A Review of the Literature on Global Value Chain and Foreign Direct Investment: Towards an Integrated Approach

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Abstract

Although information spillovers from internationally dispersed activities of multinational enterprises (MNEs) in developing countries are subjects of the literature on foreign direct investment (FDI) and global value chain (GVC), FDI and GVC studies are carried out independently and separately. While GVC studies are largely descriptive and conceptual, FDI studies are quantitative, with focus on the impact of FDI on productivity of local enterprises in developing countries. However, a review of the literature on GVC and FDI
studies shows that the two strands are commonly interested not only in spillovers of
technological and managerial knowledge but also in absorptive capacity of domestic
firms and backward linkages between foreign firms and domestic firms. Therefore, this
literature review argues there is significant scope for empirical research to make new
contributions to the literature on the impacts of FDI on industrial development in
developing courtiers by incorporating the insightful perspective of the GVC approach into
empirically rigorous FDI studies.

Keywords: FDI, GVC, information spillovers, absorptive capacity, backward linkages,
integrated approach

1. Introduction

It is widely recognized that information or knowledge spillovers from internationally
dispersed activities of multinational enterprises (MNEs) to domestic enterprises are an
important source of technological progress in developing countries. For example, the
World Bank (2012) points out the importance of foreign direct investment (FDI) for job
creation through the effect of information spillovers on productivity improvements in
developing countries. UNCTAD (2013) discusses the major benefits for local enterprises
in developing countries arising from participation in global value chains (GVCs) in terms of value added, employment, income, and exports. Indeed, the majority of developing countries have attempted to attract FDI by setting up investment promotion agencies (Harding and Javorcik 2011), and recently developing countries have absorbed more FDI than developed countries have.¹

The impact of such internationally dispersed activities of MNEs on economic development in developing countries is a main subject of both FDI and GVC studies. The main interests of FDI studies lie in the empirical elucidation of the impacts of knowledge spillovers from FDI on domestic firms’ productivity in host countries and the identification of factors that affect the strength of the spillover effects. Actually, there are many statistical analyses on this topic.² On the other hand, GVC studies are largely descriptive and conceptual; their main interests are to explore why domestic firms have specific types of relationships with lead firms in developed countries, which is termed “GVC governance” (Gereffi, Humphrey, and Sturgeon 2005).

It is worth emphasizing that these studies are carried out independently or separately. For example, none of the representative empirical studies on the impacts of

¹ The values of FDI inflows in developing countries surpassed those in developed countries in 2012 for the first time (UNCTAD 2013).
² For representative surveys of the empirical literature, see Saggi (2002), Görg and Greenaway (2004), Crespo and Fontoura (2007), Smeets (2008), and Javorcik (2014).
FDI inflows on the productivity of domestic firms in developing countries, such as Aitken and Harrison (1999), Javorcik (2004), and Javorcik and Spatareanu (2008), refer to the seminal studies on GVC, such as Humphrey and Schmitz (2002) and Gereffi, Humphrey, and Sturgeon (2005). On the other hand, GVC studies focus on the role of global buyers rather than MNEs, even though both global buyers and MNEs are potential sources of new useful knowledge. Only a few studies (e.g., Murakami and Hernández 2016) analyze the spillover effects of FDI on the upgrading of production activities in developing countries, while applying the analytical concepts and tools of both FDI and GVC studies.

It is important to note that a shift of production bases from developed to developing countries can be achieved by relocating a production base from a parent company to its foreign affiliates (i.e., FDI) or by outsourcing production of goods and services to local suppliers or third-party providers by creating GVC. Therefore, both GVC and FDI studies analyze the international shift of production bases and thus, they are bound to have common interests.

Based on a review of the literature on GVC and FDI, this study finds that the two strands of research are commonly interested not only in technological and managerial information spillovers but also in absorptive capacity of domestic firms and backward linkages between foreign and domestic firms. In addition, this study demonstrates there
is significant scope for empirical research to make new contributions to the literature on
the impacts of FDI on industrial development in developing courtiers by incorporating
the insightful perspective of the GVC approach into empirically rigorous FDI studies.

We organize the rest of this paper as follows. Section 2 discusses the major
contributions and shortcomings of GVC studies from the comparative viewpoint of FDI
studies. Section 3 reviews the major findings of existing studies on the channels of
knowledge spillovers from FDI and their impacts on productivity as well as the
determinants of FDI spillovers in developing countries. Based on the review, Section 3
also presents an integrated econometric approach to FDI studies. Section 4 makes further
suggestions for enriching FDI studies by incorporating the insightful perspective of GVC
studies. Finally, Section 5 concludes and suggests new areas of research useful for
industrial development policies in developing countries.

2. Research on Global Value Chains

2-1. Topics of global value chain studies

GVCs are defined as “fragmented supply chains, with internationally dispersed tasks and
activities coordinated by a lead firm” (UNCTAD 2013). The main interests of GVC
studies are the exploration of 1) the typology of local firms’ relationships with lead firms
(i.e., GVC governance) and 2) the relationships between GVC governance and the type of upgrading. The literature analyzing GVCs usually defines upgrading in terms of increase in value-adding activities (Humphrey and Schmitz 2002; Giuliani, Pietrobelli, and Rabelotti 2005). Specifically, upgrading is defined as “the capacity of a firm to innovate to increase the value added of its products and processes” (Giuliani, Pietrobelli, and Rabelotti 2005, 550).

