

Pérez-Villar, Lucia; Seric, Adnan

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## Knowledge transfer in global supply chains: Multinationals in Sub-Saharan Africa

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## **Working Papers**

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### **Knowledge Transfer in Global Supply Chains: Multinationals in Sub-Saharan Africa**

**Lucia Pérez-Villar  
Adnan Seric**

**No. 1994 | March 2015**

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## **Knowledge Transfer in Global Supply Chains: Multinationals in Sub-Saharan Africa\***

Lucia Pérez-Villar and Adnan Seric

### Abstract:

We analyze in this paper determinants of voluntary knowledge transfer from foreign investors to their local suppliers in 19 Sub-Saharan African countries using data from the 2010 Africa Investor Survey by UNIDO. We argue that not all backward linkages entail the same potential for spillovers since not all local sourcing activities by multinationals involve a transfer of knowledge to suppliers. Our findings support the idea that foreign investor's heterogeneity and country environment are key factors shaping the spillover potential of backward linkages. Local management autonomy and the long-term nature of local procurement contracts are positively associated with the transfer of knowledge. Also sourcing strategies that seek to meet local market requirements, to optimize value chain efficiency and that respond to social responsibility commitments are more likely to involve a transfer of knowledge to suppliers. Additionally, host country institutional quality and institutional distance relative to the origin country of the MNE are relevant determinants of the degree of knowledge transfer. Investment policies that merely focus on promoting larger shares of locally sourced inputs might fail to get the most of FDI positive externalities. Instead, quality linkages that involve a transfer of knowledge should be promoted over quantity linkages.

Keywords: knowledge transfer, global value chains, institutional distance, supplier upgrading, sub-Saharan Africa.

JEL classification: F23, 033

### **Lucia Pérez-Villar**

Kiel Institute for the World Economy  
D-24105 Kiel, Germany  
Tel.: +49(0)431-88 14 632  
Email: [Lucia.perez@ifw-kiel.de](mailto:Lucia.perez@ifw-kiel.de)

### **Adnan Seric**

United Nations Industrial Development Organization,  
Vienna Austria

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## 1. Introduction

The effect of foreign direct investment (FDI) on host economies and its implications for development has for a long time been a major policy concern in developing countries. In this regard, multinational enterprises (MNE) that have access to more advanced technology and possess a knowledge-based advantage can contribute to economic growth and structural change in developing economies via spillovers to the domestic economy. Three main mechanisms through which spillovers materialize have been identified by the literature. First, positive externalities to the local economy can take the form of horizontal spillovers if local firms in the same sector learn from more efficient technologies by competition or demonstration effects. Secondly, vertical spillovers can take place through value chain linkages with domestic suppliers and buyers. In this sense, foreign investors that source intermediates locally -backward linkages- have incentives to share know-how with their suppliers in order to help them meeting required quality levels or higher technical standards. Also, domestic firms that buy from MNEs -forward linkages- have access to more sophisticated inputs and can therefore learn new production techniques or enhance the quality of their final goods. Third, labor market interactions can also generate positive effects in form of wage spillovers and through turnover of skilled workers. Among these various mechanisms, empirical literature has consistently found that the main channels through which positive externalities materialize are backward supply chain linkages with domestic suppliers (Javorcik, 2004 *inter alia*<sup>1</sup>).

However, while it is possible that domestic firms benefit from backward linkages with foreign investors, not all local sourcing activities by multinationals entail the same potential for spillovers. In this regard, for the backward linkage to generate a domestic learning effect, a transmission of knowledge from the multinational to their domestic supplier is needed (Morrisey, 2012). Therefore, local sourcing activities that do not involve a transfer of knowledge or provision of assistance are likely to not translate into local suppliers upgrading and consequently no positive long-run benefits for the local economy will be materialized. As found by Görg and Seric (2014) for the case of Sub-Saharan Africa, supplying to a MNE only has a positive impact on domestic supplier's process innovation and labor productivity when they additionally receive assistance from their multinational customers in terms of training and technology transfer respectively. Similarly, Winkler (2014) finds that MNE's imposed requirements to suppliers have no impact on the latter's productivity whereas effects from technical assistance are positive. Further evidence of the relevance of voluntary knowledge transfer is provided by Giroud et al. (2012) and Saliola and Zanfei (2009) who study the spillover potential derived from different MNE's sourcing behaviors by distinguishing between extent of local sourcing activities and their knowledge sharing intensity. Both studies find that it is the knowledge intensity (quality) and not the extent (quantity) of backward linkages that matters for spillovers generation. This argument suggests that focusing exclusively on extent of backward linkages might lead to a misidentification of the key factors that potentially lead to successful upgrading of local suppliers (Giroud 2007; Giroud and Scott-Kennel, 2009).

But, why would a MNE invest resources in voluntarily promote local supplier upgrading? As suggested by number of case studies, foreign investors deliberately transfer technology to their local suppliers in developing countries. Sound examples are, among other voluntary transfers of technology by the Japanese electronics MNEs in Malaysia (Campanelli, 1997), the automotive sector MNEs in Mexico and

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<sup>1</sup> See Görg and Greenaway (2004) or Havranek and Irsova (2011) for comprehensive literature reviews on FDI spillovers.

Thailand and the computer/electronic sector in Singapore, Malaysia or Taiwan (Moran, 2001). Moreover, as explained by Ivarsson and Alvstam (2010) for the case of IKEA, local supplier upgrading practices respond not only to corporate ethics and needs regarding technical and quality standards, but they are also driven by economic benefits. Sourcing from smaller and less experienced suppliers in face-to-face relationships translates into large cost savings for the company, while costs of supplier monitoring remain relatively low. Therefore, knowledge intensive local sourcing by foreign investors appears as a win-win process where the MNE benefits from lower production costs and higher quality inputs while local suppliers upgrade their technical capabilities.

Understanding how knowledge is transferred through supply chain relationships becomes crucial in the actual context of increasing internationalization of production. As pointed out by Farole and Winkler (2014) the largest share of non-extractive investment in low-income countries takes place in the context of global value chains (GVCs). Thus, a proper understanding of the spillover potential inherent to this type of investments and the country environment enhancing such positive externalities is necessary in the process of minimizing risks and enhancing the developmental benefits of joining the global economy. Empirical evidence on the transfer of knowledge involved in MNE's local sourcing activities it is relatively recent and mostly relies on case studies with few observations focusing on specific firms, industries or single countries/regions. An exception is the recent study by Farole and Winkler (2014, chapter 3) which focuses on determinants of productivity spillovers to domestic firms in 78 developing countries using data from the World Bank's Enterprise Surveys. Although the authors consider the voluntary provision of assistance by MNEs as a mediating factor affecting productivity spillovers to domestic firms, the foreign investor characteristics that lead to this transfer of knowledge are not explored.

While extant studies provide a framework for analysis and a first stage understanding of the factors driving the vertical transfer of knowledge their results are not easily generalizable. Neither are the policy implications derived from them. Also, as they concentrate on single or very few countries, they do not allow for an assessment of country level factors.

This paper builds on this literature and adopts a more comprehensive approach in the analysis of determinants of knowledge transfer by multinationals to their local suppliers in 19 Sub-Saharan African countries. More specifically, we investigate the role played for the transfer of knowledge by two broad sets of drivers: foreign investor characteristics and country level factors. We aim at answering the following questions: Which sourcing activities and characteristics of foreign investors are related to transfers of knowledge to local suppliers? And, under which host country economic and institutional characteristics are foreign investors more likely to engage in supplier upgrading practices?

Disentangling the drivers behind the transfer of knowledge by multinationals is of particular relevance for the case of Sub-Saharan Africa. Under the assumption that FDI will contribute to growth by transferring skills, management expertise and technology many African governments have made attracting FDI a priority in their development strategies. However FDI in the continent remains mostly in extractive sectors with few domestic linkages and with no significant technology transfer to the local economies (UNCTAD, 2013). Farole and Winkler (2014) state the crucial role that FDI knowledge spillovers plays for Sub-Saharan African long-run growth and development and draw attention to the need for a better understanding of the dynamics behind FDI spillovers in the region.

The contribution of this paper is threefold. First, we add to the literature on vertical knowledge transfer by adopting a broader approach in terms of observations, variables and countries that allow us to explore country level factors and to draw more generalizable conclusions and policy implications.

Second, we complement previous studies on the extent of backward linkages in Sub-Saharan Africa (Amendolagine et. al, 2013; Pérez-Villar and Seric, 2014) by accounting for the particularly relevant dimension of the knowledge intensity of backward linkages. As argued above, understanding this feature is essential for capturing the full picture of MNE's local sourcing behavior and its potential for spillovers in the context of global value chains. Finally, our focus on Sub-Saharan Africa provides evidence on the still understudied effects of FDI in least developed countries where international transfer of knowledge through FDI flows is a key factor to achieve structural change and technological catch up.

Our findings support the idea that foreign investor's heterogeneity and institutional environments are key factors shaping the sourcing patterns of MNEs and consequently the spillovers potential of backward linkages. More specifically, we find that i) the transfer of knowledge follows a non-linear relationship with the extent of backward linkages. Higher shares of locally sourced inputs are associated with higher probabilities of transfer of knowledge up to a 50% threshold after which the relationship turns negative; ii) the long-term nature of local procurement contracts incentivizes provision of support to local suppliers; iii) the type of investments that are more likely to provide support to their local suppliers are MNE subsidiaries with a certain degree of local management autonomy and with sourcing strategies that seek to meet local market requirements, to optimize value chain efficiency and that respond to social responsibility commitments; iv) host country institutional quality and institutional distance relative to the origin country of the MNE have also an impact on the degree of knowledge transfer. Finally, v) other firm characteristics such as firm size, the perceived technology gap and targeting developed export markets are positively associated with the transfer of knowledge.

The rest of the paper is organized as follows: section 2 briefly reviews the extant literature; section 3 presents the analytical framework; section 4 describes the dataset and the methodology; section 5 discusses the estimation results and section 6 concludes and derives policy recommendations.

