

Global Value Chain and Foreign Manufacturing Investors: An empirical analysis of Sub-Saharan Africa and Vietnam

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Abstract

We investigate whether the behaviour of foreign investors in the host country depends on the degree of involvement of the country into Global Value Chains (GVCs). This is done combining detailed firm-level information on foreign investors about their linkages with local firms with industry-level indicators based on value added trade data, measuring countries' involvement into GVCs. The paper systematically compares the behaviour of foreign investors in Sub-Saharan African (SSA) countries and in Vietnam to explore the different role of country and industry characteristics in shaping their potential development role in the host economies. Our preliminary results show that the position a country holds into GVCs explains the sourcing behavior of foreign investors. More specifically, we find that the extent of local sourcing is higher in industries specialized in more upstream productions. This relation gets reversed in the case of Vietnam, highlighting a difference that can be explained not only by the existing gaps in terms of productive capabilities, but also by a lower degree of complementarity of inputs sourced from Vietnam, compared to those that can be obtained from SSA countries.

Keywords: FDI; Global Value Chains; Linkages, Africa; Vietnam

JEL Classification: F45

1. Introduction

The potential benefits of the presence of foreign firms in developing countries have been widely investigated (Blomstrom and Kokko, 1996, Görg and Greenway, 2004). Nevertheless, and despite the large existing evidence on their potential spillovers (Crespo and Fontoura, 2007), it is not yet clear why the impact of foreign investments on the host countries can be so heterogeneous. This variability is explained by a number of factors including the characteristics of foreign investors, the local context, as well as the interactions between the investing companies and the institutions in the receiving countries.

More recently, an increasing attention has been attributed to the role played by the position of the host economies in Global Value Chains (GVCs), particularly on the international sourcing strategies undertaken by foreign firms (Antràs and Chor, 2013; Farole and Winkler, 2014; Alfaro et al., 2015). The advent of GVCs represents an opportunity for many developing countries, which are nowadays no longer constrained to develop capabilities along the whole production process but can exploit their comparative advantage in certain specific stages of production to link up to global markets (Taglioni and Winkler, 2016). As a matter of fact, foreign investors increasingly target developing countries and their local inputs, especially when they aim at undertaking the stages of production that better complement their own production process.

According to the most recent literature, high local sourcing by foreign firms and the establishment of linkages with suppliers holds the greatest spillover potential in the context of less developed countries (Javorcik, 2004; Gorodnichenko et al., 2015; Newman et al., 2015). Depending on the characteristics of the host country and the industry in which they operate, as well as the capabilities of the local firms, foreign investors decide not only how much to source locally, but also whether to transfer key resources such as technology and knowledge to their local suppliers, further enhancing the developmental effect of their investments (Gereffi et al, 2005; Giroud and Scott-Kennel, 2009).

In this paper, we aim at investigating the factors driving the local sourcing behavior of foreign investors and their likely implications for low-income countries. The empirical analysis is based on the combination of two firm-level databases – the Africa Investor

Survey (AIS) on 19 Sub-Saharan African (SSA) countries and the Vietnam Investor Survey (VIS) – both collected by UNIDO, offering the possibility to investigate the role of foreign investors with respect to dimensions so far partially disregarded by the existing literature due to data availability. They provide detailed information about investors' behavior in terms of local sourcing and transfer of knowledge and other key resources to local suppliers. To the best of our knowledge, this is the first empirical effort to provide a detailed comparison, along the previously discussed lines of research, between SSA countries and Vietnam, therefore contrasting a region still poorly attractive to foreign manufacturing investments with a country which has recently been central in the rapid expansion of the global fragmentation of production.

By exploiting the richness of the information provided by our surveys, we can run our analysis by accounting for a number of factors including the heterogeneity among investing companies and the characteristics of local suppliers (Farole and Winkler, 2014). In addition, a key innovation of our work is to explicitly account for the involvement of each host country within each industry into GVCs. We do this by adding to the firm-level data some industry levels indicators calculated with international I/O tables from the Eora database. Our main indicator is a measure of the distance of an industry's production to the final demand, i.e. a variable considering at which stage the sector enters in global production. This is an indicator that has been exploited in the literature to investigate how firms organize their production process (Antràs and Chor, 2013; Alfaro et al., 2015; Del Prete and Rungi, 2015). Still, however, no analysis on low income countries has tried to understand whether such GVC indicators influence local sourcing behavior of foreign investors, and their spillover potential to local suppliers. In addition, in our empirical analysis we look also at other indicators, including the bilateral flow of value added between host and origin country of the firm, as well as other measures of GVC involvement discussed in the literature (Taglioni and Winkler, 2016).

Our contribution is related to different strands of literature looking at the international sourcing behavior of firms within fragmented production networks and on the nexus between host country's characteristics and their participation into GVCs.

First, many papers have been recently investigating the relevance of countries' position along the Global Value Chain for global firms in terms of both location (Baldwin and Venables, 2013; Costinot et al., 2013; Engemann and Lindemann, 2013; Fally and

Hillberry, 2015; Harms, et al., 2012) and organizational choices (Alfaro et al., 2015; Antràs and Chor, 2013; Del Prete and Rungi, 2015). The contribution by Costinot et al. (2013), for instance, shows that in a production process characterized by a continuum of intermediate stages, each subject to mistakes whose costs becomes higher the closer is the stage to final production, countries that are less likely to make mistakes end up producing upstream, and vice versa. Engemann and Lindemann (2013) have tested these assumptions using FDI location decision of German affiliates, and found indeed that they are more likely to invest in low productive countries in more upstream activities only. Compared to our specific research setting, this framework is useful to explain why foreign investors are producing in certain industries, but it could say little about their different propensity to use local or other inputs in their production process.

On this specific issue, the seminal work by Antràs and Chor (2013) explored the optimal sourcing strategies (i.e. in-sourcing Vs. out-sourcing) along the value chain, by assuming sequential-type production and incomplete contracts. They found out that the sourcing strategies related to upstream production stages depend on whether inputs are sequential complements or sequential substitutes.¹ In the first case, in order to boost upstream suppliers' incentives to produce more, final goods' producers will opt to buy their inputs (out-sourcing option); instead, downstream inputs will be produced within final good producers' boundaries (in-sourcing option). In the second case, final goods' producers will push up production levels at more downstream stages by the out-sourcing option.

Indeed, we think that this framework might help theoretically grounding our results in the literature, as long as the foreign investors in our dataset choose between buying intermediates from local suppliers (out-sourcing option) and producing them within intra-firm boundaries (in-sourcing option). Nevertheless, two main data limitations prevent us from a proper empirical test of this framework. First, the AIS/VIS questions do not allow to properly capture the in-sourcing option, since they do not provide the respective values of imports within-firm boundaries and imports from outside the investors. Second, previous works that have already tested this theoretical framework

¹ Inputs are considered "complementary" or "substitutes" if the final good's demand elasticity is, respectively, larger or lower than the elasticity of substitution across inputs. In the case of sequential complements, the value of the marginal product of suppliers' investments increase with the investment levels by prior suppliers. In the case of sequential substitutes, the value of suppliers' investments is decreasing in how much prior suppliers have invested.

