Multinational strategy, institutions and spillovers: the role of institutions in knowledge spillovers in emerging markets

Abstract

This paper delves into the pivotal role of institutions in facilitating knowledge spillovers, particularly in the context of multinational enterprises (MNEs) and knowledge transfer. While extant literature highlights the positive correlation between good institutional quality and knowledge transfer, this paper introduces a nuanced perspective. It argues for an inverted U-shaped relationship, suggesting that MNEs may exhibit reluctance in knowledge transfer to subsidiaries not only in environments with low institutional quality, as conventionally discussed, but also in those characterised by high institutional quality. In fact, there are beneficial implications of good institutions for domestic firms as well, enabling greater capacity to absorb knowledge and thereby emerge as competitors of MNEs. The paper demonstrates an inverted U-shaped relationship between spillovers, to capture knowledge transfer, and the quality of local institutions. This study provides valuable insights into the complex dynamics of knowledge spillovers, emphasising the multifaceted influence of institutional environments on knowledge dissemination and economic development.

Keywords: Inward FDI, spillovers, knowledge transfer, institutions, emerging markets, random parameter model

JEL classification: F23, D22, R58

1. Introduction

Multinational enterprises (MNEs) serve as vital conduits for spillovers to domestic firms in host economies by facilitating the transfer of knowledge, technology, and best practices. This transfer can lead to significant productivity gains and innovation within the local host economy, and it is particularly important in emerging markets as a way to boost economic development. Such beneficial exchanges occur through various mechanisms as MNEs engage with local economic actors in multiple roles: as competitors, they stimulate efficiency and innovation; as customers, they set higher quality and performance standards; and as suppliers, they provide advanced inputs and foster learning opportunities; and as employers they help spread intangible knowledge through the mobility of trained workers from the multinational to the local labour market (Crone and Roper, 2001; Görg and Strobl, 2005; Zanfei, 2012).

The role of formal institutions in fostering knowledge spillovers has garnered significant attention in the international business (IB) (as well as economics) literature.[1] In particular, the focus has been on the positive association between the quality of institutions and knowledge transfer from multinational enterprises (see Bhaumik *et al.*, 2019). Well-developed (formal) institutions, which are able to reduce transaction costs and safeguard intellectual property rights (IPR), are perceived as catalysts for facilitating the diffusion of technology and knowledge across borders. However, while existing IB theory acknowledges the importance of good institutions in enhancing knowledge transfer, it tends to overlook their broader implications for MNE strategies and, by extension, for spillover benefits for domestic firms. In this paper, we explicitly take into consideration the strategic considerations of MNEs that go beyond the reduction of transaction costs in host countries and posit that well-developed institutions may actually limit the extent of spillovers.

We contend that strong institutional environments not only benefit MNEs but also empower domestic firms, enabling them to better absorb technology and knowledge, and emerge as global competitors. Available evidence suggests, for example, that there is a positive association between institutional quality and a firm's ability to allocate resources to productive activities and foster human capital accumulation (Vu, 2022), including innovative resources to improve innovation production processes (Blanco and Goel, 2023). Building on this argument, there is a large literature, drawing on the traditions of both international business and international economics that shows that corruption deters foreign direct investment (FDI), but that experience of dealing with corruption mitigates

[1] This is not to suggest that informal institutions are not useful. However, as Stiglitz (2000) argues, "[a]s a society develops economically, its social capital [that helps it to cope with moral hazard and incentive problems] must adapt as well, allowing the interpersonal networks to be replaced with the formal institutions of a market-based economy" (pp. 59).

this (Dedho et al. 2025). However, from the perspective of the local economy, this leaves a number of issues under-explored. For example, what is the nature of the experience that drives subsequent decisions, and how does this manifest itself after the investment? Specifically, does firm's experience facilitate its better engagement with the local economy, or does it inform its decision to essentially seek to isolate itself from uncertain local environments? This will therefore in turn influence the nature of the knowledge transfer that occurs as a result of the investment. Together with the technological advancement of domestic supply chains and greater availability of appropriately skilled labour in the domestic labour market, this is likely to improve the technical efficiency and productivity of domestic firms. There is also evidence to suggest that institutional quality influences firm entry (Bruno et al., 2013), thereby facilitating the Schumpeterian process that is essential for the efficient use of resources in a market economy. In other words, while a high level of institutional quality encourages knowledge transfer by MNEs, ceteris paribus, it also creates an environment in which local firms can absorb and refashion this knowledge better and emerge as local and (potentially) global competitors of the MNEs. As such, it can be argued that well-developed domestic institutions can provide domestic (or local) firms with institutional competitive advantage (Martin, 2014) that can make these firms not only competitive vis-à-vis the MNEs in the domestic market but also make them competitive in the global context.

This nuanced understanding leads us to posit that MNEs may exhibit reluctance in transferring knowledge or technology to subsidiaries not only in environments characterised by low institutional quality, as widely discussed but also in those marked by exceptionally significantly high institutional quality. Our paper, therefore, challenges the conventional wisdom around the role of institutions in facilitating knowledge transfer, which envisages a linear positive relationship between institutional quality and knowledge transfer (and spillovers), *ceteris paribus*, by suggesting that there exists an inverted U-shaped relationship between institutional quality and knowledge transfer. In other words, from a host country perspective, there may exist an optimal level of institutional quality if it wants to maximise spillover benefits from inward FDI.

The contributions of this paper, therefore, centre around a better understanding of the interactions between institutions, absorptive capacity of domestic firms and international knowledge transfer by multinational firms. To begin with, from a theoretical or conceptual standpoint, it extends the literature on the implications of host country institutions on MNE strategy beyond discussions about transaction costs, learning and institutional arbitrage towards a trade-off between transaction cost and the threat of credible competition. While other papers have taken into consideration the strategic considerations of MNEs in the context of technology transfer (Glass and Saggi, 2002), and while the literature also acknowledges the concerns that MNEs have about absorptive

capacities of domestic firms that are, in part, dependent on local institutional quality, to the best of our knowledge, this is the first paper to systematically explore the relationship between host country institutional quality and MNE strategy, in the context of knowledge transfers and spillovers. This focus on institutions is important for two reasons. Firstly, the current absorptive capacity of domestic firms is, at least in part, a function of past institutional quality. Secondly, current institutional quality informs MNEs' expectations about the nature of both absorptive capacity and ability of the firm to manage its technology in the home country in the future.

Further, by introducing this trade-off into the discussion around knowledge transfer, we provide a theoretical basis for an explanation for the variation in reported spillover effects that is documented in the literature. Building on this, we are similarly able to develop a deeper understanding of what has often been referred to as the "missing part of the jigsaw" in spillover analysis, which is the distinction, as expressed in the multiple embeddedness literature (Santangelo *et al*., 2019) between the incentive for a foreign firm to become embedded in its host region, and the incentive to prevent leakage of knowledge that would hurt its competitive advantage globally. We also contribute to the discourse on knowledge transfer for productivity and economic growth, particularly by exploring potential mechanisms for such transfer (Acs et al., 2013; Audretsch and Belitski, 2024). Our focus is on a specific source: the presence of foreign multinationals through FDI in the local economy (Driffield *et al*., 2010; Castellani *et al*., 2024), an area that has been relatively underexplored in the entrepreneurship literature (Laursen *et al*., 2006; Amoroso *et al*., 2018), with a few exceptions (Andersson *et al*., 2022).

We argue that when considering whether to integrate into the host economy, multinational firms face a trade-off between institutional quality and absorptive capacity of local firms when determining their scale and scope of embeddedness in the host economy. We demonstrate that if one considers the importance of firm strategy, and in particular how in turn institutions and absorptive capacity influence the strategy of affiliates, then this better explains the variation in reported spillover effects that we see in the literature. Our narrative also allows us therefore to pose an important question for host country policymakers, in contexts where there is significant headroom for improvement in institutional quality. While an improvement in institutional quality may be a worthwhile objective in its own right, for countries that attach significant weight to knowledge transfer by MNEs and spillover effects, our framework suggests that there may be some optimal level of institutional quality beyond which net economic benefits may be insignificant. In the context of the IB (and economics) literature, this adds to the complexity of the discourse about the policy choices of host country governments and their bargaining with MNEs (see Bhaumik *et al*. 2024), by introducing the possibility that secular improvements in institutional quality may not always be in the interest of host country governments if they aim to maximise spillover benefits.

Since knowledge transfer is difficult to observe directly, we use spillover from specific MNE projects as our proxy for knowledge transfer within that project. Our key hypothesis, therefore, is that there is an inverted-U relationship between local (or host country) institutional quality and observed spillover effects. We empirically test the proposed inverted-U relationship between institutional quality and spillover effects with a unique dataset of about 1300 investment projects made by 621 MNEs from developed countries operating in automotive and computer industries, from Moody's Orbis-Cross Border Investment (CBI) database. These projects take place in 30 emerging economy destinations, more specifically, in 201 host cities. Using Moody's Orbis database, we collect financial data for the local companies located in these cities and we compute their labour productivity. We estimate the effect of each foreign project on local productivity, and we investigate why this effect varies across projects (and locations) using a random parameter (mixed-effect) model. Our empirical analysis finds support for the aforementioned inverted U-shaped relationship.

The paper proceeds as follows: Section 2 discusses the literature on MNE strategy, institutions and knowledge spillovers, and develops the hypotheses. Section 3 outlines the empirical strategy adopted. In Section 4, we present data and measures. Section 5 discusses the main findings, and Section 6 concludes.

2. Theoretical framework and hypothesis development

2.1. Absorptive capacity and spillovers

It has long been recognised that absorptive capacity (typically measured in the form of productivity of the domestic firms and sectors) in the host country is an important determinant of spillovers (Bournakis *et al.,* 2022; Castellani *et al.* 2024). Firms with high absorptive capacity can extract higher values from joint patenting with foreign multinationals (Mathew *et al*., 2024), they can also recognise and combine FDI spillovers with internal knowledge to identify new business opportunities and product innovation (Zhao *et al.,* 2019; Guo *et al*., 2022). Countries are found to experience more technological advancement when they are more connected with global FDI networks, and such benefits are more prominent if the host countries have more absorptive capacity (Sultana and Turkina, 2020). Especially for less developed countries, absorptive capacity is important for domestic sectors to transform FDI knowledge spillovers to innovation, as this will save in-house R&D expenditure costs (Duan *et al.,* 2021). Dunning's (1986) investment development cycle details how inward investment, and the accompanying knowledge transfer can be used by countries seeking to upgrade their technology and levels of development. Indeed, we find significant evidence of this in several Asian countries, notably Korea (Buckley *et al.,* 2022), Malaysia (Noor *et al*, 2002) and China (Wang and Kafouros, 2020).

