FDI as a Catalyst for Domestic Investment in Developing Economies: New Evidence from Industry-level Data

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Abstract. We contribute to the long debated issue of whether inward FDI can stimulate domestic investment in developing countries by introducing a novel measure of FDI, based on industry-level data. We assess the differential impact of FDI on domestic investment according to the activities performed by MNEs abroad as well as the source of FDI. Our results suggest a positive impact of FDI on domestic investment, if MNEs effectively engage in productive activities that can exert spillovers to the host economies, compared to trade-related activities that instead tend to remain enclaves without linkages to the domestic economy. Moreover, we find evidence of a more beneficial impact of foreign investors from advanced economies. Our results are robust to alternative model specifications.

Keywords: Foreign Direct Investment, domestic investment, gross fixed capital formation, crowding out, developing countries, MNEs

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1 Introduction

As economic growth is mostly driven by capital accumulation, at least up to the optimal level of capital per worker (Solow, 1956), increasing investment in developing countries is a key policy objective. Therefore, in countries with persistently insufficient domestic capital formation, foreign direct investment (FDI) is often welcome as a means to financing development. As a result, FDI attraction policies into the developing world have increased dramatically, so that FDI has actually become the leading source of external financing (Calderon et al, 2004; OECD, 2014).

Since the Monterrey Consensus of 2002, mobilizing financing and investment has been a top policy priority, and FDI in terms of stock tripled in Least Developed Countries (LDCs), Small Island Developing States (SIDS), and quadrupled in landlocked developing countries (LLDCs) (UNCTAD, 2015). However, the overall effects of FDI on economic growth in developing economies are far from certain, and contrasting perspectives on the developmental impact of FDI vividly confront with one another both in scholarly and in policy circles.

The effects of inward FDI on domestic investment have been the focus of a sizeable theoretical and empirical literature since at least the end of the 1970s (Brecher & Diaz-Alejandro, 1977; Lall & Streeten, 1977; Matos, 1977). Theory suggests that FDI plays a crucial role in financing development, both directly, as an external source of capital, and indirectly through its impact on domestic capital formation. However, FDI can potentially be beneficial or detrimental to domestic investment, and theoretical prescriptions on which net effect a country hosting FDI should expect are still inconclusive. No less controversial are the results from the empirical literature, which suffer from severe data limitations on the real investment by foreign invested firms, due to the fact that they rely upon aggregate FDI data taken from the Balance of Payments (BoP) statistics.

Yet, empirically assessing the role of FDI in financing development - and possibly also the conditions under which FDI is likely to have beneficial or detrimental effects - has remarkable policy implications. Since economic policy can influence investment decisions, understanding whether and how FDI triggers more or less domestic investment would help tailoring investment policy measures aimed at attracting FDI. Those policies are now widespread in a growing number of developing countries, but largely unconditional on the actual activities performed by MNEs, and often combined with industrial development and fiscal policies towards domestic investment that are not necessarily consistent with the overall aim of increasing capital formation.

This paper contributes to the long debated issue of whether inward FDI can stimulate domestic investment in developing countries in three main ways. First, we introduce a novel measure of FDI, based on project-level data on the activities of multinational enterprises (MNEs) operating in developing countries, which allows to overcome the previous limitations of the literature concerning data availability on industry and firm-level foreign investments. Second, we account for the possible differential impact of FDI on domestic investment according to 1) the business activities performed by MNEs abroad, distinguishing between productive and trade-related activities (i.e. sales, marketing, client support, retail and wholesale) and 2) the source of FDI, distinguishing investing countries between advanced and developing economies. Our dependent variable varies by industry – as it is defined by the Gross Fixed Capital Formation (GFCF) for each 2-digit industry in the manufacturing sector – besides also being country and time variant. Therefore, we are able to explore the issue of whether FDI foster capital accumulation in host economies in a much more refined way than in the extant literature (which focuses on the crowding in or out debate at the level of national economy), namely we try to assess whether - and which type of – FDI, measured as the number of MNEs entering a specific foreign industry, foster capital accumulation in that same industry. Finally, another important feature of this study compared to the existing literature is that we specifically focus on greenfield FDI, which contribute directly to domestic capital formation, unlike mergers and acquisitions (M&A) – which instead simply imply a change in the ownership structure of existing firms (Calderon et al., 2004; Ashraf and Herzer, 2014).

Our overall results suggest a positive impact of FDI on domestic investment and are therefore consistent with more recent evidence from studies relying on macro data (Farla et al, 2014). Moreover, we are able to better qualify the link between FDI and domestic investment by identifying which types of FDI are indeed likely to be more beneficial to domestic capital formation. Our evidence provides support to the widespread view that foreign capital can be a source of development financing for developing countries, provided that MNEs effectively engage in productive activities that can exert spillovers to the host economies, and do not just engage in trade-related activities that instead tend to remain enclaves without linkages to the domestic economy. Moreover, we find evidence of a differential impact of the presence of foreign firms from advanced countries compared to those from developing economies. The latter, despite some encouraging evidence on the beneficial effects of South-South FDI, seem to have no significant effects on domestic capital formation, and this is probably due to the little experience of Southern MNEs as foreign investors.

The remainder of this paper is organized as follows. Section 2 outlines the related theoretical and empirical literature. Section 3 describes the data and the

methodology. Section 4 presents the results. Policy implications and concluding remarks are presented in Section 5.

2 Literature background

Economic theory points to a number of distinct channels through which FDI may affect capital accumulation in recipient economies. FDI can exert both direct and indirect effects on capital formation. As regards direct effects, the most common perspective considers FDI as a financial flow contributing to capital stock accumulation, by adding up to domestic investment. As such, the impact of FDI largely depends on the entry mode of MNEs. Greenfield investments – i.e. brand new domestic subsidiaries of foreign firms – are more likely to have a direct impact on capital formation as they create new capital assets, whereas M&As mainly result in a partial or total transfer of existing capital assets through a change in the nationality of existing domestic firms, but do not add to the capital stock.

Nor is it certain that the acquisition of a domestic firm by a foreign firm would lead to more investment than the acquired firm would have made without the acquisition (Mencinger, 2003; Agosin & Machado, 2005; Herzer, 2012). There is indeed some evidence pointing to the dubious - and in some instances, potentially negative – effect of M&As on capital formation (Ashraf and Herzer, 2014).[1]

Although the literature has regularly acknowledged a differential impact of FDI on capital formation depending on the entry mode of MNEs in the host economies, most empirical studies relying on macro data cannot disentangle between different entry modes. Only recently, Ashraf & Herzer (2014) have explored the different impact of greenfield investment and M&A on domestic investment, with aggregate data from UNCTAD FDI database; their results confirm that M&A do not have a significant impact on domestic investment, whereas (estimated) greenfield flows do seem to have a crowding-out effect.

The literature has also invariably overlooked the fact that FDI as an aggregate measure from the BoP statistics represents just a financing flow, and not necessarily investment (Calderon et al, 2004). FDI includes any financial transfers from a multinational's headquarters to its subsidiary, and back[2]. As

[1] As a matter of fact, the increased importance of M&A in total FDI flows starting in the 1990s, especially in developing countries embarking in massive privatisation policies, has been singled out as the likely cause of an observed weakening in the empirical FDI-investment link in that decade (World Bank 2001).

[2] UNCTAD (2013) claims that the amount of repatriated profits could be substantial, especially in certain sectors and countries. The same report estimates that, globally, in 2010 about 60% of total FDI income was repatriated.

they are measured in net terms, aggregate FDI flows can be either positive or negative, but that does not relate at all to the amount of investment in the host economy. Moreover, aggregate FDI statistics do not allow for industry-level breakdown on a bilateral basis, nor include information about different entry modes of MNEs into foreign markets.

A complementary perspective acknowledged in the literature is to look at FDI as knowledge flows that accompany capital. As a matter of fact, FDI are often welcome in developing countries as they bring fresh capital together with a number of intangible assets that are usually scarce in those economies, namely technological capabilities, management skills, brand names, channels for marketing products internationally, product design (Romer, 1992; Moran, 2011). Besides the direct effects of FDI on capital accumulation in the host economy, indirect effects can take place through the impact of foreign capital on domestic capital formation, as the entry of foreign firms may alter the incentives to invest by domestic firms. Several channels are at work.