(Antras and Chor, 2013 itself; Alfaro et al, 2015; Del Prete and Rungi, 2015) have measured the complementary degree of inputs at a fine level of disaggregation (6-digit level data), while industry information in our data are defined according to a much more aggregate level (2-digit ISIC Rev. 3).²

The second strand of the literature we touch on highlights the importance of the participation and the position of industries/countries within the GVC in shaping foreign investors' potential spillover effects (Paus and Gallagher, 2008; Farole and Winkler, 2012). Even though it does not directly explore the relationship between participating in GVC and foreign investors' propensity to establish linkages to local suppliers, it reveals the importance of GVC for the development of host economies and, particularly, local producers that can potentially supply intermediates to foreign investors. Related empirical work on Asian countries has so far pointed out that the more upstream an industry, the higher the probability to receive FDI that is related to GVC (Ramondo, 2016). Related research, looking on the side of domestic producers, finds a positive effect of GVC participation on productivity for a North African sample drawn from the World Bank Enterprise Survey database (Del Prete et al., 2016). They argue that participating to the GVC implies fulfilling international quality standards to trade customized inputs: this imposes a selection of high-productivity producers as candidates to join GVCs. Similarly, Montalbano et al (2016), focusing on a sample of domestic companies in Latin America and Caribbean countries, find a positive effect of industry upstreamness in GVC on firm-level productivity. Firms operating in industries exporting intermediates with high domestic value added turn out to outperform those importing foreign value added though inputs.

Our results show that there is a positive and highly statistically significant relation between the distance to the final market of an industry and the share of local sourcing from foreign-owned firms, meaning that foreign firms involved in production in upstream sectors are likely to exploit the specialization of local suppliers in the production of intermediate goods at earlier stages of the production process. This relation turns negative in the case of Vietnam, a result that we show can depend on the different, and more advanced, productive structure compared to SSA countries. Additional results show also that the relation found between industry's *upstreamness*

² The complementarity degree of the sourced inputs is derived by the demand elasticity of the investors' final good sector.

and local sourcing is likely to be reinforced by some country and industry's characteristics, including their institutional environment, human capital, and the degree of GVC participation. Finally, on the base of our analysis of the incidence of GVC position on the probability to transferring resources to domestic suppliers, we show that those involved in production stages that are rather relatively closer to final demand are more likely to receive foreign support, especially in the form of product or process upgrading.

The paper proceeds as follows. Section 2 introduces the firm level data and provides a thoughtful comparison of the main characteristics of the investors between SSA and Vietnam; furthermore, it presents the industry level indicators constructed from Eora. Section 3 introduces the empirical framework and discusses the main results. Section 4 concludes, drawing some policy implications.

2. The data and the characteristics of the investors

2.1. Foreign investors in Sub-Saharan Africa and Vietnam

The analysis is based on two original firm-level surveys collected by UNIDO: the African Investor Survey (AIS) on 19 Sub-Saharan countries and the Vietnam Industrial Survey (VIS).³ The collection of both datasets followed a rigorous survey methodology in terms of stratified sampling (on three dimensions: sector, size and ownership) and interview techniques (face-to-face interviews with top-level managers of foreign- and domestic-owned firms).⁴ For comparative purposes, in this analysis we select foreign investors specialised in the manufacturing industry (ISIC revision 3 categories C). Therefore, the total sample includes 1,929 foreign investors, 42% of which based in Vietnam.

The surveys provide detailed information on some characteristics of the foreign investors, including their organizational structure, country of origin, motivation for investing, location factors, linkages to the local producers, support received by host institutions. In the rest of this section, we present a descriptive comparative analysis of the foreign investors operating in SSA and in Vietnam, two very different contexts in terms of their attractiveness for foreign investors. As a matter of fact, according to a

³ For a detailed description of the two surveys, see respectively Africa Investor Report (UNIDO, 2012a) and Viet Nam Industrial Investment Report 2011 (UNIDO 2012b). Additional information on both surveys is also available through the UNIDO Investment Monitoring Platform at <http://investment.unido.org/imp/>.

⁴ The sample is representative of public and private for profit firms with 10 or more employees.

recent World Bank (2015) report, SSA countries are still poorly attractive to foreign investments in the manufacturing industry due to the underdevelopment of infrastructures, the high political instability and the low levels of industrialization in the region. Instead, Vietnam is located on the border with China in a region, which is central in the rapid expansion of the global fragmentation of production, and therefore strongly attractive for foreign investors interested in setting up their production facilities. Since its recent access to the World Trade Organization (WTO) in 2006, Vietnam has received massive amounts of FDIs, mainly attracted by efficiency seeking motivations. As a matter of fact, foreign investments have played a key role in the economic transformation of the country, representing a large share of output and employment and contributing to roughly 20% of GDP and half of the total exports (UNIDO, 2012b).

In more detail, as shown in Figure 1, both SSA economies and Vietnam recorded an increase in FDI in-stocks over the 2005-2015 decade (UNCTAD, 2016). FDI in-stocks grew by 3.6 times in Vietnam (from 22,400 million US\$ to 102,790 million US\$) and 8.9 times, on average, in SSA (11.3 times in Ghana, from 2,100 million US\$ to 26,400 million US\$, and 9.8 times in Mozambique from 2,600 million US\$ to 28,779 million US\$). Interestingly, most of the growth occurred within the first half of the decade (2005-2010), when SSA African economies' inward FDI grew by, on average, 4.3 times, starting often by really low values (such as in the cases of Lesotho, Madagascar and Niger). Finally, in 2015 Vietnam received more FDI in-stocks (103,000 million US\$) than the top SSA FDI recipient, Nigeria (89,735 million US\$).

[FIGURE 1 ABOUT HERE]

Table 1 presents some characteristics of the foreign investors and their investments, showing notable differences between SSA and Vietnam. The UNIDO surveys consider two types of foreign investors: the subsidiaries of Multinational Corporations (MNCs) and the independent and stand-alone Foreign Entrepreneurs (FEs), whose governance structures do not follow the classical headquarters-subsiidiary relationship. In SSA, FEs are 53.5% of the total, mainly including regional investors (mostly from Kenya and South Africa) investing in neighbouring countries. On the contrary, in Vietnam FEs are only 22.1%.

[TABLE 1 ABOUT HERE]

Considering some characteristics of the investments, a large share of them in both SSA and Vietnam takes the form of greenfield investments. Interestingly, in SSA foreign investments are on average older than in Vietnam (respectively, 18.5 and 9 years old), and this could be explained by the more recent liberalization taking place in the latter country, following the WTO access. The main motivations for investing are also rather different across destinations: in SSA 70% of the deals are market seeking, confirming the findings by the World Bank (2015), while this happens in about 41% of the cases in Vietnam, where the prevailing motive to invest is efficiency seeking. This is not surprising considering the role of the country as a low-cost production base for many industries, especially in more recent years, once the position of China as production platform has been progressively reducing.

The factors driving investors' location decision also differ across host countries: in Vietnam they are mostly attracted by low labour costs and the quality of legal framework, while in SSA they are mainly driven by the availability of raw materials and the size of the local market. Interestingly – and against common perceptions – factors such as the political and economic stability of the host country see a slight preference towards SSA, a result that could be explained by the presence in the sample of some SSA countries that have consistently improved in one or both of these dimensions over the last decade (e.g. Rwanda, Ethiopia).

Sectoral distribution of foreign manufacturing investors result to be quite different between SSA and Vietnam. In SSA, almost one-half of investors belong to Food and Beverages sectors (20%) and Chemicals sectors (including petroleum, coke, and rubber, 30%). In Vietnam, investors are more evenly distributed across industries; the most relevant sectors are Textiles (20%), Chemicals (16.5%), and Machinery (16%). Similar shares are represented by the Wood & Paper sectors (9% and 10% for, respectively, SSA and Vietnam) and Metal products industries (13% and 11%).