## **2. Transfer of knowledge through backward linkages: a literature review**

As pointed out in the introduction, the literature on FDI spillovers has with some consensus, identified the backward linkage as the main channel driving positive externalities to the domestic economy. The typical analysis in this literature strand relates domestic firm performance in a specific sector with a measure of foreign presence in upstream sectors often relying on input-output tables. Then, the assumption is made that knowledge has been transferred from the MNE's to their domestic suppliers if domestic performance in a sector improves due to FDI presence in upstream sectors. However, backward linkages do not automatically lead to spillovers since they do not always involve a transfer of knowledge. Hence, while these studies find positive evidence of spillovers happening through backward linkages quite consistently across countries and industries, they are not able to identify the drivers and specific mechanisms behind the transfer of knowledge involved in local sourcing activities by multinationals that determine the spillover potential of backward linkages.

In order to understand how knowledge spills over from the MNE to the local economies through the vertical channel, a closer look at heterogeneous local sourcing activities is needed. In other words, an understanding of the dynamics at play in supply chain relationships is essential for identifying the mediating factors that lead to the materialization of positive externalities. Giroud and Scott-Kennel (2009) and Farole and Winkler (2014) identify three types of mediating factors: i) domestic firm characteristics that favor absorptive capacity; ii) foreign investor features that enhance their spillover

potential and iii) country level factors regarding a proper institutional background and business climate. This study focuses on the last two mediating factors<sup>2</sup>.

Regarding foreign investor characteristics, a number of case studies have tried to disentangle what makes a foreign investor more likely to voluntarily transfer knowledge to local suppliers. In brief, the degree of integration of the MNE with local markets, share of locally sourced inputs, long term supplier relationships and autonomy of the subsidiary's local management appear to be key determinants of the knowledge-intensive local sourcing behavior by MNEs. In this way, Saliola and Zanfei (2009) study the transfer of knowledge involved in heterogeneous value chain relationships with MNE's of Thai firms. They find that *embeddedness* that is, the degree of integration and adaptation of MNEs into the local market and the capabilities of local suppliers are crucial factors generating knowledge-intensive backward linkages. A relatively larger share of locally purchased inputs is however associated to supply relationships of a lower technological profile. This finding suggests that a distinction between the *extent* (quantity) and the *intensity* (quality) of backward linkages is needed in order to identify potential spillover effects.

The interaction between extent and intensity of backward linkages is further explored by Giroud et al. (2012) for the case of five transition economies. They find a non-linear relationship between the amount of inputs shared locally by a multinational and the knowledge transfer to suppliers. A plausible interpretation of this result is that higher shares of locally sourced inputs are more likely to occur in lower stages of the value chain, are related to non-differentiated goods and therefore not involving a knowledge intensive sourcing behavior. Indeed as Ivarsson and Alvstan (2005) find by studying Volvo's plants in Brazil, China, India and Mexico, the lower the level of standardization in the sector, the higher the transfer of knowledge to suppliers in order to obtain customized parts. Put differently, a large share of local inputs might reflect that the presence of the foreign affiliate in the country is due to cost-saving more than quality motivations. An alternative explanation is also given by Giroud et al (2012) who argue that knowledge flows might be more intense when the multinational combines locally sourced with imported inputs. This combined production process might then require higher quality locally sourced inputs that meet international standards and therefore require potential upgrading of local suppliers. Additionally, Giroud et al (2012) find that the degree of *embeddedness* with the local economy and the degree of *autonomy of the subsidiary* are important for enhancing the likelihood of knowledge transfer to suppliers. Further evidence of the importance of subsidiary roles in terms of technological competence and the degree of autonomy is found by Jindra et al (2009) for transition countries, by Gentile-Lüdecke and Giroud (2012) for the case of the Polish automotive sector and by Crone and Roper (2001) for Northern Ireland. Looking at a sample of foreign subsidiaries, these studies find that intra-firm relationships do play a role and a subsidiary's higher degree of autonomy in terms of supply-related decisions is associated with larger probabilities of transferring knowledge to suppliers.

Technological differences between domestic suppliers and MNEs are addressed by Jordaan (2005, 2010, 2013). The author explores the determinants of technology transfers to local suppliers by MNEs in

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<sup>2</sup> The issue of domestic firm characteristics and knowledge absorption from forward and backward linkages with MNE's has been addressed by Görg and Seric (2013), also using the UNIDO AIS 2010 dataset. Other studies looking at domestic firm characteristics enhancing the scope from learning from MNEs are Farole and Winkler (2014) and Jordaan (2013). Roughly, these studies find that firm technological capabilities, size, experience and export status are features that foster absorptive capacity and make domestic firms more likely to receive assistance from their suppliers at a first stage and to benefit from the a potential transfer of knowledge at a later stage.

Mexico emphasizing the positive impact of the *technology gap* between the MNE and its local suppliers for the provision of assistance. This shows that a certain scope for supplier upgrading is important in the decision to transfer knowledge by MNEs. He also finds that larger firms that are engaged in the local production of inputs are more likely to provide support to their local suppliers.

Finally, the above findings are confirmed by several firm-specific case studies by Ivarsson and Alvstam (2005, 2009, 2010, 2011) on the local sourcing behavior of respectively, Swedish engineering firms, Volvo and IKEA in Asian and Latin American countries. By collecting survey data on local suppliers' upgrading and provision of assistance by Swedish firms the authors find that long-term commitment and cooperative supply relationships, deliberate supplier upgrading programs as part of the MNEs global sourcing strategy and the relative technological backwardness of suppliers largely drives knowledge sharing with suppliers. The authors highlight the fact that Swedish MNE's benefit from closer and trust-based supplier relationships and reveal to have strong incentives to provide assistance to their suppliers in developing countries especially for the case of non-standardized intermediates.

To sum up, the extant literature provides a framework for analysis and a first stage understanding of the factors driving the vertical transfer of knowledge. However, these results are not easily generalizable neither are the policy implications derived from them. Also, they do not allow for an assessment of country level factors since they are limited to single or small samples of countries. In the next subsection, we build on the literature and present our analytical framework expanding the scope of the analysis and capturing a wider range of factors shaping the local sourcing behavior by foreign investors and the transfer of knowledge to suppliers.

### **3. Analytical framework: What drives the transfer of knowledge by MNE's?**

As proposed by Giroud and Scott-Kennel (2009) and Farole and Winkler (2014) we distinguish between two broad types of determinants. First, we look at firm-level factors stemming from foreign investor's structural and organizational heterogeneity. Second, we account for host country and origin characteristics that define location strategies and value chain governance of multinationals.

#### **3.1 Foreign Investor characteristics**

As it suggested by the literature reviewed above, accounting for investor heterogeneity is crucial to understanding the mechanisms behind knowledge spillovers to the domestic economy. A common finding has been that the degree of integration of MNEs into the local economy, often referred to as *embeddedness*, is positively related to the generation of positive externalities. This is a broad concept and includes several aspects that influence to what extent foreign investors' organizational characteristics and activities lead to integration and involvement in the host economy. Among them are, for instance the time since the investment took place, the degree of adaptation to local practices or the share of foreign ownership. In this section we review these and other factors behind the transfer of knowledge to local suppliers. We classify the different factors into three main groups: a) factors regarding the type of backward linkage; b) factors referring to the type of investment in terms of ownership, sourcing strategy and autonomy of the subsidiary and c) other relevant firm characteristics.



#### a. Type of backward linkage

As stated above foreign investors with different motivations and strategies generate different types of backward linkages. In this regard, we argue that two attributes of backward linkages are likely to have an impact on the transfer of knowledge: the extent or size of backward linkage and the nature of the sourcing contract.

The first issue we account for is the relationship between the *extent* (quantity) and the *intensity* (quality) of backward linkages i.e how the share of local sourced inputs relates to knowledge transfers to suppliers. Saliola and Zanfei (2009) and Giroud et al (2012) have found either a negative or a non-linear relationship between the amount of inputs sourced locally and the likelihood of knowledge transfer. As explained above, the drivers of these results might relate to the likelihood of higher shares of locally sourced inputs relating to non-differentiated goods and therefore not involving a knowledge intensive sourcing behavior. An alternative explanation is given by Giroud et al (2012) who argue that knowledge flows might be more intense when the multinational combines locally sourced with imported inputs. This combined production process might then require higher quality locally sourced inputs that meet international standards and therefore require potential upgrading of local suppliers.

The second key attribute of backward linkages fostering knowledge transfers refers to the long-term nature of local sourcing contracts. As found by Ivarsson and Alvstan (2005, 2011) and Gentile-Lüdecke and Giroud (2012) long-term contracts are more likely to generate knowledge intensive linkages and trust-based cooperative sourcing relationships. Thus, repeated interaction with suppliers will translate into higher likelihood of knowledge transfer relative to sporadic short-term sourcing orders.

#### b. Type of investment

The type of investment strongly influences the sourcing behavior of multinationals in host countries. Naturally, there are a number of criteria according to which one may classify the type of FDI taking place in a host country. Also it should be kept in mind that multinationals are complex entities that usually respond to hybrid types of investment. Here we focus on three aspects commonly found by the FDI literature to be relevant for host country effects: ownership structure, sourcing strategy and subsidiary autonomy.

*Ownership structure:* Several studies provide evidence that foreign investors that are in joint ventures with domestic firms tend to integrate to a higher degree into the local economy and to engage in local sourcing. Javorcik and Spatareanu (2009) find for Romania that vertical spillovers are more likely to materialize in domestic-foreign joint ventures. Similarly, Amendolagine et al (2013) provide evidence that having a local partner is associated with a higher share of locally sourced inputs. Also, Jindra et al (2009) find that the degree of foreign ownership has a negative impact on the intensity of backward linkages. Having a local partner facilitates access to information about suppliers, reduces transaction uncertainty perceived by foreign investors and fosters subsidiaries embeddedness. Joint ventures might therefore be more likely to engage in transfer of knowledge.

*Sourcing strategy:* Motivations behind the multinational decision to source locally respond to the strategic organization of production along the global value chain. In this regard different value chain governance modes determine sourcing strategies and potential for value-adding of each production stage (Saliola and Zanfei, 2009). On the one hand, local sourcing activities might seek access to cheap

raw materials which are considered standardized goods with little scope for upgrading. In this case the possibilities for knowledge transfer are expected to be rather limited. On the other hand, motivations behind local sourcing can be driven by factors that enhance embeddedness of multinationals into the domestic economy such as adaptation to the local market or optimization of logistics and inventory management. We argue that sourcing strategies that promote embeddedness are more likely to generate transfer of knowledge to suppliers relative to resource seeking local sourcing.