Theory has pointed out a number of mechanisms through which FDI can increase the profitability of domestic investment. First, FDI can act as a catalyst for domestic investment because multinationals usually have greater access to information and financial resources than most private investors do in developing countries. Hence, they are able to both identify and take advantage of profitable opportunities more quickly than domestic investors, so that the entry of foreign firms in a developing country signals the existence of unexploited profitable business opportunities that domestic investors might not be capable of identifying or willing to seize by themselves. Moreover, foreign firms entering a developing country often bring about the need for more efficient infrastructure facilities (roads, telecommunications, ports, railways, etc.), which they can contribute to finance (Cardoso & Dornbusch, 1988) if they are not - as it is often the case - directly involved in providing such infrastructure. As poor or insufficient infrastructure is often a binding constraint to business development in developing countries, improved infrastructures can open up new business opportunities that would not have been profitable otherwise, thus increasing the profitability of overall domestic investment. A further mechanism through which foreign firms can contribute to capital formation is through the supply of scarce inputs (Helleiner, 1988), which they can vehicle by importing human and physical capital, technology, and other intangible assets. In particular, positive externalities are the increased availability of training services, managerial skills, technological capabilities, access to overseas markets, market information, all of which benefit all domestic firms (Moran, 2011). The entry of foreign firms may also create new demand for inputs that can be provided by local firms through backward linkages as complements to those imported from their home countries (Gorg and Greenaway, 2004). Finally, in developing countries with poor business

opportunities, FDI can contribute with additional tax revenue invested in public goods (Cardoso and Dornbusch, 1988).

The literature has also emphasized the existence of potential negative effects on the profitability of domestic investment due to the presence of foreign firms. Different mechanisms may be at work. Foreign owned firms can acquire domestic market shares to the detriment of domestic firms (Aitken & Harrison, 1999). Foreign firms can crowd out domestic investment if they increase the host country's interest rate by borrowing on the domestic market (Harrison & McMillan, 2003). Foreign firms entering a developing country in sectors with relatively underdeveloped productive capacity may sensibly increase the cost of locally supplied inputs, especially wages (Lall & Streeten, 1977). Moreover, FDI have uncertain effects on the degree of competition in host economies, as foreign firms, usually more efficient and productive than domestic firms, can boost competition among the latter, but at the same time could acquire market power, with a potentially negative effect on domestic investment (Markusen and Venables, 1999). FDI can have negative effects on overall capital formation in developing countries, when the entry of foreign-owned firms pushes the less efficient domestic firms out of the market and therefore reduces domestic production capacity (Gorg and Greenaway, 2004). Finally, foreign firms could also have a negative impact on the demand for local inputs, if they rely less on domestic inputs than domestic firms (Rodriguez-Clare, 1996).

Empirical evidence on the relation between FDI and investment has largely been provided at the macroeconomic level[3] (a summary of empirical evidence is reported in Table 1). The macroeconomic studies typically use aggregate measures of investment to study either one particular country or a panel of countries. Among the first to analyse panels of countries, Fry (1993) used macroeconomic data for a sample of 16 countries to show that FDI can have a positive or a negative impact on domestic investment depending on the level of trade barriers and financial regulations imposed by the host country. Later evidence is similarly inconclusive. Empirical studies by Morrissey and Udomkerdmongkol (2012), Mutenyo, Asmah, and Kalio (2010) and Titarenko (2005) all find that increases in FDI crowd out domestic investment. Conversely, other scholars find that FDI or crowds in private domestic investment, such as De Gregorio, & Lee (1998), Bosworth & Collins (1999), de Mello (1999),

[3] Microeconomic studies are much less frequent. They include case studies and studies on firm-level panel data for specific countries. Among those, Aitken and Harrison (1999), on a panel of more than 4,000 Venezuelan firms, show that the impact of FDI on domestic investment depends on the ownership structure. FDI that participates with domestic firms in a joint venture arrangement enhances the profitability of the domestic investment. By contrast, FDI negatively affects the productivity of firms with 100% domestic ownership. On balance, they find that FDI has a positive impact on domestic investment.

Borensztein, Ndikumana & Verick (2008), Tang, Selvanathan, & Selvanathan, 2008), Ramirez (2011), Al-Sadig (2013), Farla et al. (2014). Several scholars find mixed evidence when using several lags for FDI or when splitting the country sample according to geographic region (Agosin & Mayer, 2000; Misun & Tomsik, 2002; Agosin & Machado, 2005; Apergis, Katrakilidis, & Tabakis, 2006; Adams, 2009), or find no effect of FDI on domestic investment (Lipsey, 2000).

While most of the studies reported in Table 1 have so far examined the direct relation between FDI and proxies for domestic investment, some recent works have provided further insights. Morrissey and Udomkerdmongkol (2012) show that the crowding out effect of FDI on private investment is stronger in countries with higher political stability. Farla et al (2014) contributed to that issue with a better implementation of system GMM, as well as to the adoption of a less artificial measure of domestic investment in order to investigate whether the results in the literature are robust to such changes. By so doing, they conclude that foreign investment has a positive effect on total investment, but find no moderating role of good governance in the relation. Starting from similar findings, Munemo (2014) adds that such positive impact of FDI is rather conditional on the existence of a good investment climate.

Overall, neither the theoretical work nor the empirical evidence provides a definitive answer as to the impact of FDI on domestic investment. On balance, however, the empirical work seems to suggest that FDI has a positive impact on domestic investment. Arguably, none of the existing studies have been able so far to move behind the aggregate picture, ignoring the potential heterogeneity that can arise from micro factors such as the sectorial distribution of the investors as well as the kind of business activity they perform. This papers aims at specifically filling this gap.

TABLE 1 HERE

3. Data and Methodology

While some of the existing studies have constructed a measure of gross fixed capital formation (GFCF) net of FDI flows to try building a 'pure' measure of domestic investment (Morrisey and Udonmkerdmongkol, 2012), some well-motivated criticisms have been moved to this definition based on two main arguments. First, GFCF and FDI are measured according to different accounting rules (National Accounting rules and Balance of Payments, respectively) and are therefore hardly comparable in practice (Agosin and Machado, 2005). Second, and more fundamental, FDI flows from the BoP do not correspond directly to any measure of real investment. Indeed, as reported by Leino and Ali-Yrkko (2014: 3): "... real investments of foreign-owned companies can be funded locally or by

other foreign entities than direct investors. (…). Furthermore, recorded inward FDI may consist of funds that are immediately invested abroad by the investment-receiving FDI enterprises".

In the remaining of this paper we take the perspective of FDI as encompassing the amount of capital invested, and also considering the knowledge flows accompanying capital, which are likely to be an important source of spillovers onto the host economies. By so doing, we depart from the extant literature, and consider the number of MNEs entering a developing country, rather than the overall flow of capital[4].

3.1 Data and descriptive statistics

As in most of the studies listed in Table 1, we depart from a traditional investment function and use instead a measure of *industry* level GFCF in percentage over total GDP as our dependent variable. In this respect, one of the main strengths of our paper over existing macroeconomic studies is that we can move away from aggregate level statistics, and directly account for the cross-sectorial, as well as cross-country, nature of the relation between FDI and GFCF. More specifically, we test whether MNEs entering a country in a given industry exert a positive or negative impact on overall capital formation in that same industry. It must be noted that as foreign firms can stimulate spillovers both within and across sectors, our empirical specification will possibly tend to underestimate the overall impact of FDI on capital accumulation in host economies[5].

To do this, we rely on the 2014 edition of the Industrial Statistical Database (INDSTAT) published by the United Nations Industrial Development Organization (UNIDO). INDSTAT provides information over the main aggregates, including GFCF, for all industries (defined at the 2-digit levels of the ISIC rev. 3) included in the manufacturing sector for a long time series (1964-2011) and covering all countries in the world.

Our initial sample includes all the countries not classified as high-income OECD by the World Bank definition based on the levels of their per capita GNI in 2006. Still, industry level information for a number of countries included in INDSTAT,

[4] In most studies, the impact of FDI is analyzed by expressing FDI as a percentage of gross fixed capital formation in the domestic economy. This ratio is often considered as an indicator of the share of domestic capital formation undertaken by foreigners. However, as argued by Ramstetter (1996), a more meaningful indicator of the importance of FDI would be the share of foreign multinationals in total output, or, as here, the number of foreign firms entering a host country.

[5] Due to the large sample of countries included in our study it has not been possible to find consistent information on input-output tables to explore the potential spillovers of FDI on the GFCF of related industries.

especially the low-income ones, presents a large number of gaps. After cleaning the data[6], our final sample consists of an unbalanced panel including 55 countries, listed in Table A1 in the Appendix.

As regards our main variables of interest, i.e. FDI, we define a variable building from project level data. To do so, we rely on an original source of information (Financial Markets' *FDIMarkets*) covering data on greenfield investments at the deal level, including information on source country, destination country, industry (2-digit ISIC rev. 3) and year (2003-2011, the longest time series currently available). It is worth emphasising - as discussed in Section 2 - that precisely greenfield investment data are appropriate for our purpose, because they add up to domestic productive capacity, while M&A simply substitute foreign for domestic existing activities. Summary statistics on the actual number of FDI project by industry are shown in Table 2[7].

