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# Institutional proximity and the size and geography of FDI spillovers: do European firms generate more favourable productivity spillovers in the EU neighbourhood?

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# **Institutional proximity and the size and geography of FDI spillovers: do European firms generate more favourable productivity spillovers in the EU neighbourhood?**

## **Abstract**

The EU association framework provides European businesses with an entry advantage into the associated countries by facilitating production links and encouraging institutional convergence. It is believed that this has multiple beneficial effects for the associated countries, including ones related to productivity spillovers accruing to domestic firms. However, no empirical evidence exists to show that the presence of European firms produces larger productivity spillovers in recipient economies compared to firms from other world regions. We examine this question using firm-level data covering 28 transition countries over the period 2002-2009. We estimate the intra-industry productivity effects of foreign ownership and examine how these differ across regional blocks (CEE, SEE and ENP), by origin of investor (EU15 versus non-EU15), across geographical scales (national versus regional) and for different types of locations (capital-city regions versus the rest). Our results suggest that investments of EU origin play a distinctive role, helping raise domestic productivity in the associated countries unlike investments from outside the EU. However, this process operates in a spatially selective manner, potentially enhancing regional disparities and spatial imbalances. This assigns a particular responsibility for EU policy to devise interventions that will help redress these problems within its existing association framework.

**Keywords:** EU neighbourhood; FDI spillovers; institutional proximity; regional disparities

## **1. Introduction**

The successful experience of accession conditionality in Central and Eastern Europe (CEE) led the EU to establish a similar framework for pre-accession and 'approximation' for countries in its wider periphery (Phinnemore, 2003; Emerson, 2004). In the Balkans (SEE), a framework of 'extended conditionality' was established through the Stabilisation and Association process (Monastiriotis and Petrakos, 2010); in the eastern neighbourhood (as well as in the South Mediterranean), the EU established the European Neighbourhood Policy (ENP), offering preferential economic and political

relations, but no explicit prospect of accession, conditional on the recipient countries' adherence to a set of association principles (Witman and Wolff, 2010).

These processes aim at eliciting democratisation and socio-economic development in the associated countries, through institutional harmonisation/convergence and economic integration with the EU (Grabbe, 2006; Schimmelfennig and Scholtz, 2008). The latter is thought to create significant economic benefits for the associated countries, relating both to preferential access to EU markets (scale economies and market size effects linked to trade liberalisation) and to the inflow of, mainly European, capital and technology (capital deepening, demonstration effects and productivity spillovers). But although the beneficial effects of trade liberalisation are largely uncontested in the literature (for a critical view see Petrakos et al, 2013), the literature on the productivity spillovers of foreign-firm presence, especially those accruing within-sectors (intra-industry spillovers), often finds that these are minimal – or even negative – and in any case conditional on a number of firm-, country- and sector-specific factors (Konings, 2001; Damijan et al, 2003; Javorcik, 2004; Sabirianova et al, 2005; Gorodnichenko et al, 2007; Meyer and Sinani, 2009; Damijan et al, 2013).

One factor that has only recently started to be systematically examined in the literature concerns the links tying together sending and receiving countries – i.e., various forms of sender-recipient proximity. As we discuss in the next section, a number of studies have utilised information on the country of origin of the foreign firms to examine the role of factors such as *geographical*, *technological* or *cultural* proximity. However, no study to date in this literature has investigated specifically links that have to do with *institutional* proximity. Thus, for what concerns this paper, there is no prior knowledge to inform whether the institutional isomorphism pursued by the EU association policies has an effect on the size (and sign) of foreign-ownership productivity spillovers.