*Subsidiary Autonomy:* Subsidiary roles and assigned capabilities within the multinational global network have been found by several studies to be a key variable defining their interaction with local economies. Autonomous subsidiaries more easily adapt to local markets, gain local expertise and reach a higher degree of embeddedness with the domestic economy. They are additionally more likely to innovate since their technological capabilities are larger. Jindra et al. (2009) analyze subsidiary data from Eastern European countries and find that the extent of backward linkages is positively related to the subsidiary autonomy in terms of supply and logistics and product development. Similarly, Giroud et al (2012) find that more autonomous subsidiaries are more likely to engage in knowledge intensive linkages with their local suppliers in transition economies. Crone and Roper (2001) find that autonomy of the subsidiaries is a key feature of MNE plants that transfer knowledge to local suppliers in Northern Ireland. Autonomous subsidiaries have then the ability to influence their scope for value-adding, decide on supplier selection and establish close supplying relationships (Giroud et al, 2012). Therefore, we argue that decentralization of competencies from the headquarters to the subsidiaries will translate into higher likelihood of knowledge transfer to domestic suppliers.

#### c. Other firm characteristics

Five additional foreign investor characteristics have been found in previous studies to play a role for vertical transfer of knowledge by multinationals. Here we account for the effect of the technology gap, size and experience of the firm in the market, the degree of R&D carried out in the subsidiary and the main destination market.

*Technology gap:* The effect of productivity or technological differences between foreign and domestic investors on the transfer of knowledge is not a priori clear. On one hand, if differences are too large, the domestic supplier might not be able to benefit from potential transfer of knowledge since they lack the necessary absorptive capacity to learn from the knowledge being transferred. In this case the MNE might not find operational to source locally and might opt for imported inputs. On the other hand, certain degree of technological differences between the multinational and the domestic supplier is needed in order to create scope for learning and to motivate the MNE to transfer knowledge that upgrades supplier's capabilities. In this case, the technology gap will encourage the transfer of knowledge. Békés et al (2009) and Jordaan (2008, 2013) find evidence of the positive impact of the technology gap for FDI spillovers in Hungary and for knowledge transfer to Mexican suppliers respectively. For the specific case of IKEA, Ivarsson and Alvstan (2010) identify that the MNE tends to provide more assistance to smaller and less technically advanced suppliers where scope for learning is larger.

*R&D at the affiliate:* Technological capabilities of the subsidiary are also likely to influence the sourcing behavior of foreign investors. In this regard, more innovative subsidiaries that are able to generate their own knowledge and to invest in R&D might also be more likely to transfer the created knowledge to

their local suppliers. As Marin and Bell (2006) point out “the potential for spillover is created within local subsidiaries as a result of their own knowledge-creating and accumulating activities in the host economy”. They find for Argentina that within subsidiary innovation has a significant positive effect on the domestic spillovers. Further positive evidence of subsidiary R&D capabilities in transfer of knowledge to suppliers has been found by Giroud et al (2012) and Jindra et al (2009).

*Experience in the country:* The time since the investment took place affects foreign investor’s embeddedness into the local economy. In line with what Kiyota et al (2008) describe as “vintage effects”, more experienced investors are more familiar with local market requirements, the way of doing business in the country and with supplier’s networks. Therefore they are able to establish longer-term and trust based sourcing relationships that will increase the scope for knowledge transfer. Evidence of a positive effect of experience for the transfer of knowledge has been found by Gentile-Lüdecke and Giroud (2012) for the Polish automotive sector.

*Size:* Larger firms are able to dedicate more resources to local sourcing development and might therefore be more likely to transfer knowledge to their suppliers. Positive effects of the size of the firm regarding number of employees on provision of assistance to suppliers have been found by Jordaan (2011) and Jordaan (2013) for the Mexican regions of Monterrey and Nuevo Leon respectively.

*End Market:* The level of sophistication and standards of the market where the final product of the multinational is sold might also influence the willingness to transfer knowledge to local suppliers. If the final market demands high quality standards, the MNE has then incentives to provide assistance to suppliers in order to enhance input quality and meet requirements by final customers. Evidence for this argument is provided by Giroud et al (2012). The authors find for the automotive sector in Poland that market orientation plays a role for the intensity of backward linkages and firms that target international markets are more likely to transfer knowledge to their suppliers relative to foreign investors that sell exclusively in the domestic market. Also Jabbour and Muchielli (2007) study vertical spillovers in the Spanish manufacturing industry and present evidence that export orientation of the subsidiary is associated with a positive impact of backward linkages in domestic firm’s productivity.

### 3.2 Country level determinants

Host country environments in terms of institutional quality and technological development determine to a large extent MNEs choices about location and organizational strategy. The FDI literature has found with some consensus that the quality of institutions is crucial for attracting quantity and quality foreign investments<sup>3</sup>. Broadly speaking, empirical evidence is consistent in showing that poor institutions deter FDI inflows and attract more resource- seeking relative to market-seeking FDI. However, evidence on how institutions affect spillovers to the domestic economy remains inconclusive. Indeed, although there is a variety of channels through which good institutional environments might enhance positive externalities, the extant spillovers literature at the industry level shows mixed results. Meyer and Sinani (2009) perform a meta-analysis including 66 studies on productivity spillovers. They find that institutional quality regarding transparency and economic freedom presents a U-shape relationship with the extent of spillovers, where only above a certain threshold of institutional quality host countries are able to benefit

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<sup>3</sup> See for example, Zurawicki and Habib (2010), Cuervo- Cazorra (2006), Asediu (2006) or Wei (2000).

from spillovers of FDI derived from institutional improvements. Gorodnichenko et al (2007) find that the extent of spillovers is not affected by the business environment in the host country, measured alternatively through corruption and red tape indicators. Farole and Winkler (2012) find for Sub-Saharan Africa that among a number of country level factors education spending and trade openness have a positive impact on spillovers. Institutional quality of the host country has only a significant spillover impact for low-productivity domestic firms. We argue that a closer look at one direct mechanism for spillovers that is, the voluntary knowledge transfer from MNEs to local suppliers, will contribute to shed light on how host country factors affect MNEs potential for spillovers

There are a number of mechanisms through which good institutions will facilitate interaction and exchange of knowledge between MNEs and local firms. Insecurity involved in economic activity is therefore greater when transactions cross national borders (Dixit, 2011). When investors operate in a foreign country they face higher uncertainty relative to the home country regarding ways of doing business, supplier networks and their reliability. Literature on transaction costs defines institutions as the mechanisms that provide the rules of how exchanges are to be made and the mechanisms enforcing them (North 1991). Therefore quality institutions reduce uncertainty as perceived by the foreign investor and facilitate interaction with domestic suppliers.

We exploit the 19-country cross-sectional dimension of our sample and focus on five country level factors that are likely to influence the MNE decision of transferring of knowledge to suppliers: overall governance, contract enforcement, ethical behavior of firms, protection of intellectual property rights and technological readiness of the country.

The degree of overall governance of the host economy, being a broad indicator of institutional quality, is often related to an appropriate business climate, economic stability and lower levels of corruption. If overall governance is good investors will then perceive investing in knowledge intensive relationships with suppliers as less risky and enhance the likelihood of knowledge transfer. Turning to more specific institutional indicators, Pérez-Villar and Seric (2014) found that contract enforcement, ethical behavior of firms and property rights protection matter for the generation of domestic linkages by MNEs in Sub-Saharan Africa<sup>4</sup>. These indicators measure different aspects of the extent to which a host country is able to guarantee security of transactions. Consequently, the more secure is the observance of the terms of commercial exchanges, the less the perceived risk and the more likely it will be that foreign investors will engage in relatively costly knowledge transfer relationships with local suppliers. Finally, besides institutional indicators, the level of technological readiness of the host country, in terms of sophistication of production processes or availability of latest technologies, will determine the needs of local suppliers in terms of knowledge transfer and their scope for learning from MNEs. Therefore the more advanced the host country is regarding its production technologies the less likely it will be that the foreign investors identify a need for transferring knowledge.

While, as stated above, host country institutions are of crucial relevance for foreign investor's sourcing decisions, institutional environment in the *origin country* also plays a role. In this regard, the notion of *institutional distance* was introduced by the literature on South-South FDI to account for the fact that

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<sup>4</sup> This study uses, as we do, the AIS 2010 dataset by UNIDO.

sensitivity towards host-country institutional quality is not homogeneous across investors<sup>5</sup>. The dramatic rise of outward FDI from developing economies in the last decade gave rise to the so called South-South FDI flows as these new *emerging multinationals* tend to locate their investments in other developing economies. Studies on this relatively novel investment flows<sup>6</sup> identified that determinants, location patterns and effects on the host economy of this new investment differ from those traditionally identified by the literature on North-South flows.

Institutional, cultural and technological proximity have often been pointed out as a comparative advantage specific to South-South investors that can promote linkages and generate positive externalities to the local economy. As argued by Dixit (2011) the capacity of southern multinationals to better cope with bribery and also their technology and managerial skills, more adapted to deal with poor governance, overcome northern MNE's advantages in terms of modern technology and access to capital. Institutional proximity allows multinationals to better cope with the foreign environment and consequently, the interaction with local suppliers will be perceived as less risky. Building on this argument, Pérez-Villar and Seric (2014) found for Sub-Saharan Africa that institutional distance in terms of contract enforcement deters the size of backward linkages for investors coming from better institutional backgrounds.

We argue that institutional distance plays a role not only for the size of backward linkages but also for their intensity in terms of transfer of knowledge to local suppliers. Significantly worse institutional backgrounds in the host country relative to the home country faces foreign investors with higher perceived uncertainty linked to commercial transactions. Consequently, trust relationships with suppliers involving a transfer of knowledge are less likely to occur when institutional distance is large and local economic transactions are perceived as uncertain and risky.