In terms of investor origin, around one-third of investments in SSA come from Europe and, in particular, from the UK (11.44%), France (7.01%) and Portugal (3.87). An important share of the investments in SSA (20 %) is originated within the same area (South Africa, 6.18% and Kenya, 5.44%). However, the most important investor in Africa is India, representing 17% of the deals. Turning to Vietnam, the majority of investments are from the East Asia region (86.6%): China (26.4%), Japan (19%), and Republic of Korea (14.34 %) are the most important investors. Moreover, among the

few investments coming from different regions, the most relevant origin countries are: US (3.9%), UK (1.14%), and France (1%).

Table 2 provides a set of interesting information about the establishment of linkages between foreign investors and local firms. Despite foreign investors are relatively younger in Vietnam they rely on average on a much larger number of local suppliers compared to SSA (respectively, 50.7 and 18.2) and such difference is confirmed also when considering the number of long-term (i.e. those maintained for more than 2 years) suppliers. Moreover, the average share of inputs sourced locally is similar between SSA and Vietnam (respectively 22% and 18%), which is consistent with previous empirical evidence on other developing countries (Javorcik and Spatareanu, 2009).

[TABLE 2 ABOUT HERE]

An important difference is that in Vietnam investors source a larger share of inputs through their parent firms, whereas in SSA investors import more inputs from abroad (both directly and through local importers). Similarly, a clear difference between investors in SSA and Vietnam is the (average) share of exports directed to the parent company, which reaches 66% in Vietnam and only 14% in SSA. Combining these two stylized facts, it results that a large share of local suppliers' activity in Vietnam concerns intra-firm trade, which is consistent with the prevalence of efficiency seeking motive as well as with the evidence pointing at the country being a central node of production and assembly in regional and global value chains (OECD, 2012).

Finally, and importantly, investors sustain upgrading, both in quality and efficiency, more frequently in the context of SSA than in Vietnam, with these differences likely to be explained by the lower degree of technical capacities among local suppliers in the former host countries.

2.2. GVC indicators

To investigate whether the position of a host country in Global Value Chains, impact on the quantity and quality of the local linkages established by foreign investors, we take advantage of the Eora Multi Region Input-Output (MRIO) dataset⁵, which provides information over a large number of countries (187) and a comprehensive list of sectors⁶

⁵ Eora MRIO database is freely available at <http://www.worldmrrio.com> (accessed on 18 October 2016)

⁶ More specifically, Eora employs a 26-sector classification, which we match with the ISIC Rev. 3 classification (2-digit) of the UNIDO surveys as follows (ISIC codes in parentheses): “food & beverages” (15 and 16); “textiles and wearing apparel” (17, 18, 19); “wood and paper” (20,21,22); “petroleum,

(Lenzen et al, 2012). In particular, Eora is used for calculating the *distance to the final demand* (*DEMAND_DISTANCE*) indicator for any given industry. This is defined following Antràs et al. (2012), as a proxy for a country’s position into a GVC in any given industry, accounting for the different stages of production involved. It takes a value of 1 if the production of an industry is completely sold in the final market, and values higher than 1 when the production is used as an intermediate good for manufacturing a final product (in other words, the higher is the value, the more upstream is the industry).

The index is calculated as

$$DD=Bu, \tag{1}$$

where DD is the $NM \times 1$ demand distance index vector, with N as the number of countries and M as the number of sectors; B is a $NM \times NM$ “total requirement coefficients” matrix⁷; u is a $NM \times 1$ vector of ones. In more detail, (1) can be also written as follows:

$$\begin{bmatrix} DD_1 \\ \dots \\ DD_N \end{bmatrix} = \begin{bmatrix} B_{11} & \dots & B_{1N} \\ \dots & \dots & \dots \\ B_{N1} & \dots & B_{NN} \end{bmatrix} \begin{bmatrix} 1 \\ \dots \\ 1 \end{bmatrix}, \tag{2}$$

where DD_n is a $M \times 1$ sub-vector, whose entry d_{nm} represents the distance to final demand of sector m in country n, with $n=1, \dots, N$, and $m=1, \dots, M$; B_{ns} is a $M \times M$ matrix, where the element b_{ij} represents the amount of gross output from sector i in country n is required for a one-unit increase in the final demand of sector j in country s, with $n,s=1, \dots, N$, and $i,j=1, \dots, M$.

In Figure 2 we plot the mean values of *DEMAND_DISTANCE* for the 20 countries and for the industries included in our sample. Along the lines of some existing evidence (Foster-McGregor et al., 2015; UNIDO, 2016), we confirm that the countries included in our sample are all relatively far from the final market and, whereas integrated into GVCs, they are mainly specialized in the production of intermediate inputs in the initial phases of the production process. As expected, this is especially true for those countries specialized in the processing of primary resources, such as basic metals in Zambia, or

chemical, and non-metallic mineral products” (23,24,25,26); “metal products” (27 and 28); “electrical and machinery” (29,30,31); “transport equipment” (34 and 35); “other manufacturing” (36); “electricity, gas, water” (40).

⁷ B is derived a Leontief inverse matrix, such as in Koopman et al. 2011.

wood and paper products in Cameroon (OECD & AfDB, 2014). Industries closer to the market include food processing in Nigeria and Mozambique, and the textile sector in Lesotho and Nigeria.

[FIGURE 2 ABOUT HERE]

Furthermore, we employ Eora to calculate *the value added embodied in the exports of foreign investors' home country originated in the host country of the investment, within the same sector of investors*. (*VA_EXP_SHARE*). It is a measure of the upstream linkage of the host country to the home country in terms of value added. It varies across industry and country-pairs and the higher the share, the stronger is the dependence of the home country of the investor on the host market in that specific industry.⁸

3. The empirical analysis

We test a standard model of FDI spillovers, including the GVC indicators introduced in Section 3 with the aim of understanding whether the relative positioning of industries and countries into GVCs can affect the behaviour of foreign investors and on their linkages with the host economies. We consider the degree of local sourcing of foreign investors, measured through the *quantity* (i.e. the share of inputs that are sourced locally) and the *quality* of their linkages with domestic firms, which are a proxy for the *intentional* transfer of resources (or knowledge flows) (Giroud and Scott-Kennel, 2009; Giroud et al., 2012).

The general form of our specification is:

$$Y_i = \sum X_i + \sum Z_i + \delta_x + \lambda_k + \gamma_{jk} + \varepsilon_i, \quad (3)$$

where Y_i is the outcome of interest (i.e. quantity and quality of local linkages) for all the i firms in the sample. It is worth noticing that the cross-sectional nature of the data does not allow establishing causality, but only uncovers existing correlations among the variables considered, this being a limitation of our study.

There are two main sets of factors that can affect the dependent variables: the characteristics of investors (X_i) and those of the industries attracting the investments (Z_i), based on the GVC indicators presented in the previous section-

⁸ The same index indicating the decomposition of the value added in exports by origin – at the more aggregated country-level – is used in Koopman et al. 2011.