Gereffi, Humphrey, and Sturgeon (2005) argue that 1) complexity of transactions, 2) ability to codify transactions, and 3) capabilities in the supply base determine GVC governance. We assume that complexity of transaction is closely associated with transaction costs, ability to codify transaction refers primarily to ability to codify production system, and capabilities encompass those of production and management. Thus, if transaction costs are high, codification of the production system is difficult and local producers are incapable, the lead firm internalizes production activities by setting up its own affiliates, that is, FDI. Gereffi, Humphrey, and Sturgeon (2005) label this governance type “hierarchy.” However, they do not discuss transactions between foreign affiliates and local firms, which is one of the key issues in FDI studies. On the other hand, if transaction costs are high, codification of the production system is difficult, but local producers are capable of management activities, the lead firm outsources its activities to
local producers, seeking mutually dependent and beneficial relationships. Reputation, trust created by repeated transactions, and family and ethnic ties between the lead firm and the local producers can manage such relationships. Gereffi, Humphrey, and Sturgeon (2005) label this governance type “relational.” Conversely, if transaction costs are high, local producers are incapable, but codification of the production system is easy, and the lead firm outsources its activities to local producers and tightly monitors and controls them. In this case, local firms passively receive materials and production instructions from the lead firm. Gereffi, Humphrey, and Sturgeon (2005) label this governance type “captive.” As Figure 1 demonstrates, information flows are in two directions in the case of a relational supply system and only one direction in the case of a captive system.

In addition to the typology of the relationship between lead firm and local firms, Humphrey and Schmitz (2002) and Pietrobelli and Rabellotti (2011) discuss the relationships between the types of GVC governance and the types of upgrading. These works define functional upgrading as a shift to higher value-adding activities within a given value chain, product upgrading as the shift to more sophisticated product lines with higher unit values, and process upgrading as transforming inputs into outputs more efficiently by reorganizing the production system or introducing superior technology within a given type of output (Humphrey and Schmitz 2002; Giuliani, Pietrobelli, and
Rabellotti 2005).\textsuperscript{3} For example, integration into value chains in which local firms have symmetric relationships with lead firms (e.g., relational value chains) offers favorable opportunities for functional upgrading, because local producers, which are capable of management activities and have relatively strong bargaining power vis-a-vis lead firms, can negotiate their assigned tasks in the value chains. On the other hand, the integration into value chains in which local firms are under captive relationships with MNEs offers no favorable conditions for such functional upgrading. This case confines the local producers to simple tasks and discourages them from engaging in value-adding activities, such as production design and marketing, because of the low level of management abilities. However, both relational and captive suppliers are interested in upgrading the quality of products and production processes through learning from production experience (Humphrey and Schmitz 2002; Pietrobelli and Rabellotti 2011). It is likely that relational suppliers would be more successful at upgrading than captive suppliers would be because of their superior entrepreneurial abilities.

Figure 1. Two types of GVC governance: captive and relational value chains

\textsuperscript{3} See also Figure 3 of UNIIDO (2004, 10).
Source: Author, based on Figure 1 of Gereffi, Humphrey, and Sturgeon (2005: 89).

Note: The arrows show the directions of order and information.

2-2. Contributions of global value chain studies

Based on the conceptual framework of GVC studies, Sato and Fujita (2009) consider functional upgrading as widening of functional capabilities from production to management, for example, more active participation of local firms in pre-production activities, such as marketing research, technology choice and development, and production design, as well as in post-production activities, such as advertising and marketing. Lead firms usually discourage local firms from participating in value adding pre- and post-production activities, because these activities are considered the core
competence of lead firms and are a major source of their profit (Humphrey and Schmitz 2002). In addition, the debate about the “smiling (U) curve” highlights that tasks in pre- and post-production activities tend to generate higher value added than those in production activities per se, such as manufacturing and assembling (Mudambi 2008; Shin, Kraemer, and Dedrick 2012). Thus, the insight of Sato and Fujita (2009) provides an important mechanism of productivity improvements of local firms: once local firms obtain higher capabilities as suppliers to MNEs, they participate in relational value chains, instead of captive value chains. Such evolution of local firms’ relationships vis-à-vis MNEs extends the functions of local firms toward high-value generating tasks related to pre- and post-production activities.

The distinction between captive and relational contracts is similar to the distinction between contracts with “drawings supplied” and “drawings approved” in the automobile industry in Japan (Asanuma 1989). In the former case, suppliers manufacture parts according to the drawings that core firms supply, whereas in the latter case, suppliers manufacture parts according to drawings or blue prints that suppliers provide and that the core firm approves. According to Asanuma (1989), “drawings approved” have become more common over time, replacing “drawings supplied.” Thus, we consider this process as the evolution from captive to relational contracts.
Hence, how local producers transform themselves from captive to relational suppliers is a major development issue. It is worth noting that this argument is consistent with the recent findings in the field of development economics that emphasize the role of management practices and managerial human capital in improving the performances of manufacturing firms in developing countries (Bruhn, Karlan, and Schoar 2010; Bloom et al. 2013; Sonobe and Otsuka 2014; Bloom, Sadun, and Van Reenen 2016). In a study on the productivity improvements of acquired plants in Indonesia from 1983 to 2001, Arnold and Javorcik (2009) suggest that foreign firms employ organizational and managerial systems that make the production process more efficient.

2-3. Shortcomings of global value chain research

Although the aforementioned discussion of GVC closely relates to the inter-industry spillover effects of FDI through the supply of parts and components to MNEs (backward linkages), analysis of the dynamic mechanism of productivity improvements of local parts-supplying firms is not the main concern of GVC studies. This is because the main interests of seminal GVC works, such as Humphrey and Schmitz (2002), Gereffi, Humphrey, and Sturgeon (2005), and Pietrobelli and Rabelloitti (2011), lie in the static categorization of GVC governance and upgrading, rather than the evolution of enterprises
from captive to relational type.