#### **4. Data and Methodology**

The first part of our analysis focuses on the influence of several *foreign investor characteristics* on the probability of knowledge transfer. We use firm level data from the Africa Investor Survey (AIS) conducted by UNIDO in 2010. The survey provides detailed cross-country firm level information on a number of characteristics of foreign firms -organizational structure, country of origin, market orientation, relationship with local producers, output and production factors . The survey also covers questions related to international trade activities of the firms and to linkages to domestic and foreign producers. After data cleaning and removal of outliers we use information on around 1000 foreign companies from 78 different source economies investing in 19 Sub-Saharan African countries<sup>7</sup>.

It should be kept in mind that causal relationships are not to be derived from the study due to two potential shortcomings. First regarding endogeneity, a simultaneity problem may exist if the firm decides jointly on the extent of backward linkages and the knowledge to be transferred to suppliers. Secondly, giving the cross-sectional nature of the study it does not include a time-dimension to pick up effects that

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<sup>5</sup> Cuervo-Cazurra and Genc (2008), Bénassy-Quere et al. (2007) and Aleksynska and Havrylchuk (2012) found evidence of the negative impact of institutional distance on in bilateral FDI flows at the macroeconomic level. See Pérez-Villar and Seric (2014) for an overview on the notion of institutional distance in South-South FDI literature.

<sup>6</sup> For an overview on South- South FDI particularities see for example UNCTAD (2006), Khana and Palepu (2006), Gammeltoft et al. (2010) or Takii (2011).

<sup>7</sup> Host countries included are: Burkina-Faso, Burundi, Cameroon, Cape Verde, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Tanzania, Uganda and Zambia.

occur through time. While ideally a panel-data study would allow for a more robust identification of causal relationships, we are limited by survey data availability. However, the detailed information on supply chain linkages and local sourcing behavior provided by the UNIDO AIS 2010 allows for a unique and thorough characterization of interactions between investors' characteristics and their economic activities.

We estimate the following probit baseline model<sup>8</sup>:

$$P(\text{Knowl. Transfer}=1)_i = \alpha + \beta_1 \text{BACK\_LINK}_i + \beta_2 \text{INVEST\_TYPE}_i + \beta_3 X_i + \beta_4 Z_i + e_i,$$

where our dependent variable (*Knowl. Transfer*)<sub>i</sub> accounts for the probability of a foreign firm *i* transferring knowledge to its domestic suppliers and takes the form of a binary variable that is equal to one if the multinational reports to have offered any assistance to its local suppliers in order to improve their operations and it is zero otherwise. The survey includes information about five different forms of assistance provided to suppliers (production process and product upgrading, joint design of products, transfer of technology or know-how and provision of training). For simplicity we build an aggregate variable that indicates if the foreign investor transfers any type of knowledge to its suppliers. Detail on the question and possible answers are included in table A4 in the Appendix.

The first explanatory vector (*BACK\_LINK*)<sub>i</sub> accounts for two attributes of the backward linkage. First, *extent of backward linkage* is measured as the share of locally sourced inputs over total inputs. Second, the long-term nature of the local procurement contract is measured through a dummy variable that takes the value one if the foreign investor reported to have at least one long-term local supplier.

The second regressor (*INVEST\_TYPE*)<sub>i</sub> refers to the type of investment regarding alternatively ownership structure, sourcing strategy and subsidiary autonomy. *Type of ownership* distinguishes between subsidiaries from MNEs vs. individual investors and joint ventures vs. fully foreign owned establishments. The variable *Subsidiary* takes the value one if the company is a subsidiary of a multinational and zero if it is an individual foreign investor. The variable *JV* takes the value one if the foreign firm has a local partner (10% or more of domestic ownership) and it is zero otherwise. *Sourcing strategy* is built from the main motivation for local procurement as reported by the MNE. It comprises five dummy variables that take the value one if the main reason for local procurement is respectively, adaptation to the local market, optimization of value chain efficiency, access to raw materials, corporate responsibility concerns and other factors. The third investment type regards to *subsidiary autonomy*. This variable records the relationship of the foreign investor with its parent firm and refers to the degree of local management autonomy of the subsidiary. Information about autonomy is only available for the subsample of 408 subsidiaries of MNE (and not for individual investors), therefore we are only able to evaluate the impact of autonomy for this type of investments.

*X*<sub>i</sub> is a vector of controls accounting for five other firm characteristics that have been found by the literature to affect vertical transfer of knowledge namely, experience in the market, firm size, R&D at the subsidiary, technology gap and destination market. *Experience* in the market is accounted for as the number of years since the investment took place; *firm size* is measured as number of employees and *extent of R&D* carried at the subsidiary is reported as R&D expenditures over total sales. We also account

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<sup>8</sup> All results are robust to logit estimation. See tables A5 and A6 in the Appendix.

for the *technology gap* with respect to the local suppliers as perceived by the MNE. This variable is measured as a dummy variable that takes the value one if the main reported reason for not entering or cancelling local procurement is technical or management skill issues, quality of equipment or process capacity of local suppliers. This measure is built in line with Jordaan (2013) and it captures the technological distance between the domestic supply sector and each foreign investor as perceived by the latest. *End Market* is defined as *Export North (South)* and is a dummy variable that takes the value 1 if most of the firm's exports target industrialized (developing) countries. Finally, the vector  $Z_i$  includes industry dummies at the ISIC-2 digit level and country dummies referring to both host and origin economies.

Table 1 provides descriptive statistics on knowledge transfer by type of assistance provided, sector, host, and origin countries. 55% of firms in the sample reported having transferred at least one form of knowledge. The most common type of assistance was provided to suppliers aiming to upgrade the efficiency of their production processes and the quality of their products, with respectively 45% and 33% of MNEs reporting a positive answer in these areas. Less common forms of knowledge transfer are the provision of training, transfer of technology or know-how and joint design of products with less than 20% of the foreign investors reporting to have provided these forms of assistance. The distribution across *sectors* of firms that transferred knowledge to suppliers is relatively homogeneous. Vehicles and transport equipment, basic metals and tobacco products present higher shares of assistance provision. Regarding the *origin* of the foreign investors, the frequency of reported assistance is quite uniformly distributed with some more European, Northern American and Asian (mostly Indian) investors reporting assistance to suppliers. About the breakdown by *host countries*, a similar behavior is found in most of the sample with the exception of foreign investors in Cape Verde, Uganda and Nigeria where 70% of MNEs transferred knowledge to their suppliers. Lesotho and Cameroon appear as the countries with least frequent knowledge transfer to local suppliers with around 30% of investors having reported provision of assistance.

The second part of our analysis focuses on the **country level** and is carried out in two steps: first, for the institutional quality levels at the host country and second, for the institutional distance between origin and host country.

- Regarding host country *institutional quality* we include alternatively the following institutional indicators: First, overall *governance*, measured as the average of the six Worldwide Governance Indicators by the World Bank<sup>9</sup>. For robustness, we repeat our analysis for an alternative measure of overall governance, namely the Ibrahim Index of African Governance by the Mo Ibrahim Foundation<sup>10</sup>. Second, we include an indicator of *contract enforcement* measured through the efficiency of legal framework in settling disputes taken from the Executive Opinion Survey by the World Economic Forum (WEF). Third, we look at *ethical behavior of firms* which is taken from the Executive Opinion Survey (by WEF) and it records frequency of private sector corruption

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<sup>9</sup> We follow Aleksynska and Havrylchuk (2012) and compute a simple average of the Worldwide Governance Indicators by the World Bank, defined by Kaufmann et al. (2010). These include six institutional dimensions: Voice & Accountability, Political Stability and Lack of Violence, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption.

<sup>10</sup> This comprehensive indicator is built exclusively for African economies using a number of national and international sources and includes information about safety and rule of law, human rights, sustainable economic opportunity and degree of human development.

practices such as bribery. Third, we look at the degree of protection of property rights measured through the 2010 Ginarte-Park Index of Patent Rights<sup>11</sup>. Finally we account for the degree of production process sophistication as measured in the Executive Opinion Survey (by WEF). Finally, besides institutional and technological development a number of country level factors relating to welfare, education and infrastructure are likely to influence the sourcing behavior by MNEs. Therefore we include as a control the Ibrahim Index of Human Development by the Mo Ibrahim Foundation that includes welfare, education and health indicators.

- Next, *institutional differences* between origin and host country are accounted for by computing the difference between investor's origin and host country institutional indicators. Following Aleksynska and Havrylchuk (2012), we distinguish between negative (positive) distance i.e. worse (better) institutions at the home country than at the host country. We define each negative (positive) distance variable as equal to the value of the difference if it is negative (positive) and zero otherwise. To account for non-linearities across different levels of institutional distance we include the quartile partition with values below the first, second and third quartiles representing low, medium and high distance respectively. Finally, in our distance analysis and aiming at accounting for relevant country-pair effects we additionally add a set of host-home *bilateral variables*. These comprise geographical distance, common colonizer or colonial relationship and are taken from the Gravity Database by CEPII.

Means of the institutional indicators by origin region and host countries are shown in Table 2. When looking at investor's origin, Swedish and Cote d'Ivoire investor's account for the most and the least ethical behavior respectively. Intellectual property right protection among origin countries is strongest in United States while Somalia records the weakest protection degree. The most efficient legal system is found in Singapore whereas the Italian legal system appears as the least efficient. Regarding host countries, Burundi and Nigeria record the lowest levels of overall governance, while Cape Verde and Ghana account for the best overall governance. Burundi scores the lowest regarding firm's ethical behavior whereas firm ethics are the highest in Zambia and Malawi. Lesotho and Kenya show the weakest contract enforcement which reaches its maximum for Nigeria and Burkina-Faso. Regarding protection of intellectual property rights, it presents its weakest score for the case of Burundi and it scores highest in Ghana. Finally, the most technological advanced among our host countries are Nigeria and Senegal and the least Uganda.

Finally, as we are aware that transfer of knowledge might be determined by factors that also affected the location decision of the multinational in the first place, we control for availability of local suppliers or skilled workers as reported location factors in all our specifications. A detailed description of each variable as well as descriptive statistics and the correlation matrix are provided in the Appendix in tables A1-A3 respectively.

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<sup>11</sup> We thank Professor Park for kindly providing the last version of the Index.