While originating in the context of the theory of the firm, the concept of absorptive capacity can be extended to complex institutions, such as regions and cities (Roper and Love, 2006; Criscuolo and Narula, 2008; Caragliu and Nijkamp, 2012, 2016). An accumulated stock of cognitive capital helps it to identify, absorb and utilise proper knowledge from outside. Indeed, previous studies at the regional level in Europe show that a lower regional absorptive capacity hampers the regions' capability to decode and efficiently exploit new knowledge, whether this is locally produced or originating from outside (Caragliu and Nijkamp, 2012). Conversely, the presence of a higher regional absorptive capacity attracts knowledge spillovers even when other regions invest in R&D activity (Caragliu and Nijkamp, 2016). In keeping with this, several studies have found that the effect of inward FDI on innovation and production is positively moderated by an indicator of aggregated (regional) absorptive capacity. For example, in the case of Chinese regions, Fu (2008) finds that the strength of the effect of inward FDI on overall regional innovation capacity depends on the availability of absorptive capacity and the presence of innovation-complementary assets in the host region. In regions that host most of China's R&D activities, top universities, and research institutes, and thus possess a pool of highly educated and skilled workers, FDI has played a significant role in promoting regional innovation capacity. Similarly, Smith and Thomas (2017) show that Russian regions with a higher level of absorptive capacity, as measured by the level of human capital, have benefited from FDI-related technological spillovers.

However, this literature typically considers only the ability of host country firms to assimilate such knowledge, rather than the relationships between this capacity and the decision by the multinational to engage in knowledge transfer between parent and affiliate, and then the extent of its integration into the host economy. Zahra and George (2002) propose that a regime of appropriability will affect firms' capability to protect the advantages of introducing new products or processes. When appropriability is low and knowledge spillovers are prevalent, firms are less likely to invest in developing absorptive capacities. When appropriability is strong, firms are more likely to develop absorptive capacities and create competitive advantages because there will be high costs associated with imitation from other firms. Especially for technology-leading MNEs, they are found to engage in fewer alliances and exchange fewer workers with domestic firms in host countries to avoid inadvertent knowledge spillovers to local firms. Hence, host countries could benefit more from lower-ranking MNEs than those that are technology leaders (Crescenzi *et al.*, 2022).

The wider literature also acknowledges that MNEs themselves share concerns about the absorptive capacity of domestic firms. Alcácer and Chung (2007) find that FDI in the US considers both the potential gains from knowledge spillovers in the host country and the risks of inadvertent spillovers to local competitors. Less

technologically advanced FDI can absorb more appropriable knowledge produced by industrial innovation activities, and therefore it tends to favour such locations. In contrast, more technologically advanced FDI tends to avoid locations with high levels of industrial activities to protect their knowledge. It tends to be located in regions with high levels of academic innovative activities that produce more basic and less appropriable knowledge. Not only can this approach help such FDI gain knowledge spillovers in a host country, but also can protect their knowledge from local competitors. Crescenzi *et al.* (2022) observe that technology-leading MNEs tend to invest in less developed regions with low absorptive capacity compared with other MNEs to protect their knowledge from spilling over to competitors.

This argument highlights the complexity of the relationship between spillovers and absorptive capacity. Developing the argument above one may assume that multinational firms require a certain level of absorptive capacity in the host country, in order, for example, to source certain inputs and develop local supply chains. Building on the analysis of Girma (2005), a given level of absorptive capacity is then required for the local firms to assimilate knowledge transfer from the inward investors. However, as absorptive capacity increases, the knowledge gap between the inward investor and the local firms decreases, such that the benefits from spillovers, while still present, occur at a declining rate. As absorptive capacity increases, the distance between the local firms and the technology frontier declines, as does the scope for further learning effects.

2.2. Institutions and knowledge transfer

The traditional spillovers literature (for review papers see Meyer and Sinani, 2009; Perri and Peruffo, 2016; Keller, 2021) adopts what one may consider an augmentation of Dunning's (1979) OLI framework, focusing on the incentives for multinational firms to engage in knowledge transfer to exploit their ownership advantages in new markets, with location advantages explaining location. However, this omits the crucial element of country-specific advantages in explaining variations in knowledge transfer and therefore spillovers, and also the importance of institutional quality as a country-specific advantage in this context.

Knowledge transfer may occur at the time of the investment, with technology or knowledge being embedded, for example, in the physical capital, or accompanying the initial investment in the form of managerial skills, or it may occur subsequently as part of the development of the affiliate. Specifically, it has been argued that knowledge transfer by MNEs increases with the quality of host country institutions (Tihanyi and Roath, 2002). The argument underpinning this observation is simple yet powerful. To begin with, a MNE seeks to protect its ownership

advantage, and this requires the protection of intellectual property (Javorcik, 2004; Bransletter *et al.*, 2006; Park and Lippoldt, 2008).[2]

Weak property rights protection hampers inter-firm collaboration for several reasons beyond those connected to the uncertainty of appropriation, which is typically the focus of such deliberations (Buckley *et al.*, 2020). When technology is embedded in physical capital, MNEs are unlikely to make investments in these assets at a host country location if the host country context does not provide adequate property rights protection. Further, if the sanctity of these property rights is to be challenged in a court of law, the MNE would require that the rule of law prevails in the host country context before it contemplates the transfer of technology associated with its ownership advantages. As such, good institutions can create an environment in which inter-organizational trust, which is necessary for knowledge transfer (Garcia-Vega and Huergo, 2017), is based not on prior relationships and informal norms but on the strength of Coasian institutions. Finally, good quality institutions in the host country context may help MNEs overcome weaknesses in their international experience and, more generally, their liability of foreignness (Putzhammer *et al.*, 2018). In particular, good host country institutions can reduce the transaction cost of acquiring local assets (including contractual relationships with local firms that can be part of their supply chains) that have to be bundled with a MNE's ownership advantage to make the business venture profitable/rewarding for the MNE (Hennart, 2009).

To be sure, institutional quality is not given and can evolve over time. Countries are often tied to international and supranational organizations that favour specific types of – usually market-friendly – institutions and are required to adopt them. The evolution of Coasian institutions in Central and Eastern Europe in the post-socialism era and the adoption of market-friendly institutions favoured by the Washington Consensus in developing countries are a testament to this process, but evidence suggests that transplanted formal institutions may not work in the desired way if people in the context in which these institutions are transplanted are not predisposed towards them (Berkowitz *et al.*, 2003). The political economy literature suggests that institutions such as the protection of property rights and the rule of law are an outcome of the political process within a country that determines, among other things, the limits of expropriation by a predatory state (Besley and Ghatak, 2010) and the interest of the players who should demand better formal institutions (Hoff and Stiglitz, 2004). Recent developments in the IB literature suggest that MNEs too adopt strategies that enable them to not just survive in specific host country

[2] While Coasian institutions include both property rights and those ensuring sanctity and enforeceability of contracts, it has been argued that property rights have a "first order" effect on economic outcomes such as growth, while "contracting institutions" only matter for financial itermediation (Acemoglu and Johnson, 2005). This is consistent with the discussion about institutions in the IB literature.

institutional contexts but also to shape the relevant institutions (Regner and Edman, 2014). However, for any given country, the quality of these institutions is arguably stable over a period of time, unless there is significant external intervention, as in the case of the Central and Eastern European countries in the nineties. It is, therefore, often possible to abstract from the evolution of these institutions over time and focus on their cross-sectional differences instead.

To summarise, while institutions are not static and can evolve over time, with the paths of their evolution influenced by internal and external economic and political agents, the importance of well-developed institutions for deeper engagement of MNEs with a host country, in general, and knowledge transfer, in particular, is well established in the literature. The corollary of this is that strategies around co-development of new technology by MNEs in host countries is also influenced by host country institutions such as (intellectual) property rights (Nandakumar and Srikanth, 2016). Recent literature highlights the possibility of "opportune enforcement" of IPRs (Prud'homme and Tong, 2024), which has implications for the institutional quality - knowledge transfer relationship. However, the broad emphasis on institutional quality – property rights, in particular – remains the cornerstone of the literature on technology transfer by MNEs to specific contexts.

2.3 Institutions and spillovers

The above discussion suggests that strong formal institutions facilitate greater spillover, in part by way of greater absorptive capacity and in part by way of greater knowledge transfer. Indeed, the role of institutional quality in shaping knowledge spillovers has been widely recognized in the literature. Villar et al (2020) discuss the literature that contrasts spillover effects in advanced and emerging economies, with the implicit distinction regarding institutional quality. They focus on export spillovers, and highlight the role that local institutions play in fostering a dynamic environment to allow firms to compete internationally. Similarly, Dogan and Wong (2020) focusing on a set of ASEAN countries find that institutional quality enhances FDI spillovers, though the mechanisms by which this occurs, or the nature of the relationship, are not discussed in detail. This overall approach is common in the recent literature, for example Nam et al (2023) or Lebedev and Peng (2024) find that local institutions are important in explaining spillovers, but do not explore the nature of this relationship in detail. More recently, Slesman et al (2021) explore this relationship in the context of institutions promoting local entrepreneurship. They find that a threshold level of institutional quality is needed for inward investment to foster local entrepreneurship.

There are other reasons why high-quality institutions may be associated with greater spillovers. Better institutions enhance labour market efficiency (Nickell and Layard, 1999), making it easier for skilled workers to transfer between firms, which in turn fosters knowledge spillovers via labour turnover. Fairer competition laws can create a level playing field for domestic and foreign firms, encouraging domestic firms to innovate and improve through competition pressure (Fabrizio *et al.*, 2017). High-quality institutions facilitate the establishment of backward and forward linkages between domestic and foreign firms by developing infrastructure to ensure reliable infrastructure, utilities supporting the formation of supply chains, as well as efficient business support services (Schøtt and Jensen, 2016). As a result, domestic firms can derive greater benefits from these linkages with MNEs.

However, an important distinction has to be made about the role of institutions in influencing the absorptive capacity of local firms and MNE strategies. We posit that absorptive capacity of domestic firms in period t is influenced by the quality of institutions in periods t-i, when i = 1, 2, 3, …., i.e., observed absorptive capacity at any given time is a cumulative outcome of operating in a certain institutional context over a period of time. However, given the forward-looking nature of strategy, current institutional quality shapes the expectations of MNEs about the future quality of local institutions and the implications of local institutional quality on future outcomes. These expectations, in turn, influence its strategy, in particular, about knowledge transfer. Accordingly, we discuss next an outcome of good institutions on economic outcomes that matter for MNE strategies, specifically, on the capabilities of domestic firms.

2.4 Institutions and domestic firm capabilities

In contexts where institutions do evolve and improve in quality over time, their economic impact is not limited to MNEs and the impact on the local firms can be significant as well. In part, this is on account of the same benefits enjoyed by their MNE counterparts. For example, as institutional quality improves, local firms are able to invest in technology adoption and internal R&D because of better IPR protection. They are also able to optimally distribute resources within companies, disinvesting from resources that do not contribute to their productivity and financial performance and, simultaneously, investing in resources that can enhance these metrics of company performance. Their ability to access capital markets to invest in key resources and to facilitate the aforementioned strategic repositioning/restructuring is enhanced by more secure property rights associated with tangible assets as well as by improvement in shareholders' and creditors' rights. Finally, these developments also

reduce the cost of market entry and, sometimes, market exit and this Schumpeterian churn, in turn, ensures the survival of the most productive or efficient firms.