TABLE 2 HERE

As our main interest is the impact of foreign firms on capital formation in the host economies, we exploit the richness of our industry-level data (compared to aggregate FDI flows) to build two alternative measures of the presence of foreign firms, namely the number of MNEs entering into a host economy in a given country/industry/year combination (henceforth called "flows") or as the total number of MNEs operating in a host economy since the beginning of the period considered (cumulated FDI or FDI "stock").

By so doing, we overcome a major limitation of the previous literature, i.e. the lack of data on real investment by MNEs and on the presence and weight of foreign firms in host economies. In developing countries local firms may lack access to foreign markets and technology, and therefore suffer from "binding constraints" (Rodrik, 2006) to growth that inhibit their investment behaviour. The entry of MNEs could serve as a vehicle for domestic firms to get access to new technology and possibly also to larger markets, to the extent that they can enter into arm's length relationships with more productive firms that can exploit larger international distribution networks, thereby increasing investment profitability. In this perspective, the same amount or size of total MNEs'

[6] When cleaning the data, combinations of country-sectors reporting abnormal values of the GFCF on GDP (e.g. over 100%) have been dropped out of the sample. We have also excluded two countries, Indonesia and Vietnam, both reporting very few observations in total, but whose values of GFCF on GDP were between 60 and 80% across all the different industries.

[7] It must be noted that the list of FDI included in our study is not as large as the entire FDI database, but it is largely influenced by data availability in INDSTAT. In fact, the number of observations is the number of investments in any given country, conditional upon that country being covered by INDSTAT with industry level data in one of the N manufacturing industries in any given year between 2003 and 2011.

investment would have a different impact on GFCF depending on the actual number of foreign firms in the host economy. In fact, the positive impact of foreign firms on domestic capital formation is likely to depend on the number of interactions between any domestic firm and any foreign firm, so that the number of foreign firms in an economy is potentially a more appropriate measure when assessing the spillover to the local economy. Evidence from a survey on a large number of MNEs based in 19 African countries show that neither the number of linkages they establish with domestic suppliers nor the total amount of inputs supplied domestically are in fact related to the initial investment size (Figure 1).

Figure 1 HERE

Using industry level information on FDI provides an important addition over existing aggregate evidence. It might be argued, in fact, that the net impact of FDI on capital accumulation results from high sectorial heterogeneity. Agosin and Machado (2005), for instance, suggest that FDI is more likely to add up to GFCF in sectors with lower investments and replace it in more developed industries. Similarly, due to the richness of our FDI data, we are also able to distinguish the business activities undertaken by foreign firms (see Table 3). Drawing on the large literature on FDI and development, we can argue in fact that the potential spillovers to the domestic economy, including on investments, largely depend on the extent to which foreign investors are involved in activities more likely to foster local linkages, such as production, rather than "footloose" ones, such as export platform or quota-hopping FDI (Farole and Winkler, 2013).

TABLE 3 HERE

Finally, we further innovate on the previous literature by including the origin of FDI as a variable of interest. There is nowadays a rising interest in understanding whether South-South FDI could result in larger positive spillovers compared to North-South flows, but still little evidence playing in favour of this hypothesis (Amighini and Sanfilippo, 2014; Pfeiffer et al., 2014), and evidence is still scant and inconclusive about the potential effect of South-South FDI on domestic capital formation. The underlying idea behind this is that FDI might have a different impact on domestic firms depending on the "distance" between home and host economies, being it technological, geographic or institutional. Southern economies are in fact more likely to share similar technologies due to closer factor endowments, and to their higher complementarities along the product space (Klinger, 2009; Hausmann et al., 2007). However, while these arguments have often been raised in favour of stronger spillovers from South-South FDI, they might similarly be used to affirm that southern MNEs might potentially be

stronger competitors of domestic firms, undermining their competitiveness (Sanfilippo and Seric, 2015)[8].

3.2 Methodology

We start with a basic specification that tries to identify the relation between FDI and GFCF:

$$GFCF_{ixt} = \beta_1 N\_FDI_{ixt} + \gamma_{it} + \xi_{xt} + \varepsilon_{ixt} \quad (1)$$

The dependent variable is the GFCF in country *i*, industry *x*, and year *t* measured as a share of total GDP. Our main control variable, FDI, is the number of investments received by country *i* in industry *x* in year *t*. γ_{it} and ξ_{xt} are country-year and industry-year fixed effects, respectively.

In further specifications of (1) the variable FDI is disaggregated according to the business activity performed and the origin of the investors, as follows:

$$GFCF_{ixt} = \beta_1 N\_FDI\_PROD_{ixt} + \beta_1 N\_FDI\_TRADE_{ixt} + \gamma_{it} + \xi_{xt} + \varepsilon_{ixt} \quad (2)$$

$$GFCF_{ixt} = \beta_1 N\_FDI\_NORTH_{ixt} + \beta_1 N\_FDI\_SOUTH_{ixt} + \gamma_{it} + \xi_{xt} + \varepsilon_{ixt} \quad (3)$$

Adopting the number of investments, rather than the flows[9], should attenuate the risk of endogeneity of the FDI variables, excluding at least the event that the initial amount invested – involving the purchase of fixed assets – could end up to be part of GFCF. This, as discussed, is a potential concern in the case of greenfield FDI. Still, the correct identification of the relation between FDI and GFCF poses a number of econometric challenges, including the direction of causality and the omitted variables bias. Theory suggests a potential reverse causality between GFCF and FDI, since higher domestic investments could represent good signal to foreign firms, in turn affecting their entry choice (Mody and Murshid, 2005). At the same time, local conditions that influence domestic investment may in turn affect the decision to invest by foreign multinationals.

In the rest of the paper, we try to tackle the potential endogeneity of our main control variable using a number of different strategies, testing at the same time the robustness of our estimates. First, in our main specifications we add country-

[8] Following the theoretical model by Ghebrihiwet and Motchenkova (2015), competition is a less compelling argument in the case of Northern MNEs. Due to the higher cost of technology transfer in developing countries, Northern MNEs transfer less resources to their affiliates, making them less likely to crowd-out domestic firms.

[9] In later specifications, as a further robustness check, we will also check for the effects of investment flows.

year and industry-year fixed effects to take out all the possible unobserved factors that could influence at the same time domestic and foreign investment decisions. In successive specifications, we also include a number of controls at both the country- and country-industry level. Second, we run our basic specification by using the lags of the FDI variable, so to exclude concerns on reverse causality. Third, we adopt traditional approaches tackling endogeneity directly by means of instrumental variables.

Table 4 provides the summary statistics of all the variables included, whose more detailed description can be found in table A2 in the appendix.

TABLE 4 HERE

4. Results

The main results from our basic identification strategy presented in (1)-(3) and including country-year and industry-year fixed effects are reported in Table 5.

Results confirm that FDI has an overall positive effect on domestic capital formation, as shown by more recent empirical literature (Farla et al., 2014; Munemo, 2014). This result is robust across different specifications. Interestingly, this positive relation is also robust to the adoption of both the number of FDI (n_FDI) and the "stock" of foreign companies in the host country[10] (columns I and IV of Table 5). Compared to the extant literature, however, our results better qualify this relation. First, by looking at greenfield investments only we reduce the potential bias represented by the inclusion of M&As simply changing the property of the owner, but not affecting the propensity to invest. Second, and more importantly, by looking only at the manufacturing sector we provide a more concrete picture of the potential effects of FDI on domestic investment. FDI in natural resource sectors have in fact a large share of their profits repatriated, rather than reinvested, as recently estimated by UNCTAD (2013). On the other hand, FDI in the services generally require lower fixed investments. Third, by looking at the number of investors, rather than the flows, we are able to disentangle the effect of the investment itself, which in the case of greenfield FDI involves a direct contribution to GFCF due to purchase of fixed assets, from the overall contribution of foreign multinationals to domestic capital formation, which can materialize through alternative modalities as well, independently on the size of the initial investment. Evidence reported in Agosin and Machado (2005: 152) suggests for instance that the purchase of fixed assets

[10] Still, however, in such specific setting, our preferred measure of foreign presence is the "stock", considering that new investments can be undertaken by foreign affiliates independently on the time of their entry. Also, a large stock of foreign firms (relative to domestic), may indicate that larger shares of GFCF are under foreign control (Farla et al., 2014).

(i.e. what enters in the balance of payment definition of FDI) represents only a small fraction of their total investment, lately involving the addition of assets for modernization and technology upgrading.

