in FDI in a host-country do not intend to mainly serve the domestic market, but rather to serve the host-countries' trading partners, then FDI flows to that host-countries might not be related to (or might be negatively associated with) the size of their domestic market. Overall, as the analysis relies on aggregate FDI inflows, it is difficult to anticipate the net impact of the market size of the host-countries on FDI inflows into these countries. In the present analysis, as we are exploring the effect of export product diversification on FDI inflows through the economic growth channel, we first exclude this variable from the model specification, and later test the extent to which the effect of export product diversification on FDI inflows translates through the economic growth channel.

As for human capital accumulation, we expect that higher education level in the host-country, which reflects higher literacy and more skilled labor would be positively associated with FDI inflows to the country (Asiedu, 2006; Trevino et al., 2008; and Okafor et al., 2015).

A low and stable inflation rate in a host-country reflects an internal macroeconomic stability (and to some extent, a stable internal political stability). Therefore, low inflation rates are associated with higher FDI inflows. A negative impact of inflation rate on FDI inflows has been uncovered for example, by Coskun (2001) and Boateng et al. (2015).

We have included in the model a variable capturing the natural resource endowment of a given country—which is measured by the share of total natural resource rents in GDP—so as to capture the effect of natural resources on FDI inflows. Poelhekke and Van der Ploeg (2013) have investigated the effects of natural resources on the different components of FDI, and obtained evidence that natural resources reduce FDI flows to the non-resource sector. Asiedu (2006) has shown that natural resources promote FDI flows to African countries, and Asiedu (2013) has provided empirical evidence that natural resources exert an adverse effect on aggregate FDI inflows in developing countries, although better institutional quality can help mitigate this effect but not neutralize it. In light of the above, it would be difficult to anticipate the effect of total resources rents on FDI inflows.

We proxy the institutional quality by the constraints on the executive. Institutional quality is expected to influence FDI inflows (e.g., Ali et al., 2010; Asiedu, 2003; Asiedu, 2006; Asiedu and Lien, 2011; Buchanan et al., 2012; Globerman and Shapiro, 2002; Peres et al., 2018). The executive constraints (Decision rules) refer to the extent of institutionalized constraints on the decision-making powers of chief executives, whether individuals or collectivities (Marshall et al., 2018), and are expected to affect export product upgrading (Henn et al., 2013; 2015). As a result, we expect higher constraints on the executive (i.e., better institutional quality) to be positively associated with FDI inflows.

Against this background, we postulate the following model:

$$FDICAP_{it} = \alpha_0 + \alpha_1 FDICAP_{it-1} + \alpha_2 ECI_{it} + \alpha_3 OPEN_{it} + \alpha_4 \log(GDPC)_{it} + \alpha_5 \log(POP)_{it} + \alpha_6 RENT_{it} + \alpha_7 XCONST_{it} + \alpha_8 EDU_{it} + \alpha_9 INFL_{it} + \mu_i + \eta_t + \omega_{it} \quad (1)$$

where i represents the country's index; t denotes the time-period. The panel dataset used in the analysis is unbalanced and contains 143 countries (of which 50 are LDCs), with data spanning the period 1970-2010. The dataset was chosen on the basis of data availability. To smooth out the effect of business cycles on the variables

contained in model (1), we use average data over 5-years. In particular, we use 7 non-overlapping sub-periods of 5-year averages and 1 non-overlapping 6-year average sub-period. This amounts to 8 non-overlapping sub-periods for the entire period 1970-2010 and includes: 1970-1974; 1975-1979; 1980-1984; 1985-1989; 1990-1994; 1995-1999; 2000-2004; and 2005-2010.

The dependent variable “FDICAP” represents the real per capita FDI inflows (constant 2010, US\$). This variable has been computed by multiplying the FDI inflows-to-GDP ratio by the real per capita GDP (constant 2010, US\$) (see also Herzer, 2011 and Nagel et al., 2015). To limit its skewness, it has been transformed using a formula proposed by Yeyati et al. (2007) (see details in Appendix 1). The one-period lag of this variable has been introduced in model (1) in order to capture the state dependence nature of this variable, i.e., its persistence over time.

α_0 to α_9 are parameters to be estimated. μ_i are countries’ fixed effects; θ_t represent time dummies and aim to capture global shocks that affect together all countries’ FDI inflows. ω_{it} is a well-behaving error term.