This process can perhaps be best understood if we focus on the market for financial resources, which is key to investment in tangible and intangible assets, as well as market entry by new firms. In emerging market contexts, financial markets do not operate well because of some voids within the domain of formal institutions. For example, while it is well established that the use of collateral is required to overcome potential adverse selection problems (Bester, 1987; Jimenez *et al.,* 2006; Godlewski and Weill, 2011), property rights of assets that can serve as collateral are often not well established in emerging market economies, whether on account of absence of appropriate records or account of persistent threats of expropriation by others including the state (Cuervo-Cazurra & Ramamurti, 2015).[3] Weak property rights protection adversely affects the ability of firms to post collateral, thereby making it difficult for them to raise external capital (Maurer and Sharma, 2001; Kerekes and Williamson, 2008). Greater access to outside capital is also facilitated by improvements in the quality of contract enforcement (Quintin, 2010), which is another pillar of formal institutions.

Thus, better institutions are generally associated with firm entry, entrepreneurial activity and firm survival (Desai *et al.,* 2003; Aidis *et al.,* 2009; Baumohl *et al.,* 2019; Audretsch and Fiedler, 2022). This is often on account of greater access to capital and greater willingness to take entrepreneurial risks when property rights are protected. This results in greater market competition that is generally associated with greater allocational efficiency of resources and, more broadly, higher productivity for firms that survive the competition (Gort and Sung, 1999; Holmes and Schmitz, 2010; Backus, 2020). In addition, better enforcement of contracts enables firms to grow and generate scale economies (Van Biesebroeck, 2005), both because it provides better access to external capital and also because it enables firms (or entrepreneurs) to focus on productive activities rather than activities such as lawsuits (Sobel, 2008; Giacomelli and Menon, 2017; Lopez-Martin and Perez-Reyna, 2021), further contributing to productivity growth. Better contract enforcement also enables firms to use complex and customized intermediate goods (Ma *et al.,* 2010), thereby enabling them to move up the value chain. In sum, the competitiveness of emerging market firms grows with improvement in the quality of their formal institutions.

Improvement in formal institutions can also facilitate the internationalization of these firms. For example, improvement in formal institutions is associated with better-functioning capital markets and better contract enforcement, which reduce the incentives for firms to adopt organizational forms that involve family control and

[3] Data from the World Bank suggests that the property rights index has much lower scores for the BRICS countries (Brazil 55.80; Russia 48.70; India 55.40; China 46.70 and South Africa 67.60) than for developed countries such as the USA (79.30); UK (92.20); France (84.00), Germany (81.00) and Japan (86.00).

business groups that reduce the likelihood of outward FDI for a variety of reasons (Bhaumik *et al.*, 2010). To be sure, the existing literature suggests that the internationalization of emerging market firms may both be driven by a desire to escape weak institutions (Gaur *et al.*, 2018; Cui and Xu, 2019) and be facilitated by institutional support that these firms can leverage (Cuervo-Cazurra and Genc, 2008; Landau *et al.*, 2016).

Therefore, high quality institutions are expected to be associated with greater absorptive capacity of local firms in the future. More importantly, it creates a virtuous cycle whereby this absorptive capacity and the ability to develop proprietary technology grows over time. As we discuss in the following section, this poses a strategic challenge for a MNE.

2.5. Multinational strategy

The traditional IB discourse has focused largely on transaction costs associated with weak institutions in host country contexts, where MNE strategy revolves largely around the choice of ownership in the host subsidiary (Driffield *et al.,* 2016) and around the choice of entry mode (Meyer *et al.,* 2009), or the inability of local firms to absorb that knowledge (Girma, 2005; Castellani *et al.*, 2024). This literature adopts a two-stage approach, where the first stage focuses on the investment decision in the context of variations in institutional quality (Dedho et al. 2025) and the second on the decisions regarding technology management and engagement with the local economy subsequent to the decision Amiti et al. (2024). More recent research has focused on MNE political strategies and, among other things, the ability of these organizations to influence the nature of formal institutions in host countries. However, in this literature, the motivation of MNEs to strategize about political engagement with host country governments has largely been the mitigation of political risk arising out of undesirable policy choices of the host country governments. Implicit in this literature is the desire of MNEs to protect their ownership advantage by way of reducing the loss of IPR, as discussed earlier in this paper, but, while the literature on spillovers has discussed the importance of host country institutions in shaping the absorptive capacity of local firms, as well as the concerns and strategies of MNEs around this absorptive capacity, the role of host country (or local) institutions in shaping MNE strategies has not been fully explored and we do that in the rest of this sub-section. The implication of this for the ownership advantages of MNEs remains largely ignored. We explore the strategic implication of this institutional quality-absorptive capacity relationship.

The traditional view of international knowledge transfer shows that the process initially requires knowledge transfer from the MNE to its foreign affiliate, followed by the potential for the generation of externalities (*i.e.*, spillovers) from the foreign affiliates to domestic firms (Driffield *et al.*, 2010). The extensive spillover literature

concerns itself exclusively with measuring the final stage, and this presents an identification problem (Driffield *et al.*, 2024). In practice, there is no guarantee that either condition will be fulfilled, and while it is assumed that international technology transfer is a prerequisite for spillovers, the identification of this stage is seldom discussed within the spillover literature. Not all affiliates automatically have access to the leading technology and knowledge of their parent company, and, notwithstanding the possibility of inadvertent leakage, multinational enterprises frequently go to considerable lengths to internalize their knowledge and prevent or control its transfer to third parties. Therefore, even if intra-firm knowledge transfer occurs, there is no guarantee that the domestic economy in which the affiliate is located will benefit as a result. This raises two questions, which we seek to address here. The first is that to understand the nature of these processes, particularly in the context of FDI to emerging markets, one must first understand the firms' strategy regarding the decision to invest, and secondly one must understand the nature of the location in question. Therefore, we aim to link multinational strategy to the scale and scope of potential spillovers in emerging markets. Our framework is developed from the literature concerning multinational strategy in emerging economies, and specifically the decisions that firms make regarding the degree of embeddedness. The literature has highlighted that MNE strategies in host countries are influenced by local formal institutions. However, the quality of the local formal institutions can also influence the competitiveness of local host country firms. We pose the question, therefore, as to how an MNE would strategize about integration in an emerging market context, when it knows that improvement in local formal institutions not only protects it from expropriation and facilitates market transactions by reducing transaction costs, but this improvement in institutional quality also creates more productive and competitive domestic firms that can absorb frontier technologies more easily.

Building on Rugman and Collinson (2006), we argue that companies face a trade-off between integration to benefit from local supply chains and to foster relationships with local stakeholders, and retaining/defending the protection of their property rights. For simplicity, our model presumes three potential states of institutional quality, low, medium or high, and similar variation in absorptive capacity of host country firms. When institutional quality is *Low*, the threat of expropriation is high and the incentive of the MNE to integrate into the host country market is low. At the other extreme, if institutional quality is *High*, the likelihood of expropriation of the MNE's "technology" is low and hence there is a greater incentive to integrate more with the host country. However, this advantage is offset by the possibility that if greater integration leads to greater spillovers, given the greater absorptive capacity and capabilities of the domestic firms, in the longer run the MNE may face a more competitive local (and perhaps even global) market. On balance, therefore, it is reasonable for the MNE to not pursue a high

degree of integration into the host country market. In other words, the best response of the MNE might be to integrate less with the host country market when the host country's institutional quality is both *High* and *Low*. This gives us the following propositions:

Proposition 1: When the institutional quality in a host country is low/weak, a MNE is less likely to transfer technology to a host country because of the attendant risks associated with the loss of IPR and, by extension, its ownership advantage.

Proposition 2: When the institutional quality in a country is high/strong, a MNE is also less likely to transfer technology to a host country because of the risk of creating local and global competitors by way of spillovers that are strong when the absorptive capacity and capabilities of local firms are high.

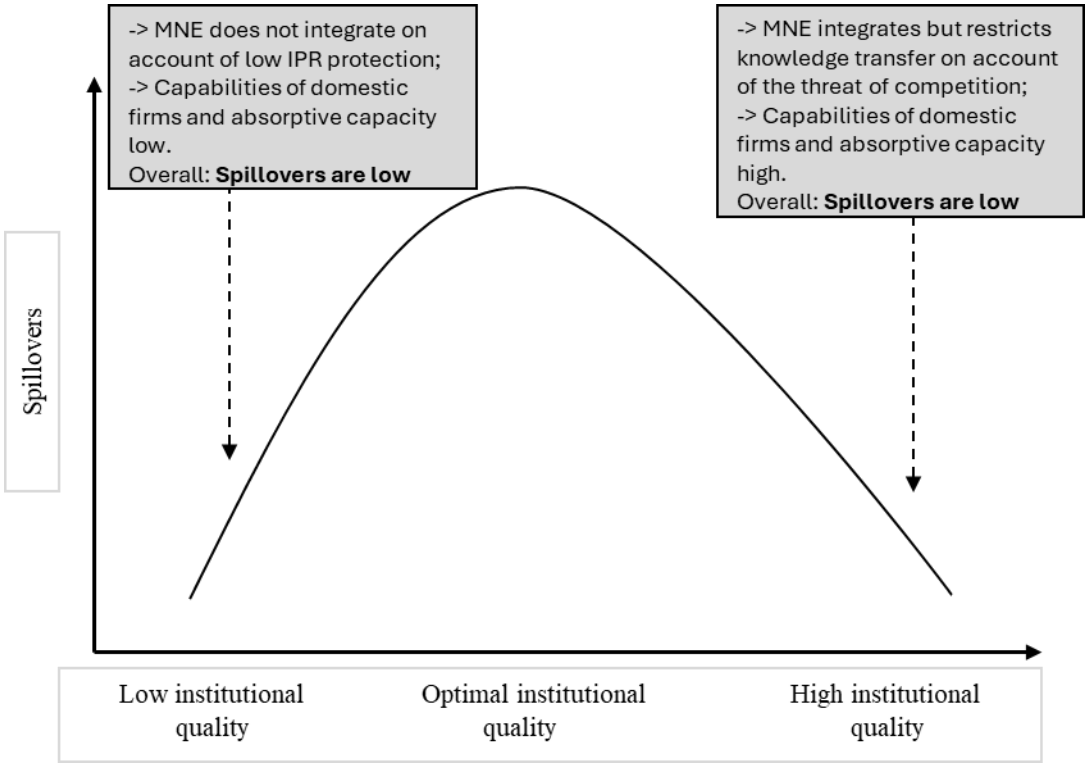
The multinational firm can choose its level of engagement with the host country sector, and this we argue involves certain trade-offs (Rugman and Collinson, 2006). In the context of MNEs investing in emerging markets, this involves a trade-off between the need to retain control of firm-specific assets, as implied by internationalization theory (Narula *et al.*, 2019), and the risks from leakage of those assets in the presence of weak institutions. At the same time, integration with the local economy, and the potential for technological upgrading locally may improve the quality of local suppliers, or be linked to inward investment incentives. While Driffield and Love (2007) explore spillovers in the context of FDI motivation, we argue that one has to understand, and subsequently model the trade-offs that occur within the firm when considering investments in emerging economies

Proposition 2 highlights that beyond an optimal level of institutional quality, with further improvements in institutional quality, increased competition may lead to reduced knowledge transfer from MNEs to domestic sectors. While IB literature often focuses on absorptive capacity of domestic firms and technology transfer by MNEs, it overlooks how institutions influence domestic firms' capabilities and MNE strategies. Stronger institutions, such as improved education systems, infrastructure, and regulatory frameworks, enhance domestic firms' competitiveness. For example, better institutions produce a more skilled workforce capable of absorbing advanced managerial and technological knowledge introduced by MNEs (Corradini et al., 2023). Additionally, efficient financial markets provide domestic firms with the resources to innovate and adapt technologies (Aggarwal and Goodell, 2010).