Another important reason for the neglect of the evolutionary process of local industry is that GVC studies, especially the early works, such as Gereffi and Korzeniewicz (1994), consider lead firms as global buyers located in developed countries (e.g., large supermarkets), whose main role is to control or coordinate the GVC without directly engaging in production activities. As mentioned earlier in Section 2-1, the literature assumes foreign affiliates engage in independent production without procuring any inputs from local firms in GVC studies. In addition, the empirical foundations for the arguments of these studies are weak: the original studies undertook only conceptual analyses regarding the choice of governance systems, but not analyses of their quantitative impacts on the productivity of local firms, which is a main issue for FDI studies. Subsequently, researchers carried out empirical studies on local firms’ productivity and types of GVC governance, but these works are not rigorous in econometric methodology. For example, Pietrobelli and Saliola (2008) empirically analyze the impacts of the various types of GVC governance on local firms’ productivity in Thailand from 2001 to 2003. However, it is not certain to what extent their categorization is based on the original concepts of Gereffi, Humphrey, and Sturgeon (2005). Moreover, although the types of GVC governance are endogenous with respect
to firms’ productivity, the authors do not deal with the issue of endogeneity.

3. Research on Foreign Direct Investment

3-1. Channels of knowledge spillovers from foreign direct investment

Although numerous studies discuss the channels of knowledge or information spillovers from FDI, there is inconsistency and confusion about the conceptual classification of the spillover channels. For example, some review articles, such as Saggi (2002), Crespo and Fontoura (2007), and Smeets (2008), assume that the demonstration effect and imitation effect are identical. However, we argue that we should separate, at least conceptually, free copying, which might correspond to the demonstration effect, from resource-using research and development (R&D) activities, which might correspond to the imitation effect. This is because domestic firms can freely appropriate the knowledge or technology of foreign firms; for example, we should analytically separate public goods from the case in which only domestic firms that expend conscious effort can acquire useful new knowledge. The absorptive capacity of domestic firms is particularly relevant in the latter case.

Although many studies, such as Saggi (2002), Görg and Strobl (2005), Crespo and Fontoura (2007), Smeets (2008), and Javorcik (2014), consider the labor turnover
effect in addition to the imitation effect, we argue that labor turnover from foreign to domestic firms is a one-way or instrument of imitation, as the latter must incur the cost of recruiting and employing new workers.

There are four major spillover effects: demonstration effect, labor turnover effect, competition effect (i.e., the effect of the entry of MNEs on market demand for products produced by competing local firms), and vertical linkage effect (i.e., externalities derived from backward linkages between MNEs and domestic firms). The problem is that existing studies, except for Javorcik (2014), do not differentiate between pure and pecuniary externality effects. Since competition and vertical linkage effects undoubtedly occur through market mechanisms (market competition and purchases as well as sales of inputs), we argue that we should treat these effects separately from pure externality effects. In addition, the vertical linkage effect might accompany pure externality effects, if part suppliers learn from foreign firms through demonstration and imitation. Therefore, we argue that demonstration, imitation, and some sort of vertical linkage are the pure externality effects of FDI, which we should separate from pecuniary externality effects (i.e., competition effects and some sort of vertical linkage effect) arising from market mechanisms (see Table 1).

The aforementioned four channels of knowledge spillovers from FDI are can be
classified into either inter-industry or intra-industry effects: the competition effect is considered an intra-industry spillover effect, while the vertical linkage effect is considered an inter-industry spillover effect. Since demonstration and imitation effects might occur between firms in the same industry and between vertically related firms (e.g., with regard to management methods), they can be both inter-industry and intra-industry spillover effects.

The literature deems demonstration, imitation, and backward linkage effects to have evident positive impacts on domestic firms’ productivity (Crespo and Fontoura 2007). However, the competition effect can be both positive and negative for domestic firms’ productivity (see Table 1). On the one hand, if intensified competition with MNEs were to induce domestic firms to use existing resources and technologies more efficiently, it would improve their productivity (Görg and Greenaway 2004; Crespo and Fontoura 2007). On the other hand, if the intensified competition were to cause domestic firms to lose their market share, with a consequent increase in their average costs, it would decrease their productivity (Crespo and Fontoura 2007; Javorcik 2014).

Table 1. Impacts of four channels of knowledge spillovers from FDI on local firms’ productivity
Notes: + and − indicate that the channel theoretically has positive and negative impacts, respectively, on domestic firms’ productivity.

3-2. Empirical assessment of knowledge spillovers from foreign direct investment

As Smeets (2008) summarizes, the literature commonly analyzes information spillover effects from FDI by estimating the following function:

\[
Y_{ijt} = \beta_0 + \beta_k \ln K_{ijt} + \beta_L \ln L_{ijt} + \beta_{Horizontal} + \beta_{2 Backward} + X_{ijt} \beta_3 + Z_{ijt} \beta_4 + \alpha_i + \alpha_j + \alpha_t + \epsilon_{ijt}
\]

where \( i \) indexes the firm; \( j \) and \( k \) index the industry; \( t \) indexes time; \( Y \) is the value added of a domestic firm; \( K \) is capital and \( L \) is labor; \( \beta_k \) and \( \beta_l \) are production elasticities of capital and labor, respectively; \( Horizontal \) is a measure of the presence of FDI in industry \( j \), which is usually measured by the foreign firms’ share of total employment or output (“foreign” firm is commonly defined by the share of the equity owned by foreign
investors in the given firm); \(^4\) *Backward* is a measure of the presence of FDI in downstream industries that is supplied by industry *j*; *X* is a vector of firm-level control variables that we assume affect productivity, such as the ratio of expenditure on R&D and the level of workers’ human capital; *Z* is a vector of industry-level control variables, such as the degree of market concentration and export orientation; \(\alpha_i\) is a time-invariant firm fixed effect; \(\alpha_j\) is a time-invariant industry fixed effect; \(\alpha_t\) is a time effect (for simplicity, we show fixed effects by \(\alpha\) in subsequent equations); and \(\varepsilon\) is an error term. Although some studies include a term capturing the forward linkage effect arising from parts-supplying MNEs (Liu 2008; Smeets 2008; Fatima 2016), it is usual that local firms engage in parts-supplying upstream industries while MNEs engage in downstream activities. Thus, we consider that the forward linkage effect is not empirically important and do not include its term in equation (1).