DEMAND_DISTANCE and *VA_EXP_SHARE*. The vector X_i includes the following variables:

- The *age of the investment* (*LINV_AGE*) is a proxy for the local experience of foreign firms, measured as the log of the years since the first investment.
- The *size of foreign investors* is measured as the log number of employees (*LEMP*).
- The *motivation for investing* is a dummy variable taking the value of 1 if it is a market seeking investment (*MKT_SEEKING*), and 0 for efficiency seeking.
- The *type of the investor* is a dummy taking the value of 1 for stand-alone foreign entrepreneurs (*FE_INV*) and 0 if the investor is a MNC.
- The *entry mode* of the investment is a dummy taking the value of 1 for greenfield (*GREENFIELD*) and 0 for acquisitions.
- The *destination of the investment* is a dummy taking the value of 1 for Vietnam and 0 in case for SSA countries (*VIETNAM*).

Finally, all models also include industry (δ_x), host country (λ_k), and country-pair (Υ_{jk}) fixed effects to control for common factors not included in the regressions that could influence the outcomes.

3.1 Local linkages

Table 3 reports the main results, when the dependent variable is the share of inputs supplied locally and a sample made by foreign firms only operating in the manufacturing sector. Results of the main controls are in general in line with the existing literature (Giroud et al., 2012; Winkler, 2013), confirming that both the characteristics of firms and investments influence the local sourcing behaviour of foreign investors. Specifically, higher local sourcing is positively correlated to the age of the investment, considering that it takes time to search and find reliable local sources of inputs. Greenfield investments are also positively related to local sourcing. Conversely, the size of the investor is negatively related with local sourcing and therefore the larger the firm, the bigger is the use of alternative sourcing strategies, including imports (both intra-firm, i.e. from the parent, and through the market) (Winkler, 2013). More surprising is the negative value recorded for stand-alone foreign entrepreneurs, who in the absence of an intra-firm network could be expected to rely more on local suppliers. Finally, a negative relation is also found between the market

seeking motive and local sourcing, which can be explained by the relatively lower importance of local factors of production (compared to efficiency-seeking investments) in these investments.

[TABLE 3 ABOUT HERE]

Moving to our variables of interest, we find a positive and highly statistically significant relation between the distance to the final market of an industry and the share of local sourcing from foreign-owned firms (Table 3, Column 1). This is, to some extent, an intuitive result. The more upstream an industry, the more intermediate goods and further upstream inputs are produced. Foreign firms involved in production in upstream sectors are therefore likely to exploit the specialization of local suppliers in the production of intermediate goods at earlier stages of the production process. However, this holds important implications. Being FDI one of the key mode to link up into GVC in developing countries, a larger recourse by foreign firms to local inputs is an opportunity for domestic firms trapped in low-value added activities in upstream industries to enter global markets, and to start enjoying advantages of GVC involvement. Interestingly, this relation turns negative when we interact the demand distance coefficient with a dummy equal to 1 if the country is Vietnam (Column 2). What can explain this result? One way to understand this finding is to read it with the lens of the theory of firms investing and producing in more upstream industries in less developed countries given the lower risks of losing value because of less sophisticated production processes (Costinot et al., 2013; Engemann & Lindemann, 2013). This seems to be consistent with the reality of many SSA countries, in which the manufacturing sector is still undiversified, and mainly focused on raw material processing or end product assembly; therefore dominated by low value added activities (World Bank, 2015), which are more likely to be upstream (OECD & AfDB, 2013). This also explains why Vietnam, *relative* to SSA, attracts more investments and local sourcing in downstream activities, considering its stronger production capacities. An additional explanation can be found by taking into account the degree of complementarity of the inputs sourced based on their demand elasticities of investors' final goods (Antràs and Chor, 2013). For this purpose, we calculate the demand elasticities at the industry level for each country of origin of the investors and find that on average, in SSA demand elasticity is larger than in Vietnam (Table A1 in Appendix). Following the approach of Antràs and Chor (2013) this could mean that inputs sourced

from SSA are in general more of the complementary type. Within an incomplete contracts framework, this is a characteristic making more convenient for investors to source more upstream in the local market given that upstream producers of complementary inputs have larger incentives to produce quality inputs.

Finally, we show that the pattern of local sourcing can also be influenced by the bilateral flow of value added between the host and the home countries of foreign investors in each industry. This indicator provides a detailed information about the existence of specific linkages between countries within industries and GVCs. Though we do not have the possibility to explore this mechanism any further given data limitations, this finding could be related to traditional theories of international production claiming that vertical integration strategies of foreign firms can complement trade relations by securing local resources that are re-exported back home (Barba Navaretti and Venables, 2004).

3.2. Demand distance and local linkages: the mediating factors

The previous Section has shown the existence of a positive correlation between a country involvement upstream in production and the sourcing strategy of foreign firms. This is important, especially to those developing countries, like many SSA ones, that are trapped into low-value added activities at the beginning of the production process, since local sourcing by foreign firms is likely to provide access to new markets, resources and knowledge to local players allowing them to upgrade.

Still, and besides the result for the case of Vietnam, it is useful to understand whether there are other factors, at both the country and the industry level, that can affect this relation and how. In what follows, we will therefore discuss the results based on the interactions between the demand distance coefficient and some mediating factor with the aim of understanding whether they can impact on local sourcing (Columns 3-7 in Table 3).

First, we introduce an indicator of GVC participation (*GVC_PARTICIPATION*), defined as the sum of an “upstream” participation component (i.e. the share of a country-sector’s exports of intermediates used by other countries’ exports) and a

“downstream” participation component (i.e. the share of imported intermediates in a country-sector’s exports.).⁹

While it is true that the coefficient of demand distance provides an information on the relative position of a given industry/country pair within a global production network, it does not say much about the degree of involvement in it. Adding an interaction term with the demand distance coefficient ($GVC_PARTICIPATION * DEMAND_DISTANCE$) allows to understand whether higher involvement into GVC plays or not in favour of local sourcing, and in which stages of the production process. Results are interesting. While the coefficient of demand distance left alone becomes not significant, the interaction term is positive and significant, meaning that local sourcing by foreign firms in upstream industries seems conditional on high GVC involvement. Figure 3 reports the average marginal effect of demand distance for different degrees of GVC participation, showing that the relation between demand distance and local sourcing is basically null for very low degrees of GVC participation, and becomes more relevant only once higher levels of involvement are reached. Higher GVC involvement can be understood as an indicator of the relevance of the industry for global production, and as a proxy of internationally recognized quality (including, for instance, on the adoption of standards) of local firms operating in that industry.

[FIGURE 3 ABOUT HERE]

In column 4 (Table 3), we introduce the domestic value added produced by each sector in the host country ($DOMESTIC_VA$), which is then interacted with the domestic demand coefficient ($DEMAND_DISTANCE * DOMESTIC_VA$). The interacted term shows that local sourcing is stronger in upstream activities in those sectors accounting for the larger shares of the domestic value added (see also Figure 4.a). This is in part expected, since sectors more upstream tend to employ more domestic (rather than foreign) inputs (UNCTAD, 2013; Ramondo, 2016). Nevertheless, this is not always the case (as for instance in capital intensive industries with higher dependence on foreign capitals, such as the processing of metal products), and it could be also explained differently. On the one hand, this could be due to some local content requirements by the host countries, which do not only push foreign investors to establish linkages with local (i.e. upstream) suppliers, but also to employ a certain amount of domestic inputs

⁹ See Koopman et al., 2011

in production. On the other hand, this could also reflect to some extent the comparative advantage of the host country in employing domestic factors of production to produce specific inputs, and to differentiate them, inducing foreign investors to source more locally.