However, as local firms grow stronger, MNEs may limit knowledge transfer to protect their core competencies and cutting-edge technologies, especially given risks like technology leakage and reverse engineering, even with intellectual property protections (Alcacer and Chung, 2007, 2014). Furthermore, strong institutions foster industrial clusters and business networks, facilitating informal knowledge spillovers between MNEs and domestic firms (Breschi and Malerba, 2001). Consequently, as institutions strengthen, MNEs may adopt more cautious strategies to safeguard competitive advantages.

This aligns with the inverted U-shaped relationship between institutional quality and spillovers, where better institutional quality initially enhances spillovers but can eventually lead to a strategic reduction in knowledge transfer by MNEs as domestic firms grow more competitive. Strong institutions facilitate knowledge spillovers by reducing transaction costs and improving contract enforcement; however, they also enable domestic firms to accumulate absorptive capacity and enhance their capabilities, creating a credible competitive threat to MNEs over time. This is captured in Figure 1.

Figure 1: Conceptual scheme of institutions, knowledge transfer, and spillovers



Our framework then allows us to develop two hypotheses that both emphasize the importance of absorptive capacity in explaining knowledge transfer, and distinguish between the effects of absorptive capacity and institutional quality. Implicitly, our framewok considers the incentive for a firm to engage in knowledge transfer

from its home country to the host country, as well as the scale and scope of knowledge transfer from the affiliate to the local economy. We argue that to develop an empirical construct for this, it is necessary to unpick the respective roles of institutions and the nature of local firms. Therefore, we focus on the role of absorptive capacity at the level of the local firm, as well as the non-linear relationship between host country institutions and spillovers.

Based on the above discussion, we hypothesize that:

Hypothesis 1: Given a level of knowledge transfer by MNEs, spillovers increase with the level of absorptive capacity, but at a decreasing rate.

Hypothesis 2: For a given level of absorptive capacity, the relationship between spillovers from FDI and institutional quality will exhibit an inverted U shape relationship.

3. Empirical strategy and methods

3.1. Two-stage random parameter model

Our paper aims to investigate the role of the absorptive capacity of domestic firms and quality of institutions of the host environment in shaping MNEs' strategies when investing in emerging markets and, therefore the impact on the local economy. In doing so, our empirical strategy needs to allow us to investigate (1) the effect of inward FDI on productivity returns of local firms (*i.e.*, spillovers), and (2) whether the size of such spillovers can be the result of host local characteristics influencing MNEs' strategies in the host location, and in turn, whether different investment projects can generate heterogenous spillover returns based on the characteristics of the local context in which the investment takes place. Thus, we approach this investigation with a two-step econometric strategy exploiting some features of random parameter (mixed-effect) models (RPMs). In the first stage, we estimate the association between inward FDI projects and local productivity using a random parameter model. RPMs allow to control for unobserved heterogeneity in regression coefficients, as they allow coefficients to vary by group (*e.g.*, firm, region, project), and directly model such heterogeneity. From this first stage, we derive an average coefficient (similar to standard regressions) and a standard deviation, signalling a heterogeneous influence of the foreign presence across groups (*i.e.*, in our case, FDI projects). In the second step, we exploit one of the properties of RPMs and we predict group-level parameters. We use this predicted parameter as a dependent variable in a second-stage regression to investigate whether and how host country characteristics can explain its

variation across investment projects (Greene *et al.*, 2009; Hawk and Pacheco-de-Almeida, 2018; Castellani and Lavoratori, 2020).

3.1.1. First stage – Effect of inward FDI on local productivity

Random parameter models represent an appealing response to go beyond average effects and explicitly model heterogeneity, something that standard regression models cannot do directly (Alcácer *et al.*, 2018). RPMs are a special case of multilevel (or hierarchical) linear models, relevant when the data present a hierarchical structure. In our case, the data present a two-level structure, where the first level is represented by the local firms exposed to the presence of the focal MNE's investment project, which represents the second (higher) level: local firms (observations) are nested within investment projects in a given city. This allows us to predict the heterogenous effect at the investment project level on the host local productivity. In other words, our units of observation are pairs of local firms (*j*) and focal investments (*i*) in a given city (*c*) where the investment project takes place. Considering a linear regression model formalized as follows,

$$Y_{ij} = \alpha + \beta_{\square} X_{1ic} + \theta X_{2c} + \delta_{\square} X_{3j_{\square}} + \varepsilon_{ij} \quad (1)$$

where Y_{ij} is the dependent variable, X_{1ic}, X_{2c}, and X_{3j} are a set of project-location, location and local firm characteristics, respectively. If we allow for differential intercepts at the project level, the randomness of the intercept is introduced (α), whereas $\beta_{\square}$, θ and $\delta_{\square}$ are fixed coefficients equal to all firms. The coefficient α can be now expressed as:

$$\alpha_i = \gamma_{00} + u_{i0} \quad (2)$$

where γ_{00} is the overall mean, and u_{i0} is the random part of the model consisting of higher-level residuals as the distance from the sample mean related to the project-level group *i*.

So far, the model assumes homogeneous average effects associated with the explanatory variables, hiding possible heterogeneous patterns. As discussed in section 3.1, RPMs can explicitly model such heterogeneity, allowing for the randomness not only in the intercept but also in the slope of some explanatory variables by estimating group-specific parameters. Thus, considering the variable X_{1ic} as our variable of interest, in (1) it can be set as random at the project level *i*, and the model can be formally extended as follows,

$$Y_{ij} = \gamma_{00} + u_{i0} + \beta_i X_{1ic} + \theta X_{2c} + \delta_{\square} X_{3j_{\square}} + \varepsilon_{ij} \quad (3)$$

where

$$\beta_i X_{1ic} = \beta_0 X_{1ic} + u_i X_{1ic} \quad (4)$$

namely β_0 is the overall mean slope and u_i is the slope deviation for project *i* for the variable X_{1ic}. β is allowed to vary by project *i*, with a probability density function g(.)[4], decomposed in its mean coefficient (β_0) similar for all firms and a standard deviation (σ). In equation (4), u_i is the deviation from the mean coefficient β associated with project *i*, randomly distributed with mean zero and standard deviation σ. A significant σ reveals that different projects may generate different benefits for the host local economy. Since each investment project is a one-time event, we treat the data as a cross-section analysis, and the explanatory variables are lagged by one period to address potential endogeneity problems. We also include year, industry and host country dummies to control for unobserved factors.

3.1.2. Second stage – Heterogenous returns from Inward FDI

There are two main traditional approaches to account for heterogeneity. The first one consists of splitting the sample into subsamples by some relevant characteristics under investigation, performing the analysis for each subsample and then comparing coefficients; the second consists of using interaction terms between the variable of interest and firm/host location characteristics as an additional explanatory variable. However, these two approaches have several limitations (for a detailed discussion, see Alcácer *et al.*, 2018), especially when several moderating factors operate simultaneously, or non-linear relationships exist (Lavoratori and Castellani, 2021; Castellani *et al.*, 2024).

Using the results from the first stage, if the variable of our interest will present a significant standard deviation of the random parameters, it means that a source of heterogeneity exists and we aim to understand which factors may explain it.

In so doing, we exploit one of the characteristics of RPM and we estimate project-level coefficients (β_i) by predicting the project-specific random component u_i, which captures the effect of our variable of interest (X_{1ic}), i.e. the capital expenditure of the focal investment *i* in the city *c*, on the local productivity, across investment projects. Then, this vector can be used as a dependent variable in a second-stage regression, where several explanatory variables can enter the model simultaneously in order to explain its variation. Following Saxonhouse (1976) and Hornstein and Greene (2012), we use this predicted parameter β_i as a dependent variable in a second-stage OLS estimation. More formally and following our hypotheses,

[4] We assume that β_i is normally distributed, namely $\beta_i \sim N(\beta, \sigma)$.

$$Spillovers\ (\beta_i) = \gamma_0 + \gamma_1 X + \gamma_2 X^2 + \sum_{g=3}^{n} \gamma_g X_g + \epsilon \quad (5)$$

where, β_i (*Spillover*) is the vector of predicted project-specific coefficients, X represents our main explanatory variables and their quadratic form (i.e. quality of institutions and absorptive capacity), while X_g are host city, industry and country controls. In the first stage, we also obtain the standard error of each estimate together with the coefficient of interest. These estimated standard errors are then used as weights for the second-stage regression to control for heteroscedasticity issues potentially affecting estimated parameters (Saxonhouse, 1976; Hornstein and Greene, 2012).

4. Empirical setting

4.1. Data

Given the aim of the paper and our empirical strategy, we organize the data collection in three steps. First, we collect data on FDI projects undertaken by companies from developed countries investing in developing countries based on the classification provided by UNCTAD[5], and operating in four manufacturing sectors classified by Eurostat[6] as medium-high and high-tech sectors where FDI spillovers are more likely to happen, that is the manufacturing of electrical equipment, computers, machinery and equipment and automotive[7]. Our analysis relies on data from the Orbis CBI database, which covers detailed information on greenfield investments and merger and acquisition (M&A) deals worldwide. The dataset is compiled and made available by Moody's (formerly by Bureau van Dijk). The CBI dataset provides detailed information on the investment projects, such as the parent company name and BVD identification number, its home country, the destination country and city of the project, the type of investment (greenfield vs. M&A deals), and the capital expenditure in USD. All projects missing data for any of these relevant variables were removed from our sample[8]. Thus, our final sample is composed of 1,266 investment projects over the period 2013-2017. 8% of these projects are M&A deals, but the majority (92%) are greenfield projects. The FDI projects are from 28 developed countries, more specifically, as reported in Table A.1 in the Appendix, around 18% of projects are from Asia (Japan), 45% from Europe and 36% from North America, where the USA and Germany represent the main investors. These investment projects take place in 30 developing countries in 201 host cities, while 10% of projects go to Mexico, the majority of

[5] For more details, please see https://unctadstat.unctad.org/EN/Classifications/DimCountries_All_Hierarchy.pdf
[6] For more details on the classification, please see https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:High-tech_classification_of_manufacturing_industries
[7] More specifically, 2-digit NACE Rev. 2 code 26-Manufacture of computer, electronic and optical products, 27-Manufacture of electrical equipment, 28-Manufacture of machinery and equipment n.e.c., 29-Manufacture of motor vehicles, trailers and semi-trailers. The companies can report this sector as primary or secondary sector.
[8] Moreover, in order to include the project in the sample, we need to be able to collect the relevant information of local firms located in the destination cities of our focal investments (second step), this is crucial to estimate our first stage.

investments take place in Asia, leaving 3% of projects in Africa. The distribution of projects by destination country and city is reported in Tables A.2 and A.3.