**Table 1: Knowledge transfer to local suppliers: type of knowledge, sector, host and origin country.**

Total no. firms=1017		Percent of knowledge transfer firms = 55,36%		
<b>Type of Knowledge</b>		<b>% firms</b>		
Product upgrading		33.91		
Production process upgrading		45.73		
Provision of training		19.33		
Transfer of technology and know-how		19.18		
Joint design of products		18.67		
		<b>No. Firms</b>	<b>% total</b>	<b>% Any Transfer Knowledge</b>
<b>By Sector</b>				
Food and beverages		193	19.0	61,13
Tobacco products		12	1.2	75.00
Textiles		41	4.0	58,36
Garments		79	7.8	50,63
Leather and footwear		26	2.6	50.00
Wood products and furniture		75	7.4	56.00
Paper and paper products		32	3.1	56,25
Publishing		28	2.8	64,28
Petroleum products and chemicals		133	13.1	54,88
Rubber and plastics		133	13.1	48,87
Non-metallic minerals		44	4.3	52,27
Basic metals		37	3.6	67,56
Fabricated metal products		98	9.6	45,91
Machinery and equipment		62	6.1	56,45
Vehicles and transport equipment		18	1.8	66,66
Other manufacturing		6	0.6	50.00
<b>By Investor Origin</b>				
Europe+North America		400	39.3	57
China & Easter Asia		118	11.6	50,21
India & Other Asia		205	20.2	49,10
Mena		88	8.7	53,34
Other (LAC&Oceania)		6	0.6	66,66
SSA		197	19	50,76
South		584	57.4	56,83
North		431	42	54,30
<b>By Host Country</b>				
Burkina Faso		6	0.6	50.00
Burundi		9	0.9	33,33
Cameroon		34	3.3	26,47
Cape Verde		20	2.0	70.00
Ethiopia		78	7.7	64,10
Ghana		94	9.2	46,80
Kenya		200	19.7	56.00
Lesotho		48	4.7	31,25
Madagascar		46	4.5	54,34
Malawi		14	1.4	50.00
Mali		27	2.7	40,74
Mozambique		62	6.1	59,67
Niger		6	0.6	50.00
Nigeria		81	8.0	71,60
Rwanda		14	1.4	35,71
Senegal		22	2.2	45,45
Tanzania		89	8.8	55,05
Uganda		131	12.9	70,99
Zambia		36	3.5	41,66

Notes: North America. USA and Canada; Mena (Middle East and North Africa); LAC (Latin America and Caribbean); SSA (Sub-Saharan Africa).

**Table 2: Institutional Indicators: Means by origin region and host country.**

	Overall Governance	Contract Enforcement	Firm Ethics	IPR Protection	Tech. Readiness
<b>By Investor Origin</b>					
Europe+North America	1.25	4.65	5.46	5.57	5.39
China & Easter Asia	0.02	4.21	4.55	4.12	4.48
India & Other Asia	-0.33	4.30	4.10	3.62	4.19
Mena	-0.42	4.29	4.65	3.04	4.23
Other (LAC&Oceania)	1.10	4.65	5.46	4.57	5.39
SSA	-2.62	3.97	4.15	3.21	3.53
South	-0.28	4.16	4.22	3.52	3.97
North	1.24	4.64	5.45	4.56	5.38
<b>By Host Country</b>					
Burkina Faso	-0.28	3.91	3.84	0	2.32
Burundi	-1.16	3	2.84	1.98	2.41
Cameroon	-0.88	3.82	3.25	2.89	2.68
Cape Verde	0.48	-	-	2.89	-
Ethiopia	-0.95	3.42	3.64	2.13	2.45
Ghana	0.10	3.68	3.95	3.35	2.55
Kenya	-0.66	2.92	3.77	3.22	3.21
Lesotho	-0.12	2.75	3.48	-	3.05
Madagascar	-0.75	2.85	3.44	2.18	2.59
Malawi	-0.29	3.72	4.41	2.44	2.34
Mali	-0.44	3.70	3.68	2.77	2.46
Mozambique	-0.26	3.45	3.21	3.02	2.98
Niger	-0.70	-	-	2.77	-
Nigeria	-1.16	3.99	3.46	2.89	3.24
Rwanda	-0.25	-	-	2.48	-
Senegal	-0.42	3.46	3.87	2.77	3.28
Tanzania	-0.35	3.80	3.79	3.10	2.78
Uganda	-0.60	3.61	3.43	3.10	2.26
Zambia	-0.35	3.70	4.10	2.23	2.79

Notes: North America. USA and Canada; Mena (Middle East and North Africa); LAC (Latin America and Caribbean); SSA (Sub- Saharan Africa). Overall Governance refers to the average of the six Worldwide Governance Indicators by the World Bank. Contract Enforcement is measured by the Efficiency of the judicial system in Settling Disputes from the Executive Opinion Survey by the World Economic Forum. Firm Ethics refers to Ethical Behaviour of Firms taken from the Executive Opinion Survey by the World Economic Forum. Protection Intellectual Property Rights refers to the Ginarte-Park Index of Patent Rights. For a detailed description of variables see table A1 in Appendix. Indicators from the the Executive Opinion Survey by the World Economic Forum are not available for Cape Verde, Niger and Rwanda that sum up to 50 obs.

## 5. Results

### a. *Investor' characteristics and knowledge transfer*

Average marginal effects from the probit estimation on foreign investor characteristics are presented in Table 3 and 4. We start by looking at how *backward linkage* (model 1) attributes affect the likelihood of transfer of knowledge to suppliers. First, regarding the extent of the linkage, we find a non-linear relationship with the share of locally sourced inputs related to higher probabilities of transfer of knowledge until reaching a threshold (50%) beyond which the relation turns negative. This finding is consistent with results by Saliola and Zanfei (2009) and Giroud et al (2012) and can be interpreted as larger scale linkages reflecting local sourcing of non-differentiated goods responding to cost-saving more than quality motivations. Second, also in line with previous findings, the long-term nature of the local procurement agreements fosters trusts relationships and encourages the transfer of knowledge.

Next, we look at the role played *by type of investment* regarding ownership structure, sourcing strategy and subsidiary autonomy for the transfer of knowledge to local suppliers. We find that subsidiaries from multinationals are more likely to transfer knowledge to their suppliers relative to individual investors and that having a local partner does not play a significant role (model 2). Putting these findings in relation with previous studies on size of backward linkages<sup>12</sup> it suggests that whereas individual investors and JV's tend to source larger shares of their inputs locally, the knowledge transfer involved is however less likely for this type of firms. Second, regarding the MNE's sourcing strategy (model 3) we find that foreign investors that source locally to better match requirements of local customers or that search to optimize value chain efficiency are around 16% more likely to transfer knowledge. Similarly, when the local sourcing decision is based on corporate social responsibility concerns such as environmental or local development commitments MNE's are 18% more likely to support their local suppliers. Local sourcing that aims at accessing raw materials is not related to higher probability of knowledge transfer according to our results. This is consistent with findings by previous studies that appoint local sourcing of non-differentiated goods as poor in terms of knowledge transfer and with studies that reflect rather limited interaction with the domestic sector of resource seeking FDI<sup>13</sup>. Additionally, our findings support the positive role played by local embeddedness for knowledge intensive supply chain relationships. Third, in models (4) and (5) we look at type of investment regarding autonomy of the subsidiary<sup>14</sup>. More autonomous subsidiaries are about 6% more likely to transfer more knowledge to its domestic suppliers and this effect derives mostly from autonomy regarding selection of suppliers<sup>15</sup>. This finding confirms results by Jindra et al. (2009), Giroud et al. (2012) and Crone and Roper (2001) that more autonomous subsidiaries tend to engage in more knowledge intensive relationships with local firms.

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<sup>12</sup> Amendolagine et al (2013), Perez-Villar and Seric (2014) (also using the AIS 2010 dataset by UNIDO).

<sup>13</sup> See Farole and Winkler (2014, pp: 32) for an overview.

<sup>14</sup> Note that the survey only provides information about the degree of autonomy for the subsample of subsidiaries of MNE (letting out individual investors). With this subsample, variables regarding sourcing strategy, the extent of the backward linkage and technology gap become insignificant given the lower number of observations. We performed the whole analysis for the subsample of subsidiaries and results are consistent with those from models (4) and (5). See table A7 in Appendix for detail.

<sup>15</sup> The survey reports information about the degree of autonomy regarding nine management areas. For simplicity reasons we include an average autonomy index and the most significant autonomy area, namely selection of suppliers.

Finally, *other firm level characteristics* show intuitive and interesting results consistent with the previous literature. Size of the firm, measured as the number of employees, has a positive impact on the transfer of knowledge. Our measure of technology gap shows positive coefficients, implying that with firms that are mostly concerned about technical capabilities and workforce skills of suppliers tend to transfer knowledge to promote its upgrading. Our finding provides support for the argument that technical differences should be large enough so that there is scope for transfer of knowledge and learning possibilities in line with Békés et al (2009) and Jordaan (2008, 2013). Further, we find that investments that serve export markets are more likely to transfer knowledge to suppliers relative to investments targeting exclusively the domestic market but only when the main destination markets are developed economies<sup>16</sup>. This finding goes in line with the arguments by Jabbour and Muchielli (2007) and Giroud et al. (2012) that investors targeting more sophisticated markets have incentives to assist upgrading of local suppliers. This provides access to better inputs that meet international standards or requirements of the final market. Finally, experience in the market and the amount of R&D performed in the subsidiary seem not to influence the transfer of knowledge according to our analysis.

Summarizing, our results on foreign investor' characteristics show that i) the transfer of knowledge follows a non-linear relationship with the extent of backward linkages. Higher shares of locally sourced inputs associated are with higher probabilities of transfer of knowledge only up to a 50% threshold where the relation turns negative. ii) The long- term nature of the local procurement contracts incentivizes provision of support to local suppliers. iii) The type of investments that are more likely to provide support to their local suppliers are subsidiaries of MNE with certain degree of local management autonomy and with sourcing strategies that seek to meet local market requirements, to optimize value chain efficiency or that respond to social responsibility commitments. Finally, iv) other firm characteristics such as firm size, the perceived technology gap and targeting developed export markets are positively associated with the transfer of knowledge.

