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International Business Review

journal homepage: www.elsevier.com/locate/ibusrev



Absorptive capacity from foreign direct investment in Spanish manufacturing firms[☆]

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ARTICLE INFO

Article history:

Received 15 March 2012

Received in revised form 24 June 2013

Accepted 26 June 2013

Keywords:

Absorptive capacity

Foreign direct investment

Productivity

Internationalization

Dynamic capabilities

ABSTRACT

This paper deals with the determinants of absorptive capacity from foreign direct investment (FDI) spillovers. We study how firm behavior, capabilities, and structure drive absorptive capacity such as research and development (R&D) activities and expenditures, R&D results, internal organization of innovation, external relationships of innovation, human-capital quality, family management, business complexity, and market concentration. Our results enhance and complement previous evidence of the determinants of absorptive capacity, particularly with different approaches to innovative activities as mediators of the capability.

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1. Introduction

Spillovers within an industry are improvements in productivity that local firms learn from foreign companies operating in the same sector. Similarly, spillovers from foreign direct investment (FDI) arise from transactions outside specific markets, in which resources – and particularly knowledge – spread without any contractual relationship (Meyer, 2004). Spillovers in developing countries are widely studied; however, empirical evidence for developed countries is less common.

The capacity for absorption refers to a company's ability to apply knowledge from competitors via these spillovers (Cohen & Levinthal, 1989). This paper analyzes the capabilities to absorb spillovers from FDI, measured as technical progress in Spanish manufacturing firms. We focus on how firm behavior, capabilities, and structure drive this absorptive capacity of FDI. However, doing so requires asking why a company's resources and capabilities affect the absorptive capacity of FDI in the first place. The *approach*

of resources and capabilities proposes that valuable, rare, imperfectly imitable, and imperfectly substitutable resources are necessary, making them a key source of competitive advantage (Barney, 1991).

This study furthers the understanding of the dynamic capabilities of a firm (Teece, Pisano, & Shuen, 1997), particularly regarding the factors that limit or enhance the ability to absorb and capitalize on knowledge spillover. Firm-specific idiosyncrasies, distinctive institutional and industrial environment drive foreign investments (Wang, Hong, Kafouros, & Boateng, 2012b), and with this in mind, we focus on absorptive capacity, which is a resource, a capability, and a good source of sustainable competitive advantage over time (Cohen & Levinthal, 1990).

In Spain, research evaluates the effect of FDI and R&D on technical progress at the industrial level (Rosell-Martínez & Sánchez-Sellero, 2012). Barrios, Dimelis, Louri, and Strobl (2004) also use the survey of business strategies (ESEE) to study the absorptive capacity of spillovers from FDI in Spanish manufacturing firms. Alvarez and Molero (2005) use ESEE to identify horizontal spillovers from FDI in Spanish manufacturing industries according to their high, medium, or low technological content. Similar to Barrios et al. (2004), Alvarez and Molero (2005), and Rodríguez and Pallas (2008), we use the ESEE in relation to FDI but extend its application to the factors determining the behavior, the capabilities and the structure of the firm which are driving absorptive capacity, such as research and development (R&D) activities, results of R&D, internal organization of innovation, external relationships of innovation, quality of human capital,

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family involvement, complexity of the business, and market concentration.

Our conclusions are relevant for managers and policy makers. In particular, if a firm knows what determines its capacity to absorb FDI spillovers, then firm managers can make better decisions regarding efficiency and performance improvement. Policy makers can also identify which industries will benefit most from FDI spillovers and adjust their fiscal incentives accordingly.

The paper is structured as follows. Section 2 looks at the capacity for absorbing FDI in the strict sense; Section 3 investigates the factors in the capacity to absorb FDI; Section 4 presents the models, data, and methodology for explaining the factors in the capacity to absorb FDI. The final section concludes.

2. Absorptive capacity and foreign direct investment

Some studies of FDI spillovers evaluate the absorptive capacity of local firms (Dimelis, 2005). The results of such absorption are very hard to copy, which makes the process of absorption a competitive advantage in and of itself (Peteraf, 1993). Accordingly, businesses make investments that increase their ability to absorb, and the more externalities that are in their environments, the greater the incentive to invest in improving the capacity for absorption (Cohen & Levinthal, 1990).

Absorptive capability is a process involving four diverse and complementary stages or dimensions: acquisition, assimilation, transformation, and exploitation (Zahra & George, 2002). It requires a business to evaluate, assimilate, and apply knowledge transmitted from another (Lane & Lubatkin, 1998). The academic literature widely covers the capacity to absorb from FDI and defines absorptive capability as the ability to identify, assimilate, and apply knowledge from external sources (Cohen & Levinthal, 1990) for commercial purposes.