The variable “ECI” is the measure of export product concentration, and represents our key variable of interest. It has been extracted from the database² on export upgrading developed by the International Monetary Fund (IMF) (see IMF, 2014). The extent of diversification across a country’s exports has been measured using the Theil index, and following the definitions and methods used in Cadot et al. (2011b). This indicator has now been widely used in the empirical literature (e.g., Can and Gozgor, 2018; Gnanon, 2017b; Gnanon, 2018; Gnanon and Brun, 2017; Papageorgiou and Spatafora, 2012; Papageorgiou et al., 2015). The calculation³ of these variables has relied on a classification of products into “Traditional”, “New”, or “Non-Traded” products categories, using a dataset covering the period 1962-2010. A decline in the values of ECI index signifies an increase in the degree of overall export product diversification, while an increase in the index indicates a rise in the degree of overall export product concentration.

The control variables used in model (1) include:

- the level of openness to international trade (denoted “OPEN”);
- the market size of a country, captured through three variables, including real per capita income (denoted “GDPC”), and the population size (“POP”).
- the level of human capital development, proxied by the level of education (denoted “EDU”).
- the inflation rate (denoted “INFL”);
- the natural resources rents, in percentage of GDP (denoted “RENT”) as a proxy for countries’ dependence on natural resources;
- and the institutional quality denoted “XCONST”.

The definition and sources of all variables used in model (1) are described in Appendix 1. Standard descriptive statistics on these variables are reported in Appendix 2. Appendix 3 presents the list of the 143 countries contained in the full sample.

ECONOMETRIC STRATEGY

The estimation of model (1) by means of the standard econometric estimators, such as the fixed effects or the random effects would raise several endogeneity concerns and lead to biased coefficients. This is because of the dynamic nature of this model, i.e., the presence of the one-year lag of the dependent variable as a regressor, which would generate the Nickell bias (Nickell, 1981) on a panel dataset similar to ours (limited time dimension ($T = 8$) and large number of cross-sections ($N = 143$)). Second, many explanatory variables of this model could be considered as endogenous due to the reverse causality problem. To address these concerns and obtain reliable

²See the IMF Diversification Toolkit “Export Diversification and Quality Databases”, online at: <https://www.imf.org/external/np/res/dfidimf/diversification.htm>.

³Details on the methodology used to calculate this index could be found online at: <https://www.imf.org/external/datamapper/Technical%20Appendix%20for%20Export%20Diversification%20database.pdf>.

estimates, we use the Generalized Methods of Moments (GMM) estimator, and in particular the two-step system GMM approach developed by Blundell and Bond (1998) (see Appendix 4 for further description of this estimator). The variables “ECI”, “OPEN”, “EDU”, “INFL”, “XCONST” and “RENT” have been considered as endogenous in the two-step system GMM-based regressions. This is due to the bi-directional causality between each of these regressors and the dependent variable. For example, while export product diversification could affect FDI inflows, the latter could in turn influence export product diversification. Similarly, all the other variables highlighted as endogenous could, in turn, be influenced by FDI inflows. We have used a maximum of 3 lags of the dependent variable as instruments and a maximum of 2 lags of the endogenous variables as instruments in the regressions.

The results of the estimation of model (1) are reported in column [1] of Table 1. In light of the findings in the literature that there is a non-linear relationship between export product diversification and economic growth in the host-countries (see Section 2), we hypothesize that a non-linear relationship between export product diversification and FDI inflows might also exist, in particular as we are examining the effect of export product diversification on FDI inflows through the economic growth channel. Therefore, we estimate a variant of model (1) in which we introduce the squared term of the variable “ECI”. The results of the estimation of this model specification are displayed in column [2] of Table 1. From now onwards, any variant of model (1) could include the squared term of “ECI” if the coefficient of this variable (in column [2] of Table 1) appeared to be statistically significant at the conventional levels, in particular if it was at least at the 5% level. We also go deeper into the analysis by investigating the extent to which the effect of export product diversification on FDI inflows varies across countries in the full sample. To that effect, we estimate another variant of model (1) in which we include

Table 1. Effect of export product diversification on fdi inflows. Estimator: Two-step system GMM