Additional findings (columns II and V, Table 5) show that the type of activity performed by foreign firms matters: foreign affiliates engaged in productive activities are more likely to raise the profitability of domestic investment, unlike those operating in trade-related activities. In our view, this is a relevant distinction, especially in a context where most FDI are strategically linked with the different stages of GVCs. In this regard, our results seem to show that foreign affiliates involved in local production are more likely to contribute to domestic capital formation. A likely explanation for this is that the propensity to invest further to expand efficiency-seeking FDI in countries involved in middle stages of the value chain is higher compared to investments in upstream or downstream activities, where the income is less likely to be reinvested (UNCTAD, 2013). In addition, production oriented FDI are more likely to generate domestic spillovers in the form of backward and forward linkages (Rodriguez-Clare, 1996). Conversely, foreign investments in trade-related activities do not seem to exert a positive impact on domestic investment, because their objective is to create platforms either for exports to third countries or for imports from the investing country. In both cases, trade-related FDI reinforce direct relations with the parent firms, while relying less on market-based transactions, which are more likely to give rise to spillovers to or linkages with local firms.

Finally, a further important dimension that we are able to explore with our data has to do with the different effect of FDI according to the origin of the investor. Differently from our ex-ante expectations, results do not support the view that emerging and developing countries investors have so far contributed to raise GFCF in developing economies. Conversely, we find that a positive and significant relation characterizes FDI from advanced economies. The explanations can be diverse.

First, there might be a scale effect. Southern FDI are in fact still quantitatively (in terms of number of projects at least, where they still represent less than 20% of the total) less relevant that northern ones.

Second, Southern firms are relatively more recent and investors less structured and experienced compared to their northern counterparts. These features are particularly relevant when looking at their impact on domestic investments. Investments are lumpy, and therefore risky, requiring knowledge of the host country and experience that southern MNEs are still building up starting from lower levels (Cuervo-Cazurra and Genc, 2008). Moreover, since their structure and levels of efficiency are still smaller compared to well-established players from the North, this does not favor the establishment of linkages with domestic

firms, as recently demonstrated by research on foreign MNEs in Sub-Saharan Africa (Amendolagine et al., 2013).

Third, there might be a divergence between short-run and long-run effects from FDI on local investment. For example, De Backer and Sleuwaegen (2003) analyzing Belgian manufacturing companies show that FDI displaces local investment in the short run, but in the long run this effect is limited or even reversed. In the short-run, foreign firms entering an economy might displace local firms' investment by increasing the degree of competition (competition effect). Over the longer term, the benefits accruing to local firms from interacting with foreign firms might result in positive spillovers to domestic firms and investment (spillover effect). The net effect of FDI might therefore change from the short- to the long-run, and it is more likely to be negative in the short-run than in the long-run, when (positive) spillover effect might compensate for the (negative) competition effects. Hence, Southern FDI in the South might still be exerting their short run effects compared to Northern FDI, which started a long time before.

Fourth, the negative sign of the coefficient (though not significant) can be viewed as the result of a competitive effect. Contrary to Northern MNEs, Southern MNEs adopt technologies that are more suitable to the local context, so that they may find themselves in direct competition with domestic firms, crowding them out of the market, and discouraging their propensity to invest.

Finally, Northern MNEs might need to transfer less technology to the South – compared to what Southern MNEs should have to – in order to enjoy a competitive advantage over local firms. This might result in a weaker competition effect on local firms, so that the overall impact on the profitability of domestic investment would be lower as a result of Northern FDI compared to FDI from the South (Ghebrihiwet and Motchenkova, 2015).

4.1 Adding controls

Following the theoretical insights and existing empirical works, we augment (1)-(3) by including a number of control variables to account for factors potentially affecting GFCF. More specifically, we add GDP growth to account for the fact that current investment decisions depend on the expected flow of future profits which are increasing in income; political stability and inflation as measures of political and economic uncertainty surrounding investors; the price of investment, as a proxy of the cost of capital. We also include some industry specific variables, all taken from INDSTAT, such as the size and the value added produced, to test whether the impact of foreign firms on domestic GFCF varies according to the importance of the industry to the host economy (Agosin and Machado, 2005).

As shown in Table 6, most of these control variables behave according to the expectations and in line with the findings of the existing literature. Good governance, proxied by the levels of political stability, contributes to generate a better investment climate domestically, as previously found – using the same indicator – by Morrisey and Udonmkerdmongkol (2012), and only weakly confirmed in a more recent work by Farla et al. (2014). On the other hand, the inflation rate has a positive effect on investments. Despite one could expect price instability to cause higher uncertainty, it does not necessarily depress all the kind of domestic investment (Shaalan, 1962). As in previous studies, we do not find evidence of a significant relation between the cost of capital and domestic investment (Mody and Murshid, 2005). Similarly, we do not find any significant effect for the growth of the GDP, which has been previously found as a significant determinant of GFCF in aggregated studies[11].

TABLE 6 HERE

As far as the variables taken from INDSTAT are concerned, our results show consistently across different specifications that capital formation in the host economies is not independent from the characteristics of the industry. In particular, the overall amount of investment depends on the overall size of the industry, proxied by the total employment[12]. In addition, a beneficial impact on capital formation is found the higher the capacity of the host industry to generate value added in the production process. This shows that the higher the value added produced by an industry, the higher the resources available for new investments.

4.1.2 Further results and robustness checks

Results discussed in the previous section point to a number of relevant findings on the relation between GFCF and FDI. Still, however, some issues can be raised concerning this relation, and the data used for the analysis.

In this section, we report a number of further results and robustness checks to compare with the main outputs discussed in the previous sections.

First, one way to deal with the potential reverse causality of FDI and GFCF is to check whether results are robust to the inclusion of various lags of the FDI variables. Table A3 in the appendix reports the results including the first three lags of FDI and seem to show that the effect of FDI on GFCF is persistent, and

[11] All these results can also be explained by the fact that while the dependent variable is measured at the industry level, these controls are at the country level.

[12] Results do not change if we use the total number of domestic firms net of the number of foreign-owned firms instead of the total employees. This, however, does not exclude the presence of foreign firms in the data, due to the inclusions of investors established before 2003 or through different modalities, i.e. M&As.

does not change significantly compared to the case in which the variable is set at time t. Similarly, the same behaviour is recorded by the more disaggregated variables, with FDI in production and FDI from Northern investors keeping their positive and significant effect on GFCF. Interestingly, what changes a little in the model is some of the control, including for instance the GDP growth, now turning significant and positive, or the cost of capital, now negative and significant, as expected, or, yet, the size of the industry, no longer significant. This might be due to the potential risk of contemporaneous correlation between these variables and the FDI ones when included at the same period. Results reported in Section 5, dealing directly with the potential endogeneity of FDI, will discuss this more in details.

Second, we have controlled if the level of technology of the industry could affect the general results. Table A4 in the appendix provides some evidence distinguishing according to the technological level of the industry. Differently from the main findings discussed before, results show that the determinants of GFCF in low-tech industries follow more closely the finding of the existing literature. In this sub-sample, in fact, domestic capital formation is more likely to depend on economic growth (Agosin and Machado, 2005; Farla et al., 2014) and is negatively affected by the cost of capital (Munemo, 2014), while being neutral to the actual size of the industry. Concerning our variables of interest, we can show that capital formation in low technology industries receive a positive impact by the presence of foreign firms, especially from the north, but independently on the activities performed. On the other hand, the rate of capital accumulation in higher tech industries is enhanced by investments in productive activities, more likely to generate local linkages. Quite interestingly, we show that in high-tech industries, domestic investments seem to be more likely to be spurred by the presence of investors from the South. This finding is not entirely surprising and seems to support the assumption, grounded in factor endowment theories of trade (Amsden, 1982), claiming that due to the lower technological distance developing countries might find stronger benefits from South-South integration, including in their capacity to absorb skills, knowledge and technologies brought in by the new investors (Lipsey and Sjoholm, 2011).

Lastly, though with the adoption of the number of firms we look at the contribution of FDI to domestic investments in a broader way, still, we might want to understand whether the investment itself – i.e. the capital flow involved with the establishment of the new project – has a positive or negative impact on the formation of domestic capital. This is the question traditionally raised by the vast majority of the studies reported in Table 1, and resulting in the crowding-in/out argument. Information included in *FDIMarkets* report the capital expenditure for each project, based on the investment announced at the time of opening. This allows to compute the investment flows at the host country and

industry level. There are, however, some methodological concerns related to the adoption of this information. A large portion of these data is in fact estimated based on a proprietary econometric model, introducing thus serious measurement errors in the data. Specific to our sample of developing countries' recipients, this affects about 64% of the projects included[13]. Still, however, when looking at some descriptive statistics, we can see that the total value computed from *FDIMarkets*, though affected by some methodological issue, behave quite similarly compared with both the more reliable information on the number of projects and with other aggregated statistics based on Balance of Payment information, such as those provided by UNCTAD[14] (see Figure 2).