We usually measure *Backward* by the following formula:

\[
\text{Backward}_{jt} = \sum_{k \neq j} (a_{jkt} \cdot \text{Horizontal}_{kt}),
\]

\(^4\) An alternative measurement for the presence of FDI is the absolute value (e.g., the number of workers employed by foreign firms), as suggested by Castellani and Zanfei (2003). As long as we assume that the demonstration effect is the main channel, the use of the absolute value is plausible, because we can treat the existence of FDI like that of public goods.
where \( a \) is the proportion of the output of sector \( j \) supplied to industry \( k \). In other words, \( \text{Backward} \) is greater if FDI in industry \( k \) purchases a larger amount of intermediate products from industry \( j \). Note that \( \text{Backward} \) is specific to the industry in this specification, implying that this variable captures the effect of inter-industry variations in backward linkages, but not the effect of firm-specific backward linkages. In equation (1), we assume \( \beta_1 \) and \( \beta_2 \) capture the intra-industry (horizontal) effect and the inter-industry (vertical) effect, respectively.

More often than not, the literature estimates equation (1) using firm-level data in a variety of industries. However, this frequently used estimation implicitly adopts the following restrictive assumptions: First, the literature assumes that spillovers of knowledge, which are flow, affect productivity, which is determined by the accumulated stock of useful knowledge. Second, the spillover effect captured by \( \beta_1 \) is only a demonstration effect, because this term captures only the effects that arise without any conscious effort by local firms to learn, implying that this term does not capture spillover effects derived from imitation. Third, the measurement of backward linkages shown in equation (2) is industry specific and employs highly restrictive assumptions; for example, foreign affiliates, regardless of their nationality, have the same input-sourcing behavior.
as domestic firms do, as Barrios, Görg, and Strobl (2011) point out. Fourth, the spillover effects of FDI are identical across all industries, that is, $\beta_1$ and $\beta_2$ are identical, which enables the use of firm data in different industries to identify the spillover effects. Fifth, different industries have the same parameters of production function, that is, $\beta_k$ and $\beta_l$ are identical. These restrictive assumptions are likely to lead to biased or imprecise estimation of the regression parameters.

In addition, what the backward linkage variable captures is not clear. If frequent transaction between foreign affiliates and local firms is associated with the training of production for workers in local firms by foreign affiliates, its coefficient captures the training effect. If frequent transaction relates to the poaching of workers in foreign firms by local firms, the coefficient would reflect the imitation effect. It might not reflect the demonstration effect, since products produced by foreign firms and local firms are different, even though local firms might copy improved management practices. Thus, the coefficient of backward linkage would capture the mixed effects arising from intimate

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5 See Barrios, Görg, and Strobl (2011) for other two restrictive assumptions regarding the measurement of backward linkages. Note that Javorcik and Spatareanu (2011), analyzing firm-level panel data in Romania from 1998 to 2003, find that the strength of the backward linkage effect depends on the nationalities of FDI.

6 This is not necessarily true and a few studies assume that $\beta_k$ and $\beta_l$ are different in different industries. For example, some studies, such as Chung, Mitchell, and Yeung (2003) and Blalock and Gertler (2008), estimate the production function only for homogeneous industries with similar technologies. Other studies, such as Todo and Miyamoto (2006) and Fatima (2016), separately estimate the production function in each industry in the first stage and pool the estimated total factor productivity (TFP) in the second stage for analyzing its determinants.
transactional relationship between the two types of firms. It is important to recognize that although we assume the backward linkage effect is identical among the different inter-enterprise relationships, we expect that backward linkage effects are likely to be different for different intra-firm transactional relationships.

In this regard, the specification of estimated equation that Griffith, Redding, and van Reenen (2004) propose is highly relevant. These authors analyze the determinants of the industry-level productivity growth of 12 OECD countries from 1974 to 1994. Although their original unit of analysis is country and industry, we change the unit of analysis from country to industry and from industry to firm in our discussion. There are several advantages in their specification of estimated function. First, Griffith, Redding, and van Reenen (2004) assume that knowledge spillovers affect changes in productivity, but not the productivity level. Todo and Miyamoto (2006) also adopt the same assumption. Second, their specification predicts that the share of R&D expenditure in the \( i \)-th firm and other controls, such as 1) the technological distance of the \( i \)-th firm from the frontier firm in the same industry \( j \) and 2) the interaction term between the firm’s share of R&D expenditure and the technological distance, determine productivity growth.\(^7\) They

\(^7\) Their specification originally assumes that the firm’s growth of R&D stock and other controls determine the productivity growth in a given firm. If the depreciation rate of R&D stock is small, the growth of R&D stock multiplied by the elasticity of output with respect to the R&D stock is reduced to the share of R&D expenditure in the value of output multiplied by the rate of return to R&D. For details, see equations (2) and (3) of Griffith, Redding, and van Reenen (2004, 884).
measure the technological distance by the difference in TFP. In other words, this specification separates the spillover effect automatically derived from the technological distance from the spillover effect derived from the resource-using activities, measured by the expenditure on R&D. Thus, this specification separates the demonstration effect from imitation effect. Third, the use of each firm’s technological distance from the frontier firms within the same industry allows each industry to have different extent of spillover effects. Fourth, they use the superlative-index-number approach of Caves, Christensen, and Diewert (1982), which allows us to estimate TFP with flexible parameters of the production function. In fact, production function parameters can be different among firms and over time.

