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# Local sourcing in developing countries: The role of foreign direct investments and global value chains

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## ARTICLE INFO

## ABSTRACT

The local sourcing of intermediate products is one the main channels for foreign direct investment (FDI) spillovers. This paper investigates whether and how participation and positioning in the global value chains (GVCs) of host countries is associated to local sourcing by foreign investors. Matching two firm-level data sets on 19 Sub-Saharan African countries and Vietnam to country-sector level measures of GVC involvement, we find that more intense GVC participation and upstream specialization are associated to a higher share of inputs sourced locally by foreign investors. These effects are larger in countries with stronger rule of law and better education.

## 1. Introduction

Since 2000, many developing countries have experienced an upsurge of foreign capital inflows accompanied by increasing participation in the process of global production fragmentation. Between 2001 and 2016, developing economies were the main beneficiaries of the rise in worldwide foreign direct investments (FDIs), on average receiving more than twice the amount invested in advanced economies (UNCTAD, 2017). Moreover, their participation in global value chains (GVCs) has allowed many developing country firms to become full and qualified participants in the global market by specializing in specific stages of the production process. These firms have exploited their comparative advantages without having to develop all the capabilities encompassed by the value chain (Taglioni and Winkler, 2016). The opportunity to become part of the production process through participation in one or a few specific stages is of particular relevance for many Sub-Saharan African (SSA) countries which have a limited manufacturing base but for which internationalization through GVC involvement can be a "*golden opportunity*" (IMF, 2015: 56).

FDI represents an important source of development finance, and contributes to domestic employment, capital formation, and access to key external knowledge for the local economies in developing countries (Hanousek, Kocenda, & Maurel, 2011). Since the pioneering work by Caves (1974), the effect of FDI spillovers on local economic development in recipient countries has been thoroughly investigated with mixed results (Crespo and Fontoura, 2007; Görg and Greenaway, 2004; Rojec and Knell, 2017). This has led to some scholars focusing on the channels through which domestic firms can benefit from such spillovers, and the factors influencing their existence, sign, and magnitude (Farole and Winkler, 2014; Irsova and Havranek, 2013). Among the channels investigated, local sourcing of inputs and intermediate products by foreign investors is considered an important potential source of FDI spillovers based on demand for local supply of more and better inputs to satisfy the global market, and assistance that foreign firms can offer to their local providers (Giroud, Jindra, & Marek, 2012; Jordaan, 2017; Newman, Rand, Talbot, & Tarp, 2015; Rodriguez-Clare, 1996).

This article contributes to the literature on local sourcing by foreign investors by proposing a novel determinant: the host country's involvement in GVCs. We measure GVC participation by examining the importance of global production chains in country (and sector) exports and assess the GVC position based on country (and sector) specialization in the upstream (i.e. production of intermediates used by other countries) and downstream (i.e. use of intermediates produced by other countries to manufacture final

goods for exports) stages of the GVC. Intensive participation in GVCs exposes local firms to the requirements of international markets and more sophisticated demand, and to learning opportunities through the transfer of knowledge and technology from global leaders to local suppliers within the value chain. In addition, upstream participation in GVCs implies local specialization in the production of intermediate inputs available for foreign investors to purchase. Conversely, in developing countries downstream specialization frequently corresponds to concentration in the assembly phase of imported inputs, exploiting mainly low-cost local labor force, with no direct impact on the local supply of intermediate inputs.

In the empirical analysis, GVC indicators are calculated from internationally comparable input/output (I/O) tables retrieved from the Eora Multi Region Input-Output (MRIO) database (Lenzen, Kanemoto, Moran, & Geschke, 2012) and computed at the country-sector pair level. Two firm-level data sets—the Africa Investor Survey (AIS) on 19 SSA countries, and the Vietnam Investor Survey (VIS) both administrated by UNIDO—provide detailed information on foreign investors' choices concerning local sourcing and the transfer of knowledge and other key resources to local suppliers. Due to the cross-sectional nature of the data, we control for confounding factors using firm-level characteristics and include a set of fixed effects to absorb unobserved heterogeneity at the country and sector levels. In our preferred specification, we control also for more granular host country-industry fixed effects and estimate the differential effect of GVC involvement across firm characteristics.

A joint analysis of SSA countries and Vietnam is particularly pertinent in the context of our research since it allows us to investigate a region that attracts relatively fewer foreign manufacturing investments and a country that recently has assumed a central position in the rapidly expanding process of global fragmentation of production. Although between 2005 and 2015 the contribution of FDI to African development increased by 9.6 times on average, it remains marginal (UNCTAD, 2017). Infrastructure gaps, political instability, and relatively low levels of industrialization and economic diversification deter FDI (World Bank, 2015) and GVC participation (OECD and AfDB, 2014; IMF, 2015). In contrast, since the mid 1990s Vietnam has encouraged the entry of foreign capital, the establishment of joint ventures with local firms (especially SOEs), also introducing local content requirements in some sectors (e.g. motor-bike), then phased out in more recent years, as a result attracting large FDI inflows based mainly on efficiency seeking motivations. These investments represent a large share of Vietnam's output (roughly 20 percent of GDP) and half of its total exports (UNIDO, 2012b). Thanks to its strong GVC involvement, Vietnam has emerged as one of Asia's manufacturing powerhouses (Hollweg et al., 2017).

Including Vietnam in the analysis strengthens the general relevance of our empirical findings beyond the SSA context. Our analysis shows that the degree and type of involvement of developing countries in GVCs are positively related to the amount of local sourcing of intermediate products by foreign investors. Also, foreign investors in countries and sectors with heavy involvement in GVCs are more likely to source their inputs locally. This includes countries specialized in more upstream stages in the GVC where higher local sourcing is accompanied by a higher likelihood that local suppliers will receive support from their foreign buyers. Furthermore, the relationship between GVC involvement and local sourcing is stronger in countries with stronger rule of law and higher spending on education.

The rest of the paper is organized as follows. Section 2 provides a discussion of the literature on FDI spillovers and GVCs. Section 3 presents some descriptive evidence of GVC involvement and investors' characteristics and describes the empirical framework. Section 4 discusses the main results and Section 5 concludes.

## 2. FDI, local sourcing and GVC involvement

### 2.1. FDI spillovers and backward linkages

The large empirical literature on the link between FDI and local economic development in recipient countries does not achieve consensus because it tries to measure the impact of aggregate spillovers (for reviews see Görg and Greenaway, 2004; Crespo and Fontoura, 2007; Rojec and Knell, 2017). Therefore, more recently, the literature has focused instead on the channels that facilitate such spillovers, and their determinants (Crespo and Fontoura, 2007).

Research based on detailed firm-level data shows that spillovers are more likely when a direct backward linkage between the foreign and the domestic firm has been established (Javorcik and Spatareanu, 2009; Jordaan, 2017; Newman et al., 2015; Rojec and Knell, 2017). Direct relationships with foreign firms generate both static and dynamic effects on local firms (Blomström and Kokko, 1998; Jordaan, 2011b), relying on two connected mechanisms: the demand and the assistance effects (Rodriguez-Clare, 1996; Giroud et al., 2012; Farole and Winkler, 2014) The former refers to increased demand for specific intermediate products, quality improvements, and increased variety of local supply since foreign investors expect their local suppliers to satisfy the requirements of global markets. The latter is the result of the intentional transfer of knowledge and technological and managerial capabilities by multinationals to assist local suppliers in order to ensure that their requirements are met (Giroud and Scott-Kennel, 2009). Foreign investors can contribute also by providing training for the local labor force, offering local suppliers advance payments, and in some cases, helping them to obtain international certifications.

Several factors can facilitate the establishment of backward linkages and the provision of support to domestic suppliers by foreign firms (Potter, Moore, & Spires, 2003). Some foreign investor's characteristics influence the opportunities for local sourcing. Greater participation in the domestic company and a high level of managerial autonomy from the parent firm facilitate access to information about what is available locally, the quality of domestic inputs, and the reliability of local suppliers (Amendolagine, Boly, Coniglio, Prota, & Seric, 2013; Giroud et al., 2012). Previous investment experience in the host country can enhance the accumulated knowledge about the local context, thereby encouraging the purchase of local inputs (Jordaan, 2011a, 2017). In general, the intensity of local sourcing depends on the foreign investor's global production strategy (Farole and Winkler, 2014). The opportunities for local providers might be limited if the foreign company chooses to internalize its production or to source from the same global network of established suppliers (Paus and Gallagher, 2008; Belderbos et al., 2001). A global sourcing strategy that penalizes local suppliers is more common in industries such as electronics, automotive, and pharmaceuticals where inputs are technologically complex. Also, the motivation for investing can have an impact on the opportunities for local sourcing (Giroud et al., 2012). In the manufacturing industry in developing countries, efficiency and market seeking motivations offer more opportunities for local sourcing compared to resource seeking investments in a primary industry that often is concentrated in enclaves isolated from the rest of the domestic economy (Nunnenkamp and Spatz, 2004).

Also, some host country characteristics affect local sourcing. Sound local institutions reduce problems related to contract

enforceability, while cumbersome regulations can discourage foreign investors from purchasing local intermediate products (Alfaro, Areendam, Sebnem, & Selin, 2004; Hsiao and Shen, 2003). In addition, the level of human capital affects local production capabilities and the absorptive capacity of domestic companies which influences their ability to satisfy the more sophisticated demand from foreign investors (Borensztein, De Gregorio, & Lee, 1998; Irsova and Havranek, 2013).

Once a linkage is established, foreign investors are likely to provide support to their local suppliers as shown by empirical evidence on Mexico (Jordaan, 2011b, 2017). However, this support on its own does not guarantee that the linkage will have positive spillovers. These effects depend also on the duration of the relation and contract specifications, the technological gap, and the domestic firm's absorptive capacity (Giroud and Scott-Kennel, 2009; Jordaan, 2017).