We also interact the domestic demand coefficient with some characteristics of the host countries with the aim of understanding whether they can impact on local sourcing. We do this on the ground of some existing evidence that has identified some characteristics that are likely to affect the distance to the final demand (Antràs et al., 2012) or that have the potential to shape the spillovers from FDI participation (Taglioli and Winkler, 2016). They are the log of real per capita GDP (LRGDPE_PC, source Penn World Tables); the level of human capital (HC, source Penn World Tables), which is related to the average years of schooling and the return to education; and a measure of institutional quality as the control of corruption (CONTROL_CORR, source World Governance Indicators). Figure 4 plots the marginal effects of the interaction terms showing that the positive relation between upstreamness and local sourcing is stronger in lower income countries (DEMAND_DISTANCE*LRGDPE_PC, Figure 4.b); in countries with high institutional quality (DEMAND_DISTANCE*CONTROL_CORR, Figure 4.c); as well as in countries with high human capital (DEMAND_DISTANCE*HC, Figure 4.d). To some extent, this set of findings looks coherent with the results of the cross-country analysis by Antràs et al. (2012), showing that the level of downstreamness is positively correlated to the income level and confirms previous speculations, including the result specific to Vietnam, in that higher productive (i.e. richer) countries are less likely to be targeted for local sourcing in upstream tasks, but rather are more capable to produce inputs downstream either (Costinot et al., 2013). The other two findings can, instead, add some more insights on the relation examined. Local sourcing by foreign firms in upstream industries is affected by the institutional context, since the relation is marginal in corrupted contexts and turns stronger for less corrupted ones. Even more relevant is the finding on human capital, which appears to play a relevant mediating role in the relation examined. Moving from countries with low, to countries with high levels of HC determines a switch in the sign of the relation between upstreamness and local sourcing. Again, this is a finding that echoes the framework developed by Costinot et al. (2013), as well as

finding from more empirical studies. Countries trapped in upstream activities will be more attractive to foreign buyers if they can provide a more qualified workforce.

[FIGURE 4 ABOUT HERE]

3.3 Quality of linkages

In this section, we try to develop our analysis further by testing a model with a set of new dependent variables measuring the quality of linkages or in other words the extent to which local linkages can become sources of knowledge or other resource transfer to domestic suppliers. To do this, we use the questions – common to both surveys – asking whether foreign investors do provide some forms of assistance to their suppliers. A peculiarity of the data is that this question is made to both foreign investors and to the domestic firms surveyed. To avoid raising the risks of over-reporting on their supporting strategies by investors, we use the responses provided by domestic firms that supply to foreign buyers.

The dependent variables are dummies taking the value of 1 if foreign investors do provide this form of assistance to their domestic suppliers and 0 otherwise. Considering the variety of dimensions covered and the fact that (a) not all domestic firms supply foreign investors and, even in that case, that (b) they rarely receive more than one type of support, we have re-aggregated the individual dimensions according to the following four main variables:

1. *any_support*, a dummy equal to 1 if domestic suppliers received any of the 6 possible sources of support from foreign investors;
2. *support_upgrade*, a dummy equal to 1 if domestic suppliers received support specific to upgrade their product or process (quality upgrade, efficiency upgrade or technology transfer);
3. *product_upgrade*, a dummy equal to 1 if domestic suppliers received support specific to upgrade their product (quality upgrade or collaboration);
4. *other_support*, a dummy equal to 1 if the domestic firm received other forms of support, not directly related to upgrading (training or capital);

In view of this, we opt for a standard probit regression, in which we control for a bunch of standard firm characteristics, such as the number of foreign buyers, also squared ($N \text{ FOREIGN BUYERS}$, $N \text{ FOREIGN BUYERS SQ}$), their age (AGE), size ($EMPL$), capital intensity (K/L), and the exporting status ($EXPORTER$). In

addition, to account for the potential non-linear relation between the size and the quality of linkages (Giroud et al., 2012), we control as well for the total number of foreign buyers for each suppliers (and its square value). Consistent with the previous set of results, we use the constructed coefficient measuring industry distance to the final demand, calculated as before at the host country and industry level, as a key indicator of upstream involvement in GVCs. Existing empirical evidence provides support that domestic suppliers in more upstream industries are more likely to benefit from specialization and enjoy productivity advantages compared to other local producers (Montalbano et al., 2016). Whether this specialization and higher set of local capabilities translates in the production of core inputs to the production process of certain products, this could lead to higher incentives by foreign investors to provide assistance and to transfer resources to their local partners, as a means to ensure high specifications and quality. Cross-country evidence on local suppliers based in low income countries show for instance that are those producing core upstream inputs, such as agro-food and cut-makes textiles, are those more likely to receive assistance by their foreign buyers (Farole and Winkler, 2014). This way of thinking seems to be consistent with theoretical models proving that foreign firms, in light of their technological advantage, have an incentive to transfer technology to their local suppliers with the objective of rising quality of their suppliers, as well as fostering competition and lowering prices of inputs upstream (Blalock and Gertler, 2009; Lin and Saggi, 2007).

[TABLE 4 ABOUT HERE]

4. Conclusions (to be developed)

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Table 1. Main characteristics of foreign investors/investments by host countries

| | | SSA | Vietnam | |
|---|--|-----------------------|---------|-------|
| Foreign investor | % of MNC investments | 28.5 | 66.6 | |
| | % of foreign entrepreneurs (FE_INV) | 53.5 | 22.1 | |
| Investment | % of greenfield (GREENFIELD) | 86.1 | 87.4 | |
| | Average # of years since the first investment (INV_AGE) | 18.5 | 8.9 | |
| Motivation | % of market seeking (MKT_SEEKING) | 69.7 | 41.2 | |
| | % of efficiency seeking | 7.8 | 43.8 | |
| Location factors (Average score of perceived importance: 1 non important, 2 important, 3 very important) | Political stability | 2.64 | 2.56 | |
| | Economic stability | 2.65 | 2.55 | |
| | Transparency of business regulations and legal framework | 2.36 | 2.19 | |
| | Local market | 2.49 | 2.15 | |
| | Labor costs | 2.44 | 2.51 | |
| | Skills availability | 2.45 | 2.37 | |
| | Raw materials | 2.54 | 1.94 | |
| | Local suppliers | 2.25 | 2.14 | |
| | Incentives | 2.12 | 2.13 | |
| | Bilateral agreements | 2.12 | 2.16 | |
| Industrial sector of investors (%) | Food & Beverages | 20.73 | 6.09 | |
| | Textiles & Wearing Apparel | 13.52 | 20.12 | |
| | Wood & Paper | 9.16 | 10.06 | |
| | Petroleum, chemicals and other non-metallic mineral products | 29.89 | 16.52 | |
| | Metal products | 13.61 | 11.06 | |
| | Electrical and machinery | 6.23 | 16.02 | |
| | Transport equipment | 1.69 | 6.58 | |
| | Other manufacturing | 5.16 | 13.54 | |
| | Origin of investors (%)¹⁰ | East Asia & Pacific | 12.76 | 86.61 |
| | | Europe & Central Asia | 35.75 | 5.97 |
| Latin America & Caribbean | | 0.47 | N.A. | |
| Middle East & North Africa | | 7.73 | 0.16 | |
| South Asia | | 18.34 | 0.32 | |
| SSA | | 20.11 | 0.16 | |
| | North America | 4.84 | 6.77 | |
| N. investors | | 1124 | 805 | |

Source: UNIDO AIS and VIS

¹⁰ Origin countries have been grouped according to World Bank classification of regions.