Although the specification of Griffith, Redding, and van Reenen (2004) is highly relevant for FDI research, some revisions are necessary. First, the interests of that study lie in technological distance from the frontier firm, rather than foreign firms. Second, they focus on the spillover channels between firms in the same industry without considering any spillovers between firms in different industries (i.e., vertical linkage effect). In order to deal with such problems, we revise their specification and discuss the merit of the

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8 See Aw, Chen, and Roberts (2001) for an extension of the superlative-index-number approach to the case of combined cross-sectional and time-series data. Arnold and Javorcik (2009) use this approach for the estimation of TFP.
revised estimation function in Subsection 3-6.

3-3. Horizontal (intra-industry) spillovers

Early studies using firm-level cross-sectional data, such as Kokko (1994) and Chuang and Lin (1999), find positive intra-industry spillover effects. However, once controlling for industry- or firm-specific fixed effects by using panel data, the observed positive effects disappear, as Aitken and Harrison (1999), Javorcik (2004), and Liu (2008), among others, find. These findings indicate that the positive impacts observed in the early cross-sectional studies may be generated by the larger presence of foreign firms in more productive industries rather than the productivity improvements brought about by foreign firms (Smeets 2008; Javorcik 2014). Actually, only a few studies carrying out panel data analysis at firm level find robust positive intra-industry effects of MNEs in general in the UK (Haskel, Pereira, and Slaughter 2007) and those of R&D performing MNEs in Indonesia (Todo and Miyamoto 2006).

By contrast, many studies that estimate equation (1) using firm-level panel data in developing countries with limited market size find negative intra-industry spillover effects. Major examples are Aitken and Harrison (1999) for Venezuela from 1976 to 1989; Bwalya (2006) for Zambia from 1993 to 1995; Javorcik and Spatareanu (2008) for

Furthermore, Javorcik and Spatareanu (2008) find that the negative impacts are smaller in partially owned foreign affiliates (joint ventures) than in wholly owned foreign affiliates, because the former affiliates are more likely to use less sophisticated technologies transferred from the headquarters than the latter affiliates; thus, domestic firms can more easily absorb such technologies from the partially owned foreign affiliates through demonstration or imitation effects. Interestingly, Liu (2008) finds negative impacts in the short term but positive impacts in the longer term, which might indicate that the spillover effect is likely to arise from imitation, requiring resource-using and time-consuming R&D activity. In addition, some studies find no significant intra-industry spillover effects, such as Haddad and Harrison (1993) for the case of Morocco from 1985 to 1989.

Therefore, the dominant findings in the literature indicate that the negative impacts of the competition effect dominate the positive knowledge spillover effects (demonstration and imitation) in the short term in most developing countries (Javorcik and Spatareanu 2008; Javorcik 2014). Thus, the presence of foreign firms in most
developing countries does not unconditionally generate the positive horizontal externality effects. In other words, what matters could be the imitation effect but not the demonstration effect, so that the absorptive capacity of domestic firms is likely to play a role.

It is worth emphasizing that the studies reviewed in this sub-section typically apply equation (1) and, hence, the estimation results are likely to suffer from misspecification of functional relationships. We point out that since these studies assume the horizontal spillover effects are identical across all industries, they could estimate some kind of average effects across them. Thus, it is possible that some industries have positive horizontal effects, while many others have negative horizontal effects.

3-4. Vertical (inter-industry) spillovers

Before Javorcik’s (2004) path-breaking study, the majority of empirical studies of FDI analyze intra-industry effects.\(^9\) After Javorcik (2004), many studies find positive backward linkages effects based on equation (1) using firm-level panel data: Bwalya

\(^9\) However, a few studies analyze vertical spillovers before Javorcik (2004). For example, Belderbos, Capannelli, and Fukao (2001) analyze the determinants of backward vertical linkages of 272 Japanese electronics manufacturing affiliates in 24 countries in 1992 and find that the quality of infrastructure and the size of the local components supply industries increase the local content ratios in the host countries. However, the authors do not analyze the impacts of vertical linkages on local firms’ productivity.

The finding that the backward linkage effect is the major channel for the positive spillovers indicates that subcontracting relationships between local firms in upstream industries and MNEs in downstream industries are crucial for productivity improvements of local firms. Thus, such findings of FDI studies strongly relate to the argument of GVC research concerned with the inter-firm governance issues, as Section 2 discusses.

3-5. Labor turnover, absorptive capacity, and agglomeration economies

\(^\text{10}\) However, Liu (2008) finds negative inter-industrial effects in the short term, as in the case of intra-industry effects. On the other hand, Chung, Mitchell, and Yeung (2003) find that local suppliers providing components to Japanese assemblers (tie-in-firms) do not receive significant vertical spillover effects, although such suppliers have a higher survival rate than other suppliers (non-tie-in firms) in the automobile industries in the U.S from 1979 to 1991.
Some studies pay special attention to the role of labor turnover, absorptive capacity, and agglomeration economies in disseminating FDI’s useful knowledge to local firms. Both GVC and FDI studies are commonly interested in these issues.