Variables	FDICAP (1)	FDICAP (2)	FDICAP (3)
FDICAP _{t-1}	0.134*** (0.00652)	0.122*** (0.00533)	0.0856*** (0.00339)
ECI	-1.079*** (0.0945)	2.105*** (0.346)	9.622*** (1.229)
ECI ²		-0.388*** (0.0474)	-1.136*** (0.162)
[Log (GDPC)]*ECI			-0.835*** (0.133)
[Log (GDPC)]*ECI ²			0.0783*** (0.0179)
OPEN	0.0192*** (0.00150)	0.0183*** (0.00112)	0.0190*** (0.000778)
Log (GDPC)	0.313*** (0.0919)	0.420*** (0.0726)	2.331*** (0.232)
Log (POP)	0.503*** (0.0857)	0.707*** (0.0656)	0.329*** (0.0325)
RENT	0.0585*** (0.00597)	0.0641*** (0.00668)	0.0791*** (0.00405)
XCONST	0.0764** (0.0377)	0.0988*** (0.0300)	0.0727*** (0.0128)
EDU	0.00202 (0.00466)	0.00727** (0.00336)	0.0132*** (0.00200)
INFL	-0.256*** (0.0540)	-0.428*** (0.0446)	-0.271*** (0.0199)
Constant	-2.011 (1.419)	-11.54*** (1.491)	-23.01*** (2.525)
Observations-Countries	738-143	738-143	738-143
Number of Instruments	102	114	134
AR1 (p-value)	0.0075	0.0086	0.0099
AR2 (p-value)	0.3542	0.3451	0.2953
AR3 (p-value)	0.9106	0.8830	0.9901
Sargan (p-value)	0.3469	0.3468	0.3172

Note: *p-value < 0.1; **p-value < 0.05; ***p-value < 0.01. Robust standard errors are in parenthesis. In the regressions, the variables “ECI”, its squared term, “OPEN”, “GROWTH”, “EDU”, “INFL”, “XCONST”, “RENT” and the interaction variables have been considered as endogenous. Time dummies have also been included in the model. However, to save space, we have not reported here the related estimates. We use a maximum of two 3 lags of the dependent variable as instruments and a maximum of 2 lags of the endogenous variables as instruments in the regressions.

the interaction between the export product concentration variable and the real per capita income (as well as possibly the interaction between the squared term of “ECI” and the real per capita income variable), the real per capita income being considered here as a proxy for countries’ economic development level. The results of these estimations are presented in column [3] of Table 1. In column [1] of Table 2, we show the results that allow investigating how the effect of export product diversification on FDI inflows is dependent on countries’ economic growth, which we measure by the real per capita GDP growth rate (denoted “GROWTH”). These results help test our assumption in section 2 that the effect of export product diversification on FDI inflows could translate through the economic growth channel. To perform this analysis, we estimate another specification of model (1), which contains the variable “GROWTH” (which is considered as endogenous given that FDI inflows could also affect economic growth rates), the interaction between “ECI” and the “GROWTH” variable, and eventually the interaction between the squared “ECI” and “GROWTH” (depending on results on column [2] of Table 1). Finally, to assess the extent to which export product concentration (diversification) and trade openness interact in influencing FDI inflows, we estimate a specification of model (1) in which we introduce the interaction between the variables capturing respectively the level of export product concentration (eventually its squared term) and the measure of trade openness. Results are presented in column [2] of Table 2.

Table 2. Effect of Export Diversification on FDI for varying levels of economic growth and trade openness. Estimator: Two-step system GMM

Variables	FDICAP (1)	FDICAP (2)
FDICAP _{t-1}	0.114*** (0.00399)	0.0973*** (0.00293)
ECI	1.626*** (0.188)	5.578*** (0.221)
ECI ²	−0.337*** (0.0254)	−0.855*** (0.0286)
GROWTH*ECI	−0.230*** (0.0197)	
GROWTH*ECI ²	0.0255*** (0.00243)	
OPEN*ECI		−0.0401*** (0.00141)
OPEN*ECI ²		0.00627*** (0.000198)
GROWTH	0.422*** (0.0397)	
OPEN	0.0210*** (0.000823)	0.0707*** (0.00337)
Log(GDPC)	0.572*** (0.0431)	0.363*** (0.0463)
Log(POP)	0.613*** (0.0343)	0.857*** (0.0404)
RENT	0.0572*** (0.00379)	0.00507 (0.00573)
XCONST	0.0570*** (0.0132)	0.0697*** (0.0148)
EDU	−0.00259** (0.00131)	0.0253*** (0.00189)
INFL	−0.337*** (0.0200)	−0.390*** (0.0289)
Constant	−10.16*** (0.913)	−19.26*** (0.945)
Observations - Countries	738-143	738-143
Number of Instruments	146	134
AR1 (p-value)	0.0101	0.0103
AR2 (p-value)	0.3363	0.2984
AR3 (p-value)	0.7556	0.7729
Sargan (p-value)	0.3774	0.3965