Intuitively, institutional approximation between the EU and the associated countries may contribute to reducing entry and transaction costs for EU firms operating in these countries. If so, it is reasonable to expect that EU-originating investments in these countries will be less speculative and of a more long-term strategic character vis-à-vis

investments from other parts of the world, thus plausibly having a more positive impact on the receiving economies. Indeed, studies concerning the CEE accession countries have shown that the prospect of accession was paramount in mobilising foreign investments, as western firms responded to the opportunities offered by the opening of the new markets by changing the geographical organisation of their production thus instigating a wider process of restructuring for the European industry (Clausing and Dorobantu, 2005; Monastiriotes and Agiomirgianakis, 2009; Crescenzi et al, 2014). In a sense, these movements were part of a deeper integration process, reflecting the significant linkages that developed on the ground, which in turn facilitated sizeable technology transfers to CEE countries. In contrast, in the countries of the wider neighbourhood where the prospect of accession was feeblar, this process was less intense and partly driven by different motives (Estrin and Uvalic, 2013; Ascani et al, 2013) – with volumes of FDI being significantly lower and more of the market-capture type.

In this paper we set out and examine empirically a set of hypotheses linked to these issues. We anticipate that institutional approximation is linked to stronger and more organic production linkages and thus that EU-originating investments will be associated with larger (more positive or less negative) productivity spillovers (vis-à-vis investments from non-EU firms), especially so in the countries with which the EU has closer institutional ties. To examine these hypotheses we use firm-level data for the period 2002-2009 covering 28 transition countries. We split these countries into three groups that correspond to the processes of membership (CEE), candidacy (SEE) and neighbourliness (ENP). We apply a simple production-function approach to estimate the intra-industry productivity spillovers accruing to domestic firms by foreign presence and examine how these spillovers vary (a) for groups of countries belonging to different processes with respect to EU association and (b) separately for investments of EU15 and non-EU15 origin.<sup>1</sup> As spillovers are found to be of variable sizes along these dimensions at the national level (within sectors), we further

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<sup>1</sup> EU15 comprises Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and UK. In the text we use the terms 'EU15' and 'European' interchangeably, but the reader should note that firms originating from the countries that acceded to the EU from 2004 onwards are treated here as 'non-European'.

investigate the localisation of these spillovers by examining how their intensity varies at different geographical scales (national – regional) and for different types of locations (capitals versus the rest). This allows us, in addition, to examine the distributional consequences (across space) of foreign investments, thus informing about possible issues that may emerge in relation to policies aiming at fostering deeper economic links and institutional convergence between the EU and its neighbourhood.

The remainder of the paper is structured as follows. The next section introduces in more detail our research questions, also discussing some theoretical considerations and reviewing parts of the literature that are relevant for the motivation of our analysis. Section 3 gives details about our data and method, while section 4 presents our empirical results. The last section concludes with a discussion of the policy implications of our findings.

## **2. Considerations for the analysis**

The literature on the productivity spillovers of foreign-firm presence in transition countries has shown that, generally, vertical spillovers (through backward and forward linkages to the sector of foreign presence) are positive and often sizeable, but that horizontal (intra-industry) spillovers are typically negative. The latter become positive only conditional on a number of intervening factors, such as firm size, sector and location; absorptive capacity and technological distance; national level of development and extent of corruption; and the extent and type of foreign ownership.<sup>2</sup> While acknowledging the importance of these factors, our focus in this paper is with the role of institutional proximity and the geography of intra-industry spillovers. This, in turn, relates to two issues in the relevant literature: the role of the origin of foreign investments; and the localisation and regional differentiation of spillovers.

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<sup>2</sup> See, inter-alia, Javorcik (2004), Sabirianova et al (2005), Gorodnichenko et al (2007), Nicolini and Resmini (2010), Monastiriotes and Alegria (2011), Farole and Winkler (2012) and Damijan et al (2013). See also Jordaan (2005) and Meyer and Sinani (2009) for similar evidence for developing countries outside the transition world.

### *i. Origin of foreign investment*

As mentioned already, the literature has only recently started paying systematic attention to the issue of 'origin'. In an early examination of the issue, Gorodnichenko et al (2007) examined the impact of foreign presence in 17 emerging economies separately for firms originating from OECD and non-OECD countries. Their finding, that the impact is if anything stronger for non-OECD investments, led them to suggest that *technological proximity* (rather than a "high level of technology") may be important in generating positive productivity spillovers. Monastiriotis and Alegria (2011) provide evidence consistent with this, in their study of Greek versus other European and non-European FDI in Bulgaria. Focusing on the case of intra-industry spillovers, the authors argue that technological proximity makes spillovers easier to absorb by domestic firms thus increasing the estimated productivity effects. Additionally, however, they argue that *cultural proximity* is also important as culturally 'proximate' foreign investors have a greater advantage in drawing on local knowledge and thus benefit more by engaging more systematically with the local economy. This, too, creates a greater scope for spillovers to local firms.