Typically, the literature estimates the impacts of labor turnover by including the share of owners and workers who have previous work experience in or training experience by MNEs in the same industry in equation (1), instead of the horizontal linkages measured by the share of FDI.\textsuperscript{11} For example, Görg and Strobl (2005), analyzing manufacturing firms in Ghana from 1991 to 1997, find that owners’ previous work experience in MNEs in the same industry has positive impacts on domestic firms’ productivity. In addition, Balsvik (2011) finds that the share of workers with experience in MNEs has positive impacts on the productivity of domestic plants in Norway from 1990 to 2000. Fosfuri, Motta, and Ronde (2001) provide some theoretical foundations for the impacts of labor turnover by showing that FDI technological spillovers due to workers’ mobility occur if MNEs do not compete fiercely with domestic firms in the same product market and the absorptive capability of the local firm is sufficiently high.

Other studies focus on the impacts of labor turnover on individual workers’ wages in domestic firms, instead of their productivity, although the estimation strategy is

\textsuperscript{11} See also equation (3) of Smeets (2008, 115).
essentially the same as the studies estimating the impacts on productivity.\textsuperscript{12} For example, Poole (2013) finds that the share of former MNE workers has positive impacts on the remaining worker’s wages in domestic firms in Brazil from 1996 to 2001, after controlling for various individual- as well as firm-level characteristics. This could indicate that former MNE workers bring new useful knowledge for workers in local firms.\textsuperscript{13}

However, we cannot deny the possibility that some time-variant positive shocks that took place in those domestic firms correlate with both the new hiring of former MNE workers and the increase in the productivity or wages in those three studies (i.e., Görg and Strobl 2005; Balsvik 2011; Poole 2013). Thus, we require empirical analyses using more explicit indicators of imitation through labor turnover. However, official statistics hardly provide data that are useful for such indicators. In this regard, additional implementation of firm-level original surveys might be necessary.

Typically, the literature estimates the impacts of absorptive capacity by the inclusion of the additional interaction term between the measure of the presence of FDI

\textsuperscript{12} See, equation (4) of Smeets (2008, 115). In this equation, the dependent variable is individual workers’ wages instead of firm-level productivity. However, the independent variables are the same, except for additional inclusion of the individual workers’ characteristics, such as age, educational level, and occupational category.

\textsuperscript{13} Lipsey and Sjöholm (2004) find that foreign-owned firms pay higher wages for a given educational level than domestically owned ones, possibly due to the acquisition of improved knowledge by workers in foreign firms.
and the measure of absorptive capacity in equation (1). In other words, such equations estimate whether the impacts of FDI presence in the given industry are different according to the level of the firm’s absorptive capacity. The literature often measures absorptive capacity of domestic firms by their level of R&D expenditure (Cohen and Levinthal 1989; Griffith, Redding, and van Reenen 2004). Studies often measure technology gap by the ratio of the highest (frontier-level) productivity within the same industry over that in domestic firms (Griffith, Redding, and van Reenen 2004) or by the ratio of productivity in foreign firms over that in domestic firms (Castellani and Zanfei 2003; Jordaan 2008).

There are two contrasting views regarding the impacts of the technology gap on domestic firms’ productivity (Castellani and Zanfei 2003; Smeets 2008; Imbriani et al. 2014). On the one hand, the “catching-up” hypothesis argues that large technology gaps with MNEs can enhance the spillovers effects of FDI, because the potential for technological improvements is larger (Findlay 1978; Wang and Blomstrom 1992). In this case, the coefficient of the interaction term of FDI presence with the measure of technology gap should be positive. On the other hand, another hypothesis argues that higher absorptive capacity of local firms can enhance the positive spillover effects of FDI and, hence, the coefficient of the interaction term between the presence of FDI and

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14 See equation (5) of Smeets (2008, 118).
absorptive capacity is be positive.

We summarize the findings of the empirical analysis as follows. Castellani and Zanfei (2003), analyzing firm-level panel data in France, Italy, and Spain from 1992 to 1997, find that the interaction term of FDI presence with the measure of technology gap has a significantly positive coefficient, while the interaction term with the measure of absorptive capacity has no significant coefficient. Jordaan (2008), analyzing spillover effects of FDI in several Mexican regions in 1993, finds that the interaction term of FDI presence with the measure of technology gap has a significantly positive coefficient. Thus, those findings support the catching-up hypothesis. On the other hand, Fatima (2016), analyzing Turkey from 2003 to 2010, finds that the interaction term of FDI presence with the measure of technology gap has a significantly negative coefficient. Blalock and Gertler (2009) find that the interaction term of FDI presence with the measure of absorptive capacity (R&D expenditure) has a significantly positive coefficient in Indonesian manufacturing firms from 1988 to 1996.

Some researchers consider that the relationship between the level of technology gap and the degree of the productivity benefits from FDI could have an inverted U-shape: the productivity benefits are likely to small for both low and high technology gaps, while they are high for intermediate technology gaps. Indeed, Girma (2005) finds the existence
of the inverted U-shaped relationship between the level of absorptive capacity and the productivity benefits from FDI in manufacturing firms in the UK from 1989 to 1999. In addition, Ben Hamida and Gugler (2009), analyzing firm-level panel data from both manufacturing and services/construction sectors in Switzerland from 1998 to 2001, find that intra-industry FDI presence has positive impacts on local firms’ productivity only when local firms have intermediate technology gaps with foreign firms, but there are no significant impacts when local firms have small and large technology gaps with foreign firms.