Table 2. Linkages with local suppliers

| | SSA | Vietnam |
|---|-------|---------|
| # Domestic_suppliers (average) | 18.19 | 50.69 |
| # Domestic_suppliers in long term relations (average) | 5.44 | 23.57 |
| Exports to parent (% of total export) | 14.53 | 66.41 |
| <i>Origin of inputs (% of total value)</i> | | |
| Domestic inputs | 21.75 | 18.18 |
| Inputs from parent firm | 14.44 | 23.15 |
| Direct imported inputs | 50.77 | 38.44 |
| Indirect imported inputs | 10.21 | 2.28 |
| <i>Assistance to local suppliers (% of total assistance received)</i> | | |
| Quality upgrade | 45.9 | 39.8 |
| Technology transfer | 19.55 | 6.96 |
| Efficiency upgrade | 34.1 | 25.0 |
| Access to financial capital | 15.43 | 11.1 |
| Training | 20.13 | 13.18 |
| Collaboration | 18.39 | 23.25 |

Source: UNIDO AIS and VI

Table 3. Quantity of Linkages (Tobit)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|-----------------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|------------------------|------------------------|
| LINV_AGE | 0.00615** (0.0026) | 0.00244 (0.0026) | 0.00409 (0.0197) | 0.00272 (0.0028) | 0.00479* (0.0027) | 0.00327 (0.0027) | -0.00598** (0.0028) |
| GREENFIELD | 0.0206*** (0.0065) | 0.0233*** (0.0064) | 0.0299 (0.0348) | 0.0222*** (0.0068) | 0.0230*** (0.00677) | 0.0209*** (0.0067) | 0.0295*** (0.0068) |
| LEMP | -0.0290*** (0.0012) | -0.0266*** (0.0012) | -0.0283*** (0.0107) | -0.0266*** (0.0012) | -0.0276*** (0.0012) | -0.0291*** (0.0012) | -0.0157*** (0.0012) |
| FE_INV | -0.0187*** (0.0063) | -0.0193*** (0.0063) | -0.0202 (0.0255) | -0.0183*** (0.0067) | -0.0196*** (0.00647) | -0.0195*** (0.0064) | 0.00255 (0.0066) |
| MKT_SEEKING | -0.0177*** (0.0062) | -0.0181*** (0.0062) | -0.012 (0.0234) | -0.0177*** (0.0066) | -0.0174*** (0.0064) | -0.0161** (0.0064) | -0.00761 (0.0064) |
| VIETNAM | 0.285*** (0.0053) | 0.674*** (0.0058) | 0.273* (0.162) | 0.272*** (0.00523) | 0.341*** (0.0055) | 0.234*** (0.0054) | 0.246*** (0.0055) |
| DEMAND_DISTANCE | 0.0866*** (0.0027) | 0.200*** (0.0027) | -0.000459 (0.0637) | -0.0510*** (0.0029) | 0.774*** (0.0029) | 0.112*** (0.0028) | -0.646*** (0.0028) |
| VA_EXP_SHARE | 0.577*** (0.0321) | 0.673*** (0.0317) | 0.564* (0.332) | 0.661*** (0.0319) | 0.674*** (0.0328) | 0.455*** (0.036) | 41.27*** (0.0261) |
| GVC_PARTICIPATION | | | -6.258** (2.919) | | | | |
| DEMAND_DISTANCE*GVC_PARTICIPATION | | | 3.467** (1.573) | | | | |
| DEMAND_DISTANCE * VIETNAM | | -0.157*** (0.0021) | | | | | |
| DEMAND_DISTANCE * DOMESTIC_VA | | | | 0.325*** (0.0055) | | | |
| DOMESTIC_VA | | | | -0.794*** (0.0125) | | | |
| LRGDP_PC | | | | | 0.153*** (0.0009) | | |
| DOMESTIC_VA*LRGDP_PC | | | | | -0.0871*** (0.0004) | | |
| CONTROL_CORR | | | | | | -0.371*** (0.0097) | |
| DEMAND_DISTANCE*CONTROL_CORR | | | | | | 0.0537*** (0.0040) | |
| HC | | | | | | | -0.235*** (0.0034) |
| DEMAND_DISTANCE*HC | | | | | | | 0.303*** |

| | | | | | | | |
|-----------------|-----------------------|------------------------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------------------|
| CONSTANT | -2.032*** (0.0069) | -2.214*** (0.00691) | 0.0192 (0.213) | -1.583*** (0.0074) | -3.230*** (0.0073) | -2.224*** (0.0072) | (0.0013) -1.373*** (0.0073) |
| COUNTRY PAIR FE | Y | Y | Y | Y | Y | Y | Y |
| HOST COUNTRY FE | Y | Y | Y | Y | Y | Y | Y |
| INDUSTRY FE | Y | Y | Y | Y | Y | Y | Y |
| OBSERVATIONS | 1,557 | 1,557 | 1,529 | 1,557 | 1,557 | 1,557 | 1,384 |

Robust standard errors in parentheses

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

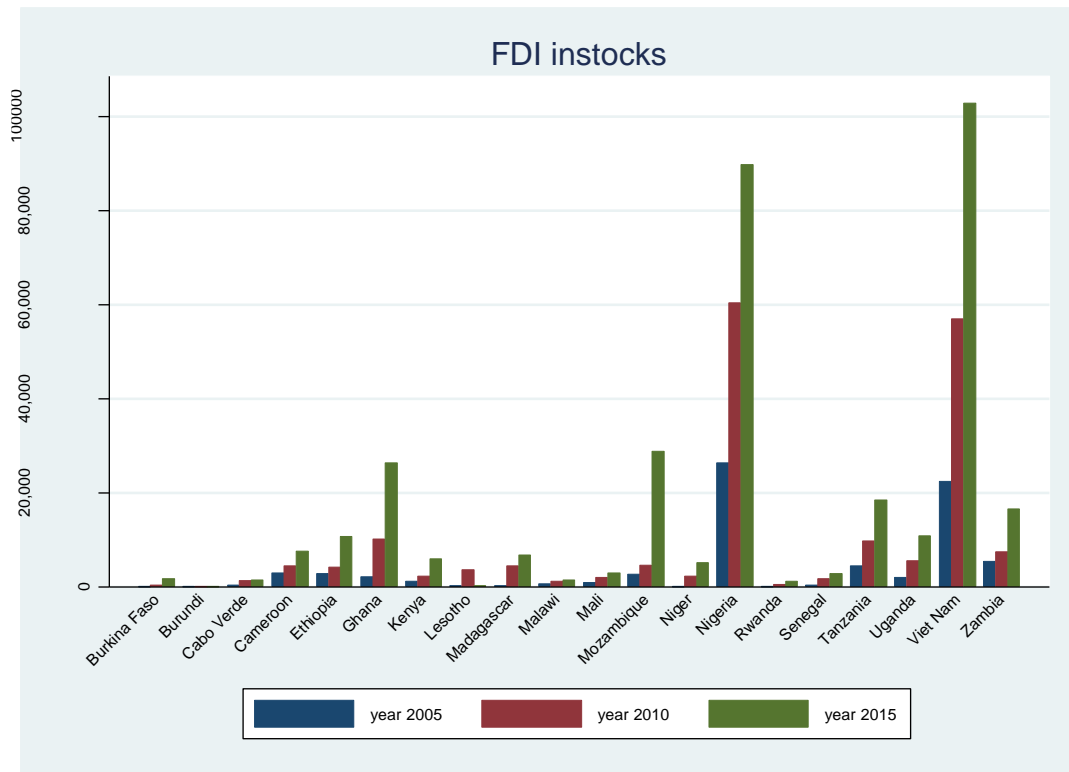
Table 4. Quality of linkages (Probit)