The role of cultural and technological proximity has also been emphasised by two earlier studies by Buckley et al (2007) and Abraham et al (2010), both on the case of China. Both studies found stronger productivity spillovers for firms originating from Chinese-speaking countries (Hong Kong, Macau and Taiwan), a result which they interpret as, on the one hand, showing how "cultural and linguistic connection [...] promotes the diffusion of technological know-how" and, on the other hand, reflecting the fact that firms from these countries tend to concentrate on "relatively simple, labour-intensive activities [with] low degrees of technological sophistication" which create more absorbable spillovers (Abraham et al, 2010, p.148).

A different argument has been made by Javorcik and Spatareanu (2011). The authors focus on the issue of *geographical proximity* and provide evidence suggesting that foreign investors originating from more distant locations are associated with greater

spillovers (for the case of vertical spillovers in particular). They attribute this to the fact that short-distance investments allow foreign firms to maintain their links with established suppliers from their home countries thus lowering their propensity to use local resources and local supply chains. This result is at least partly consistent with the finding of Girma and Wakelin (2000) for the case of the UK, who find that local spillovers from Japanese firms are significantly stronger than spillovers from firms of North American and West European origin. A few other studies have looked at the issue of origin not in relation to questions of proximity, but as an issue of composition. For example, Zhang et al (2010) have investigated, for the case of China, the role played by the concentration in a sector of firms of different country-origins. They found that diversity of country-origins has a positive effect, increasing the size of intra-industry productivity spillovers.

As noted earlier, our interest in this paper is not with the wider issue of 'origin' but specifically with the issue of proximity. Our conceptualisation of proximity, however, deviates from that used in previous studies (technological, cultural or geographical proximity) as it focuses on the notion of institutional approximation. Specifically, we hypothesise that the process of EU approximation (be it in the context of accession – CEE; of pre-accession conditionality – SEE; or of neighbourliness – ENP) creates an institutional proximity that is associated with greater productivity spillovers emanating from EU-owned firms (*vis-à-vis* non-EU firms). This is for a number of reasons. First, EU-originating investors are likely to see their investments as part of the association process and, in this sense, as part of a policy that aims at strengthening local capacities and integration with the EU. Thus, local links are encouraged and local synergies pursued. As is noted by Abraham et al (2010) for the case of China, local links and “a strong interest in developing long-term projects” are key ingredients for the diffusion of know-how and the realisation of productivity spillovers. Second, domestic producers may have similar perceptions about EU-originating investments and thus may be more inclined to cooperate and/or compete with these – resulting in more intensive processes of mimicking, learning and technology transfer. Third, the very process of association creates institutional convergence (e.g., transposition of legal frameworks and regulations in line with EU norms and rules – Freyburg et al, 2009), making it

easier and less costly for European firms to interact with the local economy and for local firms to interact and work with the European investors.

Our hypothesis assigns particular significance to the depth of institutional-political relations between the EU and the foreign-investment receiving countries. In the CEE, where integration with the EU has been full, foreign-presence spillovers ought to be large. In countries that are still in their pre-accession stage, institutional approximation is less complete and thus spillovers ought to be smaller. For countries where association does not imply full institutional convergence, the 'spillover advantage' of EU-originating investments ought to be even smaller – but still distinctively larger than that associated to non-EU firms. To examine this, we treat the countries in each recipient region as one group and derive group-specific estimates of the productivity spillovers associated to the presence of foreign-owned firms – separately for European and non-European concentrations. As the size of the spillovers is known to also depend on the level of development of the recipient country (Meyer and Sinani, 2009) – and given that levels of development differ systematically across our regional groups – in our analysis we also control for national differences (including in levels of development) by incorporating country-level time-variant fixed effects.