### 2.2. Local sourcing and GVC involvement

Involvement in GVCs is another dimension that might affect the local sourcing decision (Taglioni and Winkler, 2016). Some studies show that higher involvement in GVCs (through both higher imports and exports of intermediate inputs) can improve the capabilities of local firms, since it exposes them to stronger competition, more intense information flows, and greater production complexity (Paus and Gallagher, 2008; Farole and Winkler, 2014). Both specialized suppliers and providers of labor intensive inputs can take advantage of GVC-related interactions to master new capabilities and comply with international quality standards. Some of these mechanisms have been investigated in depth in case studies, such as in Ivarsson and Alvstam's (2011) study on IKEA's value chain in Asia which provides evidence about how local suppliers learn and upgrade within the value chain. Furthermore, two recent econometric studies on representative samples of North African and Latin American firms do also find evidence of a productivity advantage of GVC suppliers (especially in upstream stages) (Del Prete, Giovannetti, & Marvasi, 2017; Montalbano, Nenci, & Pietrobelli, 2017).

Nonetheless, the extant GVC literature shows that global value chain involvement has heterogeneous, complex implications for the local economy (Gereffi, 1999; Humphrey and Schmitz, 2002). The patterns of governance in the GVC are important for shaping its effects on local suppliers, and coordination may occur through market, hierarchy, modular, relational, and captive relationships (Gereffi, Humphrey, & Sturgeon, 2005). Pietrobelli and Rabellotti (2011) show that different governance patterns have diverse effects on the learning mechanisms in GVCs, offering different potential upgrading opportunities to local suppliers. For instance, in modular chains, learning can be the result of pressure to match international standards while in relational GVCs, it may be mutual and based on intense face-to-face interactions among value chain actors with complementary competences. In captive chains, the opportunities for learning and upgrading are generally limited to a narrow range of tasks such as simple assembly. In these cases, GVCs can be a barrier to spillovers if the country's involvement is based mostly on exploiting unskilled, low-cost labor or natural resources, or standardized tasks with few upgrading opportunities (Gereffi et al., 2005).

Furthermore, macroeconomic factors such as a well-functioning business and institutional climate, and an educated and skilled labor force might constitute tipping points in lead firms' strategic decisions and might influence the way countries participate in GVCs (Antràs and Chor 2013; Cattaneo et al., 2013). Also, the existence of international trade agreements affects local GVC involvement. For instance, in the case of preferential trade agreements,

GVC involvement can result in low levels of upgrading and linkages to local actors (Morris and Staritz, 2016).[1]

Bearing in mind the complexity involved in the impact of GVCs on the local economy, in this paper among the determinants of local sourcing we include two indicators of GVC involvement to measure the participation rate and the position at the country/sector level. Although we acknowledge that these indicators do not fully account for all the micro and macro factors characterizing GVC involvement, they offer an aggregate quantitative assessment which is a starting point for an appreciation of an empirical phenomenon so far overlooked in the empirical literature on FDIs and local sourcing.

## 3. Data and empirical analysis

### 3.1. Foreign investments in SSA and Vietnam

We use firm-level data from two original surveys administered by UNIDO: the African Investor Survey (AIS) on 19 Sub-Saharan countries, and the Vietnam Investment Survey (VIS).[2] They provide detailed information on the general characteristics of foreign investors including ownership structure, country of origin, motivation for investing, linkages, and assistance provided to local producers.

In line with other empirical studies on local sourcing, we focus on the manufacturing industry (Belderbos, Capannelli, & Fukao, 2001; Kiyota, Matsuura, Urata, & Wei, 2008; Görg, Hanley, & Strobl, 2011; Giroud et al., 2012; Amendolagine et al., 2013).[3] The total sample includes 1915 foreign investors, 42 percent of which are based in Vietnam.[4] Among SSA countries, Kenya (10.1 percent), Uganda (7.2 percent), Nigeria (5.6 percent) and Ghana (4.9 percent) are the most represented in the sample (Table A1 in the Appendix).

The average share of inputs sourced domestically by foreign investors is highly heterogeneous across countries and sectors (Table 1). Countries with larger shares of local sourcing are Kenya (43 percent), Zambia (25 percent), Tanzania and Ethiopia (23 percent), Uganda and Nigeria (21 percent). In Vietnam, the average share of local sourcing is 18 percent. Considering the average values in different industries, there are significant heterogeneities across countries. For instance, in Ethiopia, foreign investors buy 62percent of their inputs in the local market in labor intensive industries such as Food and Beverage, and 32 percent in Textile and Apparel. High shares of local sourcing in Textiles occur also

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[1] For instance, in the case of Lesotho, the strong attraction of foreign assembly plants (mostly for Asian investors) in the apparel GVC is explained by the opportunity for foreign investors to take advantage of the African Growth and Opportunity Act (AGOA), and secure preferential access to the US market (Morris and Staritz, 2016).

[2] For a detailed description of the surveys see Africa Investor Report (UNIDO, 2012a) and Vietnam Industrial Investment Report (UNIDO, 2012b). Both surveys follow a rigorous methodology in terms of stratified sampling (on 3 dimensions: sector, size and ownership) and interview techniques (face-to-face interviews with top-level managers of foreign- and domestic-owned firms). Notwithstanding the similarities between the two surveys, the merging of the two datasets required some manual harmonization. Additional information is available from the UNIDO Investment Monitoring Platform at http://investment.unido.org/imp/.

[3] We include ISIC revision 3 categories C and exclude industries such as construction and utilities (together representing 40percent of the observations) which are less likely to participate in GVCs. The majority of foreign investors are specialized in 3 sectors: Petroleum and Chemical Products (24.5 percent), particularly in Ghana, Mali, Malawi, and Nigeria; Textiles and Wearing Apparel (16.5 percent), attracting FDI in Vietnam as well as in several SSA countries including Lesotho and Madagascar where it represents the large majority of investments (respectively 72.9 percent and 57.4 percent of total investments); and Food and Beverage (14.7 percent) especially in Kenya, Rwanda, Uganda, and Zambia.

[4] In both surveys, each investor corresponds to the initial investment in the country. Vietnam is overrepresented in the dataset; we deal with this by adding destination-country fixed effects to the econometric analysis. Also, our results remain robust to the exclusion of Vietnam (see Section 4).

**Table 1**
Share of local inputs sourced by foreign investors.

| | All sectors | Food & Beverage | Textiles & Wearing Apparel | Wood & Paper | Petroleum & Chemicals | Metal products | Electrical & Machinery | Transport Equipment | Other manufacturing |
|---|---|---|---|---|---|---|---|---|---|
| Burkina Faso | 0.11 | 0.33 | 0.00 | NA | 0.00 | 0.07 | NA | NA | 0.00 |
| Burundi | 0.11 | 0.20 | NA | 0.00 | 0.00 | 0.20 | NA | NA | NA |
| Cameroon | 0.21 | 0.15 | NA | 0.25 | 0.27 | 0.33 | 0.00 | 0.30 | 0.11 |
| Cape Verde | 0.13 | 0.06 | 0.00 | 0.33 | 0.18 | 0.00 | NA | NA | 0.00 |
| Ethiopia | 0.23 | 0.62 | 0.32 | 0.12 | 0.11 | 0.04 | 0.00 | NA | 0.24 |
| Ghana | 0.09 | 0.08 | 0.03 | 0.29 | 0.02 | 0.11 | 0.00 | NA | 0.23 |
| Kenya | 0.43 | 0.4 | 0.39 | 0.60 | 0.41 | 0.64 | 0.46 | 0.30 | 0.39 |
| Lesotho | 0.07 | 0.00 | 0.04 | 0.50 | 0.14 | NA | 0.05 | NA | 0.00 |
| Madagascar | 0.17 | 0.54 | 0.09 | 0.30 | 0.20 | NA | NA | 0.00 | 0.00 |
| Malawi | 0.14 | 0.02 | 0.00 | 0.10 | 0.14 | 0.25 | 0.00 | 0.30 | 0.00 |
| Mali | 0.07 | 0.00 | 0.17 | NA | 0.10 | 0.00 | 0.07 | NA | 0.00 |
| Mozambique | 0.12 | 0.12 | 0.15 | 0.34 | 0.04 | 0.02 | 0.12 | NA | 0.50 |
| Niger | 0.12 | 0.00 | NA | 0.05 | 0.20 | 0.30 | NA | NA | 0.00 |
| Nigeria | 0.21 | 0.28 | 0.38 | 0.39 | 0.19 | 0.15 | 0.08 | 0.03 | 0.05 |
| Rwanda | 0.04 | 0.01 | 0.00 | NA | 0.00 | 0.25 | 0.00 | NA | 0.00 |
| Senegal | 0.12 | 0.15 | 0.00 | 0.35 | 0.11 | 0.00 | NA | 0.00 | NA |
| Tanzania | 0.23 | 0.28 | 0.21 | 0.25 | 0.23 | 0.17 | 0.32 | 0.00 | 0.20 |
| Uganda | 0.21 | 0.23 | 0.29 | 0.21 | 0.17 | 0.36 | 0.18 | 0.13 | 0.04 |
| Vietnam | 0.18 | 0.25 | 0.18 | 0.24 | 0.19 | 0.13 | 0.11 | 0.17 | 0.22 |
| Zambia | 0.25 | 0.30 | 0.00 | 0.23 | 0.24 | 0.30. | 0.00 | NA | 0.33 |

Source: AIS and VIS.

in Kenya (39 percent) and Uganda (38 percent). In contrast, Lesotho and Madagascar report shares of local sourcing below 10 percent since they are assembly platforms for Asian multinationals exporting to the US market under the AGOA (African Growth and Opportunity Act) preferential treatments (Morris and Staritz, 2016).

Table 2 presents a summary of the main characteristics of foreign investors reported as average values at country level. In almost all countries, the share of foreign ownership is generally well above 50 percent and most investments are greenfield. There are some cross-country differences in the motivations for investment; although most are market seeking, in Vietnam, Lesotho, and Madagascar efficiency seeking is an important reason to invest.