Several studies find other mechanisms that attenuate the aforementioned negative horizontal linkage effects of FDI. For example, Girma et al. (2015), using firm-level data from manufacturing industries in China from 2004 to 2006, find that the presence of foreign firms has positive impacts on the domestic firms’ productivity only when the foreign presence reaches a certain threshold level (i.e., 40%) within a cluster. Furthermore, Lu, Tao, and Zhu (2017) find that intra-industrial FDI in the same city has positive impacts on domestic firms’ productivity, while that in more distance areas has negative impacts. Such positive effects might arise from agglomeration economies, which facilitate information spillovers, mobility of workers from foreign to domestic firms, and inter-firm transactions. This is likely to be important, as most manufacturing industries
are in developing countries (Sonobe and Otsuka 2006, 2011, 2014).

3-6. An integrated econometric approach to foreign direct investment impacts

By modifying the specification of Griffith, Redding, and van Reenen (2004), we propose the following function for an integrated econometric approach to FDI studies:

\[
\Delta \ln (A_d)_{jt} = \gamma_0 + \gamma_1 \frac{R}{Y}_{jt-1} + \gamma_2 \ln \left( \frac{A_F}{(A_d)_{jt-1}} \right) + \gamma_3 \frac{R}{Y}_{jt-1} \ln \left( \frac{A_F}{(A_d)_{jt-1}} \right) + \gamma_4 \text{Backward}_{jt-1} + X'_{jt-1} \gamma_5 + Z'_{jt-1} \gamma_6 + \alpha_i + \alpha_j + \alpha_t + \epsilon_{jt}
\]

where \( R \) is firm \( i \)’ expenditure on R&D\(^{15} \); \( A \) is TFP and \( \Delta \ln A \) is growth rate of TFP; \( A_F \) and \( A_d \) are the TFP of foreign firms and domestic firms, respectively; and others are the same as in equation (1). Note that the coefficients \( \gamma_{1j} \) to \( \gamma_{3j} \) can be different in different industries.

This specification has the following advantages. First, we expect knowledge spillovers to determine changes in productivity, not to determine the productivity levels. Second, we expect the term of the productivity gap between firm \( i \) and foreign firms within the same industry \( j \) to capture the spillover effects due to the demonstration effect

\(^{15}\) In the case in which data on R&D spending are not available at the firm level, some proxy variables, such as share of skilled workers in total employment, can be used.
(i.e., $\gamma_{2j}$), while the term interacted with the ratio of the firm’s R&D expenditure to the value added captures the spillover effects from the imitation effect (i.e., $\gamma_{3j}$). In this way, we separate the effects of imitation from those of demonstration in this specification. We expect that $\gamma_{2j}$ and $\gamma_{3j}$ are positive. Moreover, according to Crespo and Fontoura (2007), the ratio of the firm’s R&D expenditure can be interpreted as the indicator of the firm’s absorptive capacity. Third, the use of the each firm’s TFP gap from foreign firms within the same industry allows each industry to have different extent of demonstration and imitation effects. Fourth, the specification uses the superlative-index-number approach, which allows us to estimate TFP with flexible parameters of the production function. Fifth, we include a term that is expected to capture vertical linkage effects (i.e., $\gamma_{4}$), which are missing in the original specification of Griffith, Redding, and van Reenen (2004). In summary, this specification avoids the four problems of estimating equation (1), that is, the assumed effects of FDI’s presence on the level of productivity, neglect of imitation, identical spillover effects across industries, and identical production function parameters across industries. Furthermore, this specification takes into account the effects of absorptive capacity. What remains for us to integrate are (1) the effect of labor turnover, which we might incorporate as an additional explanatory variable or as an interaction term with the technology gap, and (2) identical backward linkage effects across industries.
The second issue can be resolved only if we have access to firm-specific information representing the extent of the interaction between local firms and foreign firms.

4. Integration of Research on Foreign Direct Investment and Global Value Chain

In this section, we make suggestions to incorporate the perspectives of the GVC studies into the framework of FDI studies. From the viewpoint of the development of local firms and industries, it is critically important to analyze how and under what conditions captive suppliers transform into relational suppliers. The first question we ought to address is how existing FDI studies deal with the abovementioned transformation. For this purpose, we prepare Figure 2, which illustrates how the total value added comprises the local parts supplier and the MNE. We assume total value added consists of the payments to labor and capital (designated by areas KL) and profit (π) accrued to the management activities, including technology choice, production design, and marketing. In this framework, when management improves without changing the employment of capital and labor, π as well as value added increase, which reflects in increases in TFP.

It is clear that under the captive governance system, a local firm receives only area KL, whereas an MNE receives the whole amount of π. This is reasonable, because captive suppliers are assigned to simple tasks in production activities and the system
discourages them from engaging in value-adding activities, such as production design and marketing. On the other hand, if the local firm is highly capable of management activities and is independent, the local supplier that engages in pre- and post-production management activities receives the major part or even the whole area of $\pi$. We believe that such a shift from the status of captive supplier to relational supplier is critically important in the industrial development process. However, the production function approach, which FDI studies use exclusively, simply captures this shift as technological improvement.