## *ii. Localisation and regional differentiation of spillovers*

Although in most studies foreign-firm presence is measured at the national than the local level, the geographical dimension of foreign presence is an important one. Theoretically, geography may play a role for the size of foreign-ownership spillovers through two main channels.<sup>3</sup> The first concerns the effects of *spatial concentration* on local production through knowledge spillovers, labour pooling and network-sharing (see Overman and Puga, 2010, for a discussion of this in the agglomeration economics

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<sup>3</sup> There is a third channel that concerns the *spatial diffusion* of spillovers, i.e., the possibility that regional concentrations of foreign-owned firms may have productivity effects that are transmitted across space to other regions. Studies examining this issue (Driffield and Munday, 2001; Driffield and Hughes, 2003; Jordaan, 2008b; Monastiriotis and Jordaan, 2010) have found such spillovers to be sometimes sizeable, although always smaller than the localised spillovers and not always positive. The number of regions in our sample countries is not sufficient for a formal analysis of this issue, but we make some comments in relation to this towards the end of the paper.



literature; and Barrios et al, 2006, Jordaan, 2008a, and Marioti et al, 2010, for studies in relation to foreign firm ownership). According to this, co-location (proximity) allows domestic firms to raise their productivity by exploiting advantages related to the upgrading of workforce skills in the local economy (e.g., through training by foreign-owned firms), day-to-day interaction with foreign firms (participation in common Chambers, information-sharing) and pecuniary spillovers (sharing common distribution networks etc). This suggests that many of the mechanisms that lead to positive spillovers operate at the local level and thus that positive spillovers are rather localised. In contrast, the channels via which foreign presence may have negative effects (e.g., market capture) are more likely to operate at wider scales (nationally). Thus, even if the overall (national-level) effect of foreign presence is negative, we should expect the concentration of foreign-owned firms in a sector within a region to produce more positive spillovers compared to concentration of foreign-owned firms in the sector nationally.

The second channel concerns the capacities and characteristics of the recipient local economies and relates more to the *spatial differentiation* of spillovers. The argument here is that productivity spillovers from foreign investments will tend to differ across space. More developed regions (often, those of capital cities) are in general more extrovert and typically host larger agglomerations. In a way this means that they are already open to forces of (international) competition (and learning), more so than their national hinterlands. If so, the scope for benefits derived from the presence of foreign firms, both locally and nationally, may be more limited in metropolitan and high-agglomeration areas.<sup>4</sup> On the other hand, these areas will have a greater capacity to internalise spillovers and to withstand the additional competition from foreign investors (e.g., managing to maintain their market shares). They will also have a greater advantage in attracting foreign investments, thus also benefiting from possible threshold and agglomeration effects. To the extent that this is true, foreign firm presence will tend to offer a relative advantage to more developed regions and thus to exacerbate existing spatial disparities in the recipient countries.

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<sup>4</sup> Inversely, more peripheral regions will have more to gain from the technological knowledge of foreign firms and perhaps may benefit more also from pecuniary spillovers.

Empirical studies on these issues are far and few between in the relevant literature. Only a handful of studies examine the localisation of spillovers associated specifically to foreign-firm ownership, typically finding significantly localised spillovers (Girma and Wakelin, 2000, and Driffield and Hughes, 2003, for the UK; Mullen and Williams, 2007, for the USA; Jordaan, 2008a, for Mexico) – although evidence against this has also been offered (Aitken and Harrison, 1999; Haskel et al, 2007). Conflicting results have also been obtained in the studies examining the regional differentiation of these spillovers. Driffield and Munday (2001; for the UK) and Sgrad (2001; for Hungary) give evidence of stronger spillovers in areas with larger agglomerations, higher levels of development and greater proximity to markets. In contrast, Monastiriotis and Jordaan (2010) have shown for the case of Greece that spillovers are maximised in areas with weaker agglomerations and lower levels of development.

In our analysis we examine this dimension by estimating the productivity spillovers of foreign ownership separately for capital-city and non-capital-city regions. The two hypotheses that we test are the following: first, that spillovers are stronger and more positive when foreign presence is measured at the local than the national level; second, that they are larger for capital-city regions than for the rest.