Second, from the first step, we have the list of host cities we are interested in as recipient locations of the FDI projects under investigation. We collect data on the local firms operating in these cities from Moody's Orbis database over the period 2013-2018, and operating in the four main sectors, along with three additional sectors linked through backward and forward linkages, i.e. NACE Rev. 2 sectors 24-Manufacture of basic metals, 25-Manufacture of fabricated metal products, except machinery and equipment, 33-Repair and installation of machinery and equipment. This returns about 33,000 local firms, 65% of which operate in the four main sectors (NACE 26-27-28-29), and the remaining 35% in backward/forward sectors (NACE 24-25-33). The distribution of companies across cities is reported in Table A.4 in the Appendix. These companies and their productivity will be the basis of analysis in the first stage equation, where the unit of analysis is the dyad local firm-FDI project.

Finally, we collect relevant data at the host country level from several sources, such as the World Bank, World Economic Forum, and Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).

4.2. Measures

4.2.1. First stage – Effect of inward FDI on local productivity

As discussed in section 3.1.1, in the first stage we estimate the effect of FDI projects on the productivity of local firms located in the cities where these investments take place. We then use this information to compute a measure of spillovers, using the estimated coefficients.

Dependent variable. Our dependent variable is a measure of the productivity of local firms located in the selected cities, and we measure their labour productivity as the output (revenue) per employee.

Independent variable. The main explanatory variable is a measure of the foreign presence in the host city. Using information from CBI, we measure the foreign investment as the USD value of capital expenditure related to each focal investment project (*FDI project value*).

Since we can have multiple investors in the same city in the same year, we control for the presence of other foreign multinationals in two ways: first, by computing the sum of capital investment of other FDI projects in the city-year excluding the focal one (*Capital value other FDI projects*); second, by calculating the proportion of capital investment from other projects (excluding the focal one) to the total capital expenditure in the city-year (*Share of other FDI projects*).

We also include traditional controls of host firm and city characteristics. More specifically, we control for the age of the local company, and its size. Firms with more than 250 employees are classified as large, medium-sized with 50-250 employees and small with less than 50 employees.

We also compute the total assets of firms located in the host city (*Tot. assets in city-sector*), the number of companies in the city operating in the same sector of the firm (*No. firms in sector-city*) and the number of firms in the city operating in other sectors (*No. firms in other sectors-city*), as measures of (specialization and diversification) agglomeration economies. We also include industry, year and country fixed effects. Explanatory variables are lagged by one year (t-1).

4.2.2. Second stage – Heterogenous returns from inward FDI

The second-stage regression aims to investigate the host country and project factors that can explain the heterogeneous returns on local productivity.

Dependent variable: Spillovers. Using the results from the first stage, we predict the "spillover parameter" for each FDI project, which measures the extent of spillovers from the presence of the focal MNE in the local economy. We use this parameter as the dependent variable in our second-stage regression.

Independent variables.

To test Hypothesis 1, we compute a proxy of *absorptive capacity* in the local economy as the current level of aggregate labour productivity at the host city. We follow Olley and Pakes (1996) and compute the *aggregate productivity* at the city level as a share-weighted average of the firm labour productivity of all firms gathered from Orbis operating in the selected sectors. In other words, we sum productivity levels using firm-level output shares as weights. We also compute its quadratic term to test possible non-linear relationships between absorptive capacity and the extent of spillovers.

In order to test Hypothesis 2, our main explanatory variable is the *quality of institutions* in the host economy and its quadratic term. We rely on several indicators, (1) Rule of Law (RL), from the Worldwide Governance Indicators[9] (WGI), captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. (2) Control of Corruptions (CC), from WGI, captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as

[9] For additional details: https://info.worldbank.org/governance/wgi/

well as "capture" of the state by elites and private interests. (3) Property rights (PR), from the World Economic Forum[10], as part of the global competitiveness indicators based on surveys. In this case, the question is: "In your country, to what extent are property rights, including financial assets, protected? [1 = not at all; 7 = to a great extent]". Due to the high correlation between indicators, we treat them as alternative measures to check the robustness of our results.

Finally, we control for several other host characteristics at the country, city and FDI project levels. At the level of the country, we control for the *size and development* of the host country, using the GDP and GDP per capita; i*nflation*, as the GDP deflator considering the prices of all goods and services produced; and *international openness* as the flows of inward FDI collected from the World Bank. We also control for the *labour market* using the unemployment rate modelled by the International Labour Organization, and the *geographical distance* between home and host countries (capital to capital) gathered from CEPII.

At the level of the city, we computed two measures to capture the level of *agglomeration economies*: the number of firms in the city in the same sector and the number of firms in other sectors, from Orbis. Finally, we include a control at the level of the FDI project to account for the *type of industry* (NACE 26 is the only one classified as high tech among the four, and the others are medium-high tech) and the *type of the FDI project* (Greenfield, as a dummy equals f the investment project is a greenfield, instead of an M&A deal, from CBI). Year fixed effects are also included. All explanatory variables for the second stage are determined based on the year of the investment, which is the year preceding the spillover parameters (the dependent variable in the second stage).

Table 1 reports the list of (first- and second-stage) variables and descriptive statistics. Table A.5 in the online appendix reports the correlation matrix.

[Table 1 goes here]

5. Results

5.1. Results – first stage

As discussed in Section 3, we start with the first stage analysis at the firm level from emerging market economies to estimate project-level spillover effects on labour productivity of domestic firms in host cities receiving FDI from developed economies. These project-specific spillover estimates (*i.e.,* coefficients that vary by focal FDI project) are then used as dependent variables in the second stage (discussed in the next section),

[10] For additional details: https://tcdata360.worldbank.org/indicators/h1cdfe8bd?country=BRA&indicator=634&viz=line_chart&years=2007,2017

linking host-country and city heterogeneity and the role of institutions to explain the variation in the extent of spillovers.

The results of the first stage of spillover analysis are shown in Table 2, based on a mixed-effect model with random parameters (Equation 3), with the log of labour productivity at the local firm level as the dependent variable. We observe a positive, and statistically significant, mean value of the key explanatory variable in this model - the USD value of capital expenditure in the focal FDI project (*FDI project value* in Table 2). This variable also reports a statistically significant standard deviation, suggesting that some heterogeneity exists among FDI projects. Figure A.1 in the Online Appendix graphically shows this by plotting the kernel density distribution of the estimated FDI project level parameters of FDI spillovers. It points out that almost all observations of spillover coefficients take an estimated value that is larger than zero, but it shows a significant variation in the estimated spillovers by focal FDI project. This heterogeneity is fully consistent with the expectation that spillovers are highly context-specific: depend on local absorptive capacity (Girma, 2005; Castellani *et al.,* 2024), motivation of FDI, ownership share of FDI in local affiliates and local institutional development (Meyer and Sinani, 2009; Bhaumik *et al.,* 2019). We aim to investigate the contingent factors that explain this variation.

Controlling for other FDI projects in the same city is important in our first stage model, in order not to attribute the effects of other projects in the same city to the focal one. The variable indicating the share of other FDI projects in the city is a significant factor in local firms' productivity, in addition to the focal FDI project's own value. We further control for firm size and age and various agglomeration-diversification types of effects in the spillover regression model.

We observe from Table 2 that small (with less than 50 employees) and large firms have on average higher productivity than medium-sized firms. An increase in firm age is associated with higher productivity. We further show that the agglomeration and diversification effects at the sector-city level matter for firm productivity. Firms in larger sectors, in terms of total assets of the sector, have higher labour productivity. Firms operating in cities with a larger number of firms in other sectors have also higher productivity. This may reflect the diversification-related benefits such as knowledge transfer effects in the form of Jacobian spillovers (Beaudry and Schiffauerova, 2009). Finally, we control for year, country and industry fixed effects, to account for unobserved other aggregate level drivers of productivity of local firms.

[Table 2 goes here]

5.2. Results – second stage

This section investigates empirically the heterogeneity of FDI spillovers and tests the Hypotheses 1-2. We focus on discussion of the effects on the roles of the key interrelated components of our conceptual model of FDI spillovers: the interaction between the institutional quality of the host economy, the absorptive capacity of local firms, MNE strategy and the consequences of these interactions on the knowledge transfer from MNEs to the host economy. In particular, the novel addition to the prior literature links the role of MNE strategy to integrate or not with networks of firms in the host economy. This enables us to explain why spillovers may vary and why prior empirical studies often find mixed evidence on spillovers, with the results highly depending on the context of FDI and host economy (*e.g.*, literature reviews in Bhaumik *et al.*, 2019; Keller, 2021, among others).

In the following regression models, we use the levels and squared terms of absorptive capacity and institutional variables of the host economy as key explanatory variables of the FDI project-specific spillover parameters estimated from the first stage discussed in the previous section. The main empirical relationship of interest is whether there is an optimal level of institutional quality and local absorptive capacity that maximises the level of FDI spillovers, as suggested in Hypotheses 1-2.

[Table 3 goes here]

An important component in our conceptual model and empirical analysis is the link between the absorptive capacity of local firms in a host city and the extent of spillovers. We proxy the absorptive capacity of the host city with the aggregate labour productivity of local firms in the city. We observe an inverted U-shaped relationship between the absorptive capacity and the extent of spillovers (see Mod. 1a in Table 3 and Figure 2). Thus, there is an optimal level of absorptive capacity of firms in the host city that maximises the benefits of FDI, after that spillovers returns start decreasing. We note that the optimal level (*i.e.*, a turning point) in the inverted U-shaped relationship in Figure 2 is reached at a lower level of productivity than the mean productivity level of the sample. This means that the majority of observations are located at the downward-sloping part of the curve in Figure 2: in the case of these host cities and FDI projects the high level of local absorptive capacity (*i.e.*, high competitiveness of local firms) is limiting positive spillovers. This finds support to our Hypothesis 1 and emphasises the need to explore the non-linear effects of institutions and local absorptive capacity on FDI spillover generation, to advance a more traditional view that a high level of institutions fosters spillovers and a low level limits them. This result is consistent across specifications.

[Figure 2 goes here]

Turning to the quality of institutions (Hypothesis 2), we estimate for comparison purposes simple regression models based on a naïve assumption that the effect of institutions is linear and monotonic, with the set of controls as outlined in section 4.2.2. Unsurprisingly, none of the institutional variables turns out to be significant in these simple spillover models (see Mod. 2, 3 and 4 in Table 3).