### 3.2. Measuring participation and position in the GVC

We calculate two indicators of GVC participation and position, based on the Eora MRIO database, which provides information on value added trade for 189 countries and 26 sectors from 1990 to 2012 (Lenzen et al., 2012).[5]

The objective is to measure the interconnections across countries within a vertical trading chain where each country specializes in some stages of the production process. For vertical international trade to occur, a good must be produced in two or more sequential stages, and across at least two international borders (Hummels, Ishii, & Yei, 2001). The participation in vertically specialized trade can take two different forms: downstream, with direct exports of foreign value added, and upstream, with indirect exports of domestic value added through a third country. Koopman et al. (2011) decompose gross exports into two main components: 1) foreign value-added (FVA) content of intermediate imports embodied in gross exports, and 2) domestic value added which is the value of domestically produced exports. The latter is further decomposed into: a) direct domestic value added—i.e. the value added embodied in exports of final goods and intermediates, absorbed by direct importers; b) indirect domestic value added (IVA)—i.e. the value added embodied in intermediates re-exported to third countries;

and c) re-imported domestic value added—i.e. the value added from exported intermediates that are reimported. Building on these widely adopted definitions, we introduce two indicators of GVC participation and position to account for GVC involvement.

#### 3.2.1. GVC participation

We define GVC participation of each sector $j$ in a given country $n$ in the cross-national trade of intermediate goods as:

$$GVC\ PARTICIPATION_{jn} = FVA_{jn} + IVA_{jn}, \tag{1}$$

where $FVA_{jn}$ is the foreign value added and $IVA_{jn}$ is the indirect domestic value added in both sector $j$ and country $n$, divided by total country exports. Larger values of the index indicate more intensive participation in the GVC.

Fig. 1 depicts average GVC participation levels and shows that the countries with the highest levels of participation are Rwanda, Lesotho, Vietnam, and Ethiopia where at least 60 percent of exported value added consists of intermediates either imported by other countries or exploited by foreign countries in their exports. Absolute values of foreign and indirect value added are much smaller in SSA countries compared to Vietnam, confirming that the SSA countries generally are at the beginning of their process of integration into GVCs. For instance, while Ethiopia and Vietnam report similar relative levels of participation, total valued added of intermediates exported from Vietnam (equal to US$14.6 billion) is 16 times larger than total value added for Ethiopia (US$900 million).

Fig. A1 (in the Appendix) reports the levels of GVC participation in the six countries with the highest GVC involvement in each sector. Textile and Apparel is the industry with the highest GVC participation in Lesotho, Vietnam and Ethiopia. Other industries with important GVC participation are Food and Beverages in Senegal, Vietnam and Kenya, Wood and Paper in Ghana and Cameroon, and Chemicals in Niger.

#### 3.2.2. GVC position

The second indicator measures the relative position of sector $j$ in country $n$ within the GVCs, calculated as the log-difference between the upstream (IVA) and the downstream components (FVA) of the GVC participation index:

$$GVC\ POSITION_{jn} = Ln(1 + IVA_{jn}) - Ln(1 + FVA_{jn}) \tag{2}$$

**Table 2**
Main characteristics of foreign investors.

| Host country | % of foreign ownership | Top two origin countries with more than one investment (#) | Market seeking (%)[*] | Efficiency seeking (%)[*] | Natural resource seeking (%)[*] | Greenfield (%) | Number of years since the first investment |
|---|---|---|---|---|---|---|---|
| Burundi | 82.8 | Belgium, Rwanda, Netherlands (2) | 53.8 | 7.7 | 15.4 | 84.6 | 28.9 |
| Cameroon | 69.3 | France (16), Switzerland (5) | 67.5 | 10.0 | 10.0 | 87.5 | 26.6 |
| Cape Verde | 85.1 | Portugal (12), Spain (4) | 59.1 | 13.6 | 0.0 | 71.4 | 9.7 |
| Ethiopia | 82.2 | India (11), China (9) | 66.3 | 3.6 | 12.0 | 89.2 | 9.0 |
| Ghana | 85.0 | India (18), UK (14) | 75.3 | 6.4 | 6.4 | 87.2 | 16.9 |
| Kenya | 77.4 | UK (60), India (46) | 80.1 | 3.0 | 4.0 | 92.5 | 24.1 |
| Lesotho | 98.0 | South Africa (17), China (14) | 33.3 | 33.3 | 2.1 | 91.7 | 9.4 |
| Madagascar | 89.7 | France (18), Mauritius (16) | 33.3 | 27.1 | 6.2 | 83.0 | 15.8 |
| Malawi | 63.3 | India, South Africa (3) | 73.7 | 0.0 | 5.3 | 73.7 | 19.0 |
| Mali | 86.7 | France (7), Senegal (6) | 80.0 | 3.3 | 3.3 | 82.8 | 13.7 |
| Mozambique | 86.1 | Portugal (27), South Africa (17) | 90.8 | 1.5 | 0.0 | 90.6 | 18.4 |
| Niger | 78.7 | Ghana (2) | 50.0 | 0.0 | 0.0 | 88.9 | 14.7 |
| Nigeria | 60.6 | India (20), Lebanon (14) | 71.6 | 2.7 | 0.9 | 88.7 | 29.3 |
| Rwanda | 86.6 | Kenya (6), Belgium (3) | 83.3 | 4.2 | 0.0 | 91.7 | 11.1 |
| Senegal | 72.5 | France (8), Lebanon, Cote d'Ivoire (3) | 66.7 | 8.3 | 4.2 | 92.3 | 33.0 |
| Tanzania | 81.8 | India (25), Kenya (10) | 72.5 | 7.7 | 4.4 | 72.5 | 12.7 |
| Uganda | 93.8 | India (48), Kenya (37) | 64.2 | 10.2 | 14.6 | 86.1 | 16.1 |
| Vietnam | 96.5 | China (162), Japan (150) | 41.7 | 43.8 | 2.4 | 87.3 | 9.0 |
| Zambia | 86.1 | South Africa, India (6) | 76.3 | 7.9 | 10.5 | 68.4 | 14.8 |

Source: AIS and VIS.

[*] The total shares of the three motivations do not sum to 100% because the questionnaire included other motivations which are marginal and are not reported in the table.
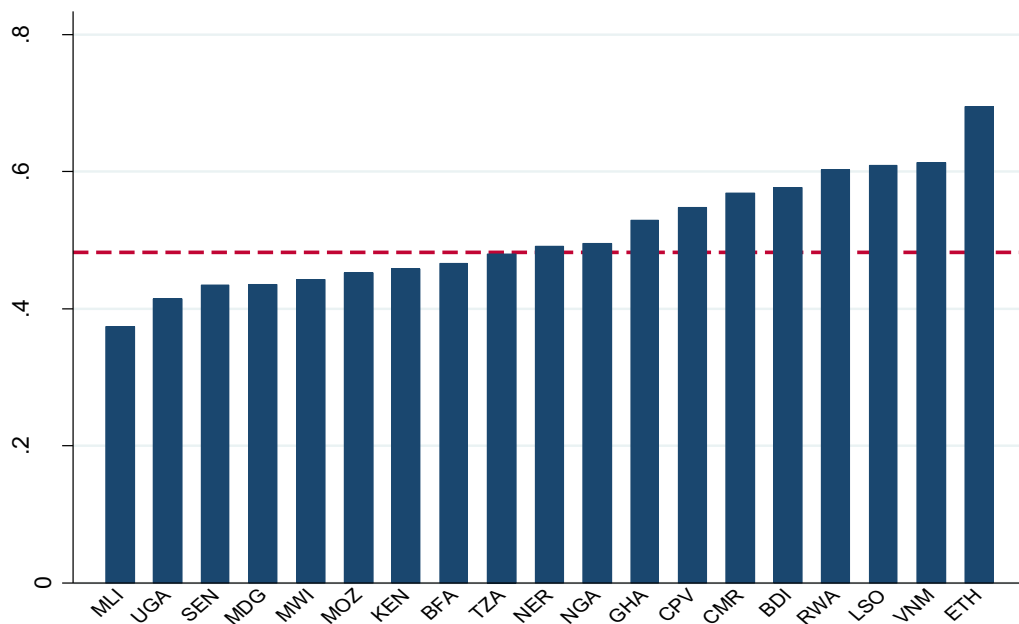


**Fig. 1.** GVC participation at country level (2010). Notes: The dotted line represents the average value in developing countries defined by the World Bank as low income and lower-middle income. Zambia is excluded because of lack of data. Source: Authors' elaboration based on the Eora Multi Region Input-Output database.

Positive values indicate upstream specialization in the GVC phases of the production process which are remote from final demand (e.g. production of intermediates products used by other countries in their exports); negative values denote downstream specialization in phases close to final demand (e.g. use of intermediates to produce final goods for exports).

Fig. 2 depicts the values of the GVC position index across countries. In general, SSA countries are concentrated in upstream activities, confirming their specialization in manufacturing activities linked to the primary sector which is dominant in many of these countries. Moreover, in many cases their level of GVC participation is relatively low which contrasts with countries such as Ethiopia, Lesotho, and Vietnam that generally are characterized by more downstream positions and relatively high levels of participation.

For each sector, Fig. A2 in the Appendix reports the GVC positions for the three most downstream (on the left side) and upstream (on the right side) countries. Overall, the sectors characterized by an upstream GVC position are Wood and Paper, Chemicals, and Metal Products. Textile and Apparel and Food and Beverages, two industries characterized by long chains including transformation and assembly of intermediate products, are more downstream in terms of GVC participation.