Note: *p-value < 0.1; **p-value < 0.05; ***p-value < 0.01. Robust Standard Errors are in parenthesis. In the regressions, the variables “ECI”, its squared term, “OPEN”, “GROWTH”, “EDU”, “INFL”, “XCONST”, “RENT” and the interaction variables have been considered as endogenous. Time dummies have also been included in the model. However, to save space, we have not reported here the related estimates. We use a maximum of two 3 lags of the dependent variable as instruments and a maximum of 2 lags of the endogenous variables as instruments in the regressions.

ANALYSIS OF EMPIRICAL RESULTS

Across columns of Tables 1 and 2, the coefficients associated with the one-year lag of the dependent variable are positive and statistically significant at the 1% level, thereby confirming that FDI inflows follow a state-dependence path. We briefly examine the results of the diagnostic tests—reported at the bottom of all columns of Tables 1 and 2—that help check the validity of the two-step system GMM estimator. These results indicate that the estimator is suitable for the empirical analysis. In fact, we note across all columns of the two Tables that the p-values associated with the AR (1) test are always lower than (or equal to) 0.01 (i.e., the 1% level of statistical significance), and indeed they should be at least lower than 10%, the p-values relating to the AR (2) and AR (3) tests are all higher than 0.1 (the 10% level of statistical significance). Additionally, the Sargan statistic is always associated with a p-value higher than 10%, and the number of instruments is almost always lower than the number of countries across these two tables.

Let us now interpret the estimates reported in Table 1.

Results in column [1] suggest that the coefficient of the variable ECI is negative and statistically significant at the 1% level, thereby showing that export product concentration influences negatively and significantly FDI inflows. At the same time, results in column [2] show that both the variables “ECI” and its squared term display statistically significant coefficients at the 1% level: the coefficient of “ECI” is positive, whereas the interaction term associated with the square of “ECI” is negative. These two results indicate that there is a non-linear relationship between export product concentration and FDI inflows, in the form of an inverted U-curve. In other words, export product concentration is positively associated with FDI inflows only when it is lower than a critical threshold, as above this threshold, it leads to lower FDI inflows. This threshold of “ECI” amounts, on average, to 5.54 ($= 2.105/0.38$). This threshold appears to fall within the range of values of ECI (i.e., between 1.067 and 6.348, see Appendix 2). To better illustrate this non-linear relationship between export product concentration and FDI inflows, we provide in Figure 1, at the 95 per cent confidence intervals⁴, the developments of the marginal impact of export product concentration on FDI inflows for varying levels of export product concentration.

The marginal impact appears to decrease as the level of export product concentration increases, and becomes negative after a certain level of export product concentration. This signifies that countries with a low level of

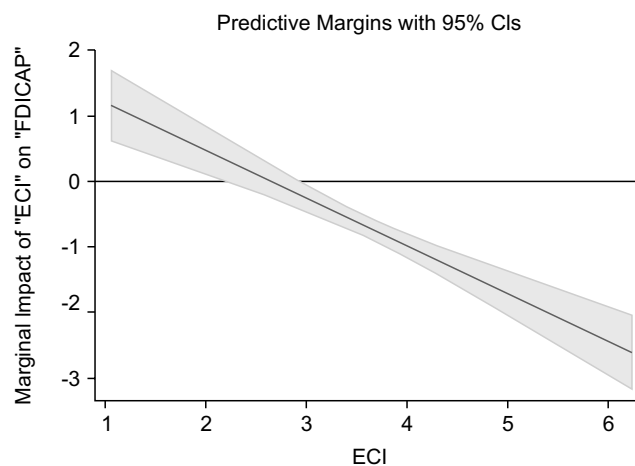


Fig. 1. Marginal Impact of “ECI” on “FDICAP”, for varying levels of ECI.
Source: Author.