FIGURE 2 HERE

Table 5 reports the results of model (1) using the aggregated flows instead of the number of firms. A few interesting findings emerge. First, the coefficients generally report a positive sign, along the lines of the previous findings. Also in this case, we do not find any significant relation between investments flows and domestic capital formation for trade-related and Southern ones. Another interesting information has to do with the size of the coefficients. If we consider that GFCF does include the fixed component of the greenfield investment, then a value of the coefficient greater (lower) than 1 would imply a crowding-in (out) effect and vice-versa. In our specific case, though positive, the coefficients in both columns seem to point to a crowding-out effect, meaning that total investment grows less than the amount of capital flowing under the form of greenfield FDI. Such result seems to be in line with the recent findings by Ashraf and Herzer (2014), also looking at greenfield FDI, but the size of our estimated coefficients are much higher than their, possibly due to the high industry disaggregation adopted in our work.

TABLE 7 HERE

5 Controlling for endogeneity

5.1 Instrumental Variables (IV) Approach

A first, traditional, strategy to address the potential endogeneity of the FDI variable is to find valid external instruments, i.e. variables that are correlated

[13] This notwistanding, it must be noted that such information is normally used by UNCTAD to compile the annual World Investment Report, and adopted in empirical research by other scholars (e.g. Desbordes and Wei, 2014). In addition, in our specific case, data on the constructed flows is highly correlated to the data on the number of firms.

[14] When comparing the flows computed using FDIMarkets data with UNCTAD statistics it must be noted that the former represents only a fraction of the latter, since they do not include M&As, as well as other recorded components of FDI including for instance reinvested earnings.

with the regressor but not directly affecting the dependent variable. The difficulties in finding out some good instruments in this specific setting are well exemplified by the existing literature, quoted in Table 1, which has so far addressed the potential endogeneity of FDI by adopting a dynamic panel framework, i.e. one in which instruments are exploited from within the model (see also the next sub section). Still, though there is no doubt that lagged values of FDI are potentially good internal instruments, they could be correlated with the error term. A likely exception is the paper by Delgado and McCloud (2014), in which the authors use an average of four variables (economic growth; exchange rate; interest rate and saving rate) for the top trade partners as instruments for both the inward and outward FDI of a given country.

Departing from this, and considering our interest in inward FDI, we use the average economic growth and the exchange rate of the top three investors in each of the country in our sample as potential instruments to be used in our IV regression. A faster economic growth at home is normally found to be a determinant of FDI decision, as it is in the case of a favorable exchange rate, which can push firms to invest abroad since it influences their relative wealth (Alfaro et al., 2004; Yeaple and Keller, 2009).

Still, however, being these aggregate measures, the risk is that they can be weakly correlated to our FDI variable, which is instead computed at the country- and industry- level. Finding an instrument available at the industry level is therefore more challenging. Some existing work used sectorial targeting by investment promotion agencies (Alfaro and Charlton, 2013; Farole and Winckler, 2013), but unfortunately this information is not available for all the countries and periods covered by this study.

Trade variables, such as applied tariffs (as in Yeaple and Keller, 2009) or exports and imports with major trading partners, have the advantage of being reported at the industry level and of having an influence on FDI, but are also likely to affect domestic economic conditions, including GFCF.

We thus try to construct a country-industry specific instrument exploiting the information available in our original FDI database. More specifically, we build an instrument representing the total number of FDI by the top ten source countries to the group of non-OECD recipients[15], weighted by the bilateral distance. Using total investments by the larger sources in absolute terms, rather than from the main partner countries should reduce the risk of finding cases in which a large part of the total investment from one country (say South Africa) represents almost the total of the FDI received by a specific partner (Lesotho) in a given industry (e.g. textiles). On the other hand, the total number of investment by the top world sources should not be related to the domestic investment in a given country-industry, satisfying the properties for it to be a valid instrument.

[15] Based on FDIMarkets data, the top ten source countries in non-OECD markets are, in order, the US, Germany, United Kingdom, Japan, France, Spain, Italy, the Netherlands, Switzerland and India. Taken together, these countries represent % of total number of projects, and % of total flows.

Table 8 reports the results of the first and the second stage regressions based on a panel IV method with the inclusion of industry-year fixed effects. We try different combinations of instruments to check the stability of the results. From the first stage regression we notice that the number of FDI received by each country in each industry is significantly correlated with the total number of projects by the top investors in the same industry. A weaker relation, though always significant, is found between our variable of interest and the other two external instruments, especially growth, likely to be conditioned by the aggregate nature of these variables. Still, in column IV, we replace the constructed FDI instrument with a new variable representing the total amount of FDI by the same top ten sources, this time using UNCTAD FDI statistics (not available at the industry level).

TABLE 8 HERE

Overall, results of the second stage regression show that there is a positive and significant effect of FDI on GFCF even after accounting directly for the potential endogeneity of the former variable, confirming once again the robustness of our main result. We test the performance of the instrumental variable approaches by means of the Hansen test of overidentification. All over the different specifications adopted the tests suggest that the instruments are generally valid and well performing.

4.3 Dynamic panel model

As a final step, and along the lines of the vast majority of the existing empirical literature reviewed in Table 1, we estimate our model by means of a dynamic panel based on a two-step system GMM estimator (Blundell and Bond, 1998; Roodman, 2009). A dynamic panel has two main advantages in the context of our data. The first, as discussed in the previous section, is that it looks for valid instruments from within the model, avoiding the risk of selecting – often theoretically weak – external instruments. The second is that current investment decisions have a strong path dependence due to depreciation component and to the fact that it is a structural component of the economy. This means that the lagged dependent variable should be included among the regressors, making (1) a dynamic model:

$$GFCF_{ixt} = \beta_1 GFCF_{ixt-1} + \beta_2 GDP\_G_{it} + \beta_3 INFL_{it} + \beta_4 POL\_STAB_{it} + \beta_5 IP\_L_{it} + \beta_6 EMPL_{ixt} + \beta_7 VA\_GDP_{ixt} + \beta_7 N\_FDI_{ixt} + \mu_i + \varepsilon_{ixt}$$

(4)

The dynamic nature of equation (4) suggests taking autocorrelation duly into account to avoid the standard OLS estimator producing biased coefficients. GMM is normally well suited for dynamic models with samples including a short time period and a large cross-section, as in our case. To do this, we adapt the structure

of the data allowing panels to vary as a combination of countries and industries. While in the first step the first difference of equation (4) drops out the cross-sectional fixed effects $\gamma_{ix,}$ the second step consists of constructing suitable instruments for the endogenous variables. Along the lines of the existing evidence (Morrisey and Udonmkerdmongkol, 2012; Farla et al., 2014; Munemo, 2014; Ashraf and Herzer, 2014), we treat lagged GFCF, GDP growth and all the FDI-related variables as endogenous, on the ground of a potential reverse causality, and we instrument them using their lagged levels and differences. Additional instruments are represented by the strictly exogenous variables, i.e. all the remaining from equation (4). We also include year fixed effects in order to control for time specific effects as well as to avoid contemporaneous correlation among individuals across time (Roodman, 2009).

Still, despite the cross-sectional dimension is not as small as in previous studies considering the addition of the industry level, we try to keep the number of instruments under control to preserve the stability of the over-identification test. We do this by using the second lag of the dependent variable and the second and the third lags of the other endogenous variables. Lastly, we make the standard errors of the two-step model robust by adopting the correction suggested by Windmeijer (2005). In order to control for the exclusion of second order correlation and to check for over-identifying restrictions we run the Arellano-Bond and the Hansen tests at the end of each output.

Table 9 reports the results of our main specification using the GMM method. All over the different columns, the Arellano-Bond test supports the null of no second order autocorrelation, while the Hansen test demonstrates that over identification restrictions are valid, and not compromised by the presence of too many instruments.

TABLE 9 HERE

Results, on the other hand, confirm the findings of existing literature (Farla et al. 2014; Ashraf and Herzer, 2014) showing that even disaggregating the data at the industry level, GFCF reports a strong path dependence, being strongly correlated with its previous year's levels. Differently from the IV estimates, we can easily instrument all the FDI-related variables, including the more disaggregated ones. By doing this, we show that there are little changes compared to the results discussed in previous sections. Also in this case, in fact, we do not only find that there is generally a positive effect of FDI on GFCF, but also that this effect is statistically significant only when new investment projects are directed to productive activities and come from advanced economies.

5. Conclusions

In this paper, we have analysed the impact of greenfield FDI on capital accumulation in developing countries by exploiting firm- and industry-level data to build a measure of FDI that allows overcoming the limitations of investment flows, the main FDI measure in the extant literature. Such disaggregated data allows a more detailed analysis of FDI spillovers on the host economies, including the differential impact of foreign firms according to their country of origin (whether from the North or from the South), and according to the business activity performed by foreign affiliates (production or trade-related).

