ELSEVIER
www.elsevier.com/locate/worlddev

World Development Vol. 40, No. 11, pp. 2206–2220, 2012

0305-750X/$ - see front matter

http://dx.doi.org/10.1016/j.worlddev.2012.03.018

Heterogeneous FDI in Transition Economies – A Novel Approach to Assess the Developmental Impact of Backward Linkages

AXÈLE GIROUD
The University of Manchester, UK

BJÖRN JINDRA and PHILIPP MAREK *
Halle Institute for Economic Research, Halle, Germany

Summary. — Traditional models of technology transfer via FDI rely upon technology gap and absorptive capacity arguments to explain host economies' potential to benefit from technological spillovers. This paper emphasizes foreign affiliates' technological heterogeneity. We apply a novel approach differentiating extent and intensity of backward linkages between foreign affiliates and local suppliers. We use survey data on 809 foreign affiliates in five transition economies. Our evidence shows that foreign affiliates' technological capability, embeddedness and autonomy are positively related to knowledge transfer via backward linkages. In contrast to what is widely assumed, we find a non-linear relationship between extent of local sourcing and knowledge transfer to domestic suppliers.

Key words — FDI, multinational enterprises, backward linkages, spillovers, transition economies, Central and Eastern Europe

1. INTRODUCTION

The relation between internationalization of firms, technology transfer, and host-country effects has long been a concern in economic research. With the integration of post-communist countries into the global economy after 1990, there has been a strong research interest in the role of foreign direct investment (FDI) and multinational enterprises (MNEs) in economic restructuring and technological catch-up. Unlike many developing countries, East European transition countries started out with an existing industrial structure and relatively educated workforce. Their economies were also close to developed European markets, and most embarked on comprehensive privatization processes at a time when FDI was starting to peak world-wide.

The bulk of existing research on FDI effects in transition economies is based on the standard production function approach. It measures the effects of FDI presence in terms of employment or value-added on domestic firms' total factor or labor productivity. Studies that assess vertical effects use inter-sectoral linkage coefficients in order to weigh foreign presence in related sectors. Linkage coefficients are derived from input–output tables at sector level and are assumed to apply homogeneously to all firms within the given sector. Significant effects of foreign presence on domestic productivity are interpreted as indirect evidence for nonpecuniary technology or knowledge spillover effects.

This approach goes back, conceptually, to Findlay (1978), who suggested a model endogenizing the rate of technical change in a backward region as a function of its exposure to foreign capital. He refers to Hymer (1960), who suggested that FDI constitutes a transfer package combining capital, management, and new technology. Applying the concept of relative backwardness in economic development (Gerschenkron, 1962; Veblen, 1915), Findlay holds that the potential for technological diffusion via FDI is positively linked to the relative technology gap between the home and host economies.

Teece (1976), however, fundamentally challenged the position that technology can be made available to all at zero social cost. He argued that technology transfer requires the commitment of real resources, and that transfer costs decline with each application of innovation. Thus, Wang and Blomström (1992) recognize two types of costs associated with technology diffusion – costs to the MNE transferring technology to its affiliate, and learning costs of domestic firms. The latter aspect has also been associated with the concept of "absorptive capacity" (Cohen & Levinthal, 1990), which implies that domestic firms need to invest in their own R&D to be able to identify, assimilate, and exploit knowledge from foreign firms.

The existing empirical evidence on FDI-induced knowledge spillovers is mixed for transition economies (see Meyer & Sinani, 2009; Rugraff, 2008 for an overview). It indicates that knowledge spillovers are more likely to occur through vertical linkages than between competitors within the same sector (Damijan, Rojec, Majcen, & Knell, 2008; Jindra, 2005). In particular, backward linkages from foreign subsidiaries to domestic suppliers seem to facilitate technology spillovers (Damijan *et al.,* 2008; Halpern & Muraközy, 2007; Javorcik-Smarzynska, 2004). The existing evidence highlights domestic firms' absorptive capacity as an enabling factor for positive externalities through FDI backward linkages (Crespo & Fontoura, 2007; Damijan *et al.,* 2008).

* We wish to thank the three anonymous reviewers for their insightful comments. This research has been partially financed by the EU Commission, in Framework Program 6, Priority 7 on "Citizens and Governance in a Knowledge-Based Society", contract number CIT5–028519. The authors are solely responsible for the contents, which might not represent the opinion of the Community. The Community is not responsible for any use that might be made of data appearing in this publication. Final revision accepted: March 13, 2012.

However, the existing research on FDI effects via backward linkages in transition economies based on the production function approach is subject to three possible criticisms:

First, the standard production function approach estimates FDI spillover via backward linkages by using industry-level input–output coefficients, used as proxy for trade linkages between sectors. This implies, on the one hand, that within any given sector domestic and foreign firms are homogeneous with regard to local sourcing. On the other hand, it implies a linear relationship between the extent of local sourcing and knowledge spillovers, which has been challenged for transition and developing countries (Dunning & Lundan, 2008; Gentile-Lüdecke & Giroud, 2012; Narula & Dunning, 2010; Pavlínek & Janak, 2007; Rugraff, 2010; Saliola & Zanfei, 2009).