### 3.3. Empirical framework

To assess whether and how GVC participation and position are associated to the amounts of inputs bought locally by foreign investors, we employ a model used widely to investigate the

**Fig. 2.** GVC position at country level (2010). Notes: The dotted line represents the average value in developing countries defined by the World Bank as low income and the lower-middle income. Zambia is excluded because of lack of data. Source: Authors' elaboration based on the Eora Multi Region Input-Output database.
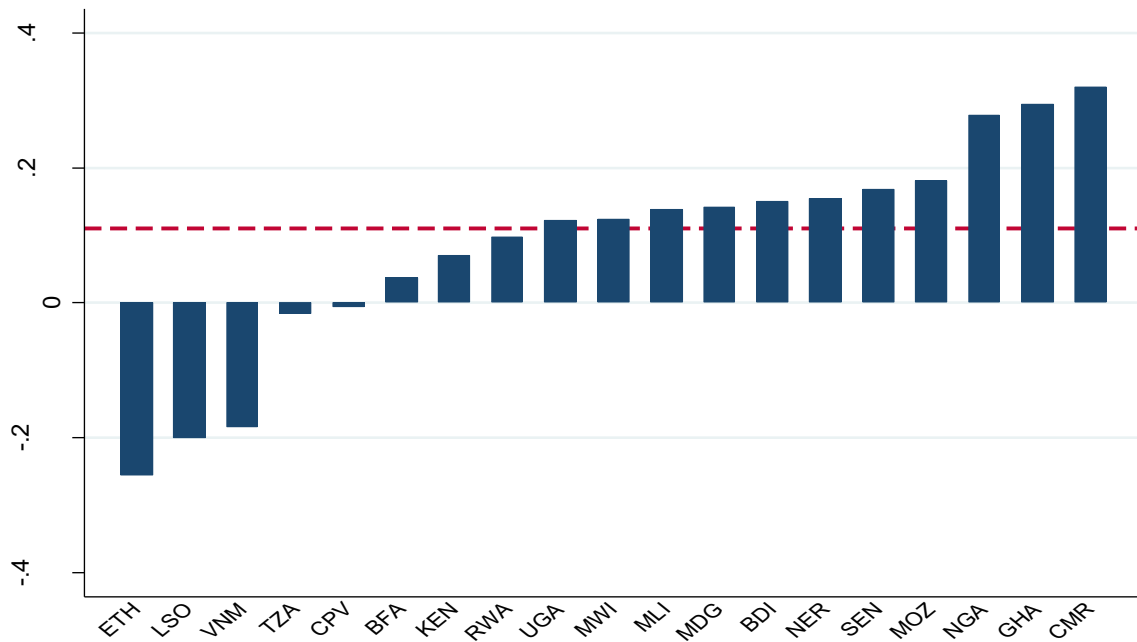
determinants of local sourcing, augmented with the two measures of GVC involvement:

$$Y_{ijn} = GVC\ PARTICIPATION_{jn} + GVC\ POSITION_{jn} + \sum X_{ijn} + \delta_x$$
$$+ \lambda_n + \gamma_j + \varepsilon_i \tag{3}$$

The dependent variable $Y_{ijn}$ measures local sourcing intensity as the share of inputs sourced domestically by the foreign investor $i$ in industry $j$ and country $n$. Following other studies on the determinants of linkages (Jordaan, 2011a, 2011b; Amendolagine et al., 2013; Belderbos et al., 2001; Kiyota et al., 2008; Giroud et al., 2012), the set of control variables ($X_{ijn}$) includes investor and investment characteristics: a) local experience of foreign firms, measured as the log of years since the first investment (*AGE*); b) foreign share in the ownership of investors (*FOREIGN OWNERSHIP*); c) investor size measured by the log of the number of employees (*SIZE*); d) labor productivity measured as the log of sales on employees *(LABOR PRODUCTIVITY)*; e) a dummy variable that takes the value 1 if the foreign investor exports and zero otherwise (*EXPORT*); f) a dummy variable that takes the value 1 if the investment is greenfield and zero if it is an acquisition (*GREENFIELD*); and g) a dummy variable that takes the value of 1 if the main reason for investing is market-seeking and zero for any other reason (*MARKET SEEKING*).[6]

To absorb unobserved heterogeneity which could affect both the degree of GVC participation and the firm's propensity to undertake local sourcing, we include fixed effects for the origin and destination countries of the foreign investor $i$ ($\delta_x$ and $\lambda_n$, respectively) and for the destination industry $j$ ($\gamma_j$). Also, as well as including fixed effects for the origin and destination countries, as a robust-

ness check we test in the Appendix A1 whether geographic, cultural, and institutional proximity between the investment origin and destination countries matters for explaining local sourcing.[7]

Given the cross-sectional nature of the data, the results cannot be interpreted in a causal way since we cannot exclude potential endogeneity of GVC participation. While reverse causality is unlikely to be an issue given the matching at the firm-sector level (i.e. we can reasonably exclude that the performance of a single firm could affect the degree of GVC involvement of the whole sector),[8] endogeneity could still arise if unobserved factors were correlated to firm propensity to source locally and to the sector degree of GVC involvement. The standard fixed effects included in Eq. (3) control for only some of these factors; there may still be unobserved factors at the country-sector level (e.g. industrial policy, technology) driving both local sourcing and GVC participation. To partially address these concerns, when looking at firm–level heterogeneity we estimate the differential effect of GVC involvement across firm characteristics, controlling also for more granular host country-industry fixed effects to minimize omitted variable bias. Standard errors are clustered at the destination country-industry pair level to allow for serial correlation among investments in the same industry and the same country.

## 4. Discussion of the main findings

### 4.1. Local sourcing of intermediate inputs

Table 3 reports the marginal effects of the Tobit estimation of Eq. (3) and shows the presence of a positive and statistically significant relation between the extent of local sourcing from foreign investors and participation and position in GVCs.

The marginal effects reported in column 1 indicate that moving from a very low level of GVC participation in a country such as Mali

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[6] Other factors, such as the share of skilled workers and the technological capabilities of foreign firms which previous studies have found to be important drivers of local linkages (Joordan, 2011a; Giroud et al., 2012; Sánchez-Martín, De Piniés, and Antoine, 2015) could contribute to explaining the size of the linkages. However, data availability prevents us from including these variables. Definitions, sources, and summary statistics of all the variables are presented in Table A2 in the Appendix.

[7] We thank the editor and one of the referees for this suggestion.

[8] To further rule out issues related to reverse causality, as a robustness test, we ran our main regressions using 3 and 5-year lags of the variables of interest. The results (available upon request) did not change.

**Table 3**
Global value chains, local sourcing and support to local suppliers.

| Dependent variable | LOCAL SOURCING | | ANY SUPPORT | TECHNICAL SUPPORT |
|---|---|---|---|---|
| Sample | SSA & Vietnam | SSA | SSA & Vietnam | |
| | (1) | (2) | (3) | (4) |
| GVC PARTICIPATION | 1.204[***] | 0.300[*] | 0.800 | 0.829 |
| | (0.133) | (0.177) | (1.051) | (0.978) |
| GVC POSITION | 1.288[***] | 1.077[***] | 1.948[*] | 1.728[*] |
| | (0.083) | (0.143) | (1.018) | (0.893) |
| AGE | 0.010[***] | 0.019[***] | −0.039 | −0.049 |
| | (0.002) | (0.004) | (0.033) | (0.034) |
| FOREIGN OWNERSHIP | −0.077[***] | −0.069[***] | 0.126 | 0.111 |
| | (0.002) | (0.003) | (0.080) | (0.077) |
| SIZE | −0.018[***] | −0.026[***] | 0.048[**] | 0.038[*] |
| | (0.001) | (0.002) | (0.023) | (0.021) |
| LABOR PRODUCTIVITY | −0.008[***] | −0.012[***] | 0.027[**] | 0.020[*] |
| | (0.001) | (0.001) | (0.012) | (0.011) |
| EXPORT | 0.016[***] | 0.045[***] | 0.068 | 0.069 |
| | (0.004) | (0.011) | (0.053) | (0.054) |
| GREENFIELD | 0.005 | −0.013[***] | 0.014 | 0.007 |
| | (0.004) | (0.004) | (0.047) | (0.048) |
| MARKET SEEKING | −0.013[***] | −0.036[***] | 0.097[***] | 0.095[***] |
| | (0.002) | (0.001) | (0.027) | (0.028) |
| LOCAL SOURCING | | | 0.365[**] | 0.362[**] |
| | | | (0.186) | (0.157) |
| LOCAL SOURCING$^2$ | | | −0.397[**] | −0.357[**] |
| | | | (0.198) | (0.176) |
| Origin Country Fixed Effects | Yes | Yes | Yes | Yes |
| Host Country Fixed Effects | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| Number of observations | 1655 | 923 | 978 | 978 |

Notes: Columns 1 and 2 report the marginal coefficients of Eq. (3), obtained with a Tobit estimator. The dependent variable is the share of inputs sourced domestically by foreign investors (LOCAL SOURCING). Columns 3 and 4 report the marginal coefficient of the probit models in which the dependent variables are dummies equal to 1 if the foreign investor provided, respectively, any form (ANY SUPPORT) or some particular support (TECHNICAL SUPPORT) to local suppliers, and zero otherwise. Results reported in columns 1, 3, and 4 refer to the full sample; results in column 2 refer to the sub-sample of SSA countries. The definitions of all the explanatory variables are provided in Appendix Table A2. Robust standard errors clustered by investment destination country-industry pair, are reported in parentheses [*] < 0.1, [**] < 0.05, [***] < 0.01.

(0.004) to the level of participation recorded in Vietnam (0.057), the share of intermediate products bought locally increases by 6.4 percentage points, a quite significant change considering that the average share of local sourcing is around 20 percent. Evidence for SSA countries and Vietnam reported in Farole and Winkler (2014) confirms that GVC involvement fosters the development of a local supply base e.g. in the mining industry (i.e. in Ghana) and the agro-food buyer-driven chain (in Vietnam, Kenya, and Mozambique). Note also that, confirming the complexity of the relationship between GVC participation and local sourcing, Taglioni and Winkler (2016) show that in similar industries, context specific conditions and different governance patterns may explain heterogeneous effects. For instance, in the food sector, the findings from a survey of foreign multinationals in Ghana, Kenya, Mozambique, and Vietnam suggest that linkages to local suppliers are much higher in Vietnam (76 percent) than in African countries (50 percent or less), and that Vietnamese suppliers enjoy higher spillover effects than their African counterparts (Taglioni and Winkler, 2016), notwithstanding similar levels of GVC involvement (see Fig. A1 in the Appendix).