#### *a. Country factors and knowledge transfer*

In the second part of our analysis we explore several country level characteristics that potentially play a role for the transfer of knowledge to suppliers. As discussed in the previous section, foreign investor's behavior and their interaction with the local economy are influenced by the institutional environments and degrees of technological development. In this regard we argue that not only the host country environment but also origin country conditions play a role.

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<sup>16</sup> European Union and United States

**Table 3: Investor characteristics and transfer of knowledge. Probit estimation (average marginal effects).**

MODEL	(1)	(2)	(3)	(4)	(5)
<i>Type of Backward Linkage</i>					
Long Term Contract	0.105*** (0.0354)	0.103*** (0.0355)	0.0884** (0.0358)	0.136** (0.0560)	0.125** (0.0561)
Backlink1	0.00444** (0.00175)	0.00487*** (0.00175)	0.00494*** (0.00173)	0.00395 (0.00262)	0.00404 (0.00260)
Backlink2	-0.00004695** (-0.0000195)	-0.0000507*** (-0.0000195)	-0.0000495** (-0.0000194)	-0.0000415 (-0.0000280)	-0.0000429 (-0.0000277)
<i>Type of Investment</i>					
<i>-Ownership Structure</i>					
Subsidiary		0.0814** (0.0375)	0.0916** (0.0373)	0.108* (0.0603)	0.110* (0.0609)
JV		0.0465 (0.0358)	0.0515 (0.0356)	0.0298 (0.0597)	0.0386 (0.0601)
<i>-Sourcing Strategy</i>					
Adapt local market			0.160*** (0.0577)	0.128 (0.0969)	0.141 (0.0953)
Value Chain Efficiency			0.160*** (0.0583)	0.113 (0.0958)	0.101 (0.0966)
Corp.Social Respons			0.180** (0.0706)	0.231** (0.0997)	0.211** (0.106)
Raw Materials Access			0.0472 (0.0578)	0.0232 (0.0973)	0.0190 (0.0970)
Other			-0.0259 (0.0613)	-0.0370 (0.0993)	-0.0295 (0.0983)
<i>-Subsidiary Autonomy</i>					
Autonomy Index				0.0628** (0.0281)	
Autonomy Sel. Supplier					0.0575*** (0.0214)
<i>Other MNE characteristics</i>					
Experience	0.000880 (0.00113)	0.000809 (0.00113)	0.00103 (0.00114)	-0.000682 (0.00154)	-0.000645 (0.00152)
Size	0.0373** (0.0149)	0.0297** (0.0151)	0.0219 (0.0156)	0.0228 (0.0213)	0.0235 (0.0213)
Tech. gap	0.123*** (0.0320)	0.120*** (0.0320)	0.0945*** (0.0324)	0.0559 (0.0515)	0.0547 (0.0521)
R&D	0.0381 (0.0440)	0.0285 (0.0441)	0.0305 (0.0434)	0.0159 (0.0647)	0.00329 (0.0648)
Exports North	0.204*** (0.0494)	0.196*** (0.0502)	0.205*** (0.0487)	0.277*** (0.0606)	0.267*** (0.0615)
Exports South	-0.000580 (0.0381)	-0.00626 (0.0380)	-0.00106 (0.0378)	0.0540 (0.0541)	0.0568 (0.0537)
Location supp.	0.000629 (0.0345)	0.00306 (0.0346)	0.000360 (0.0344)	0.0229 (0.0554)	0.00965 (0.0558)
Observations	918	914	897	394	392
Pseudo R-squared	0.1118	0.1149	0.1328	0.1842	0.1900

Industry, Host and Origin Country dummies are included

Standard errors in parentheses

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

We therefore conduct our analysis in two steps: first, we focus on the host country institutional environment and second, we look at differences in institutional environments between host and origin country of the MNE. We proceed by removing alternatively host and origin country dummies from our baseline probit model and replacing them by five institutional and technological indicators firstly in levels and secondly in host-origin institutional differences. Regarding our differences indicators, we include the quartile partition (second and third quartiles dummies representing medium and high distance respectively and first quartile or low distance dummy as the reference variable) to account for non-linearities across different levels of institutional distance. Further, we distinguish between negative and positive institutional distance that is, we construct separate variables to account for worse or better institutional frameworks relative to the origin country<sup>17</sup>. Regarding the controls in our differences regressions, we include a set of host-origin bilateral variables regarding physical distance and colonial ties. As in the previous regression and to account for the fact that that many of the variables included in our analysis might had affected the location decision of the multinational in the first place, we control for availability of local suppliers as a location factor. To control for host country factors not including in our selection of institutional and technological indicators we include the Mo. Ibrahim Index of Human Development that accounts for welfare, health and education levels and it is specifically built for African economies<sup>18</sup>. Finally, in all specifications we control for the firm level characteristics from our baseline analysis, as well as for 2-digit ISIC level industries.

Table 4 shows regression results regarding host country institutional quality and institutional distance with the origin country. Models (1) to (9) include respectively indicators on average governance, ethical behavior of firms, contract enforcement and protection of property rights. In Model (10) we account for the technological development of the country by means of the degree of production process sophistication<sup>19</sup>. Our findings suggest that the level of contract enforcement in the host country is positively related to the likelihood of transferring knowledge (model 3). Further, foreign investor's decision to transfer knowledge is impeded by relatively high differences between contract enforcement levels when MNEs are in a country with worse institutions than the origin country. Host country overall governance and the degree of property right protection show insignificant results when considered in host country levels (models 1 and 7). However, when the differences with respect to the origin country are taken into account (models 2 and 8, respectively) a significant negative impact of institutional distance is found. In other words, when the quality of institutions at the host country is worse than at the origin country, it significantly impacts the foreign investor's decision of transferring knowledge. Ethical behavior of firms, referring mostly to frequency of bribery practices in the private sector, does not seem to have an impact for the transfer of knowledge to suppliers in levels nor in distances. These results are consistent with the argument made above that quality institutions reduce uncertainty as perceived by the foreign investor and facilitate more intense interaction with domestic suppliers. Moreover, *distance* regarding overall governance and quality of institutions that secure transactions also

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<sup>17</sup> Since for the case of our analysis, only few pairs of host-origin country show positive institutional distance and for the sake of clarity we do not report these indicators.

<sup>18</sup> For the case of our first specification including Overall Governance We substitute this control in for the level of GDP per capita due to high given the high correlation of both institutional measures (60%)

<sup>19</sup> Note that indicators from the Global Competitiveness Survey (ethical behavior of firms, contract enforcement and production process sophistication) are not available for Cape Verde (21 firms), Niger (7 firms) and Rwanda (22 firms). The Ginarte-Park Index is not available for Lesotho (8 firms).

plays a role for the transfer of knowledge to local suppliers. It follows that higher perceived uncertainty linked to commercial transactions deters trust relationships with suppliers that entail a transfer of knowledge.

Finally, our technological readiness indicator (models 9 and 10) shows that the degree of production process sophistication is negatively related with the probability of knowledge transfer. This finding is consistent with the argument that suppliers in relatively technologically advanced host countries might not benefit as much from a transfer of knowledge since the scope for learning is relatively less significant. Foreign investors might not identify a need for transferring knowledge to suppliers if they have access to relatively advanced technology and sophisticated production processes.

Summarizing our country level analysis, we find that host country factors matter for the transfer of knowledge and further, its importance is affected by origin country factors. More specifically, an efficient judicial system that guarantees contract enforcement, protection of intellectual property rights and overall governance play a significant role enhancing the transfer of knowledge. Investors from better institutional backgrounds are more sensitive about host country security of transactions in terms of contract enforcement and protection of intellectual property rights. Technological backwardness of the host country regarding production processes incentivizes foreign investors to provide assistance to local suppliers independently from their country of origin. Finally, the frequency of corruption practices at the firm level does not seem to play a role according to our analysis.

**Table 4: Host country factors and transfer of knowledge. Probit estimation (average marginal effects)**

MODEL	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>Host Country Factors</b>										
Governance	-0.0460 (0.0625)									
Worse Gov: Medium		-0.0941** (0.0466)								
Worse Gov: High		-0.0831 (0.0561)								
Contract enforcement			0.143*** (0.0491)							
Worse ConEnfor: Medium				-0.0858 (0.0633)						
Worse ConEnfor: High				-0.137** (0.0655)						
Firm Ethics					-0.0779 (0.0785)					
Worse Firm Ethics: Medium						0.0422 (0.0482)				
Worse Firm Ethics: High						-0.0285 (0.0599)				
IPR protection							-0.0402 (0.0453)			
Worse IPRprot: Medium								-0.0851 (0.0526)		
Worse IPRprot: High								-0.124** (0.0583)		
Technological readiness									-0.148*** (0.0489)	
Worse TechRead: Medium										0.000122 (0.0466)
Worse TechRead: High										-0.0139 (0.0557)
<b>Controls</b>										
Host country	No	No	No	No	No	No	No	No	No	No
Origin country	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Bilateral variables	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry 2-digit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	871	897	871	813	871	813	835	771	871	813
Pseudo R-squared	0.0966	0.0895	0.0988	0.0948	0.0925	0.0920	0.0838	0.0904	0.0989	0.901
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1										

## 6. Conclusions and policy implications

This paper examines determinants of vertical and voluntary knowledge transfer from MNE to their local suppliers in 19 Sub-Saharan African countries. We argue that not all local sourcing activities by MNEs are associated with a transfer of knowledge to suppliers and therefore they are not equally beneficial to the domestic economy. Specifically, we analyze which foreign investor activities, organizational characteristics and country level factors maximize the likelihood of knowledge transfer. Our findings support the idea that foreign investor's heterogeneity and institutional environments are key factors shaping the sourcing patterns of MNEs and consequently the spillovers potential of backward linkages. Thus, investment policies that merely focus on promoting larger shares of locally sourced inputs might fail to get the most of FDI positive externalities. Instead, knowledge-involving quality linkages should be promoted over quantity linkages.