In particular, companies can absorb foreign technology through competitive rivalry, worker mobility, or the demonstration effect (Mody, 1989). FDI increases competition, allowing local businesses to absorb technological novelties and effective processes from foreign firms, thus raises their productivity (Rugman & Verbeke, 2003).

Taking advantage of the spillovers from FDI, however, again depends on the capacity to absorb them (Cohen & Levinthal, 1990). A capacity to absorb (Rugman & Verbeke, 2001) largely depends on technological abilities (Ben Hamida, 2006; Narula & Marin, 2003) but varies with the sectors in which receptor firms operate. This is why companies in certain sectors, depending upon the degree of concentration in the sector, are more susceptible to developing abilities, a flow of knowledge, technological advances and, consequently, the capacity for absorption (Deeds, De Carolis, & Coombs, 2000).

Previously, Barrios and Strobl (2002) find that in Spain only domestic firms with the appropriate “absorptive capacity” can apply the positive externalities often associated with FDI. Wang, Deng, Kafourous, and Chen (2012a) find that the pace of foreign entry and the irregularity of foreign entry have a moderate effect on the relationship between the level of foreign presence and the productivity of host-country firms. Also, they analyze how the intensity of R&D affects the pace of foreign entry and the irregularity of foreign entry. We contribute to the literature by studying the determinants of the behavior, firm capabilities, and firm structure that affect absorptive capacity of spillovers from FDI.

3. Factors determining absorptive capacity from foreign direct investment

Lane and Lubatkin (1998) and Van den Bosch, Volberda, and de Boer (1999) are some of the first to study the factors determining

absorptive capacity. Barrios et al. (2004) and Wang et al. (2012a) also analyze how well firms absorb technical advances arising out of spillovers from a foreign presence in their sector. We add to this by including the moderating effect of a number of determinants of spillover absorption.

3.1. R&D activities and expenditures

3.1.1. R&D activities

The intensity of R&D, total intangible assets per worker, and technological gaps determine how well local firms absorb FDI spillover (Liu, Siler, Wang, & Wei, 2000; Dimelis, 2005). Innovation, therefore, can improve absorptive capacity (Veugelers, 1997). However, businesses do not tend to undertake R&D activities if they can simply glean technological knowledge from outside sources (Nieto & Quevedo, 2005).

In this way, a capacity for absorption is relevant in acquiring new technology that spills over from FDI, and it therefore affects the productivity of local firms (Caves, 1974). The effects may include creating, diffusing, and commercializing technological innovations (Gugler & Dunning, 1994). The absorptive capacity of an enterprise, however, comes through acquiring, assimilating, and propagating new knowledge gleaned from outside the firm; more overall R&D in an industry enhances it (Liao, Welsch, & Stoica, 2003).

In sum, R&D activities prompt technological change, expand new knowledge, and improve how people assimilate such knowledge. All of this improves a firm's absorptive capacity (Cohen & Levinthal, 1990). Consequently, our hypothesis is

Hypothesis 1. R&D activity increases a firm's ability to absorb spillovers.

3.1.2. R&D expenditures

Because R&D spending may create competitive advantages, it encourages companies to absorb technological spillovers from external sources (Veugelers, 1997). In turn, R&D expenditures imply that companies are willing to assimilate routines and processes, thereby increasing their stock of knowledge and improving their capacity for absorption (Mowery, Oxley, & Silverman, 1996), which improves and sustains overall company performance (Todorova & Durisin, 2007). In a country-level analysis of host countries, R&D expenditures favor the absorption of technological knowledge from FDI (Bodman & Le, 2013). Overall then, we expect R&D expenditures to increase absorptive capacity of spillovers from FDI at the firm level. Accordingly, whereas Hypothesis 1 proposes that R&D activities favor absorption, Hypothesis 2 proposes that R&D intensity increases absorption.

Hypothesis 2. A local company's R&D costs divided by its stock of capital has a positive relation to a company's capacity to absorb spillovers

3.2. R&D results: Patents, product innovations, and process innovations

Beyond the development of R&D activities (Hypothesis 1) and R&D intensity (Hypothesis 2), we test whether R&D results (patents, product innovations, and process innovations) increase absorptive capacity. One type of R&D result in particular, patents, is a determinant of absorptive capacity (Coombs & Bierly, 2006)—particularly technology licenses (Atuahene-Gima, 1992). In this sense, the number and importance of patents signals absorptive capacity (Baum, Calabrese, & Silverman, 2000; Zucker, Darby, & Armstrong, 2002).

However, the existence of patents in an enterprise may be common practice in its sector, which makes appropriating

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