Our results also show that countries and industries with upstream specialization in phases of the production process far from the final demand such as production of intermediate products used in exports by other countries, report higher shares of local sourcing from foreign investors. The more upstream the industry, the more it produces intermediate goods that can be bought by foreign investors. This result is particularly relevant to SSA countries, whose involvement in GVCs so far has been confined to export of primary inputs or basic manufacturing products which are transformed elsewhere. While the literature on GVCs usually associates more upstream specialization to lower value-added activities, we show that this pattern of integration in value chains can generate

the indirect effect of opening opportunities to attract FDI with high local content. Some experiences in upstream sectors such as the agro-industry or mining where both FDI and greater local sourcing of inputs by foreign firms are increasing, confirm our findings. Examples include the gold industry Ahafo Linkage program in Ghana reported in Farole and Winkler (2014), and the Government of Tanzania's local content program following the discovery of gas.[9]

It should be noted that our results are not driven exclusively by the relatively high participation of Vietnam in GVCs (column 2),[10] although the coefficient of GVC participation is smaller and less precisely estimated if the sample is limited to the SSA countries. The relatively low levels of GVC participation in several SSA countries might explain the weaker but still positive relation to the share of local sourcing.[11]

[9] The Ahafo Linkage Program was established in Ghana in 2007 by Newmont and the International Financial Corporation with the objective of promoting the involvement of local firms in the supply chain of foreign investors in gold mining where Ghana has an upstream specialization (Farole and Winkler, 2014). Following the discovery of gas reserves, the Government of Tanzania established local content units with the objective of fostering the involvement of domestic firms as suppliers of foreign multinationals investing in Tanzania.

[10] In order to check whether the sample composition matters for the estimated effects, we estimated Eq. (3) dropping one destination country at the time and plotting the coefficients of the GVC participation and position variables in Fig. A3 in the Appendix. Our results are robust to this exercise.

[11] As a robustness check, we decomposed the index to measure downstream (FVA) and upstream (IVA) GVC participation. The results are reported in Appendix Table A4 which replicates the models presented in Table 3 with the two GVC participation components. We find that the amount of local sourcing is significantly and positively related to both the foreign and the domestic components of GVC participation, and the magnitude of the coefficients changes only slightly.

### 4.1.1. Control variables

The estimated coefficients of the control variables are generally in line with the literature and confirm the importance of foreign investors' characteristics as mediating factors on the extent of local sourcing (Giroud et al., 2012). Higher levels of sourcing are positively correlated to the experience of foreign investors and their export status, consistent with the view that searching and finding reliable local sources of inputs and establishing local linkages with domestic firms require accumulated knowledge about the local context (Amendolagine et al., 2013).

Foreign ownership, firm size, and labor productivity are negatively associated to local sourcing. The result for foreign ownership confirms that foreign investors with strong domestic participation in their capital, therefore more familiar and embedded in the local context, are more inclined to source locally (Sánchez-Martín et al., 2015). The findings for firm size and productivity validate the tendency of larger and more productive firms to either establish global networks of suppliers or produce their intermediate products internally (Winkler, 2013). Finally, the negative relation between market seeking motives and local sourcing is in line with Winkler (2013) who shows that efficiency seeking investments are more likely to result in higher demand for local inputs.

### 4.2. Support from foreign investors and GVC involvement

Given that FDI spillovers from local sourcing depend not only on the number of linkages established between foreign investors and domestic suppliers but also on the provision of knowledge through different types of assistance such as support to comply with higher technological standards or training of local workers (Rodriguez-Clare, 1996; Potter et al., 2003), in our empirical analysis we estimate Eq. (3) introducing a dependent variable measuring whether the foreign investor offers assistance to its local suppliers. This can be considered a proxy for the *intentional* transfer of resources (Giroud and Scott-Kennel, 2009; Giroud et al., 2012).

The AIS and VIS surveys include information on six different forms of assistance: 1) upgrading product quality; 2) improving access to working capital/finance/equity; 3) upgrading workforce skills; 4) transferring technology or know-how; 5) collaborating over product design or product development; and 6) upgrading the efficiency of production processes. Supporting product quality upgrading and production process efficiency are the most frequent forms of assistance (respectively in 46.6 percent and 30.7 percent of cases), followed by collaboration (22.8 percent), training (15.7 percent), access to capital (12.7 percent), and technology transfer (11.6 percent). We construct a synthetic indicator that takes the value 1 if the foreign investor provides at least one form of support to its supplier and zero otherwise (*ANY SUPPORT*). In our sample, 57 percent of foreign investors offer at least one form of assistance after establishing a linkage to a local supplier.

To test whether GVC involvement matters for the degree to which foreign investors can provide assistance to local firms, we run a standard probit regression on the sub-sample of investors that do local sourcing. We consider the same set of explanatory variables used in the baseline model and add the share of local linkages (*LOCAL SOURCING*) and its squared term to check for a potential non-linear relation between the number of linkages and the provision of assistance (Giroud et al., 2012).[12]

The results are reported in Table 3, column 3. The coefficient of GVC participation is no longer significant (though it remains

positive). As discussed in the previous section, higher participation in GVCs improves the capabilities of the local supplier allowing it to satisfy more complex demands from foreign investors. Therefore, foreign investors buy more local inputs (Table 3 column 1) but given the level of the local supplier's capabilities, they do not need to provide further assistance. What matters for the provision of assistance is the specific stage of production that is sourced locally.

The coefficient of GVC position remains positive and significant because foreign investors involved in more upstream value chain sectors are more likely to assist suppliers in the early phases of the production process.[13] Importantly, these results remain robust to a different definition of the dependent variable which accounts for more technical forms of assistance that combine upgrading of product quality in production process sectors, technology transfer, and training (*TECHNICAL SUPPORT*) (see column 4). This might be explained by the fact that the risk of failing in the more upstream stages in the production chain is higher—especially in less advanced economies, and local suppliers require more assistance for these activities compared to downstream activities (as predicted by the model developed by Costinot, Vogel, & Wang, 2013). This interpretation is supported by cross-country evidence on local suppliers based in low income countries (including Ghana, Kenya, Lesotho, and Vietnam) which shows that producers of basic inputs in the agro-food and textile value chains receive more support from their foreign buyers (Farole and Winkler, 2014).

In this specification, the control variables generally have the expected signs. We observe decreasing returns for the transfer of resources to the local supply level. In line with Saliola and Zanfei (2009), we find a weaker probability of assistance for higher levels of local linkages. More local linkages may imply specialization among local suppliers in low value-added functions, or local industry reliance mainly on standardized production. Investor size matters since larger firms are likely to have more resources, and therefore, to invest more in assisting their suppliers (Jordaan, 2011a).

### 4.3. Heterogeneity

As reported in Section 2, some host country and foreign investor characteristics are likely to affect the decision to buy local inputs and the degree of involvement in GVCs. Given that our sample includes 20 different countries and a large variety of foreign firms, to account for possible heterogeneity affecting our results we interact the two measures of GVC involvement with macro and firm-level variables (Table 4).[14]

At the macroeconomic level, some characteristics of the host countries could influence the relation of interest. Based on the literature discussed in Section 2.1, two important factors that might affect the relationship between local sourcing and GVC involvement are institutional quality and human capital endowment. The quality of local institutions, measured by the level of rule of law (*RULE LAW*),[15] matters especially for creating and maintaining local linkages to domestic suppliers since well-functioning institutions guarantee the enforceability of contracts with local partners (Antràs and Chor, 2013; Dollar and Kidder, 2017). Our results

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[12] The number of observations drops to around 61 percent of the total sample since only foreign investors that buy some of their intermediates from domestic suppliers are included. For the model, we follow Giroud et al. (2012) and Jordaan (2011a) adopting a similar set of variables to explain the number of linkages and the provision of assistance to local suppliers.

[13] This result is also robust to restricting the sample to SSA countries—see Appendix Table A5.

[14] Interpreting the estimated coefficients in the presence of multiple interactions could be complex in the context of determining the overall effects (see Kam and Franzese, 2009 for a discussion of the relevance of theory in the design of empirical models).

[15] Note that institutional indicators such as the one we use suffer from limitations since they are based on subjective assessment rather than objective and easier-to-measure indicators.

**Table 4**
Cross-country and firm-level heterogeneity.

| Dependent variable LOCAL SOURCING | Country-level heterogeneity | | Firm-level heterogeneity | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| GVC PARTICIPATION | 1.498*** | −8.509*** | | |
| | (0.172) | (0.597) | | |
| GVC POSITION | 1.569*** | −11.122*** | | |
| | (0.111) | (0.866) | | |
| RULE LAW x GVC PARTICIPATION | 0.501*** | | | |
| | (0.057) | | | |
| RULE LAW x GVC POSITION | 0.451*** | | | |
| | (0.128) | | | |
| EDUCATION x GVC PARTICIPATION | | 0.424*** | | |
| | | (0.034) | | |
| EDUCATION x GVC POSITION | | 0.532*** | | |
| | | (0.038) | | |
| EXPORT x GVC PARTICIPATION | | | −1.032*** | |
| | | | (0.044) | |
| EXPORT x GVC POSITION | | | −0.775*** | |
| | | | (0.082) | |
| SIZE x GVC PARTICIPATION | | | | −0.564*** |
| | | | | (0.032) |
| SIZE x GVC POSITION | | | | −0.625*** |
| | | | | (0.045) |
| AGE | 0.010*** | 0.002 | 0.007*** | 0.007*** |
| | (0.002) | (0.001) | (0.002) | (0.002) |
| FOREIGN OWNERSHIP | −0.076*** | −0.106*** | −0.040*** | −0.041*** |
| | (0.003) | (0.005) | (0.001) | (0.001) |
| SIZE | −0.018*** | −0.014*** | −0.016*** | −0.009*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| LABOR PRODUCTIVITY | −0.008*** | −0.007*** | −0.005*** | −0.005*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| EXPORT | 0.016*** | 0.022*** | 0.024*** | 0.007** |
| | (0.004) | (0.004) | (0.004) | (0.003) |
| GREENFIELD | 0.005 | 0.014*** | 0.002 | −0.001 |
| | (0.004) | (0.004) | (0.003) | (0.003) |
| MARKET SEEKING | −0.013*** | −0.012*** | −0.017*** | −0.016*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Origin Country Fixed Effects | Yes | Yes | Yes | Yes |
| Host Country Fixed Effects | Yes | Yes | – | – |
| Industry Fixed Effects | Yes | Yes | – | – |
| Host Country x Industry Fixed Effects | No | No | Yes | Yes |
| Number of observations | 1.655 | 1.593 | 1.655 | 1.655 |

Notes: The table reports the marginal coefficients of Eq. (3) obtained with a Tobit estimator. The dependent variable is the share of inputs sourced domestically by foreign investors (LOCAL SOURCING). The explanatory variables definitions are presented in Appendix Table A2. Robust standard errors, clustered by investment destination country-industry pair, are reported in parentheses * < 0.1, ** < 0.05, *** < 0.01.

support this assumption, since the association between GVC involvement and local sourcing is stronger in countries with stronger institutions (column 1).