### **3. Data and methodology**

It is standard in the literature to examine foreign-ownership productivity spillovers using an augmented Cobb-Douglas production function in a two-stage approach. The first stage involves the derivation of a measure of total factor productivity (TFP) from a regression of output (log-sales) on employment, fixed assets and raw materials. Given concerns about the endogeneity of inputs to firm productivity (i.e., that firms may select how much to invest depending on their true productivity type), estimation in this first stage follows typically the Olley-Pakes (1996) approach, which introduces a third-order polynomial of capital and investment to proxy for unobserved productivity at the firm level. The derived TFP measure is then regressed at a second stage on the

sectoral share of foreign ownership (and other controls that may be deemed appropriate) using OLS.<sup>5</sup>

It should be noted that although this two-stage approach is widely used in the literature on foreign-ownership spillovers, the reasons for doing so are not entirely clear. If present, the endogeneity bias can lead to inflated estimates on the production-function parameters and thus to an under-estimation of the TFP variable.<sup>6</sup> But the bias introduced on the derived estimates for the key variable of interest (foreign-share), which is measured at the sectoral level, will be minimal (or zero) if firm selection into high/low investment does not vary systematically across sectors; and will be sufficiently treated by the inclusion of sector-specific fixed effects, thus producing unbiased estimates of the foreign-ownership effect on domestic firm productivity, if selection varies systematically across sectors.<sup>7</sup>

Driven by these considerations, in our empirical analysis we do not follow the two-stage approach. Rather, we estimate directly a log-linearised augmented Cobb-Douglas production-function model which incorporates, in addition to the two main factors of production (capital and labour), the share of foreign presence in the sector where each firm is located and a set of additional controls for the different dimensions of the sample. Specifically,

$$y_{isct} = b_0 + b_1 l_{isct} + b_2 k_{isct} + b_3 F_{sct} + D_c + D_t + D_s + e_{isct} \quad (1)$$

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<sup>5</sup> Few studies examine the issue of spillovers in an IV setting, where foreign-presence is instrumented as it is considered to be endogenous to sectoral characteristics, such as profitability, average productivity, etc – see Jordaan (2005 and 2009) for an application and discussion of this. In this paper we do not pursue this path, but we note that such endogeneity concerns are technically dampened by the inclusion in our estimations of sector-specific fixed-effects.

<sup>6</sup> Assuming that high-productivity firms ‘select’ into high rates of investment. The opposite direction of bias is also possible, if for example low-productivity firms compensate for their low efficiency by making more extensive use of production inputs (extensive versus intensive production model).

<sup>7</sup> Indeed, Olley and Pakes (1996) introduce their correction as a method to address bias in the estimation of firm-level, not higher-order, coefficients. Moreover, they emphasise that the bias is more important in contexts where there is “significant entry and exit and large changes in the sizes of incumbents” (p.1263), which is not necessarily the case across datasets. In addition, application of the Olley-Pakes correction requires good quality data on capital and investment. Existing gaps and reported inconsistencies across countries in the recording of information on capital investment in the BEEPS dataset make us question the validity of this condition in our data.

where  $y$ ,  $k$  and  $l$  stand for the firm's output (total sales), capital (fixed assets) and number of employees, all expressed in natural logarithms;  $F$  is the output share of foreign-owned activity;  $D_c$ ,  $D_s$  and  $D_t$  are vectors of binary dummies for countries, sectors and years; and  $e$  is a normally distributed error. Eq.1 can be thought of as a reduced-form model of a two-equation system of the following form