| | any support | support upgrade | product upgrade | other support |
|---------------------|-------------------------|-----------------------|----------------------|-------------------------|
| | (1) | (2) | (3) | (4) |
| N_FOREIGN_BUYERS | 0.0222** (0.0099) | 0.0212*** (0.0077) | 0.0126*** (0.004) | 0.0170*** (0.0065) |
| N_FOREIGN_BUYERS_SQ | -1.72e-05** (0.0001) | 05*** (0.0001) | 05*** (0.0001) | -1.28e-05** (0.0001) |
| AGE | -0.0149 (0.0523) | 0.011 (0.0526) | -0.044 (0.0593) | 0.0263 (0.0537) |
| LEMP | 0.114*** (0.0358) | 0.0723** (0.0353) | 0.0691* (0.0394) | 0.0436 (0.0357) |
| K/L | 0.0491** (0.0227) | 0.0688*** (0.0231) | 0.00748 (0.0255) | 0.0476** (0.0235) |
| EXPORTER | 0.0339 (0.0979) | 0.0558 (0.096) | 0.0333 (0.109) | 0.14 (0.0992) |
| DEMAND_DISTANCE | -0.22 (0.186) | -0.299* (0.178) | -0.145 (0.187) | -0.304* (0.179) |
| CONSTANT | -6.027*** (0.551) | -5.963*** (0.541) | -5.357*** (0.578) | -5.434*** (0.501) |
| COUNTRY PAIR FE | Y | Y | Y | Y |
| HOST COUNTRY FE | Y | Y | Y | Y |
| INDUSTRY FE | Y | Y | Y | Y |
| OBSERVATIONS | 1,539 | 1,539 | 1,440 | 1,514 |

Robust standard errors in parentheses

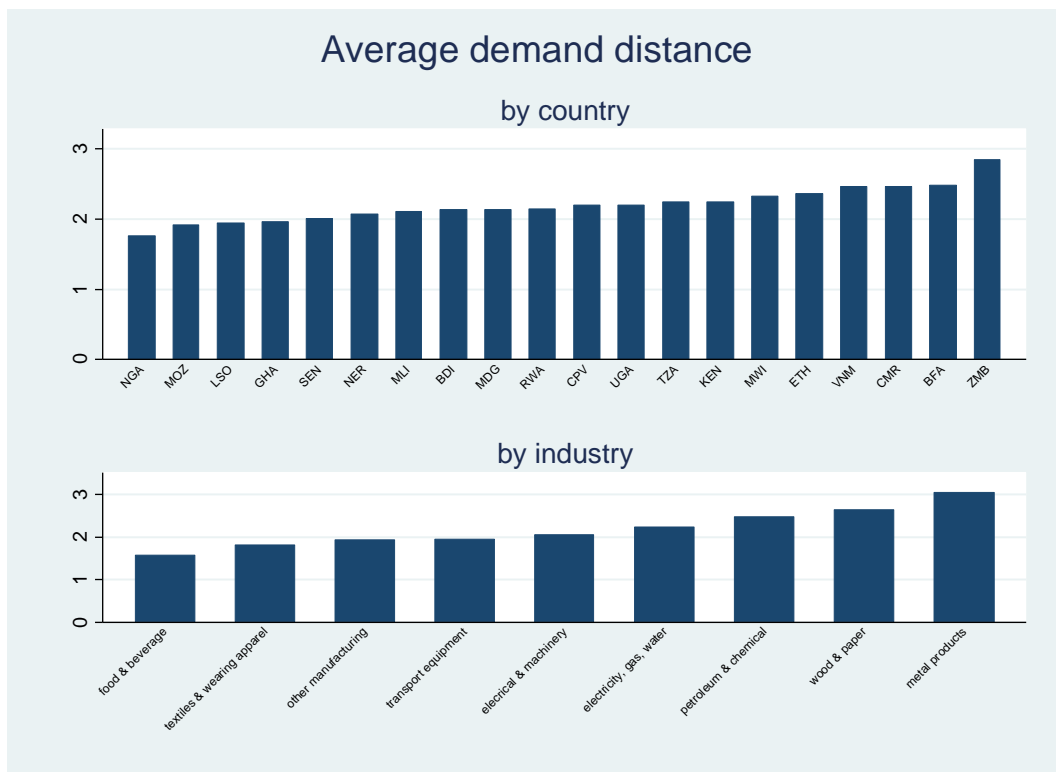
*** p<0.01, ** p<0.05, * p<0.1

Figure 1, FDI in-stocks in SSA and Vietnam



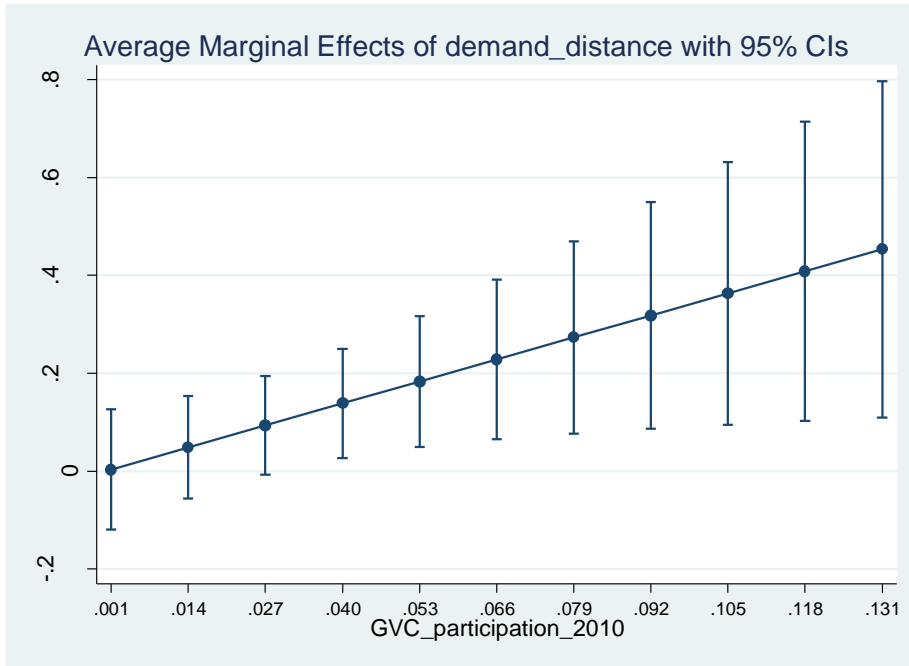
Source: our elaborations on UNCTAD FDI statistics

Figure 2. Distance to final demand (2010)