It is clear from the above discussions that whether a supplier is captive or relational affects the measured productivity associated with backward linkages. Thus, we propose to replace industry-specific $Backward_{ijt}$ in equation (3) with firm-specific $Relational_{ijt}$, which we define as the extent of mutually beneficial relationship between the $i$-th supplier and foreign company. In other words, we propose the following simultaneous equations:

(4)

$$Relational_{ijt-1} = a_0 + a_1\text{Transaction}_{ijt-1} + a_2\text{Codifiability}_{ijt-1} + a_3\text{Capacity}_{ijt-1} + a_i + a_j + a_{i-1} + \eta_{ijt-1}$$

(5)
\[
\Delta \ln(A_d)_{jt} = \gamma_0 + \gamma_1 \left( R_{jt} \right)_{jt-1} + \gamma_2 \ln \left( \frac{A_F}{A_d} \right)_{jt-1} + \gamma_3 R \left( a_{jt-1} \right) - \ln \left( \frac{A_F}{A_d} \right)_{jt-1} + \gamma_4 \text{Relational}_{jt-1} + \\
X_{jt-1} \gamma_5 + Z_{jt-1} \gamma_6 + \alpha_i + \alpha_j + \epsilon_{jt},
\]

where \textit{relational} is an indicator of relational contract; the three right-hand variables in equation (4) \textit{(Transaction, Codifiability, and Capacity)} refer to the transaction costs of contracts, codifiability of production systems, and innate capacity of local suppliers, respectively; and the other variables are the same as in equation (3). For the specification of equation (4), we follow the original ideas of the GVC study of Gereffi, Humphrey, and Sturgeon (2005). Note that the relational supplier is independent and not subordinate to any particular MNE.

There are two issues in estimating equations (4) and (5): measurement and endogeneity. While we cannot determine a priori what the best proxy variable for relational contract is, we can suggest several possibilities. The first group of variables may be related with the nature of contract between the supplier and foreign firm, such as the length of contract and the division of labor in preparing drawings or blue prints. A longer contract with larger involvement by a supplier in the preparation of drawings would imply closer relational contracting. The second group pertains to the independence of the decision-making authority of the supplier, such as the number of contracting foreign firms and the sales share of the dominant contracting foreign firm. The diversification of
contracts with foreign firms suggests the independence of the local supplier. The third group refers to the composition of workers, including the proportion of workers with work experience in foreign firms, non-production workers engaged in pre- and post-production activities, and highly educated workers.

So far as Relational is endogenous, we need instruments in the estimation of equation (4). Although we again cannot determine a priori what the best proxy variables for these variables are, we can suggest some possibilities. For example, the geographical distance between local firms and foreign firms is a proxy for the transaction costs of contractual relationships. The share of intermediate inputs ordered with technical specifications from foreign firms can be a measure for the difficulty of the codification of the production system.\(^\text{16}\) We should further consider the careful selection of appropriate measures for the instrumental variables.

Figure 2 Components of value added in captive and relational suppliers

\(^\text{16}\) Note that Defever and Toubal (2013) use this share for their measure for “relationship-specific inputs” and find that French multinationals that use these inputs are intensively more likely to import intermediate inputs from independent suppliers, instead of their foreign affiliates.
5. Concluding remarks

Given the rapidly increasing amount of FDI over the last several decades and its potential role in transferring advanced technology and management practices from developed to developing countries, there has been increasing attention to the effects of FDI on the production efficiency of local enterprises in developing countries. This study reviewed the literature on GVC and FDI, both of which are interested in the transfer of useful knowledge for the development of local firms in developing countries. Nonetheless, there have been no cross-references between the GVC and FDI studies in the existing literature.

On the one hand, we found that the literature on GVC provides useful insights into the relationship between foreign and local firms, which depends on transaction costs, codifiability of production methods, and capability of local firms, and the ways in which upgrading of functions, products, and production processes takes place. This literature, however, remains largely descriptive and conceptual without undertaking hypothesis
testing by rigorous empirical research. On the other hand, we found that the literature on FDI includes a number of econometric studies of the impact of FDI on the productivity of local enterprises. These studies have made a number of significant findings, particularly with regard to the importance of backward linkages between foreign firms in downstream industries and domestic firms in upstream industries rather than horizontal linkages between firms in the same industry. Such vertical relationship is precisely a central issue addressed by the GVC studies.

We find that the specification of estimation functions in the FDI research suffers from several restrictive assumptions, for example, identical productivity effects of the presence of FDI across different industries. Furthermore, most FDI studies have failed to explore how useful knowledge is transferred from foreign to local enterprises in practice and, consequently, how the management behavior of local enterprises changes, even though some studies pay attention to the roles of absorptive capacity of local enterprises and labor turnover from foreign to local enterprises in the process of knowledge transfer.

In order to overcome the limitations of the existing studies, this study made several suggestions. First, it suggested a possible way to avoid the shortcomings of the estimation methods of the impact of FDI by extending the model of productivity improvement that Griffith, Redding, and van Reenen (2004) originally developed for
studies on the effect of technology gap between frontier firm and other firms. Second, in view of the fact that both GVC research and FDI research are interested in knowledge transfer, this study suggested several ways to enrich the FDI research by incorporating insights developed by the GVC research. In particular, we proposed incorporating the idea of the evolution of contractual relationship from captive to relational ones into the estimation framework of FDI research.

Finally, we point out that although policymakers in developing countries are interested in the impact of FDI on industrial development, the analysis of industrial development is outside of the scope of both GVC research and FDI research. There are a couple of reasons for the absence of such analysis. First, topics in the two strands of studies commonly concern productivity growth or upgrading of functions, products, and processes in relatively short periods. Thus, neither strand of literature analyzes the long-term dynamic process of industrial development. Second, there is essentially no analysis of the roles of entrepreneurs and “innovation” based on learning from FDI. Nevertheless, the causes and consequences of innovation that entrepreneurs carry out are central issues of industrial development. For such analysis, we must explicitly analyze what types of innovations are critically important in industrial development and what role entrepreneurial traits play, for example, work experience in MNEs, experience of
receiving technology and management training, and schooling levels. It is true that such analysis is highly demanding for detailed long-term data. Without such analysis, however, we will not be able to draw useful lessons on the impact of FDI for policymakers in developing countries, who are interested in promoting industrial development by attracting FDI.

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