⁴The statistically significant marginal impacts at the 95 per cent confidence intervals are those including only the upper and lower bounds of the confidence interval that are either above or below the zero line.

export product concentration (i.e., a higher degree of export product diversification) experience higher FDI inflows, and as the level of export product concentration rises (i.e., the level of export product diversification decreases), countries attract less FDI inflows. However, this marginal impact is not always statistically significant. It is non-statistically significant for values of the variable “ECI” comprised between 2.23 and 2.97 (excluding the latter value) (these two numbers have been obtained from the Stata software). Thus, countries whose level of export product concentration ranges between 2.23 and 2.97 experience no significant effect of export product concentration on FDI inflows. However, countries with a level of export product concentration lower than 2.23 enjoy higher FDI inflows, while for countries with a level of export product concentration higher than 2.97, export product concentration is negatively associated with FDI inflows. Overall, this Figure suggests that greater export product diversification induces higher FDI inflows. Therefore, from now onwards, all other variants of model (1) estimated would contain the squared of “ECI” as a regressor. The results concerning control variables across the two columns of Table 2 are similar. Focusing on results in column [2], we obtain that FDI inflows are positively driven by greater trade openness, higher real per capita income, a rise in the population size, a higher dependence on natural resources, better institutional quality, a rise in the education level, and lower inflation rates. Turning now to estimates presented in column [3] of Table 1, we first observe that results of control variables are similar to those in column [2]. As for the estimates of key interest, we note that the coefficients of the variables “ECI” and its squared term are respectively positive and negative, and statistically significant at the 1% level. At the same time, the interaction term associated with the variable $[ECI \cdot \text{Log (GDPC)}]$ is negative and statistically significant at the 1% level, while the interaction term related to the interaction variable $[ECI^2 \cdot \text{Log (GDPC)}]$ is positive and statistically significant at the 1% level. As they stand, all these estimates taken together are difficult to interpret. As a result, we proceed with a graphical analysis of these results by presenting in Figure 2, at the 95 per cent confidence intervals, the developments of the marginal impact of export product concentration on FDI inflows for varying levels of real per capita income.

This figure shows that the marginal impact of export product concentration on FDI inflows is always negative and statistically significant, and decreases as countries experience a higher real per capita income. This suggests that export product concentration is always negatively and significantly associated with FDI inflows, and the magnitude of this reducing effect increases as countries enjoy a higher real per capita income. In other words, export product diversification always induces higher FDI inflows, with the magnitude of this positive effect increasing as countries’ real per capita income rises. This means that advanced countries obtain a higher positive effect of export product diversification on FDI inflows than do relatively less advanced countries. Thus, the low level of export product diversification in least developed countries (which are poor countries) (i.e., their high

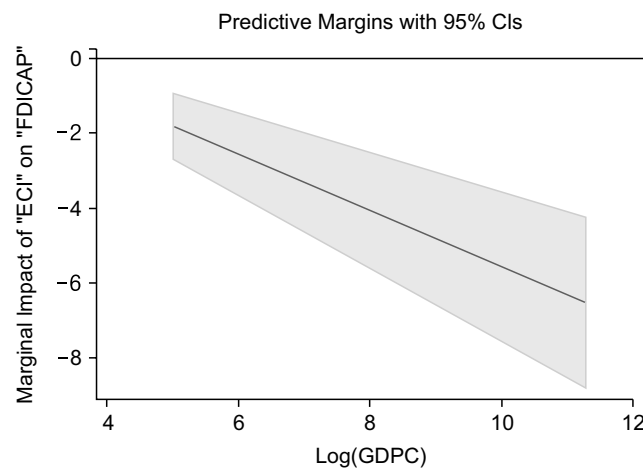


Fig. 2. Marginal Impact of “ECI” on “FDICAP”, for varying levels of real per capita GDP. Source: Author.

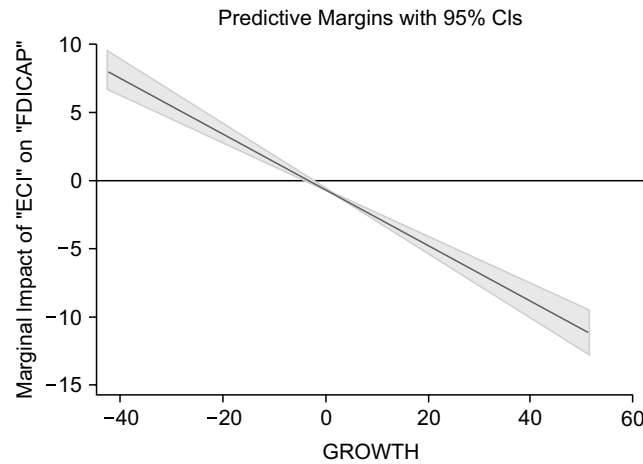


Fig. 3. Marginal Impact of “ECI” on “FDICAP”, for varying levels of real per capita GDP growth. Source: Author.

degree of export concentration on primary products) could be one of the reasons that explains why they do not attract FDI flows as do other countries.