These findings hide significant non-linearity. As expected, once we add the quadratic term of each institutional variable to the second-stage models of spillovers, we find clear evidence of a statistically significant and inverted U-shaped relationship between institutional quality and the magnitude of spillovers (see Table 3 and Figures 3-5). This means that a 'medium' level of development of institutions is the best for maximising the spillovers of FDI in a host city, compared to both 'low' and 'high' levels of institutional development. This result is fully consistent with the general underlying conceptual model of spillovers that we have developed in the earlier sections of the paper.

The non-linear inverted U-shaped effect is there in the case of all the institutional variables that we cover: in the case of rule of law (Mod. 2a in Table 3 and Figure 3), control of corruption (Column 3a in Table 3 and Figure 4), as well as the level of protection of property rights – although less precisely estimated (Column 4a in Table 3 and Figure 5). In the case of the rule of law, control of corruption and protection of property rights, the levels of institutional variables that maximise the value of spillovers are also close to the mean value of these institutional variables in our estimation sample. For example, in the case of the rule of law indicator, the turning point where the positive effects of FDI projects are maximized is at value 0.3. The mean value of the same variable in the estimation sample is close to that, with a mean value of 0.09. In general, for host countries and cities with below-average institutional development levels, improvement in the rule of law, corruption control and property rights protection is spillover-enhancing. For them, the implications of improved institutions on spillovers follow the more conventional view of the positive role of institutions in knowledge transfer from FDI. However, the opposite result holds for host cities with a higher than average level of institutions, supporting our Hypothesis 2.

[Figures 3, 4, 5 go here]

In all our regressions we account for several control variables at the host city, host country and project level. The number of firms in the same city, used to capture agglomeration, is a statistically significant factor of

spillovers, with a negative association suggesting that highly specialized cities benefit less from FDI. However, the indicator of diversification (Jacobian type of spillovers) - the number of firms in other sectors - is associated with a higher magnitude of spillovers (Beaudry and Schiffauerova, 2009; Castellani *et al.,* 2024). Among the host country-specific variables, GDP per capita, inflation and geographic distance between the capitals of the host and home country of FDI are significant. Distance matters: destinations that are farther away from the home country of investors gain less in terms of FDI spillovers. This reflects the standard findings from gravity models of FDI and trade (*e.g.*, Baier, 2019). We further account for the fact that the FDI project is a greenfield FDI or M&A. There appears to be on average no difference in spillover effects between these two types in the case of our dataset. Finally, we control for industry-specific effects. Here, the NACE high-tech sector 26 (Manufacture of computer, electronic and optical products) has consistently stronger spillovers compared to the other medium high-tech sectors covered in our analysis (NACE 28 and 29).

6. Conclusions

This study aims to shed additional light on the role of institutions in facilitating knowledge spillovers in the context of MNEs. The existing body of literature has mainly investigated the linear relationship between favourable institutional quality and knowledge transfer, along with the sub-national level of absorptive capacity of local firms. This paper presents a more complex interrelations between the host environment and MNE strategy, therefore spillovers, proposing an inverted-U relationship: MNEs might hesitate to transfer knowledge to subsidiaries not only in environments with poor institutional quality, as traditionally discussed, but also in those characterized by high institutional quality.

The evidence presented is in accordance with the proposed conceptual model, which emphasises the role of MNE strategy in interaction with local institutions and absorptive capacity. At low levels of institutional development, MNEs would endeavour to limit spillovers and knowledge transfer to the host economy because of concerns concerning the lack of IP protection, limited enforceability of contracts and weak courts of law, to avoid the appropriation of MNE's intangibles by local firms. At low starting levels of institutional quality in a host city, an improvement in institutions would guide strategic decisions of the MNE towards lesser use of defensive strategies and more integration of the MNE with local firms, consequently a likely increase in spillovers.

At high levels of quality of local institutions, the local firms have built strong capabilities (Liu, 2008; Haskel *et al.,* 2007; Meyer and Sinani, 2009), including complementary knowledge assets and strong absorptive capacity in the future (Zahra and George, 2002). These complementary knowledge resources make them more able to

engage successfully in innovation and building of intangibles, as suggested also by the profiting-from-innovation framework in Teece (1986), to absorb external knowledge (Cohen and Levinthal, 1989) and combine it with their own knowledge investments, consequently making them potentially significant competitors for MNEs.

In that case, multinational firms are deterred from becoming embedded in the local economy due to concerns of high levels of local, regional (and in some cases potentially also global) competition. The strong capabilities of incumbents for building their own intangibles and learning from external sources leads to a higher risk of spillovers and consequently to a more defensive strategy of the MNE to limit knowledge transfer. These considerations can for example also affect the decision of the firm whether to produce the knowledge-intensive inputs within the boundary of the MNE or to source these from local external partners.

As a result of the two types of opposing effects, there is going to be an optimal level of institutional quality that maximises the spillovers to the host city. The results of our empirical analysis strongly support this proposition. The empirical results suggest that the best response of the MNE would be to integrate less with the host country market both when the host country's institutional quality and local absorptive capacity are 'High' and 'Low', and integrate most when the host country's institutional quality is 'Medium'.

This brings important contributions and policy implications. In terms of maximising the benefits from inward investment, this highlights the need to better understand the relationships between firm-specific assets and local institutions. One may need for example to think in terms of appropriate institutional level, rather than an absolute improvement in institutional quality as articulated in the so called Washington consensus. As an illustration, strong intellectual property rights protection boosts local productivity, and attracts FDI, but may limit the scale of spillovers from that investment. If local policy is focused on investment lead endogenous growth, then a more nuanced policy towards patenting may be required, or countries may seek to link FDI incentives to knowledge sharing, effectively moving the turning point in the relationship between spillovers and institutional quality to the right.

Similarly, our results suggest that small changes in IP protection can influence firm-level investment decisions that may limit a country's ability to participate in global value chains. Collectively, our results suggest that where institutions are weak, improving these has the greatest return, in terms of FDI attraction, inflows of knowledge and in terms knowledge transfer from inward investors to domestic firms. Our results suggest that above all, improving areas of institutional weakness has the greatest benefit. In devolved economies, this may require intervention to improve knowledge ecosystems at a local level, as well as nationally focused initiatives targeting certain sectors. Similarly, this raises some interesting questions for entrepreneurship scholars, regarding

the best mechanisms for fostering productivity growth in the types of firms that may appropriate this knowledge. This traditional literature in this area, see for example Mansury and Love (2008), focuses on innovation as the main source of productivity growth, and while our findings are consistent with this, one may also suggest a wider set of interventions to support local firms. This may include programmes to assist firms in becoming suppliers to MNEs, and access to finance to boost productivity.

Our results suggest that an interesting avenue for research could be the interplay between institutions and local productivity for maximising, not FDI flows, or even knowledge transfer between inward investors and local firms, but the overall benefits of FDI. We have demonstrated that a key consideration for a multinational firm in terms of its decision to transfer knowledge to an emerging economy is the nature of institutions that it will encounter and that this relationship is non-linear. At the same time, it is reasonable to assume that the level of local absorptive capacity is in part a function of past institutions. For a country then seeking to maximize the gains from attracting inward FDI, this represents a nontrivial trade-off between the "optimum" level of institutional quality that attracts the highest levels of foreign knowledge, and the potential trade-off between this and a potentially greater level of institutional quality that facilitates higher productivity growth in the local economy. This calls for future research on the complex interrelationships between institutions and absorptive capacity, MNE strategies and FDI spillovers.

Furthermore, we adopt a novel methodological approach that enables a more granular investigation of spillovers, beyond the average effects of FDI presence in a sector (Castellani et al. 2024), or in downstream or upstream sectors, as conventionally investigated in standard analysis of FDI spillovers (*e.g.*, in seminal empirical papers such as Aitken and Harrison 1999; Javorcik 2004). A recent study on FDI spillovers using transaction-level data in Costa Rica by Alfaro-Urena *et al.* (2022) highlights significant limitations of standard FDI spillover analyses, which fail to capture the heterogeneous effects of FDI. Similarly, Keller (2021) underscores the shortcomings of conventional approaches to studying spillovers. Our analysis focuses on contextual factors related to the institutional environment, explaining variations in FDI spillovers. However, this empirical approach allows to control for a rich set of factors, at different levels, namely project, country, region and firm levels. Future studies could extend this research by exploring additional factors explaining the variation of FDI spillovers, and deepening the investigation on the characteristics of MNEs. Additionally, we present new evidence on the relationship between the quality of institutions and the magnitude of FDI spillovers. However, this relationship is inherently complex, as institutions are intertwined with several factors that may deter MNE integration. Future research should further investigate these mechanisms. Finally, our analysis relies on cross-sectional data and we

cannot observe the dynamic over time on institutional quality and FDI. A longitudinal study could examine how changes in institutional quality over time affect spillovers, and observe the phenomenon across diverse sectors of the economy. Our study focuses on the role of formal institutions, future research can explore the role of informal institutions which are often critical in emerging countries.

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Table 1. List of variables and descriptive statistics, first and second stage.

Variable	Description	Level	Source	Obs	Mean	Std. Dev
First stage						
DV: labour productivity	Labour productivity, revenue per employee at time t, in log	recipient	Orbis	309,131	11.83	1.26
FDI projects						
FDI project value	Capital investment of the focal FDI investment, in USD at t-1 (log)	Project/city	CBI	309,131	16.66	1.57
Capital value other FDI projects	sum of capital investment of other FDI projects in the city-year (excl. the focal one), at time t-1, log	Project/city	CBI	309,131	18.18	5.17
Share of other FDI projects	share of Capital investment of other projects to total capital expenditure in the city-year	Project/city	CBI	309,131	0.78	0.32
City characteristics						
No. firms in sector-city	Number of firms in the city in the same sector of the focal firm, at t-1 (log)	City	Orbis	309,131	6.64	0.95
No. firms in other sectors-city	Number of firms in the city in other sectors, at t-1 (log)	City	Orbis	309,131	8.05	0.75
Tot. assets in city-sector	Total assets of firms located in the host city, in the same sector of focal firms, at time t-1, log	City	Orbis	309,131	23.70	3.49
Firm characteristics						
Firm age	Age, considering year of incorporation and the year of analysis (log)	recipient (local firms)	Orbis	309,131	2.34	0.78
Firm size: Large	Dummy =1 if firm is classified as large	recipient (local firms)	Orbis	309,131	0.41	0.49
Firm size: Small	Dummy =1 if firm is classified as small	recipient (local firms)	Orbis	309,131	0.23	0.42
Second stage						
Institutions						
Rule of Law	Rule of Law (RL) captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Country	WGI, World Bank	1,266	0.09	0.74
Control of corruption	Control of corruption (CC) captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Country	WGI, World Bank	1,266	0.07	0.85
Property rights	Global competitiveness indicator, based on the question: In your country, to what extent are property rights, including financial assets, protected? [1 = not at all; 7 = to a great extent]	Country	World Economic Forum	1,259	4.71	0.74
City characteristics						
Aggreg. Labprod in the host city	Aggregate labour productivity at the city level, computed following Aggregate labour productivity in the host local city, following Olley and Pakes (1996)	City	Orbis	1,266	12.50	1.23
No. firms in sector-city	Number of firms in the city in the same sector of the focal firm, at t-1 (log)	City	Orbis	1,266	2.39	1.87
No. firms in other sectors-city	Number of firms in the city in other sectors, at t-1 (log)	City	Orbis	1,266	3.70	1.83
Country characteristics						
GDP	GDP, log	Country	World Bank	1,266	28.21	1.50
GDP per capita	GDP per capita, log	Country	World Bank	1,266	9.13	1.08
Unemployment rate	Unemployment total, as percentage of total labour force	Country	World Bank	1,266	5.03	3.42
Inflation, GDP deflator	Inflation, GDP deflator	Country	World Bank	1,266	2.46	3.58
IFDI	Inward FDI, log	Country	World Bank	1,266	24.66	1.40
Geo distance (capital to capital)	Geographical distance between countries of origin and destination (capital to capital), log	Country	CEPII	1,266	8.94	0.51
Type: Greenfield	Dummy = 1 if the investment project is a greenfield, 0 if M&A deal	Project/city	CBI	1,266	0.92	0.27

Table 2. First stage: estimating productivity spillovers of focal FDI project in the host city, multilevel mixed-effect model.