Moreover, the country's human capital endowment is a necessary condition for the absorption of FDI spillovers (Borensztein et al., 1998) including those realized through linkages (Farole and Winkler, 2014), and for entry to and upgrading in GVCs (Antràs, Chor, Fally, & Hillberry, 2012). Taking the share of expenditure on education in GDP (EDUCATION) as a proxy for human capital, we find a positive and significant coefficient of the interaction with the GVC variables (column 2).[16] This supports the idea that high education spending reinforces the positive relationship between GVC participation/upstream position and local sourcing.

Taking account of heterogeneity at the micro level, we interact the GVC indicators with some investor characteristics to allow for firm-level heterogeneity in the relation between GVC involvement and local sourcing. This strategy allows us to include more granular country-industry fixed effects to account for unobserved factors at the host country-sector level (including e.g. industrial policies, trade agreements, and technological changes) which

might shape the relationship between GVC and local sourcing. In this case, we cannot estimate the local level effect of the GVC variables but only the differential effects across firm characteristics.

When we introduce a dummy for exporting firms, the coefficients of both interaction terms are significant and negative, indicating that export-oriented foreign investors are relatively less likely than domestic investors to buy their inputs locally if the destination country/industry is involved in GVCs. This result is consistent with export platform types of investment which are typical in sectors highly integrated in GVCs such as the clothing industry where foreign firms move to locations where it is easier (i.e. because of trade agreements) to import and re-export parts and components to third markets. These types of investments are often characterized by low levels of local linkages (Farole and Winkler, 2014). For instance, some SSA countries—such as Madagascar and Lesotho—have benefitted from trade arrangements such as AGOA to attract export-oriented investors from Asia. Since these investors obtain most of their inputs (including fabrics) from their home countries or globally, the degree of integration with local firms is limited (Morris and Staritz, 2016). As a matter of facts, Vietnam has signed preferential trade agreements with the EU and Japan and has a number of agreements within the ASEAN countries; at the same time, it has increased its involvement in GVCs mostly

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[16] Estimating the same model using the human capital index provided by the Penn World Tables provides similar results.

as an assembler of low value-added outputs which are re-exported by the foreign investors based in the country.[17] This finding supports the discussion in Hollweg et al. (2017) on how the involvement of Vietnam in some GVCs (i.e. electronics) hampers upgrading and diversification from low value added tasks (such as assembly), and reduces the opportunities for links between domestic and foreign firms.

Finally, we interact the two measures of GVC involvement with firm size (*SIZE*). The coefficients of the interaction terms are negative and significant which suggests that among larger firms local sourcing is stronger if they produce in sectors and countries less integrated in GVCs and focused more on downstream activities.

## 5. Conclusions

In this paper we explored whether involvement in GVCs is related to the establishment of backward linkages between foreign and local firms. We combined data from two surveys on the role of foreign investors in 19 SSA countries and Vietnam with data on internationally comparable I/O tables to calculate two indicators of GVC involvement at the country-industry level. Our results show that greater participation in GVCs is positively associated to higher levels of local sourcing by foreign investors. We also demonstrate that the position in the GVC matters: specialization in more upstream stages of production is positively correlated to higher sourcing potential by foreign investors and a greater willingness to offer support to local suppliers. Finally, we show that the positive relation between GVC involvement and local sourcing is stronger in countries with higher spending on education and stronger rule of law, and at the firm level, it is weaker for large and export-oriented foreign investors.

These findings are especially relevant for those countries—including most SSA countries—specialized in low-value added phases that are positioned more upstream in GVCs. Our results corroborate recent policy efforts in some SSA countries to encourage foreign investors' use of local inputs by removing constraints related to information asymmetries and improving the quality of the local supplier base. This applies to Ghana, Nigeria, Mozambique, Ethiopia, and Rwanda which are investing more in quality standards in order to be able to satisfy more sophisticated demand from foreign investors in more globally integrated industries (especially agro-food and resource processing but also apparel, cement, and motor vehicles).[18]

Our study contributes to the growing literature investigating the potential benefits of GVC involvement especially in low-income countries (Taglioni and Winkler, 2016; Dollar and Kidder, 2017). We propose an additional channel through which the benefits from participation in GVCs can spread through the local economy: attracting foreign investors to establish local sourcing links. Greater involvement in GVCs can improve the business ecosystem in which foreign investors decide to produce, and enhance local capabilities, production quality, and knowledge about foreign demand. An improved business ecosystem would encourage foreign investors to rely more on local inputs which would increase domestic demand and potential transmission of positive spillovers to the domestic economic system. Our results show a high degree of complementarity between GVCs and FDI (UNCTAD, 2013; Farole and Winkler, 2014; Taglioni and Winkler, 2016), and suggest that policies to support entry to

and upgrading of countries in GVCs could facilitate potential spillovers from FDI.

Clearly, our work is limited by the cross-sectional nature of our data which do not allow us to fully identify the effect of GVC involvement on local sourcing. This could be overcome in the future if data would be available to explore it in a panel setting. Moreover, the relation between GVC involvement, domestic suppliers' capabilities, and local sourcing from foreign investors is very complex, and our indicators of GVC participation and value chain position fail to account for heterogeneity in governance patterns and macro contexts, dimensions that are stressed in the literature (Cattaneo et al., 2013; Pietrobelli and Rabellotti, 2011; Taglioni and Winkler, 2016). To explore this heterogeneity would require more qualitative information tracking the modalities of interactions between local suppliers, global firms and the host country business environments.

## 6. Conflicts of interest

None declared.

## A. Appendix

### 1. The role of geographic and institutional distance

As an additional control, we test whether cultural, institutional and geographical proximity between the country of origin and destination of the investment matters to explain local sourcing. Results are reported in the table below and confirm the original models presented in Table 3.[19]

We find that firms from countries sharing a colonial relation or the same official language with the host country buy relatively more local inputs. This result outlines the importance of cultural and institutional factors in facilitating contractual relations between buyers and suppliers and look consistent with some literature on the role played by (low) institutional distance as a driver of bilateral economic relations (Head, Mayer, & Ries, 2010).

Concerning the geographic distance, we find a negative coefficient with the full sample (column 1) which turns positive with the SSA sub-sample (column 2), confirming that more linkages are established when geographic is larger due to an increase in the communication costs with the home country (Rodriguez-Clare, 1996). The negative coefficient can be explained by the fact that foreign investors in Vietnam are mostly from Asian countries (such as China and Japan).

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[17] In our sample, about 90 percent of foreign investors based in Vietnam are exporters (in the case of SSA, this share drops to 51 percent).
[18] For related evidence, see https://www.theigc.org/person/john-sutton/.

[19] The addition of these controls reduces the size of the sample by 10% due to missing information about the country of origin for some of the investors.

The role of Geographic and Institutional Distance

| Dependent variable | LOCAL SOURCING | | ANY SUPPORT | LOCAL SOURCING | | ANY SUPPORT | LOCAL SOURCING | | ANY SUPPORT |
|---|---|---|---|---|---|---|---|---|---|
| Sample | SSA & Vietnam | SSA | SSA & Vietnam | SSA & Vietnam | SSA | SSA & Vietnam | SSA & Vietnam | SSA | SSA & Vietnam |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | BILATERAL DISTANCE | | | COLONIAL LINK | | | COMMON LANGUAGE | | |
| GVC PARTICIPATION | 1.165*** | 0.315* | 0.424 | 1.175*** | 0.320* | 0.473 | 1.106* | 0.322* | 0.181 |
| | (0.160) | (0.182) | (1.091) | (0.148) | (0.182) | (1.116) | (0.604) | (0.186) | (1.055) |
| GVC POSITION | 1.283*** | 1.198*** | 1.536 | 1.292*** | 1.177*** | 1.552 | 1.381** | 1.201*** | 1.391 |
| | (0.106) | (0.154) | (1.036) | (0.094) | (0.151) | (1.057) | (0.660) | (0.158) | (1.007) |
| AGE | 0.010*** | 0.020*** | −0.035 | 0.010*** | 0.019*** | −0.037 | 0.019 | 0.018*** | −0.039 |
| | (0.003) | (0.005) | (0.029) | (0.002) | (0.005) | (0.029) | (0.012) | (0.005) | (0.029) |
| FOREIGN OWNERSHIP | −0.087*** | −0.077*** | 0.157** | −0.087*** | −0.076*** | 0.153* | −0.085*** | −0.077*** | 0.160** |
| | (0.005) | (0.005) | (0.079) | (0.004) | (0.004) | (0.079) | (0.032) | (0.004) | (0.079) |
| SIZE | −0.018*** | −0.027*** | 0.052*** | −0.018*** | −0.026*** | 0.052** | −0.018*** | −0.025*** | 0.055*** |
| | (0.001) | (0.003) | (0.020) | (0.001) | (0.002) | (0.021) | (0.006) | (0.002) | (0.020) |
| LABOR PRODUCTIVITY | −0.006*** | −0.011*** | 0.025** | −0.006*** | −0.010*** | 0.025** | −0.005 | −0.010*** | 0.026** |
| | (0.001) | (0.001) | (0.010) | (0.000) | (0.001) | (0.011) | (0.006) | (0.001) | (0.010) |
| EXPORT | 0.021*** | 0.050*** | 0.080 | 0.021*** | 0.049*** | 0.078 | 0.030 | 0.051*** | 0.082 |
| | (0.005) | (0.012) | (0.054) | (0.005) | (0.011) | (0.054) | (0.019) | (0.012) | (0.056) |
| GREENFIELD | 0.005 | −0.012*** | 0.010 | 0.005 | −0.014*** | 0.009 | 0.013 | −0.011** | 0.009 |
| | (0.004) | (0.004) | (0.072) | (0.004) | (0.004) | (0.072) | (0.023) | (0.004) | (0.072) |
| MARKET SEEKING | −0.013*** | −0.038*** | 0.062** | −0.014*** | −0.038*** | 0.062** | −0.012 | −0.038*** | 0.068** |
| | (0.002) | (0.001) | (0.029) | (0.003) | (0.001) | (0.029) | (0.017) | (0.001) | (0.030) |
| LOCAL SOURCING | | | 0.398** | | | 0.400** | | | 0.401** |
| | | | (0.180) | | | (0.177) | | | (0.181) |
| LOCAL SOURCING$^2$ | | | −0.434** | | | −0.435** | | | −0.443** |
| | | | (0.193) | | | (0.190) | | | (0.194) |
| BILATERAL DISTANCE | −0.013*** | 0.024*** | 0.086 | | | | | | |
| | (0.001) | (0.004) | (0.055) | | | | | | |
| COLONIAL LINK | | | | 0.025*** | 0.018** | −0.201 | | | |
| | | | | (0.008) | (0.008) | (0.141) | | | |
| COMMON LANGUAGE | | | | | | | 0.037 | 0.076*** | 0.182 |
| | | | | | | | (0.023) | (0.016) | (0.122) |
| Origin Country Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Host Country Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 1499 | 909 | 851 | 1499 | 909 | 851 | 1499 | 909 | 851 |