We now consider the results presented in Table 2.

Results in column [1] of this table show a positive and significant coefficient (at the 1% level) of the variable “ECI” and a negative and statistically significant interaction term related to the squared term of “ECI”. In addition, the interaction term of the variable $[ECI \times GROWTH]$ is negative and statistically significant at the 1% level, while the interaction term related to the interaction variable $[ECI^2 \times GROWTH]$ is positive and statistically significant at the 1% level. Once again, as these results taken together could be difficult to interpret, we display in Figure 3, at the 95 per cent confidence intervals, the developments of the marginal impact of export product concentration on FDI inflows for varying rates of real per capita GDP growth.

It could be observed in this figure that the marginal impact of export product concentration on FDI inflows takes positive and negative values, and decreases as countries experience a higher real per capita GDP growth rate. However, it is not statistically significant only for the economic growth rate amounting to -3.11% , and additionally changes sign above this threshold of the economic growth rate. In particular, for countries that experience a negative economic growth rate (i.e., lower than -3.11%), it is export product concentration that results in higher FDI inflows. These results, therefore, indicate that countries in recession attract FDI inflows when they experience a high level of export product concentration. This is in line with the explanation provided in section 2 that a host-country experiencing a recession might attract some types of FDI inflows, especially mergers and acquisitions, as in such countries, multinationals could benefit from lower labor and capital costs, which improve their costs structure and generate higher profits. However, in countries where the economic growth rate is higher than -3.11% , export product diversification exerts a positive effect on FDI inflows, and the higher the economic growth rate, the greater is the magnitude of this positive effect.

The results in column [2] of Table 2 show that the coefficient of the variable “ECI” is positive and significant at the 1% level, and the interaction term related to the squared term of this variable is negative and statistically significant at the 1% level. Likewise, the interaction term of the variable $[ECI \times OPEN]$ is negative and statistically significant at the 1% level, while the interaction term related to the interaction variable $[ECI^2 \times OPEN]$ is positive and statistically significant at the 1% level. Once again, we proceed with the graphical analysis by presenting in Figure 4, at the 95 per cent confidence intervals, the developments of the marginal impact of export product concentration on FDI inflows for varying degrees of trade openness.

The figure clearly indicates that the marginal impact of export product concentration on FDI inflows is always negative and statistically significant, and additionally, decreases as countries experience a higher real per capita

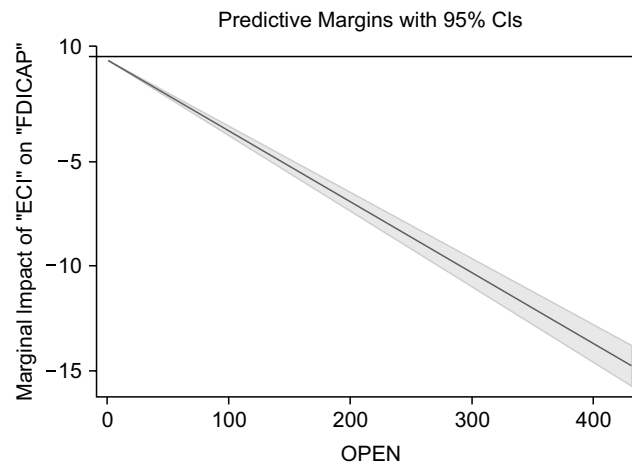


Fig. 4. Marginal Impact of “ECI” on “FDICAP”, for varying levels of trade openness. Source: Author.

income. This suggests that export product concentration is always associated with lower FDI inflows for all levels of trade openness, and the magnitude of this reducing effect increases as countries further open-up to international trade. In other words, export product diversification leads to higher FDI inflows, and the magnitude of this positive effect rises as countries’ level of trade openness rises.