Regarding the *backward linkage attributes* we find first, that the long-term nature of the local procurement relationships enhances the transfer of knowledge. Secondly, in line with previous findings by the literature, we find a non-linear relationship between the share of locally sourced inputs and the probability of knowledge transfer which is positively related with the amount of local inputs only until reaching a certain threshold, 50% according to our analysis, where the relationship turns negative. This effect might be due to larger scale linkages reflecting local sourcing of non-differentiated goods responding to cost-saving more than to quality motivations. Next, we find that the *type of investments* that are more likely to provide support to their local suppliers are subsidiaries of MNEs with a certain degree of local management *autonomy* especially regarding selection of suppliers. Sourcing strategies that seek to meet local market requirements, to optimize value chain efficiency or that respond to social responsibility commitments translate into more knowledge transfer to suppliers compared with raw material seeking strategies. Finally, *size* of the firm, the *technology gap* as perceived by the foreign investor and *developed markets export* orientation are positively related to local supplier upgrading.

With respect to our country level analysis, we find that host country overall governance enhances the potential for knowledge transfer to local suppliers. More specifically, an efficient judicial system in settling disputes plays a significant role enhancing the transfer of knowledge and furthermore, investors from better institutional backgrounds care more about host country judicial efficiency. Similarly, weak protection of intellectual property rights deters the transfer of knowledge for investors from better institutional backgrounds. Finally, technological backwardness of the host country regarding production processes incentivizes foreign investors to provide assistance to local suppliers independently from their country of origin.

Investment policies should therefore account for the fact that attracting the “right” FDI and promoting development enhancing-behavior of investors goes hand in hand with creating a business environment that secures transactions and reduces uncertainty and perceived risk. Additionally, investor’s origin matters determining their degree of transaction uncertainty and their sensitivity to institutional quality. This suggests that policy makers should be aware that heterogeneous investments respond differently to the same environment and might therefore call for adapted investment programs.

As a final note, while the present study focuses on the determinants of knowledge transfer it should not be assumed that domestic suppliers automatically benefit from the assistance provided by their MNE’s customers. Absorptive capacity and learning commitment of suppliers will determine to what extent the knowledge transferred is internalized.

Our findings support the idea that investment policy plays a crucial role in enhancing scope for spillovers. At a first stage, policies should target to identify and attract investors and sourcing strategies more likely to generate knowledge spillovers by for instance, promoting local market seeking or GVC-integrating investors over mostly resource seeking MNEs. Also delegation of competencies to the subsidiaries should be encouraged. At a second stage, policies should aim to promote not only linkages with the domestic sector but also the exchange of knowledge and provision of support through these linkages. Quality and long-term relationships that involve sourcing of non-standardized local inputs and that allow for value-adding and upgrading should be promoted. Other appropriate policies at this stage would aim at making foreign investors aware of the win-win process of local sourcing and knowledge transfer, to fill information gaps and to reduce perceived uncertainty. Additionally, although this study looks at transfer of knowledge from the foreign investor perspective, the role of a dynamic domestic sector enhancing spillovers potential should be taken into account. Private sector development measures that promote

entrepreneurship help domestic firms meet requirements of international markets or account for specific needs of small and medium enterprises will improve domestic sector capabilities to generate beneficial linkages with foreign investors. Therefore successful investment policy should be complemented by domestic private sector upgrading measures.

We conclude that there is a chance for LDCs to benefit from the global economy and multinationals are a key channel that promoting structural change through international knowledge transfer. However, materializing FDI spillovers in these countries represents a great challenge and heterogeneous foreign investors and countries account for differential spillover potential. Hence, proactive investment policies are needed in order to identify and support the type of investments that are more likely to generate positive externalities and to create the appropriate country environment for the spillovers to materialize.

## Appendix

**Table A1: Description of variables**

<b>Variable Description</b>			
<b>Variable</b>	<b>Variable Name</b>	<b>Description</b>	<b>Source</b>
<i>Dependent Variable</i>			
Anytransfer	Transfer of Knowledge	1 if the firm transferred at least one type of knowledge to suppliers	AIS 2010 by UNIDO
<i>Firm level Explanatory Variables</i>			
Backlink	Domestic Linkage	Share of locally manufactured inputs over total inputs	AIS 2010 by UNIDO
Experience	Experience in the Market	Number of years since start of operations	AIS 2010 by UNIDO
Size	Firm size	Number of full time employees (log)	AIS 2010 by UNIDO
Tech Gap	Technology Gap	1 if the foreign firm identified lack of technical skills or production capabilities as the main reason to cancel or not starting local procurement	AIS 2010 by UNIDO
R&D	high R&D	1 if subsidiary R&D expenditures are above the average expenditures	AIS 2010 by UNIDO
LongTerm Cont	Long term sourcing contract	1 if MNE has at least one long term local supplier	AIS 2010 by UNIDO
Subsidiary	Subsidiary of MNE	1 if the firm is subsidiary of MNE and has 10% or more of domestic capital	AIS 2010 by UNIDO
JV	Individual Investor	1 if the firm is individual investor of MNE and has 10% or more of domestic capital	AIS 2010 by UNIDO
Adapt local market	Local sourcing for adapt to local market	1 if main reason for local procurement is local market acceptability or local content is encouraged by ultimate customer	AIS 2010 by UNIDO
Raw material access	Local sourcing for raw material access	1 if main reason for local procurement is access to local raw material sources	AIS 2010 by UNIDO
Value Chain Efficiency	Local sourcing for value chain efficiency	1 if main reason for local procurement is easier logistics and reduced inventory or fiscal efficiency in the supply chain	AIS 2010 by UNIDO
Corp. Social Respons.	Local sourcing for corporate social responsibility commitments	1 if main reason for local procurement is environmental concerns or local supplier development commitment	AIS 2010 by UNIDO
Other	Other local sourcing	1 if main reason for local procurement is other as the above	AIS 2010 by UNIDO
Export North	Mostly North export oriented	1 if the ratio of exports to the North over total export is more than 50%	AIS 2010 by UNIDO
Export South	Mostly South export oriented	1 if the ratio of exports to the South over total export is more than 50%	AIS 2010 by UNIDO
Autonomy	Autonomy Index	Average of local management autonomy indicators. Ranges from 1 (lowest)-5 (highest)	AIS 2010 by UNIDO
Autonomy sel. Supplier	Autonomy in selection of suppliers	Local management autonomy on supplier selection. Ranges from 1 (lowest)-5 (highest)	AIS 2010 by UNIDO
Loc_SupSkills	Local Supplier/ Skill dummy	1 for local suppliers or skilled workers availability as crucial or very important location factor	AIS 2010 by UNIDO
<i>Country level Explanatory Variables</i>			
Governance	Overall Governance	Simple average of the Worldwide Governance Indicators by the World Bank, defined by Kaufmann et al. (2010). These include six institutional dimensions: Voice & Accountability, Political Stability and Lack of Violence, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption	Worldwide Governance Indicators. The World Bank 2010
Contract enforcement	Efficiency of legal framework in settling disputes	How efficient is the legal framework in your country for private business in settling disputes: [1 = extremely inefficient; 7 = highly efficient]	Global Competitiveness Report. World Economic Forum, Executive Opinion Survey (GCS) 2010
Firm Ethics	Ethical behaviour of firms	How would you compare the corporate ethics (ethical behavior in interactions with public officials, politicians, and other enterprises) of firms in your country with those of other countries in the world? [1 = among the worst in the world; 7 = among the best in the world]	GCS 2010
IPR protection	Intellectual Property Right Protection	Ginarte and Park Index of Intellectual Property Right Protection	Ginarte-Park Index of Patent Rights
Technological readiness	Production process sophistication	In your country, how sophisticated are production processes? [1 = not at all-labour intensive methods or previous generations of process technology prevail; 7 = highly- the world's best and most efficient process technology prevails.	GCS 2010
dist	Distance	kms between most important cities/agglomerations (in terms of population)	GeoDist database CEPII
comcol	Common col. Dummy	1 for countries with a common colonizer	GeoDist database CEPII
colony	Colony dummy	1 for pair of countries ever in colonial relationship	GeoDist database CEPII
Ibrahim Index of Human Development	Ibrahim Index of Human Development	Ibrahim Index of Human Development: Welfare, Education and Health	Mo Ibrahim Foundation

**Table A2: Summary Statistics**

<b>Descriptive Statistics</b>				
<b>Variable</b>	<b>Mean</b>	<b>Std. Dev</b>	<b>Min</b>	<b>Max</b>
<i>Dependent Variable</i>				
Anytransfer	0.553589	0.497365	0	1
<i>Firm level expl. Variables</i>				
Backlink	21.69479	31.89029	0	100
Experience	18.03406	16.39321	0	111
Size (log)	4.721249	1.321487	1.098612	9.673257
Tech Gap	0.445905	0.497317	0	1
LongTerm Cont	0.588176	0.49241	0	1
Subsidiary	0.071631	0.257997	0	1
JV	0.312559	0.463755	0	1
Adapt local market	0.224242	0.417293	0	1
Raw Materials	0.228283	0.419938	0	1
Value chain efficiency	0.186869	0.390003	0	1
Corp. Social Resp	0.050505	0.219095	0	1
Other local sourcing	0.223232	0.416623	0	1
Export North	0.140038	0.347189	0	1
Export South	0.292293	0.45503	0	1
R&D	0.18609	0.389363	0	1
Autonomy Index	2.985	0.9101	1	5
Autonomy sel. supplier	3.143	1.213	1	5
<i>Country level expl. Variables</i>				
Overall Gov	56.62942	7.292554	43.3	76.7
IPR protection	2.880236	0.4619	0.2	3.35
Dispute Settling	3.417307	0.389569	2.75219	3.992749
ProdProc Sophis	2.789623	0.357585	2.265862	3.288728