Our main results suggest that FDI exert positive spillover effects on domestic capital formation, in particular they spur investment within the specific industry in which the investments take place. Foreign affiliates engaged in productive activities are more likely to spur capital accumulation in the host economies than foreign affiliates performing different trade-related activities such as sales, marketing, client support. Finally, FDI from the North seem to be more beneficial in terms of their impact on GFCF than FDI from the South.

Although this result might seem to run counter some evidence on the positive impact on developing economies of FDI from economies at the same level of technological advancement, our evidence suggests that different channels might be at work – a competition effect and a spillover effect – with a net effect which could change in the long-run, due to the fact that spillovers take a longer time to show up than competition.

Overall, we contribute to the literature on the impact of FDI on capital accumulation in developing economies in two major ways. First, we explore whether different types of FDI have diverse impact on domestic investment; foreign affiliates with productive activities are more beneficial to host economies as they are more likely to increase the profitability of domestic investment. Instead, foreign affiliates performing trade-related activities are less likely to have a positive impact on domestic investment. This suggests that FDI attraction policies by developing economies should better consider linking incentives to the business activities of foreign affiliates. Second, the impact of FDI on domestic GFCF largely depends on the technological distance between investing and recipient countries; Northern FDI seem to have a positive impact on GFCF in developing economies, but it does not seem to be the same for Southern FDI. This result might be explained by the relatively low share of Southern investment in the South, compared to Northern investment, to the lower average Southern firms' age, and to the much more recent presence of Southern MNEs in other developing economies, which might imply that the potentially negative short run effects as suggested in De Backer and Sleuwaegen (2003) are still dominating, whereas the potentially positive long run effects have still to work themselves out.

In fact, our evidence suggests that the competition effects of Southern FDI might compensate for the knowledge spillovers accruing to domestic firms, so that the net effect is negative, at least in the short run. Overall, the crowding in vs crowding out debate would greatly benefit from detailed analyses on micro data that allow to consider FDI both as a source of capital and as a source of knowledge for domestic firms in developing economies.

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Tables and Figures

Table 1: Inward FDI and Domestic Capital Formation: Empirical Evidence

Date	Author(s)	Methodology	Countries	Results
2014	Munemo	OLS and GMM	139 countries	+ (conditional on good business regulation)
2014	Ashaf and Herzer	FE and GMM	100 countries	- (greenfield only)
2014	Farla et al	GMM	46 countries	+
2013	Al-Sadig	GMM	91 countries	+
2012	Morrissey & Udomkerdmongkol	GMM	46 countries	-
2011	Ramirez		Latin America	+
2010	Mutenyo et al			
2009	Adams	OLS, FE	SSA	-
2008	Ndikumana & Verick	FE	SSA	+
2008	Tang et al	ECM	China	+
2006	Apergis et al		30 countries	+/- (depending on regions)
2005	Agosin & Machado	GMM	36 countries	-
2005	Titarenko	LS	Latvia	-
2002	Misun & Tomsik		CZ, HU, PO	+/-
2000	Agosin & Mayer		developing countries	+/-
2000	Lipsey		OECD countries	none
1999	Bosworth & Collins	IV	58 countries	+
1999	de Mello	TS	33 countries	+
1998	Borensztein et al		69 developing countries	+
1997	Mbekeani	2SLS ECM	South Africa	+
1997	Aitken & Harrison	TS, panel, FE	Venezuela	+ for JV, - no local partner
1997	Fry	TS, SM, 3SLS	46 countries	+
1993	Wells	case studies	East Asia	+
1993	Wells & Warren	case studies	Indonesia	+
1993	Fry	TS, SM, 3SLS	16 countries	+/- depending on policies in place (2)
1992	Katikati	TS, Granger	Ghana	-
1992	Faroque & Bougrine	SM, TS	Morocco	-
1989	Rhee & Belot	case studies	11 countries	-
1986	Encarnation & Wells	case studies	Asia	+/- depending on policies in place (2)
1977	Matos	case study	Venezuela	-

Notes: (1) Prior to 1975, several studies were done on the impact of MNCs in Latin America. Most of these are case studies and it would be impossible to list all of them in this table. For a good summary of these see Grieco (1986). (2) For example, Encarnation & Wells find that where FDI substitutes for imports because it is "tariff-jumping", the overall impact on the host country is negative.

Table 2. No. of FDI by main activity

	N_FDI	N_FDI_PROD	N_FDI_TRADE
2003	1207	516	175
2004	1316	599	187
2005	1446	561	336
2006	1898	615	459
2007	1993	773	332
2008	2345	839	324
2009	2049	407	525
2010	2162	798	386
2011	1532	501	371

Source: Authors' elaboration on *FDIMarkets*

Note: **N_FDI_PROD** includes foreign firms doing manufacturing activities in host economies, while **N_FDI_TRADE** includes foreign firms that enter the host economy to perform non-manufacturing business activities such as sales, marketing, support and retail/wholesale.

Table 3. FDI by main manufacturing industry

year	Food& beverages (15)	Textiles (17)	Chemicals (24)	Rubber &plastics (25)	Basic Metals (27)	Machinery &equip. (29)	Electrical mach (31)	Radio, TV (32)	Motor vehicles (34)
2003	150	94	102	102	46	71	179	130	203
2004	149	117	122	122	58	102	184	134	180
2005	190	101	124	124	76	122	196	164	198
2006	237	171	148	148	121	151	278	185	265
2007	171	159	224	224	127	252	205	212	302
2008	241	188	239	239	184	297	207	182	366
2009	283	172	264	264	110	261	221	109	290
2010	227	239	260	260	137	258	246	159	275
2011	162	222	181	181	81	157	164	108	173

Source: Authors' elaboration on *FDIMarkets*

Table 4. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
gfcf_gdp	4263	0.028	0.073	0	0.499
gdp_grow	4263	5.283	5.042	-17.955	34.5
pol_stab	4263	-0.073	0.858	-2.390	1.384
infl	4019	5.410	5.131	-2.500	44.391
pl_i	4088	0.681	0.398	0.232	4.242
lempl	3925	8.748	2.224	1.792	15.960
va_gdp	3949	0.154	0.634	0	16.533
n_fdi	4263	3.590	10.929	0	134
n_fdi_production	4263	1.262	5.082	0	87
n_fdi_trade	4263	0.695	3.234	0	62
n_fdi_north	4263	3.088	9.681	0	117
n_fdi_south	4263	0.501	1.699	0	33
stock	4263	16.736	67.892	0	970
total_inv_gdp	4263	0.001	0.007	0	0.194

Table 5. Main Results, model including country-year and industry-year effects

VARIABLES	(1) n_fdi	(2) n_fdi	(3) n_fdi	(4) stock	(5) stock	(6) stock
n_fdi	0.0013*** [0.000]					
n_fdi_production		0.0023*** [0.000]				
n_fdi_trade		0.0008*** [0.000]				
n_fdi_north			0.0015*** [0.000]			
n_fdi_south			-0.0003 [0.001]			
stock				0.0002*** [0.000]		
stock_production					0.0004*** [0.000]	
stock_trade					0.0001 [0.000]	
stock_north						0.0002*** [0.000]
stock_south						-0.0000 [0.000]
Constant	0.1790*** [0.051]	0.1803*** [0.050]	0.1798*** [0.051]	0.1822*** [0.050]	0.1824*** [0.050]	0.1823*** [0.050]
Observations	4,263	4,263	4,263	4,263	4,263	4,263
R-squared	0.536	0.535	0.536	0.534	0.530	0.534

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Main Results, model including controls, country-year and industry-year effects

VARIABLES	(1) n_fdi	(2) n_fdi	(3) n_fdi	(4) stock	(5) stock	(6) stock
gdp_grow	0.0009	0.0008	0.0009	0.0008	0.0008	0.0008
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
pol_stab	0.1041***	0.1040***	0.1041***	0.1041***	0.1040***	0.1041***
	[0.028]	[0.028]	[0.028]	[0.028]	[0.028]	[0.028]
infl	0.0072***	0.0071***	0.0072***	0.0072***	0.0071***	0.0072***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
pl_i	0.0255	0.0234	0.0255	0.0265	0.0247	0.0266
	[0.067]	[0.066]	[0.067]	[0.067]	[0.066]	[0.067]
lempl	0.0029**	0.0030***	0.0029**	0.0030***	0.0032***	0.0030***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
va_gdp	0.0632***	0.0630***	0.0632***	0.0632***	0.0631***	0.0632***
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]
n_fdi	0.0010***					
	[0.000]					
n_fdi_production		0.0021***				
		[0.000]				
n_fdi_trade		0.0008**				
		[0.000]				
n_fdi_north			0.0010***			
			[0.000]			
n_fdi_south			0.0011			
			[0.001]			
stock				0.0002***		
				[0.000]		
stock_production					0.0005***	
					[0.000]	
stock_trade					0.0001	
					[0.000]	
stock_north						0.0002***
						[0.000]
stock_south						0.0003
						[0.000]
Constant	0.1282**	0.1295**	0.1281**	0.1292**	0.1288**	0.1291**
	[0.064]	[0.063]	[0.064]	[0.064]	[0.063]	[0.064]
Observations	3,496	3,496	3,496	3,496	3,496	3,496
R-squared	0.641	0.643	0.641	0.640	0.641	0.640