		Mod_1	
DV: labour productivity		**Mean**	**Std. Dev**
FDI project value		0.0163***	0.0188***
	se	(0.0057)	(0.0187)
	pvalue	([0.0045])	([0.0001])
Capital value other FDI projects		0.0003	
		(0.0023)	
		([0.8803])	
Share of other FDI projects		0.2046***	
		(0.0440)	
		([0.0000])	
Firm age		0.2789***	
		(0.0031)	
		([0.0000])	
Firm size: Large		0.1386***	
		(0.0050)	
		([0.0000])	
Firm size: Small		0.2332***	
		(0.0070)	
		([0.0000])	
No. firms in sector-city		-0.0125***	
		(0.0045)	
		([0.0050])	
No. firms in other sectors-city		0.0444***	
		(0.0084)	
		([0.0000])	
Tot. assets in city-sector		0.0191***	
		(0.0016)	
		([0.0000])	
Contant		6.0585***	0.4349***
		(1.1878)	(0.2324)
		([0.0000])	([0.1192])
Random-effects parameters (Project level)			
Corr (Project value, cons)		-0.9389***	
		(0.0381)	
		([0.0000])	
Std dev (Residual, Total)		1.1674***	
		(0.0015)	
		([0.0000])	
year fixed effects		yes	
country fixed effects		yes	
industry fixed effects		yes	
No. of obs		309131	
Log-pseudolikelihood		-487204.02	
p_value comparison test (Multilevel vs. OLS)		0	
covariance		unstructured	
Sectors (recepients)		24-25-26-27-28-29-33	
MNE sectors (Inward FDI)		26-27-28-29	

Notes. The dependent variable is labour productivity. Standard errors in parenthesis below point estimates, p-values in square brackets below the standard errors. Asterisks denote confidence levels: *p<0.10, **p<0.05 and ***p<0.01. The random parameter model is estimated using the 'mixed' package (StataCorp 2013) in Stata 14 and 16, with the covariance(unstructured) option which allows for all variances and covariances to be distinct, and the correlation between random slopes and intercept.

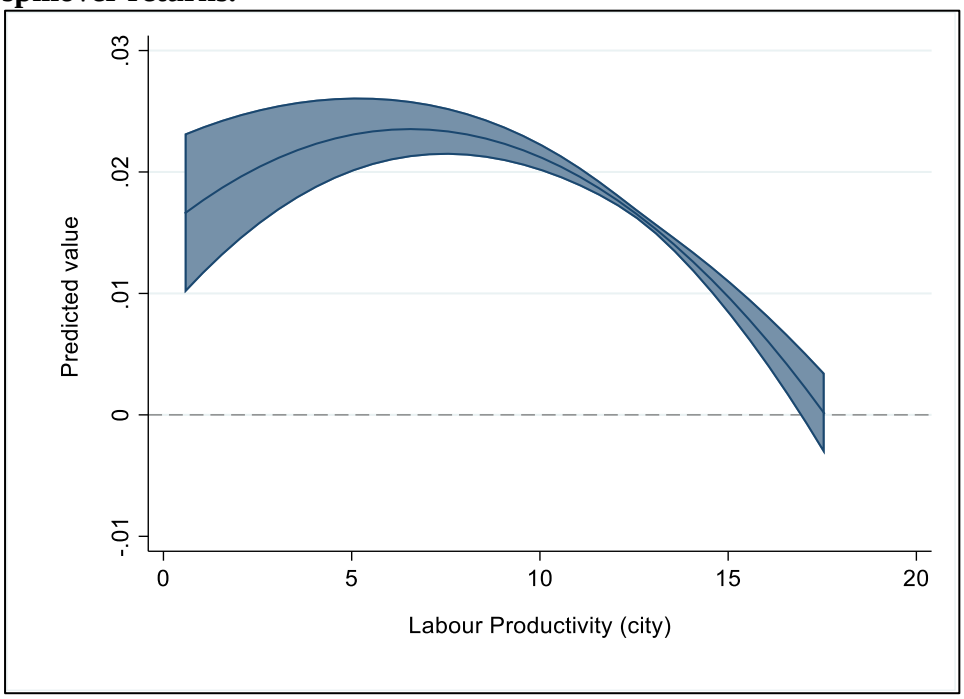
Table 3. Second stage: Exploring the heterogeneity of FDI productivity spillovers across FDI projects and host locations (cities).

	Mod 1 Abs. Capacity (ABC)	Mod 1a ABC squared	Mod 2 Rule of Law (RL)	Mod 2a RL squared	Mod 3 Control of Corruption (CC)	Mod 3a CC squared	Mod 4 Property Rights (PR)	Mod 4a PR squared
Aggreg. Labprod in the host city	-0.0014*** (0.0002) ([0.0000])	0.0025*** (0.0006) ([0.0000])	0.0026*** (0.0006) ([0.0000])	0.0027*** (0.0006) ([0.0000])	0.0026*** (0.0006) ([0.0000])	0.0028*** (0.0006) ([0.0000])	0.0027*** (0.0006) ([0.0000])	0.0028*** (0.0006) ([0.0000])
Aggreg. Labprod in the host city sq		-0.0002*** (0.0000) ([0.0000])	-0.0002*** (0.0000) ([0.0000])	-0.0002*** (0.0000) ([0.0000])	-0.0002*** (0.0000) ([0.0000])	-0.0002*** (0.0000) ([0.0000])	-0.0002*** (0.0000) ([0.0000])	-0.0002*** (0.0000) ([0.0000])
Rule of Law			-0.0004 (0.0005) ([0.4971])	0.0013 (0.0008) ([0.1273])				
Rule of Law squared				-0.0020*** (0.0008) ([0.0095])				
Control of corruption					-0.0001 (0.0006) ([0.8844])	0.0016** (0.0007) ([0.0262])		
Control of corruption squared						-0.0019*** (0.0005) ([0.0003])		
Property rights							-0.0007 (0.0006) ([0.2674])	0.0075 (0.0054) ([0.1657])
Property rights squared								-0.0009 (0.0006) ([0.1283])
Controls								
Host city level								
No. firms in sector-city	-0.0006** (0.0003) ([0.0311])	-0.0007** (0.0003) ([0.0117])	-0.0007** (0.0003) ([0.0149])	-0.0005* (0.0003) ([0.0724])	-0.0007** (0.0003) ([0.0123])	-0.0006** (0.0003) ([0.0225])	-0.0006** (0.0003) ([0.0207])	-0.0006** (0.0003) ([0.0301])
No. firms in other sectors-city	0.0010*** (0.0003) ([0.0002])	0.0012*** (0.0003) ([0.0000])	0.0012*** (0.0003) ([0.0000])	0.0011*** (0.0003) ([0.0000])	0.0012*** (0.0003) ([0.0000])	0.0011*** (0.0003) ([0.0001])	0.0012*** (0.0003) ([0.0000])	0.0011*** (0.0003) ([0.0000])
Host Country								
GDP	-0.0004 (0.0003) ([0.1963])	-0.0002 (0.0003) ([0.5320])	-0.0003 (0.0004) ([0.3746])	-0.0011** (0.0005) ([0.0184])	-0.0002 (0.0004) ([0.5566])	-0.0012** (0.0005) ([0.0101])	-0.0004 (0.0004) ([0.2718])	-0.0009* (0.0005) ([0.0639])
GDP per capita	0.0003 (0.0002) ([0.2965])	0.0005* (0.0002) ([0.0616])	0.0006* (0.0003) ([0.0551])	0.0008** (0.0003) ([0.0108])	0.0005 (0.0003) ([0.1433])	0.0006* (0.0003) ([0.0791])	0.0007** (0.0004) ([0.0476])	0.0007* (0.0004) ([0.0562])
Unemployment rate	0 (0.0001) ([0.5534])	0 (0.0001) ([0.8432])	0 (0.0001) ([0.8508])	0 (0.0001) ([0.7212])	0 (0.0001) ([0.8504])	0 (0.0001) ([0.5536])	0 (0.0001) ([0.8121])	0 (0.0001) ([0.8193])
Inflation, GDP deflator	0.0003*** (0.0001) ([0.0000])	0.0003*** (0.0001) ([0.0000])	0.0003*** (0.0001) ([0.0000])	0.0004*** (0.0001) ([0.0000])	0.0003*** (0.0001) ([0.0000])	0.0004*** (0.0001) ([0.0000])	0.0003*** (0.0001) ([0.0001])	0.0003*** (0.0001) ([0.0001])
IFDI	0.0001 (0.0003) ([0.7163])	0 (0.0003) ([0.8672])	0 (0.0003) ([0.9789])	0.0009* (0.0005) ([0.0527])	0 (0.0003) ([0.9291])	0.0009** (0.0004) ([0.0242])	0.0001 (0.0003) ([0.7085])	0.0005 (0.0004) ([0.2286])
Geo distance (capital to capital)	-0.0020*** (0.0004) ([0.0000])	-0.0021*** (0.0004) ([0.0000])	-0.0020*** (0.0004) ([0.0000])	-0.0020*** (0.0004) ([0.0000])	-0.0021*** (0.0004) ([0.0000])	-0.0020*** (0.0004) ([0.0000])	-0.0020*** (0.0004) ([0.0000])	-0.0020*** (0.0004) ([0.0000])
Project level								
Type: Greenfield	-0.0004 (0.0008) ([0.6114])	-0.0005 (0.0008) ([0.5657])	-0.0005 (0.0008) ([0.5144])	-0.0007 (0.0008) ([0.3867])	-0.0005 (0.0008) ([0.5575])	-0.0006 (0.0008) ([0.4569])	-0.0005 (0.0008) ([0.5186])	-0.0006 (0.0008) ([0.4496])
Industry NACE 26, HT	0.0017** (0.0007) ([0.0199])	0.0018*** (0.0007) ([0.0092])	0.0018*** (0.0007) ([0.0097])	0.0017** (0.0007) ([0.0166])	0.0018*** (0.0007) ([0.0093])	0.0017** (0.0007) ([0.0161])	0.0018** (0.0007) ([0.0102])	0.0018** (0.0007) ([0.0104])
Industry NACE 28, MHT	0.0005 (0.0008) ([0.5465])	0.0006 (0.0007) ([0.3907])	0.0006 (0.0007) ([0.4216])	0.0005 (0.0007) ([0.5313])	0.0006 (0.0007) ([0.3971])	0.0005 (0.0007) ([0.4775])	0.0006 (0.0007) ([0.4149])	0.0005 (0.0007) ([0.4653])
Industry NACE 29, MHT	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0002