**Table A3: Correlation Matrix**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1. Anytransfer	1																							
2. Backlink	0.06	1																						
3. LongTerm Cont	0.15*	0.20*	1																					
4. Experience	0.04	0.07*	0.09*	1																				
5. Size	0.08*	0.01	0.10*	0.26*	1																			
6. Tech Gap	0.14*	-0.05	0.03	-0.03	-0.04	1																		
7. R&D	0.05	0.02	0.08*	0.01	-0.03	-0.02	1																	
8. Export North	0.08*	0.03	0.01	-0.03	0.33*	-0.04	-0.05	1																
9. Export South	-0.04	0.03	0.08*	0.15*	0.11*	-0.05	0.00	-0.24*	1															
10. Subsidiary	0.02	-0.10*	-0.00	0.09*	0.22*	0.02	0.04	0.14*	0.07*	1														
11. JV	0.06*	0.16*	0.11*	0.19*	0.11*	0.00	0.06*	-0.07*	0.023	-0.08*	1													
12. local market	0.07*	-0.05	0.06*	-0.06*	-0.03	0.07*	0.04	-0.06*	-0.12*	-0.05	-0.02	1												
13. Raw material	0.02	0.15*	0.08*	-0.00	0.01	0.05	0.04	0.04	0.03	-0.06	0.01	-0.29*	1											
14. V.Chain Efficiency	0.08*	-0.07*	-0.00	0.03	0.07*	0.06*	-0.00	-0.01	0.06*	0.09*	-0.00	-0.25*	-0.26*	1										
15. Corp. Social Resp.	0.053	-0.07*	-0.00	0.03	-0.01	0.05	-0.04	0.02	-0.02	0.02	0.02	-0.12*	-0.12*	-0.11*	1									
16. Other	-0.17*	0.01	-0.17*	0.01	-0.01	-0.21*	-0.05	0.00	0.04	0.06	-0.00	-0.28*	-0.29*	-0.25*	-0.12*	1								
17. Autonomy	0.10*	0.01	0.01	0.12*	0.00	0.06	0.03	-0.10*	0.16*	-0.12*	0.17*	-0.10*	0.02	0.09*	-0.00	0.00	1							
18. Autonomy supp sel	0.16*	0.04	0.08	0.12*	0.03	0.13*	0.04	-0.06	0.09*	-0.00	0.10*	-0.11*	0.02	0.15*	0.12*	-0.11*	0.74*	1						
19. Overall Gov.	0.07*	0.06*	0.10*	-0.13*	-0.13*	0.01	-0.09*	-0.00	-0.07*	-0.01	-0.00	0.14*	-0.03	-0.07*	-0.08*	0.03	-0.09*	-0.01	1					
20. IPR protection	0.02	0.12*	0.03*	0.10*	0.01	-0.04	0.04	-0.07*	0.10*	-0.09*	0.05	0.04	0.04	-0.09*	0.05	-0.02	-0.04	0.00	-0.07*	1				
21. Ethical bev	-0.05	0.08*	0.02	-0.03	0.00	-0.12*	-0.00	-0.05	0.05	0.03	0.04	-0.10*	0.00	0.00	-0.02	0.09*	0.07	0.06	0.09*	0.06*	1			
22. Contract Enfr	0.08*	-0.15*	-0.09*	-0.04	-0.20*	0.17*	0.03	-0.31*	-0.07*	-0.09*	-0.04	0.16*	0.01	0.06*	0.04	-0.20*	0.05	0.09	-0.21*	-0.03	0.11*	1		
23. ProdProc Sophis	-0.02	0.18*	0.13*	0.23*	0.20*	-0.11*	0.10*	0.04	-0.01	0.05	0.24*	0.00	-0.03	-0.04	0.00	0.07*	-0.01	-0.03	-0.10*	0.29*	0.09*	-0.33*	1	

**Table A4: Survey question on knowledge transfer (dependent variable)**

-Does this company interact with local suppliers/sub-contractors with the intention of helping them to improve their operations in any of the following ways?

<b>Types of assistance</b>	<b>YES (1)</b>	<b>NO (2)</b>
<b>26.1</b> Upgrade the efficiency of their production processes		
<b>26.2</b> Upgrade the quality of their products		
<b>26.3</b> Upgrade the quality of their workforce (provision of training)		
<b>26.4</b> Transfer of technology or know-how through designs or process know-how		
<b>26.5</b> Conduct joint product design / product development / specifications etc.		

**Table A5: Investor characteristics and transfer of knowledge. Logit estimation (average marginal effects).**

MODEL	(1)	(2)	(3)	(4)	(5)
<i>Type of Backward Linkage</i>					
Long Term Contract	0.105*** (0.0356)	0.104*** (0.0357)	0.0876** (0.0362)	0.141** (0.0590)	0.130** (0.0593)
Backlink1	0.00436** (0.00176)	0.00479*** (0.00175)	0.00492*** (0.00176)	0.00382 (0.00269)	0.00395 (0.00267)
Backlink2	-4.65e-05** (1.96e-05)	-5.03e-05*** (1.95e-05)	-4.96e-05** (1.96e-05)	-4.10e-05 (2.87e-05)	-4.29e-05 (2.85e-05)
<i>Type of Investment</i>					
<i>-Ownership Structure</i>					
Subsidiary		0.0814** (0.0375)	0.0901** (0.0379)	0.103* (0.0615)	0.106* (0.0622)
JV		0.0469 (0.0358)	0.0528 (0.0360)	0.0296 (0.0620)	0.0405 (0.0623)
<i>-Sourcing Strategy</i>					
Adapt local market			0.157*** (0.0582)	0.120 (0.101)	0.133 (0.0992)
Value Chain Efficiency			0.159*** (0.0584)	0.109 (0.0985)	0.0986 (0.0996)
Corp.Social Respons			0.176** (0.0709)	0.212** (0.107)	0.193* (0.114)
Raw Materials Access			0.0445 (0.0578)	0.0118 (0.0998)	0.0108 (0.0995)
Other			-0.0253 (0.0615)	-0.0407 (0.101)	-0.0315 (0.100)
<i>-Subsidiary Autonomy</i>					
Autonomy Index				0.0622** (0.0287)	
Autonomy Sel. Supplier					0.0566*** (0.0217)
<i>Other MNE characteristics</i>					
Experience	0.000966 (0.00115)	0.000918 (0.00116)	0.00111 (0.00117)	-0.000686 (0.00156)	-0.000651 (0.00155)
Size	0.0364** (0.0148)	0.0287* (0.0151)	0.0209 (0.0159)	0.0229 (0.0218)	0.0232 (0.0217)
Tech. gap	0.123*** (0.0321)	0.120*** (0.0321)	0.0939*** (0.0327)	0.0583 (0.0549)	0.0551 (0.0558)
R&D	0.0394 (0.0448)	0.0296 (0.0446)	0.0341 (0.0435)	0.0150 (0.0686)	0.00393 (0.0684)
Exports North	0.204*** (0.0492)	0.196*** (0.0502)	0.206*** (0.0484)	0.276*** (0.0633)	0.267*** (0.0647)
Exports South	0.00325 (0.0381)	-0.00320 (0.0381)	-0.000127 (0.0381)	0.0565 (0.0554)	0.0585 (0.0555)
Location supp	0.00176 (0.0345)	0.00398 (0.0347)	0.00125 (0.0348)	0.0252 (0.0588)	0.0111 (0.0594)
Observations	920	916	899	396	394
Pseudo R-squared	0.1149	0.1183	0.1384	0.1822	0.1871

Industry, Host and Origin Country dummies are included

Standard errors in parentheses

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

**Table A6: Host country factors and transfer of knowledge. Logit estimation**

MODEL	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Host Country Factors										
Governance	-0.0464 (0.0630)									
Worse Gov: Medium		-0.0935** (0.0466)								
Worse Gov: High		-0.0782 (0.0562)								
Contract enforcement			0.146*** (0.0495)							
Worse ConEnfor: Medium				-0.0868 (0.0645)						
Worse ConEnfor: High				-0.135** (0.0670)						
Firm Ethics					-0.0803 (0.0796)					
Worse Firm Ethics: Medium						0.0417 (0.0488)				
Worse Firm Ethics: High						-0.0253 (0.0603)				
IPR protection							-0.0392 (0.0450)			
Worse IPRprot: Medium								-0.0841 (0.0527)		
Worse IPRprot: High								-0.128** (0.0587)		
Technological readiness									-0.151*** (0.0484)	
Worse TechRead: Medium										0.000775 (0.0471)
Worse TechRead: High										-0.0120 (0.0561)
Controls										
Host country	No	No	No	No	No	No	No	No	No	No
Origin country	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Bilateral variables	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry 2-digit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	873	899	873	814	873	814	863	772	873	814

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table A7: Subsample of Subsidiaries and Joint Ventures. Investor characteristics and knowledge transfer. Probit estimation (average marginal effects).**

MODEL	(1)	(2)	(3)
Long Term Contract	0.168*** (0.0544)	0.165*** (0.0544)	0.127** (0.0564)
Backlink1	0.00259 (0.00266)	0.00315 (0.00264)	0.00399 (0.00263)
Backlink2	-3.45e-05 (2.88e-05)	-3.75e-05 (2.85e-05)	-4.29e-05 (2.82e-05)
<hr/>			
Type of Investment			
<hr/>			
<i>-Ownership Structure</i>			
Subsidiary		0.0887 (0.0614)	0.0993* (0.0603)
JV		0.0362 (0.0591)	0.0323 (0.0593)
<i>-Sourcing Strategy</i>			
Adapt local market			0.124 (0.0985)
Raw Materials Access			0.0359 (0.0972)
Value Chain Efficiency			0.131 (0.0950)
Corp.Social Respons			0.247*** (0.0935)
Other			-0.0227 (0.0997)
<hr/>			
Other MNE characteristics			
Experience	-0.00105 (0.00154)	-0.00113 (0.00154)	-0.000818 (0.00154)
Size	0.0382* (0.0199)	0.0328 (0.0204)	0.0254 (0.0213)
Tech. gap	0.107** (0.0489)	0.104** (0.0493)	0.0704 (0.0513)
R&D	0.00709 (0.0626)	0.000756 (0.0635)	0.0158 (0.0647)
Exports North	0.271*** (0.0621)	0.263*** (0.0635)	0.275*** (0.0605)
Exports South	0.0564 (0.0527)	0.0568 (0.0528)	0.0628 (0.0536)
Location supp.	0.0299 (0.0541)	0.0306 (0.0545)	0.0239 (0.0553)
Observations	405	403	396

Industry, Host and Origin Country dummies are included

Standard errors in parentheses

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



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