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Results, using FDI flows rather than N

	(4)	(5)	(6)
VARIABLES	n_fdi	n_fdi	n_fdi
gdp_grow	-0.0008	-0.0008	-0.0008
	[0.001]	[0.001]	[0.001]
pol_stab	0.0838**	0.0840**	0.0838**
	[0.040]	[0.040]	[0.040]
infl	0.0014	0.0014	0.0014
	[0.002]	[0.002]	[0.002]
lempl	0.0075***	0.0076***	0.0075***
	[0.002]	[0.002]	[0.002]
pl_i	0.0260	0.0265	0.0257
	[0.047]	[0.047]	[0.047]
va_gdp	0.0509***	0.0509***	0.0509***
	[0.017]	[0.017]	[0.017]
total_inv_gdp	0.4696***		
	[0.156]		
total_inv_prod_gdp		0.2936*	
		[0.151]	
total_inv_trade_gdp		-0.8113	
		[0.843]	
total_inv_north_gdp			0.5344***
			[0.192]
total_inv_south_gdp			0.2920
			[0.347]
Constant	0.1801*	0.1809**	0.1803*
	[0.092]	[0.092]	[0.092]
Observations	3,559	3,559	3,559
R-squared	0.669	0.669	0.669

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Results, IV 2SLS model (first and second stage)

First stage Dep. Var.: N_FDI	I	II	III	IV
n_fdi_ind_weight	0.0100***	0.0100***	.0099***	
	(0.0019)	(0.0019)	(0.0019)	
lfdi_top10				0.7943***
				(0.2915)
gdp_g_weight	0.0637**	0.06268**		.07133**
	(0.0266)	(0.0260)		(0.0278)
xr_rate_weight	0.0332**		.03189**	.04822**
	(0.0152)		(0.0152)	(0.0164)
Second stage Dep. Var.: GFCF	I	II	III	IV
n_fdi	0.0030***	0.0023**	0.0032***	0.0160**
	[0.001]	[0.001]	[0.001]	[0.007]
Observations	3,364	3,364	3,364	3,364
R-squared	0.161	0.176	0.156	-1.267
Hansen J (p-value)	0.0941	0.6189	0.031	0.146

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

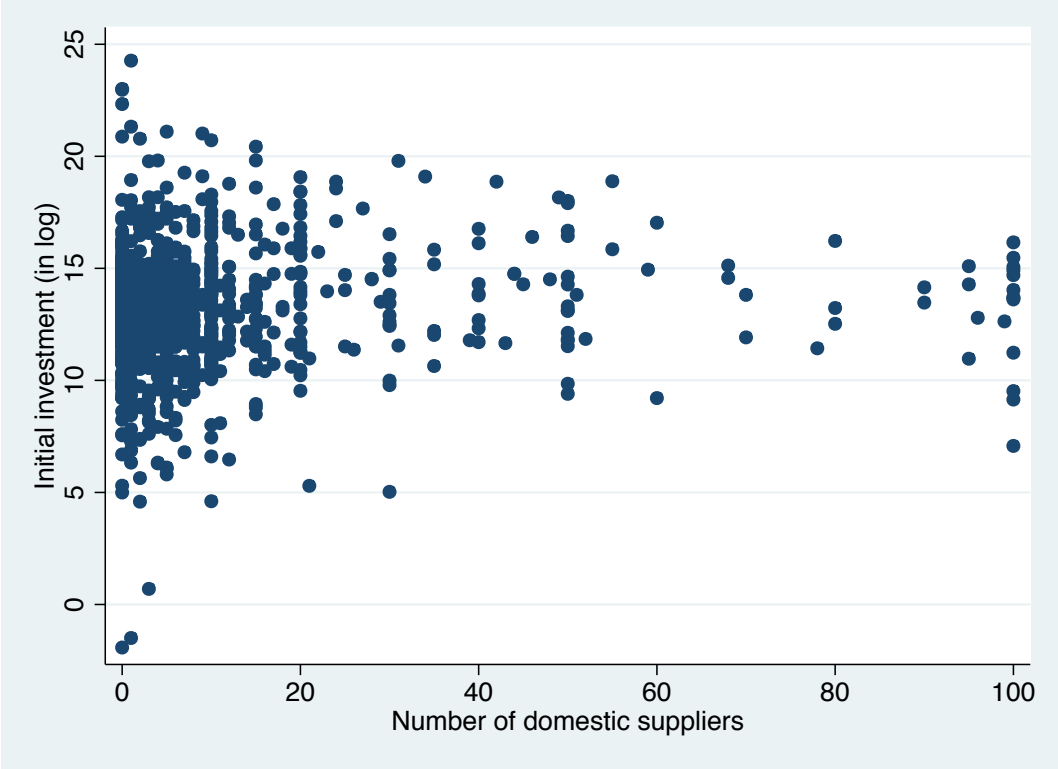
Note: All the specifications include the main control variables, gdp_grow, pol_stab, infl, pl_i, empl, va_gdp, as well as industry-year fixed effects.

Table 9. Results, dynamic panel estimator

VARIABLES	(1) n_fdi	(2) n_fdi	(3) n_fdi	(4) stock	(5) stock	(6) stock
L.gfcf_gdp	0.5613***	0.5644***	0.5430***	0.5726***	0.5962***	0.5526***
	[0.107]	[0.094]	[0.121]	[0.096]	[0.089]	[0.095]
gdp_grow	0.0000	0.0000	-0.0000	-0.0000	0.0000	-0.0000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
pol_stab	0.0015*	0.0017**	0.0014*	0.0013*	0.0016**	0.0012*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
infl	-0.0002*	-0.0001	-0.0001	-0.0002*	-0.0001	-0.0001
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
lempl	0.0005	0.0006	0.0008	0.0004	0.0003	0.0003
	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]
pl_i	-0.0073**	-0.0042	-0.0069*	-0.0086**	-0.0065*	-0.0081***
	[0.004]	[0.003]	[0.004]	[0.004]	[0.003]	[0.003]
va_gdp	0.0364***	0.0359***	0.0382**	0.0354***	0.0316***	0.0389***
	[0.013]	[0.013]	[0.015]	[0.012]	[0.012]	[0.012]
n_fdi_production		0.0010*				
		[0.001]				
n_fdi_trade		0.0006				
		[0.001]				
n_fdi	0.0003					
	[0.000]					
n_fdi_north			0.0000			
			[0.000]			
n_fdi_south			0.0023			
			[0.002]			
stock				0.0001***		
				[0.000]		
stock_production					0.0004***	
					[0.000]	
stock_trade					0.0004	
					[0.000]	
stock_north						0.0001**
						[0.000]
stock_south						-0.0002
						[0.000]
Constant	0.0027	-0.0009	0.0005	0.0049	0.0020	0.0053
	[0.006]	[0.005]	[0.006]	[0.005]	[0.005]	[0.005]
Observations	2,765	2,765	2,765	2,765	2,765	2,765
Number of panel	539	539	539	539	539	539
hansenp	0.856	0.969	0.796	0.718	0.881	0.815
ar2p	0.897	0.924	0.924	0.872	0.862	0.914
N. of instruments	67	87	87	67	87	87

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

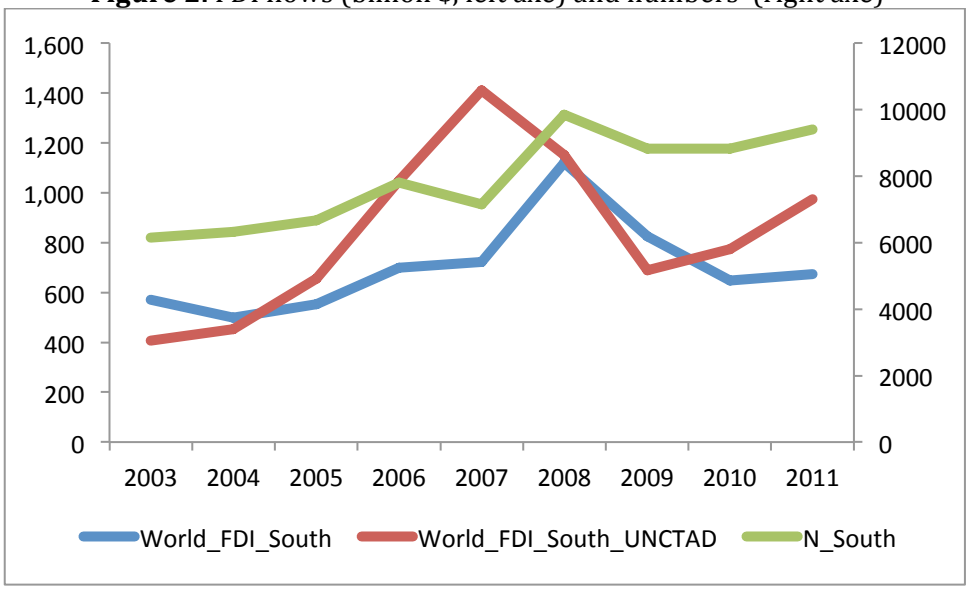
Figure 1. Initial investment size and number of linkages with domestic suppliers



Source: Authors' elaboration on African Investor Survey data (UNIDO, 2012)

Note: A threshold of 100 domestic suppliers, corresponding to the 95th percentile of the distribution, has been selected to avoid outliers.