Notes: Columns 1, 2, 4, 5, 7 and 8 report the marginal coefficients of Eq. (3), obtained with a Tobit Estimator. The dependent variable is the share of inputs sourced domestically by foreign investors (LOCAL SOURCING). Columns 3, 6 and 9 report the marginal coefficient of probit models in which the dependent variable is a dummy equal to 1 if the foreign investor provided any form of support (ANY SUPPORT), and 0 otherwise. Results reported in columns 1, 4 and 7 refer to the full sample; results in columns 2, 5 and 8 refer to the sub-sample of SSA countries. The definitions of all the explanatory variables are provided in Appendix Table A2. Robust standard errors, clustered by investment destination country-industry pair, are reported in parentheses * < 0.1, ** < 0.05, *** < 0.01.

**Table A1**
Foreign investors by country and sector (number and percentage, by country).

| | All sectors | Food & Beverage | Textiles & Wearing Apparel | Wood & Paper | Petroleum & Chemicals | Metal products | Electrical & Machinery | Transport Equipment | Other manufacturing |
|---|---|---|---|---|---|---|---|---|---|
| Burkina Faso | 15 (0.8) | 4 (26.7) | 1 (6.7) | 1 (6.7) | 3 (20.0) | 4 (26.7) | 0 (0.0) | 0 (0.0) | 2 (13.3) |
| Burundi | 13 (0.7) | 5 (38.5) | 0 (0.0) | 1 (7.7) | 5 (38.5) | 1 (7.7) | 0 (0.0) | 0 (0.0) | 1 (7.7) |
| Cameroon | 39 (2.0) | 10 (25.6) | 0 (0.0) | 7 (17.9) | 9 (23.1) | 6 (15.4) | 2 (5.1) | 1 (2.6) | 4 (10.3) |
| Cape Verde | 22 (1.1) | 5 (22.7) | 3 (13.6) | 3 (13.6) | 8 (36.4) | 2 (9.1) | 0 (0.0) | 0 (0.0) | 1 (4.5) |
| Ethiopia | 83 (4.3) | 15 (18.1) | 13 (15.7) | 10 (12.0) | 24 (28.9) | 10 (12.1) | 6 (7.2) | 0 (0.0) | 5 (6.0) |
| Ghana | 93 (4.9) | 11 (11.8) | 3 (3.2) | 12 (12.9) | 40 (43.0) | 19 (20.4) | 4 (4.30) | 0 (0.0) | 4 (4.3) |
| Kenya | 194 (10.1) | 44 (22.7) | 25 (12.9) | 12 (6.2) | 65 (33.5) | 24 (12.4) | 9 (4.6) | 6 (3.1) | 9 (4.6) |
| Lesotho | 48 (2.5) | 3 (6.2) | 35 (72.9) | 2 (4.2) | 5 (10.4) | 0 (0.0) | 2 (4.2) | 0 (0.0) | 1 (2.1) |
| Madagascar | 47 (2.4) | 6 (12.8) | 27 (57.4) | 2 (4.3) | 9 (19.1) | 0 (0.0) | 0 (0.0) | 1 (2.1) | 2 (4.3) |
| Malawi | 20 (1.0) | 1 (5.0) | 1 (5.0) | 1 (5.0) | 8 (40.0) | 5 (25.0) | 1 (5.0) | 1 (5.0) | 2 (10.0) |
| Mali | 30 (1.6) | 4 (13.3) | 3 (10.0) | 0 (0.0) | 13 (43.3) | 5 (16.7) | 4 (13.3) | 0 (0.0) | 1 (3.3) |
| Mozambique | 66 (3.4) | 13 (19.7) | 7 (10.6) | 7 (16.7) | 11 (28.8) | 19 (28.8) | 6 (9.1) | 0 (0.0) | 3 (4.5) |
| Niger | 9 (0.5) | 2 (22.2) | 0 (0.0) | 1 (11.1) | 3 (33.3) | 1 (11.1) | 0 (0.0) | 0 (0.0) | 2 (22.2) |
| Nigeria | 108 (5.6) | 20 (18.5) | 11 (10.2) | 7 (6.5) | 43 (39.8) | 14 (13.0) | 7 (6.5) | 4 (3.7) | 2 (1.8) |
| Rwanda | 24 (1.2) | 10 (41.7) | 2 (8.3) | 0 (0.0) | 6 (25.0) | 3 (12.5) | 1 (4.2) | 0 (0.0) | 2 (8.3) |
| Senegal | 30 (1.6) | 6 (20.0) | 3 (10.0) | 4 (13.3) | 11 (36.7) | 5 (16.7) | 0 (0.0) | 1 (3.3) | 0 (0.0) |
| Tanzania | 91 (4.7) | 19 (20.9) | 9 (9.9) | 15 (16.5) | 16 (17.6) | 13 (14.3) | 7 (7.7) | 2 (2.2) | 10 (11.0) |
| Uganda | 137 (7.1) | 43 (31.4) | 8 (5.8) | 14 (10.2) | 46 (33.6) | 13 (9.5) | 5 (3.6) | 3 (2.2) | 5 (3.6) |
| Vietnam | 805 (42.0) | 49 (6.1) | 162 (20.1) | 81 (10.1) | 133 (16.5) | 89 (11.1) | 129 (16.0) | 53 (6.6) | 109 (13.5) |
| Zambia | 41 (2.1) | 12 (29.3) | 2 (4.9) | 4 (9.7) | 11 (26.8) | 9 (21.9) | 1 (2.4) | 0 (0.0) | 2 (4.9) |
| Total | 1915 (100) | 282 (14.7) | 315 (16.4) | 184 (9.6) | 469 (24.5) | 242 (12.6) | 184 (9.6) | 72 (3.8) | 167 (8.7) |

In parenthesis in the first column % of investments received by each country; in the other columns % of investments received by each sector in the country.
Sources: AIS and VI.

**Table A2**
List of variables, definition, sources, and summary statistics.

| Variable | Definition | Source | Mean | St. Dev. | Min. | Max. | # of observations |
|---|---|---|---|---|---|---|---|
| LOCAL SOURCING | Share of inputs sourced domestically by foreign investors | AIS and VIS | 0.20 | 0.27 | 0.00 | 1.00 | 1655 |
| ANY SUPPORT | Dummy equal to one if the foreign investor provided any form of support to local suppliers, and zero otherwise | AIS and VIS | 0.58 | 0.49 | 0.00 | 1.00 | 978 |
| TECHNICAL SUPPORT | Dummy equal to one if the foreign investor provided support for upgrading of product quality and of production process, technology transfer and training to local suppliers, and zero otherwise | AIS and VIS | 0.54 | 0.50 | 0.00 | 1.00 | 978 |
| GVC PARTICIPATION | GVC participation index (Koopman et al., 2011) | EORA MRIO | 0.04 | 0.04 | 0.00 | 0.13 | 1655 |
| GVC POSITION | GVC position index (Koopman et al., 2011) | EORA MRIO | −0.02 | 0.03 | −0.11 | 0.03 | 1655 |
| AGE | Logarithm of the number of years since the first investment | AIS and VIS | 2.43 | 0.74 | 0.00 | 4.72 | 1655 |
| FOREIGN OWNERSHIP | Share of foreign ownership | AIS and VIS | 0.89 | 0.23 | 0.00 | 1.00 | 1655 |
| SIZE | Logarithm of the number of employees | AIS and VIS | 5.09 | 1.40 | 0.00 | 9.83 | 1655 |
| LABOR PRODUCTIVITY | Logarithm of the ratio of sales per employee | AIS and VIS | 10.16 | 1.60 | −0.38 | 20.88 | 1655 |
| EXPORT | Dummy equal to one if the foreign investor exports, and zero otherwise | AIS and VIS | 0.68 | 0.46 | 0.00 | 1.00 | 1655 |
| GREENFIELD | Dummy equal to one for greenfield investment, and zero for the other entry modes | AIS and VIS | 0.87 | 0.34 | 0.00 | 1.00 | 1655 |
| MARKET SEEKING | Dummy equal to one if the investment is market seeking, and zero otherwise | AIS and VIS | 0.58 | 0.49 | 0.00 | 1.00 | 1655 |
| RULE LAW | Rule of Law Index (it ranges from −2.5 to 2.5) | World Governance Indicators | −0.57 | 0.28 | −1.19 | 0.42 | 1655 |
| EDUCATION | Education expenditures, in percent of total government expenditure | World Bank | 19.88 | 3.75 | 9.38 | 26.30 | 1593 |
| BILATERAL DISTANCE | Log of distance (km) between capitals of origin and destination countries | CEPII | 8.24 | 0.85 | 3.17 | 9.72 | 1499 |
| COLONIAL LINK | Dummy equal to 1 if origin and destination countries were ever in a colonial relationship, and zero otherwise | CEPII | 0.13 | 0.33 | 0.00 | 1.00 | 1499 |
| COMMON LANGUAGE | Dummy equal to 1 in case of common official language, and zero otherwise | CEPII | 0.38 | 0.49 | 0.00 | 1.00 | 1499 |
| FVA | Foreign value added in sector j and country n, divided by total country exports. | EORA MRIO | 0.03 | 0.03 | 0.01 | 0.13 | 1655 |
| IVA | Indirect domestic value added in sector j and country n, divided by total country exports. | EORA MRIO | 0.01 | 0.01 | −0.01 | 0.05 | 1655 |