Second, the standard production function approach assumes that foreign firms are technologically homogeneous, i.e., every foreign firm provides the same knowledge opportunities or spillover potential for domestic firms. This is in contrast to the most recent models (Castellani & Zanfei, 2006; Chung, 2001; Driffield & Love, 2007; Marin & Bell, 2006; Marin & Sasidharan, 2010), which argue that factors such as the technological strategy of the foreign parent firm, the extent of knowledge-enhancing activities by the foreign affiliate, and its propensity to establish technological co-operation with other domestic firms affect the extent of knowledge spillovers to domestic firms.

Finally, Zanfei (2012) maintains that literature using the standard production function approach has largely remained stuck to the externality framework, which by definition entails the idea of "not-paid-for" advantages accruing to local firms from the activities of foreign firms. However, knowledge transfer between foreign and local firms is not costless (Teece, 1976). For this reason, Zanfei focuses on the broader category of "effects" rather than "externalities" from foreign presence to fully capture the links between FDI and development.

This paper does not apply the standard production approach and continues earlier work differentiating between *extent* and *intensity* of backward linkages (Giroud & Scott-Kennel, 2009; Jindra, Giroud, & Scott-Kennel, 2009; Jordaan, 2011). In principle, *extent* relates to the level of use of local suppliers by foreign firms. Following a long tradition of studies dating back to Hirschman (1958), Lall (1980) and Rodríguez-Clare (1996) under specific assumptions, this can generate pecuniary externalities for foreign and local firms. The *intensity* of backward linkages can be defined as direct and intentional knowledge flows between the foreign affiliate and local suppliers, which are not costless. This constitutes a novel approach to assessing the developmental "effects" of FDI via backward linkages, complementary to the widely used production function approach.

This paper has two main objectives: First, it tests whether the relationship between extent and intensity of backward linkages follows a linear or nonlinear pattern. Second, it analyzes how foreign affiliates' technological heterogeneity impacts on the intensity of backward linkages. In order to investigate these two research questions, we develop a model for the intensity of backward linkages which we apply to foreign affiliate-level survey data from five Central and East Europe transition countries at different levels of economic development.

This paper is structured as follows: Section 2 reviews the literature on the nature and determinants of backward linkages, to set the key research hypotheses into an appropriate context. Section 3 introduces the data and presents selected descriptive statistics. Section 4 describes the estimation approach and variables used, and Section 5 provides a discussion of the results. Concluding remarks are developed in Section 6, including limitations and possible future research avenues.

2. LITERATURE REVIEW AND RESEARCH QUESTIONS

(a) *Relationship between extent and intensity of backward linkages*

Authors have long distinguished spillovers from linkages by emphasizing the nature of the direct relationship between an MNE and its local suppliers, but only recently has that attention turned to the need to distinguish between the pecuniary effects of linkages from the development potential arising from knowledge transfer.

Hirschman (1958) suggests that particular investments create external economies in sectors that supply or buy from them, so that new investments are undertaken in order to exploit them. Foreign investment is assigned a vital role, "to enable and to embolden a country to set out on the path of unbalanced growth ... [and] to take the first 'unbalancing' steps in growth sequences". Lall (1980) holds that, in Hirschman's analysis, linkages could be said to exist in developing countries when a rise in demand (or supply) of one product raises (or lowers) its price to an extent that latent entrepreneurship is stimulated and complementary investments undertaken. Rodríguez-Clare (1996) uses Hirschman-type linkage externalities, combined with an assumed love of variety, for inputs in final production to formalize linkage effects. The essence of this type of linkage is the pecuniary externality created by price changes in inputs used in production, which affect the profit rather than production function of domestic firms (Zanfei, 2012).

An MNE exercises its *voice* (in Hirschman's approach) when it works with suppliers to reach desired levels of quality; in other terms, the catalyst impact described by Rodríguez-Clare (1996) may result from direct knowledge transfer when an MNE provides technological assistance to suppliers to increase supply quality and efficiency. Such transfers occur through various actions: (a) *information* on markets, regulations, pricing, exporting, location of production; (b) *technical assistance* on product design, quality control, factory outlet, labor, inventory management; (c) *financial*, *management* and *procurement assistance* (Gentile-Lüdecke & Giroud, 2012; Jordaan, 2011; Lall, 1980). In this case, knowledge transfer from a foreign affiliate affects directly the technology used by a local supplier, i.e., it shifts its production function.

This suggests that it is important to distinguish between the *extent* and *intensity* of backward linkages (Giroud & Scott-Kennel, 2009; Jindra *et al.,* 2009; Jordaan, 2011), i.e., to differentiate between benefits derived from an increase in demand from those derived from technological, innovation, organizational, or managerial support received by suppliers from MNEs (Crespo & Fontoura, 2007: 412). The intensity of linkages reflects the supply-side effects described by Lin and Saggi (2007), i.e., the technological relationships between the foreign affiliate and suppliers. Intensity matters because technology is not available at zero cost, and MNEs are therefore likely to be selective in where and when they engage in the accrued costs of transferring knowledge to local suppliers (Teece, 1976; Zanfei, 2012). The absence of a technological relationship between the foreign affiliate and suppliers limits not only direct knowledge transfer, but also the extent of nonpecuniary knowledge (or technology) externalities to other firms of the indigenous industrial sector (Rugraff, 2010).