CONCLUSION

This article adds to the literature on the macroeconomic determinants of FDI inflows by investigating how export product concentration in the host countries influences FDI inflows to these countries. In particular, the analysis has examined whether the effect of export product concentration on FDI inflows takes place through the economic growth channel. Additionally, it has considered the extent to which the FDI inflows effect of export product concentration depends on countries’ level of trade openness. The empirical analysis has used an unbalanced panel dataset of 143 countries over the period 1970–2010. The findings suggest that FDI inflows are positively driven by higher export product diversification, with the magnitude of this effect rising as countries experience a higher real per capita income. Furthermore, the analysis has revealed that the effect of export product concentration on FDI inflows takes place through the economic growth channel, with countries with an economic growth rate higher than -3.1% enjoying a positive effect of export product diversification on FDI inflows, whereas for the other countries it is export product concentration that induces higher FDI inflows. Finally, export product diversification leads to higher FDI inflows in the context of greater trade openness, and the magnitude of this positive effect increases as countries experience a higher level of trade openness.

This analysis adds to studies on the relationship between international trade and FDI inflows in host countries by highlighting the influence of export product diversification on FDI inflows, including when countries open-up to international trade. This analysis could explain why developing countries, notably the poorest ones, find it difficult to attract significant amounts of FDI inflows, and particularly the types of FDI inflows, notably in the international trade sector (apart from FDI aiming at exploiting natural resources in the host-country) that could genuinely contribute to reducing the saving-investment gap, and promoting economic development. Furthermore, greater trade openness appears to be critical for the effect of export product diversification on FDI inflows, which highlights the importance for countries to refrain from adopting restrictive trade measures that could reduce their participation in international trade. While policymakers, particularly in developing countries should pursue effort to diversify their export product baskets, the international community, in particular the members of the World Trade Organization could also help them in this endeavor through greater cooperation

on trade matters. An avenue for future research could be to use disaggregated FDI inflows—if data is available—to examine which types of FDI flows are affected by export product diversification, and how trade openness influences the relationship between export product diversification and each type of FDI inflows.

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Appendix 1. Variables - Definitions and sources

Variable	Definition	Source
FDICAP	Per capita Foreign Direct Investment Inflows (constant 2010 US\$). This variable has been calculated by multiplying the Foreign Direct Investment Inflows (% of GDP) by the real per capita income (constant 2010 US\$) (see for example Nagel et al., 2015 and Herzer, 2011). This variable has been transformed using the following formula (see Yeyati et al. 2007): $FDICAP = \text{sign}(FDI) * \log(1 + FDI)$, where $ FDI $ refers to the absolute value of the Per capita Foreign Direct Investment Inflows (constant 2010 US\$), denoted “FDI”. “FDICAP” is the transformed variable of “FDI”.	Author’s calculation based on data on FDI inflows (% GDP) extracted from the database of the United Nations Conference on Trade and Development (UNCTAD), and real per capita income (constant 2010 US\$) extracted from the World Development Indicators (WDI) of the World Bank. For data of UNCTAD, see online at: http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en
ECI	This is the overall Export Product Concentration Index. As explained in the text, it is computed the Theil Index and following the definitions and methods used in Cadot et al. (2011). Higher values of ECI reflect an increase in the degree of overall export concentration, while a decrease in the values of this index indicates a rise in the degree of overall export product diversification.	Details on the calculation of this index can be found in the International Monetary Fund’s Diversification Toolkit (see: https://www.imf.org/external/np/res/dfidimf/diversification.htm)
OPEN	Level of trade openness, measured by the sum of exports and imports, in % GDP	WDI
GDPC	GDP per capita (constant 2010 US\$)	WDI
GROWTH	Real per capita GDP growth (annual %)	WDI
EDU	Secondary School enrollment rate (% gross)	WDI
EXRATE	Official exchange rate (Local Currency Unit per US\$, period average)	WDI
RENT	This the total natural resources rents (% of GDP).	WDI
POP	Total Population	WDI
INFL	The variable “INFL” has been calculated using the following formula (see Yeyati et al. 2007): $INFL = \text{sign}(INFLATION) * \log(1 + INFLATION)$ (2), where $ INFLATION $ refers to the absolute value of the annual inflation rate (%), denoted “INFLATION”. The annual inflation rate (%) is based on Consumer Price Index-CPI-(annual %) where missing values has been replaced with values of the GDP Deflator (annual %).	Authors’ calculation based on WDI data
XCONST	This is the index measuring the constraints on the executive. This Index measures the extent of institutionalized constraints on the decision-making powers of chief executives. It takes seven different values: (1) Unlimited authority; (2) Intermediate category; (3) Slight to moderate limitation on executive authority; (4) Intermediate category; (5) Substantial limitations on executive authority; (6) Intermediate category; (7) Executive parity or subordination. This variable ranges from one to seven where higher values equal a greater extent of institutionalized constraints on the power of chief executives.	Polity IV Database (Marshall et al., 2018)