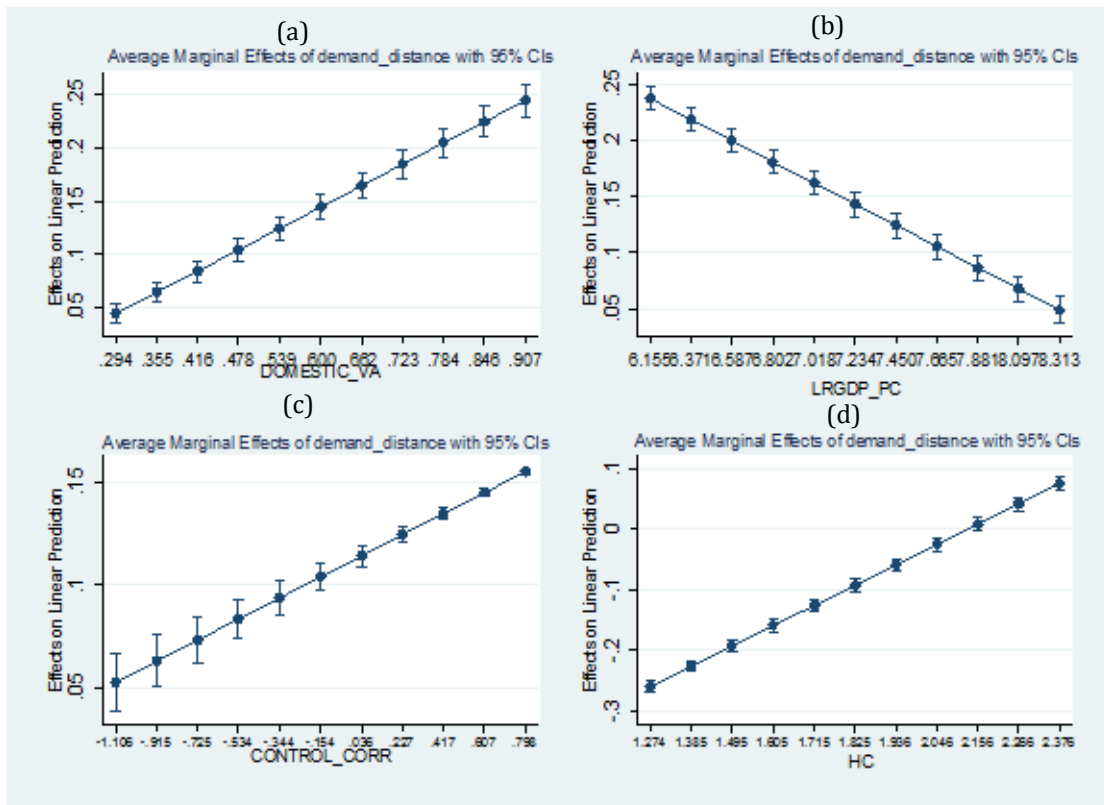
Source: our elaborations on Eora MRIO database

Figure 3. Average marginal effects of demand distance by different values of GVC participation



Source: our elaboration on the dataset

Figure 4. Average marginal effects of demand distance by different values of domestic value added share (a), GDP per capita (b), control of corruption (c), human capital (d)



Source: our elaboration on the dataset

Table A-1. Import demand elasticity

| Investor sector (ISIC rev.3./2-DIGIT) | Import demand elasticity | |
|--|--------------------------|----------------|
| | <i>SSA</i> | <i>Vietnam</i> |
| Food products & beverages | 7.482 | 6.021 |
| Tobacco | 4.633 | N.A. |
| Textiles | 5.874 | 5.517 |
| Wearing apparel | 4.553 | 4.482 |
| Leather | 4.596 | 10.001 |
| Wood | 4.236 | 2.983 |
| Paper | 4.093 | 4.662 |
| Publishing & printing | 7.268 | 10.313 |
| Coke & petroleum products | 6.324 | N.A. |
| Chemicals | 5.078 | 4.998 |
| Rubber & plastics | 4.376 | 3.355 |
| Non-metallic mineral products | 4.344 | 3.708 |
| Basic metals | 8.634 | 9.297 |
| Metal products | 6.276 | 4.316 |
| Machinery & equipment | 6.256 | 5.547 |
| Office, accounting, computing machinery | 11.884 | 3.318 |
| Electrical machinery | 3.811 | 4.356 |
| Radio, television, and communication instruments | 5.620 | N.A. |
| Medical & optical instruments | 2.646 | N.A. |
| Motor vehicles | 401.943 | 3.576 |
| Transport equipment | 17.878 | 6.988 |
| Furniture | 7.010 | 8.700 |
| <i>Average</i> | <i>24.31</i> | <i>5.674</i> |
| <i>Average (no motor vehicles)</i> | <i>6.327</i> | <i>5.798</i> |

Source: Authors' elaboration on data from Broda et al. (2006)

Table A-2 Correlation Coefficients

| | LOCAL_PROC | LINV_AGE | GREENFIELD | LEMP | FE_INV | MKT_SEEKING | DEMAND_DISTANCE | VA_CHANGE | VIETNAM | DOMESTIC_VA | LRGDPE_PC | CONTROL_CORR | HC | CREDIT_PRIV |
|-----------------|------------|----------|------------|---------|---------|-------------|-----------------|-----------|---------|-------------|-----------|--------------|-------|-------------|
| LOCAL_PROC | 1 | | | | | | | | | | | | | |
| LINV_AGE | 0.1191 | 1 | | | | | | | | | | | | |
| GREENFIELD | 0.0475 | -0.022 | 1 | | | | | | | | | | | |
| LEMP | -0.1181 | -0.0028 | -0.0292 | 1 | | | | | | | | | | |
| FE_INV | 0.0044 | 0.0364 | 0.0397 | -0.3299 | 1 | | | | | | | | | |
| MKT_SEEKING | 0.0556 | 0.2169 | 0.0367 | -0.2654 | 0.1092 | 1 | | | | | | | | |
| DEMAND_DISTANCE | -0.0376 | -0.0935 | 0.0456 | 0.0755 | -0.1244 | -0.0725 | 1 | | | | | | | |
| VA_CHANGE | 0.0783 | 0.2179 | -0.0277 | -0.2292 | 0.1968 | 0.1497 | -0.1914 | 1 | | | | | | |
| VIETNAM | -0.1036 | -0.3466 | 0.0658 | 0.5372 | -0.3143 | -0.3284 | 0.3227 | -0.5505 | 1 | | | | | |
| DOMESTIC_VA | 0.0873 | 0.3595 | -0.0627 | -0.5255 | 0.3105 | 0.337 | -0.3629 | 0.5454 | -0.9147 | 1 | | | | |
| LRGDPE_PC | -0.1012 | -0.2901 | 0.0678 | 0.4779 | -0.1996 | -0.2764 | 0.2691 | -0.221 | 0.8001 | -0.7284 | 1 | | | |
| CONTROL_CORR | -0.2575 | -0.1891 | -0.0301 | 0.0409 | 0.0668 | -0.0524 | -0.0631 | -0.0479 | 0.0204 | -0.0173 | 0.1643 | 1 | | |
| HC | 0.0609 | -0.1247 | 0.0259 | 0.2908 | -0.1373 | -0.1729 | 0.1727 | 0.0563 | 0.3827 | -0.4068 | 0.7495 | 0.0831 | 1 | |
| T_PRIV | -0.0903 | -0.333 | 0.087 | 0.5647 | -0.3081 | -0.3179 | 0.283 | -0.4392 | 0.9599 | -0.8899 | 0.8647 | -0.0022 | .4467 | 1 |