Figure 2. FDI flows (billion $, left axe) and numbers (right axe)



Source: Authors' elaboration on FDIMarkets and UNCTAD FDI Statistics

APPENDIX

Table A1 – List of countries

Country	Obs	% on total
Azerbaijan	140	3.28
Eritrea	138	3.24
Lithuania	138	3.24
Singapore	138	3.24
Croatia	136	3.19
Jordan	135	3.17
Latvia	132	3.1
Georgia	130	3.05
Slovakia	130	3.05
Slovenia	129	3.03
Macedonia	128	3
Morocco	128	3
Cyprus	125	2.93
Poland	122	2.86
India	121	2.84
Malaysia	120	2.81
Mexico	118	2.77
Oman	117	2.74
Ethiopia	110	2.58
Turkey	109	2.56
Kuwait	91	2.13
Fiji	90	2.11
Israel	90	2.11
Ecuador	86	2.02
Hungary	84	1.97
Uruguay	82	1.92
China	79	1.85
Albania	78	1.83
Czech republic	78	1.83
Bulgaria	76	1.78
Hong kong	76	1.78
Malawi	76	1.78
Sri lanka	76	1.78
Estonia	63	1.48
Philippines	59	1.38
Moldova	55	1.29
Bermuda	48	1.13
Chile	42	0.99
Macau	40	0.94
Romania	37	0.87
Trinidad and tobago	37	0.87
Tanzana	34	0.8
Egypt	32	0.75

Iran	29	0.68
Nepal	26	0.61
Tunisia	24	0.56
Yemen	21	0.49
Bangladesh	16	0.38
Lebanon	16	0.38
Saudi arabia	16	0.38
Madagascar	15	0.35
Pakistan	15	0.35
Ghana	13	0.3
Colombia	12	0.28
Gambia	7	0.16
Total	4,263	100

Table A2. Variables description

VARIABLES	DESCRIPTION & SOURCE
Dependent var	
gfc_gdp	Gross Fixed Capital Formation on GDP (UNIDO & WDI)
Main Controls	
gdp_growth	GDP growth (WDI)
pol_stab	Political Stability (WGI)
infl	Inflation, % change consumer prices (WDI)
pl_i	Price of investment (2005=100) (Penn World Tables)
lempl	Number of employees in host country, industry and year, in Log (UNIDO)
va_gdp	Value added on GDP in host country, industry and year (UNIDO)
Variables of interest	
n_fdi	Number of greenfield FDI in host country, industry and year
n_fdi_production	Number of greenfield FDI in Productive activities in host country, industry and year
n_fdi_trade	Number of greenfield FDI in trade-related activities in host country, industry and year
n_fdi_north	Number of greenfield FDI from high-income OECD countries in host country, industry and year
n_fdi_south	Number of greenfield FDI from non high-income OECD countries in host country, industry and year
stock	Stock number of greenfield FDI in host country, industry and year
stock_production	Stock number of greenfield FDI in Productive activities in host country, industry and year
stock_trade	Stock number of greenfield FDI in trade-related activities in host country, industry and year
stock_north	Stock number of greenfield FDI from high-income OECD countries in host country, industry and year
stock_south	Stock number of greenfield FDI from non high-income OECD countries in host country, industry and year
total_inv_gdp	Total investment flows to host country, industry and year
total_inv_gdp_production	Total investment flows in production activities to host country, industry and year
total_inv_gdp_trade	Total investment flows in trade activities to host country, industry and year
total_inv_gdp_north	Total investment flows from OECD to host country, industry and year
total_inv_gdp_south	Total investment flows from non-OECD to host country, industry and year

Table A3. Results including lagged levels of FDI

VARIABLES	(1) n_fdi	(2) n_fdi	(3) n_fdi	(4) n_fdi	(5) n_fdi	(6) n_fdi
gdp_grow	0.0013**	0.0013**	0.0013**	0.0043***	0.0042***	0.0043***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
pol_stab	0.1360***	0.1353***	0.1360***	0.2282***	0.2262***	0.2280***
	[0.020]	[0.020]	[0.020]	[0.031]	[0.031]	[0.031]
infl	0.0062***	0.0061***	0.0062***	0.0083***	0.0082***	0.0083***
	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
pl_i	-0.2395***	-0.2399***	-0.2394***	0.0545	0.0544	0.0542
	[0.088]	[0.088]	[0.088]	[0.039]	[0.040]	[0.039]
lempl	0.0011	0.0012	0.0011	0.0003	0.0002	0.0003
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
va_gdp	0.0752***	0.0748***	0.0752***	0.1189***	0.1182***	0.1188***
	[0.011]	[0.011]	[0.011]	[0.014]	[0.014]	[0.014]
L.n_fdi	0.0009***					
	[0.000]					
L2.n_fdi				0.0007***		
				[0.000]		
L.n_fdi_production		0.0018***				
		[0.000]				
L.n_fdi_trade		0.0009**				
		[0.000]				
L.n_fdi_north			0.0009***			
			[0.000]			
L.n_fdi_south			0.0008			
			[0.001]			
L2.n_fdi_production					0.0016***	
					[0.000]	
L2.n_fdi_trade					0.0003	
					[0.000]	
L2.n_fdi_north						0.0008***
						[0.000]
L2.n_fdi_south						0.0001
						[0.001]
Constant	0.0048	0.0053	0.0049	-0.4225***	-0.4200***	-0.4220***
	[0.039]	[0.039]	[0.039]	[0.087]	[0.086]	[0.087]
Observations	2,707	2,707	2,707	2,264	2,264	2,264
R-squared	0.665	0.667	0.665	0.674	0.676	0.674

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table A4. Results, disaggregated by technology levels of industries

VARIABLES	(1) Low_TECH	(2) Low_TECH	(3) Low_TECH	(4) HIGH_TECH	(5) HIGH_TECH	(6) HIGH_TECH
gdp_grow	0.0050**	0.0053**	0.0051**	0.0025	0.0025	0.0025
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
pol_stab	0.0858*	0.0892**	0.0862*	0.1811**	0.1772**	0.1817**
	[0.044]	[0.045]	[0.044]	[0.080]	[0.078]	[0.080]
infl	0.0011	0.0012	0.0011	0.0062*	0.0061*	0.0062*
	[0.002]	[0.002]	[0.002]	[0.004]	[0.004]	[0.004]
pl_i	-0.1279*	-0.1243*	-0.1249*	0.0672**	0.0605*	0.0677**
	[0.073]	[0.071]	[0.072]	[0.034]	[0.033]	[0.034]
lempl	0.0019	0.0029**	0.0020	0.0067***	0.0062***	0.0069***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]
va_gdp	0.0738***	0.0749***	0.0734***	0.0690***	0.0678***	0.0692***
	[0.011]	[0.012]	[0.011]	[0.022]	[0.021]	[0.022]
n_fdi_production		0.0009			0.0036***	
		[0.001]			[0.001]	
n_fdi_trade		0.0002			0.0001	
		[0.001]			[0.001]	
n_fdi	0.0013***			0.0010*		
	[0.000]			[0.001]		
n_fdi_north			0.0016***			0.0005
			[0.001]			[0.001]
n_fdi_south			-0.0020			0.0069*
			[0.002]			[0.004]
Constant	-0.0537	-0.0651	-0.0601	-0.3213**	-0.3080**	-0.3209**
	[0.115]	[0.115]	[0.115]	[0.134]	[0.130]	[0.134]
Observations	1,230	1,230	1,230	1,362	1,362	1,362
R-squared	0.777	0.769	0.778	0.714	0.724	0.716

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Note: Lower technology industries are those defined by OECD as low- and middle-low tech, while higher technology industries are those defined by OECD as high- and middle-high tech.