Appendix 2. Standard descriptive statistics on the variables used in the analysis

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
FDICAP	971	24246.930	73523.620	−77885.800	1070744.000
ECI	1,125	3.445	1.271	1.067	6.348
GDPC	989	9151.233	13783.780	149.709	89448.650
GROWTH	989	1.792	4.451	−42.624	51.466
OPEN	984	70.882	45.488	0.211	440.741
EDU	1,004	57.123	34.377	0.144	155.608
INFLATION	1,030	55.322	340.994	−5.180	6424.987
XCONST	1,072	4.060	2.316	0.000	7.000
RENT	998	8.227	11.450	0.000	84.240
POP	1,144	3.53e + 07	1.22e + 08	130931.2	1.32e + 09

Appendix 3. List of countries contained in the Entire sample

Entire Sample			
Afghanistan	Djibouti	Kuwait	Qatar
Albania	Dominican Republic	Kyrgyz Republic	Romania
Algeria	Ecuador	Lao PDR	Russian Federation
Angola	Egypt, Arab Rep.	Latvia	Rwanda
Argentina	El Salvador	Lebanon	Saudi Arabia
Armenia	Equatorial Guinea	Liberia	Senegal
Australia	Eritrea	Libya	Sierra Leone
Austria	Estonia	Macedonia, FYR	Singapore
Azerbaijan	Fiji	Madagascar	Slovenia
Bahrain	Finland	Malawi	Solomon Islands
Bangladesh	France	Malaysia	South Africa
Belarus	Gabon	Mali	Spain
Belgium	Gambia, The	Mauritania	Sri Lanka
Benin	Georgia	Mauritius	Sudan
Bolivia	Germany	Mexico	Suriname
Brazil	Ghana	Moldova	Sweden
Bulgaria	Greece	Mongolia	Switzerland
Burkina Faso	Guatemala	Morocco	Tajikistan
Burundi	Guinea	Mozambique	Tanzania
Cabo Verde	Guinea-Bissau	Myanmar	Thailand
Cambodia	Guyana	Nepal	Togo
Cameroon	Honduras	Netherlands	Trinidad and Tobago
Canada	Hungary	New Zealand	Tunisia
Central African Republic	India	Nicaragua	Turkey
Chad	Indonesia	Niger	Uganda
Chile	Iran, Islamic Rep.	Nigeria	Ukraine
China	Iraq	Norway	United Kingdom
Colombia	Ireland	Oman	United States
Comoros	Israel	Pakistan	Uruguay
Congo, Dem. Rep.	Italy	Panama	Uzbekistan
Congo, Rep.	Jamaica	Papua New Guinea	Venezuela, RB
Costa Rica	Japan	Paraguay	Vietnam
Cote d'Ivoire	Jordan	Peru	Yemen, Rep.
Croatia	Kazakhstan	Philippines	Zambia
Cyprus	Kenya	Poland	Zimbabwe
Denmark	Korea, Rep.	Portugal	

Appendix 4. Brief description of the two-step system GMM approach

The two-step system GMM involves the estimation of an equation in differences with an equation in levels where lagged first differences are used as instruments for the levels equation and lagged levels are used as instruments for the first-difference equation. It is particularly relevant in the context of highly persistent time series as the difference-GMM approach (which is a variant of the GMM approach) proposed by Arellano and Bond (1991) could introduce weak instrument bias, therefore rendering it less appropriate. Incidentally, when the panel dataset is unbalanced (which is the case of the panel dataset used in the current analysis), Roodman (2009) has suggested not to use the difference-GMM estimator, as the latter has a weakness of magnifying gaps.

The validity of the two-step system GMM is checked using three standard diagnostic tests. These include the Arellano-Bond test of first-order serial correlation in the error term (AR(1)) and no second-order autocorrelation in the error term (AR(2)), as well as the Sargan test of over-identifying restrictions, which determines the validity of the instruments used in the estimations. We additionally report the Arellano-Bond test of no third-order autocorrelation in the residuals (AR(3)), just to ensure that even at the third order the residuals are not serially correlated. This would provide an indication on whether the model suffers from omitted variables (in which case, the AR(3) test should display a statistic with a p-value lower than 10%). Finally, the number of instruments used in the regressions is provided, because when the number of instruments is higher than the number of countries, the GMM estimator may lose power (Roodman, 2009).