	(0.0008)	(0.0007)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
	([0.8548])	([0.9309])	([0.8934])	([0.8861])	([0.9200])	([0.8806])	([0.8560])	([0.7867])
Constant	0.0541***	0.0318***	0.0322***	0.0327***	0.0318***	0.0353***	0.0329***	0.0197
	(0.0078)	(0.0083)	(0.0084)	(0.0083)	(0.0083)	(0.0084)	(0.0089)	(0.0124)
	([0.0000])	([0.0001])	([0.0001])	([0.0001])	([0.0001])	([0.0000])	([0.0002])	([0.1126])
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
No of obs	1266	1266	1266	1266	1266	1266	1259	1259
R-squared	0.076	0.108	0.109	0.113	0.108	0.118	0.109	0.111
R-squared adjusted	0.064	0.095	0.095	0.099	0.095	0.103	0.096	0.097

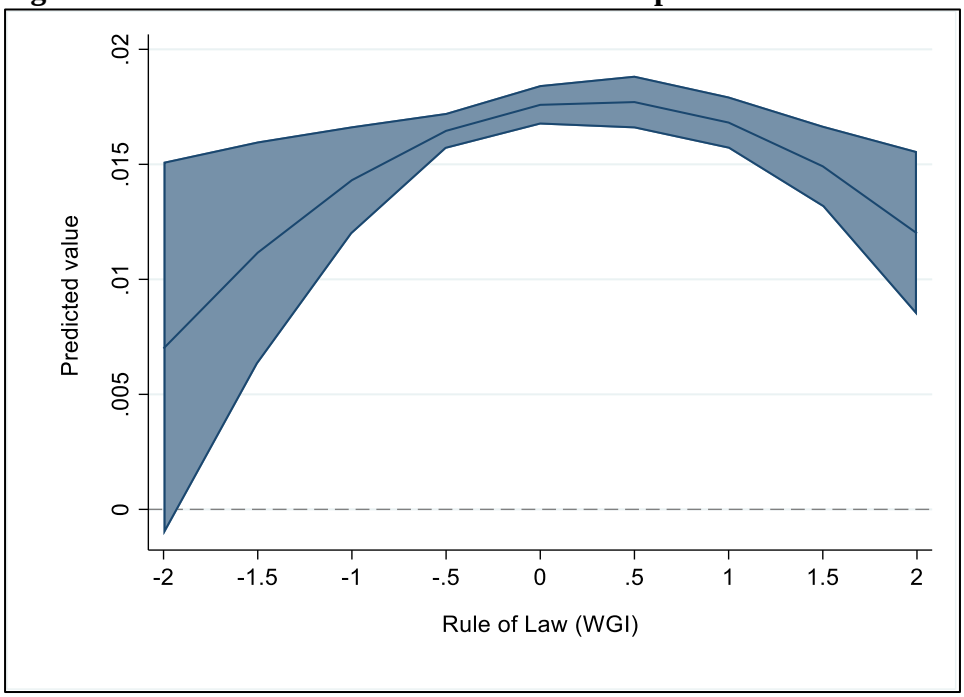
Note. The dependent variable is the FDI project-specific spillover effect from the first stage (Table 2). We predict project-specific coefficients using the post-estimation command 'predict', including reffects option within the mixed post-estimation and related 'mixed' packages in Stata 14 and 16 (StataCorp 2013). Standard errors (in parenthesis below the parameter estimates) are computed based on Hornstein and Greene (2012). P-values in square brackets below the standard errors. Asterisks denote confidence levels: *p<0.10, **p<0.05 and ***p<0.01.

Figure 2. The effect of aggregate labour productivity of the host city on the FDI spillover returns.



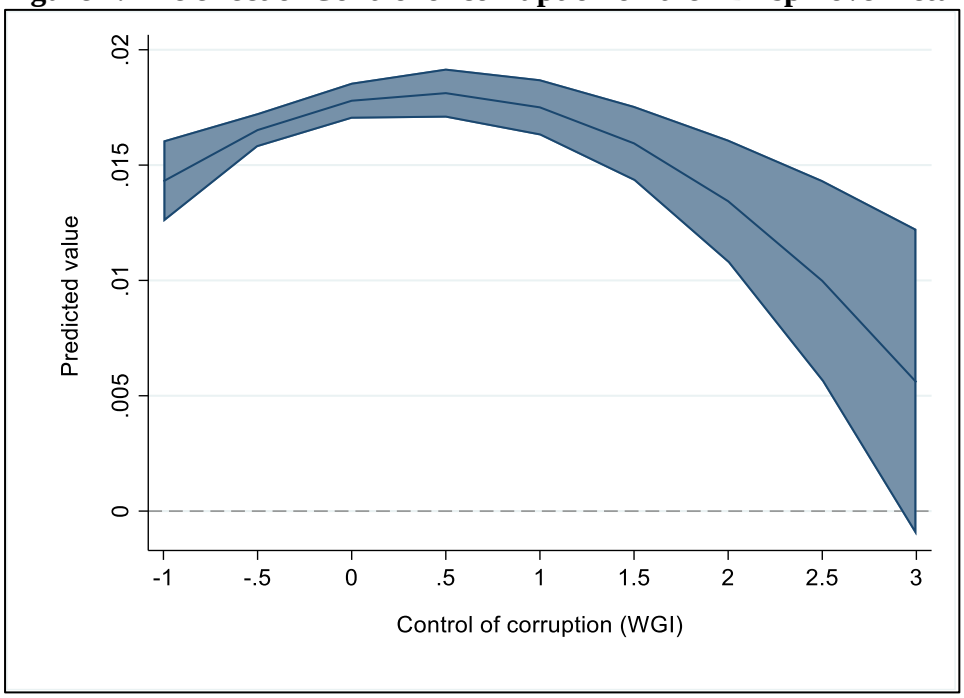
Note: the figure is created from mod. 1a in table 3, using the values of aggregate labour productivity and keeping the other variables at their mean values (margins at the means of covariates). The line represents the average marginal effect of absorptive capacity on the linear probability of FDI spillover returns (Y axis) for different levels of labour productivity (X axis). The upper-bound and the lower-bound lines represent the confidence interval (at 95% level) for the represented marginal effects. The dashed line represents 0, i.e. the zone where marginal effects are not statistically significant at 10% p-value.

Figure 3. The effect of Rule of Law on the FDI spillover returns.



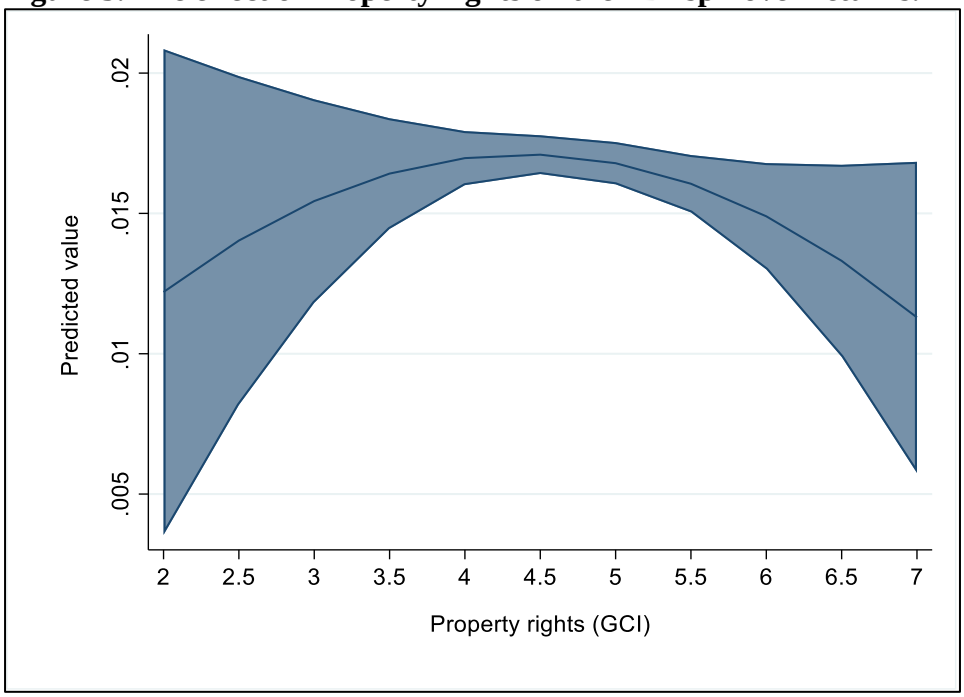
Note: the figure is created from mod. 2a in Table 3, using the values of Rule of Law and keeping the other variables at their mean values (margins at the means of covariates). The line represents the average marginal effect of institutions on the linear probability of FDI spillover returns (Y axis) for different levels of the rule of law (X axis). The upper-bound and the lower-bound lines represent the confidence interval (at 95% level) for the represented marginal effects. The dashed line represents 0, i.e. the zone where marginal effects are not statistically significant at 10% p-value.

Figure 4. The effect of Control of corruption on the FDI spillover returns.



Note: the figure is created from mod. 3a in Table 3, using the values of Control of Corruption and keeping the other variables at their mean values (margins at the means of covariates). The line represents the average marginal effect of institutions on the linear probability of FDI spillover returns (Y axis) for different levels of control of corruption (X axis). The upper-bound and the lower-bound lines represent the confidence interval (at 95% level) for the represented marginal effects. . The dashed line represents 0, i.e. the zone where marginal effects are not statistically significant at 10% p-value.

Figure 5. The effect of Property rights on the FDI spillover returns.



Note: the figure is created from mod. 4a in Table 3, using the values of Property rights and keeping the other variables at their mean values (margins at the means of covariates). The line represents the average marginal effect of institutions on the linear probability of FDI spillover returns (Y axis) for different levels of property rights (X axis). The upper-bound and the lower-bound lines represent the confidence interval (at 95% level) for the represented marginal effects.