**Table A3**
Downstream and upstream GVC participation.

| Dependent variable | LOCAL SOURCING | | | | ANY SUPPORT | |
|---|---|---|---|---|---|---|
| Sample | SSA & Vietnam | | SSA | | SSA & Vietnam | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| FVA | 2.363*** | | 0.590** | | 1.675 | |
| | (0.216) | | (0.271) | | (2.062) | |
| IVA | | 2.452*** | | 0.611* | | 1.518 |
| | | (0.412) | | (0.328) | | (2.145) |
| GVC POSITION | 2.525*** | 0.003 | 1.382*** | 0.760*** | 2.871 | 1.105* |
| | (0.172) | (0.037) | (0.172) | (0.135) | (2.004) | (0.642) |
| AGE | 0.010*** | 0.010*** | 0.019*** | 0.019*** | −0.039 | −0.039 |
| | (0.002) | (0.002) | (0.004) | (0.004) | (0.033) | (0.033) |
| FOREIGN OWNERSHIP | −0.077*** | −0.076*** | −0.069*** | −0.069*** | 0.125 | 0.126 |
| | (0.002) | (0.002) | (0.003) | (0.002) | (0.080) | (0.080) |
| SIZE | −0.018*** | −0.018*** | −0.026*** | −0.026*** | 0.048** | 0.048** |
| | (0.001) | (0.001) | (0.002) | (0.002) | (0.023) | (0.023) |
| LABOR PRODUCTIVITY | −0.008*** | −0.008*** | −0.012*** | −0.012*** | 0.027** | 0.027** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.012) | (0.012) |
| EXPORT | 0.016*** | 0.016*** | 0.045*** | 0.045*** | 0.068 | 0.068 |
| | (0.004) | (0.004) | (0.011) | (0.011) | (0.053) | (0.053) |
| GREENFIELD | 0.005 | 0.005 | −0.013*** | −0.013*** | 0.014 | 0.014 |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.047) | (0.047) |
| MARKET SEEKING | −0.013*** | −0.013*** | −0.036*** | −0.036*** | 0.097*** | 0.097*** |
| | (0.002) | (0.002) | (0.001) | (0.001) | (0.027) | (0.027) |
| LOCAL SOURCING | | | | | 0.366** | 0.365** |
| | | | | | (0.186) | (0.186) |
| LOCAL SOURCING$^2$ | | | | | −0.398** | −0.397** |
| | | | | | (0.198) | (0.198) |
| Origin Country Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Host Country Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 1655 | 1655 | 923 | 923 | 978 | 978 |

Notes: Columns 1, 2, 3 and 4 report the marginal coefficients of Eq. (3), obtained with a Tobit Estimator. The dependent variable is the share of inputs sourced domestically by foreign investors (LOCAL SOURCING). Columns 5 and 6 report the marginal coefficient of probit models in which the dependent variable is a dummy equal to 1 if the foreign investor provided any form of support (ANY SUPPORT), and 0 otherwise. Results reported in columns 1, 2, 5 and 6 refer to the full sample; results in columns 3 and 4 refer to the sub-sample of SSA countries. The definitions of all the explanatory variables are provided in Appendix Table A2. Robust standard errors, clustered by investment destination country-industry pair, are reported in parentheses * < 0.1, ** < 0.05, *** < 0.01.

**Table A4**
Probit model on SSA sub-sample.

| Dependent variable | ANY SUPPORT | |
|---|---|---|
| Sample | SSA & Vietnam (1) | SSA (2) |
| GVC PARTICIPATION | 0.800 | −1.707 |
| | (1.051) | (1.344) |
| GVC POSITION | 1.948* | 5.531*** |
| | (1.018) | (1.711) |
| AGE | −0.039 | −0.070** |
| | (0.033) | (0.030) |
| FOREIGN OWNERSHIP | 0.126 | 0.098 |
| | (0.080) | (0.074) |
| SIZE | 0.048** | 0.030 |
| | (0.023) | (0.021) |
| LABOR PRODUCTIVITY | 0.027** | 0.067*** |
| | (0.012) | (0.020) |
| EXPORT | 0.068 | 0.075 |
| | (0.053) | (0.064) |
| GREENFIELD | 0.014 | −0.061 |
| | (0.047) | (0.082) |
| MARKET SEEKING | 0.097*** | 0.122** |
| | (0.027) | (0.048) |
| LOCAL SOURCING | 0.365** | 0.126 |
| | (0.186) | (0.335) |
| LOCAL SOURCING$^2$ | −0.397** | −0.139 |
| | (0.198) | (0.298) |
| Origin Country Fixed Effects | Yes | Yes |
| Host Country Fixed Effects | Yes | Yes |
| Industry Fixed Effects | Yes | Yes |
| Number of observations | 978 | 383 |

Notes: Columns 1 and 2 report the marginal coefficient of probit models in which the dependent variable is the dummy equal to 1 if the foreign investor provided any form of support, and zero otherwise. Results reported in column 1 refer to the full sample; results in column 2 refer to the sub-sample of SSA countries. The definitions of all the explanatory variables are provided in Appendix Table A2. Robust standard errors, clustered by investment destination country-industry pair, are reported in parentheses * < 0.1, ** < 0.05, *** < 0.01.
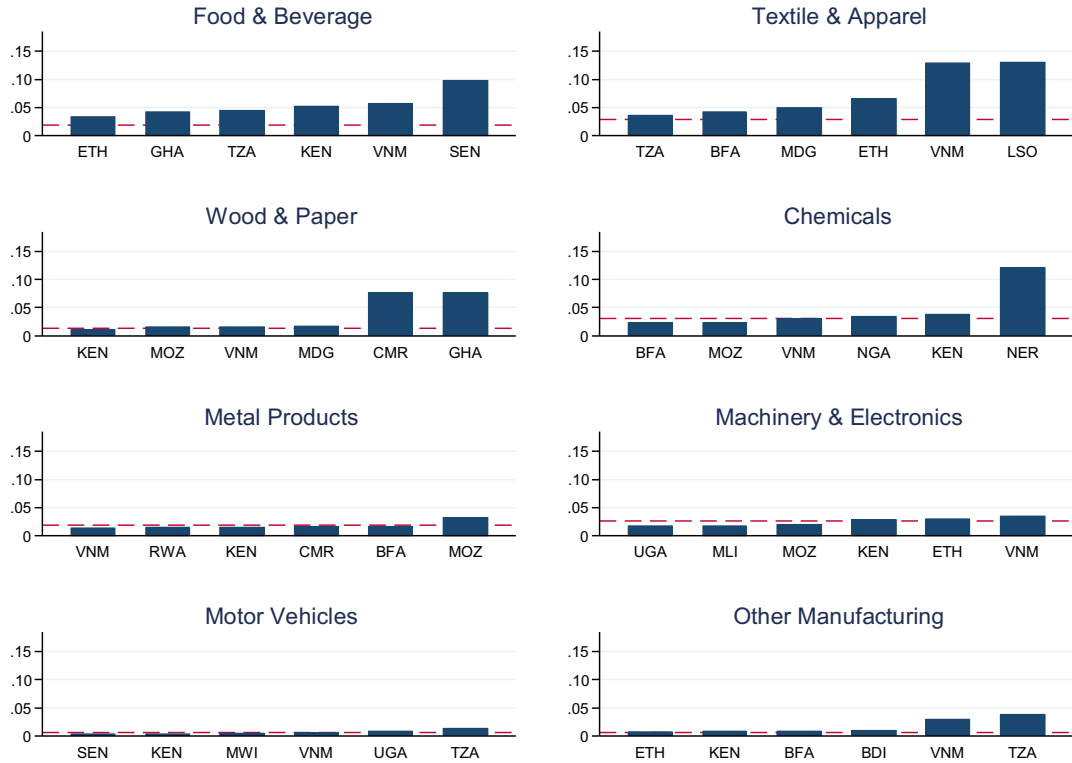
**Fig. A1.** GVC participation at sector level (2010) Notes: The dotted lines represent the average value in developing countries, defined by the World Bank as low income and the lower-middle income countries. Source: Authors' elaborations based on the Eora Multi Region Input-Output database.



**Fig. A2.** GVC position at sector level (2010). The dotted lines represent the average value in developing countries, defined by the World Bank as low income and the lower-middle income countries. Source: Authors' elaborations based on the Eora Multi Region Input-Output database.
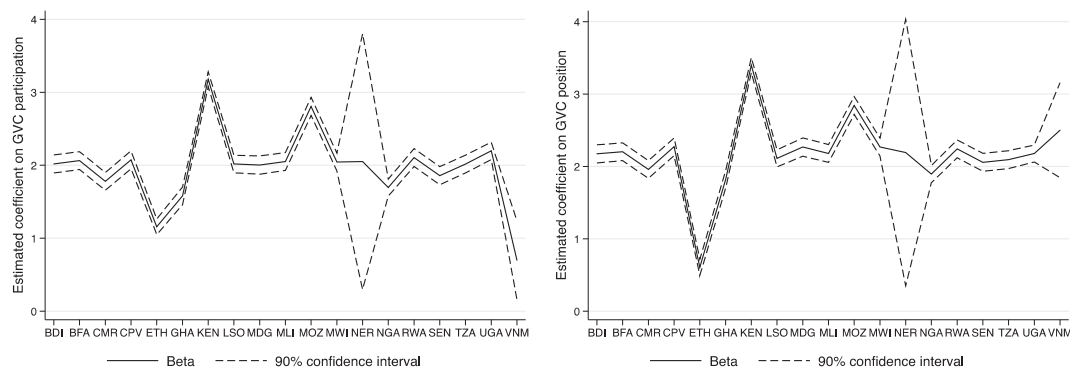
**Fig. A3.** The role of GVC involvement for local linkages – Jackknife samples Notes: the charts report the coefficients of the variables of GVC participation (left panel) and position (right panel), estimated for the baseline specification (Table 3, column 1), dropping one country at the time, as listed on the horizon.

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