$$Y_{isct} = TFP_{isct}(L_{isct}^{b_1} * K_{isct}^{b_2}) \quad (2a)$$

$$\ln(TFP)_{isct} = b_0 + b_3 F_{sct} + D_c + D_t + D_s + e_{isct} \quad (2b)$$

where (1) is derived by log-linearising (2a) and then substituting  $\ln(TFP)$  from (2b). The issue of selection aside, the equivalence between the two-equation and single-equation models implies that the parameter  $b_3$  in (1) can be interpreted as the effect of foreign presence on firm's  $i$  total factor productivity. In our estimating version of this equation, we use interacted fixed-effects for countries and years, in order to control for country differences in inflation rates as well as for possible problems in the conversion of the nominal local currency data into US dollars.<sup>8</sup> Additionally, in parts of our analysis we extend (1) to also include a quadratic term of the foreign-share variable, in order to test the possible non-linearity of spillovers across different degrees of foreign-firm concentration, as has been identified in the literature (see, inter alia, Damijan et al, 2003, Merlevede and Schoors, 2007, and Monastiriotis and Alegria, 2011 for evidence of this in transition countries; and Barrios et al, 2005, Buckley et al, 2007, and Chen et al, 2011 for evidence from the wider literature). Because this variable is measured at the sectoral level, in all specifications we cluster the standard errors across sectors (and, where appropriate, sector-regions).

A separate issue with this specification concerns the measurement of firm sales, given the absence of data on physical output volumes (Van Beveren, 2011). If pricing mark-ups differ across sectors, for example due to differences in regulation or entry costs, it is possible that measured output will be inflated in some sectors relative to others. If the distribution of foreign presence is not independent to this, then the derived estimates for the foreign-share will be biased. We address this issue by including

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<sup>8</sup> See Data Appendix.

sector-level fixed effects ( $D_S$ ) in all regressions. If, however, market power differs across firms within sectors, the inclusion of  $D_S$  is not sufficient. The solution proposed in the literature for such a case (De Loecker, 2007) involves the estimation of a deflated revenue function which includes local-area (and sectoral) price deflators. In the absence of such price data for our sample countries, we were unable to apply this correction to our sales data. We note, however, that the effect this may have on our estimates of interest (on the foreign-share variable) is ambiguous and – unless patterns of firm-level market power correlate with the sectoral distribution of foreign ownership – intuitively minimal.

Given our interest in this paper, equation (1) is further extended in three ways. First, we split the foreign-presence variable  $F$  into two separate variables measuring foreign-presence by EU15 and non-EU15 countries, respectively ( $F^{EU}$ ,  $F^{NEU}$ ). Thus, our estimating model becomes

$$y_{isct} = b_0 + b_1 l_{isct} + b_2 k_{isct} + b_3^{EU} F_{sct}^{EU} + b_3^{NEU} F_{sct}^{NEU} + (D_c * D_t) + D_s + e_{isct} \quad (3)$$

This model is estimated for the full-sample as well as separately for each of the three recipient regions (CEE, SEE and ENP). Second, we re-define our foreign-share variable at the regional level, so that  $F$  is allowed to vary across regions-sectors-years within each country ( $F_{rsct}$ ), in order to examine whether the effect of foreign presence is localised, i.e., whether concentration in the sector within each region produces more significant spillovers. Our estimating relationship becomes

$$y_{isct} = c_0 + c_1 l_{isct} + c_2 k_{isct} + c_3 F_{rsct} + (D_c * D_t) + D_s + e_{isct} \quad (4)$$

Third, we interact the nationwide foreign-share variable ( $F_{sct}$ ) with a capital-region dummy ( $D_R$ , taking the value of 1 if the firm is in a capital-city region and 0 otherwise), to test whether foreign presence has differentiated effects for different types of regions within each country (capital versus peripheral regions). We test this both for the national-sectoral and the regional-sectoral definition of the foreign-share variable:

$$y_{isct} = b_0 + b_1 l_{isct} + b_2 k_{isct} + b_3 F_{sct} + b_4 (D_R F_{sct}) + (D_c * D_t) + D_s + e_{isct} \quad (5a)$$

$$y_{isct} = c_0 + c_1 l_{isct} + c_2 k_{isct} + c_3 F_{sct} + c_4 (D_R F_{rsct}) + (D_c * D_t) + D_s + e_{isct} \quad (5b)$$

All in all, our analysis examines the following four hypotheses:

- **H1:** Productivity spillovers associated to EU15 firms are always larger, so that  $b_3^{EU} > b_3^{NEU}$
- **H2:** Productivity spillovers associated to EU15 firms are larger for countries with deeper forms of association with the EU, so that  $b_{3,CEE}^{EU} > b_{3,SEE}^{EU} > b_{3,ENP}^{EU}$
- **H3:** Productivity spillovers are localised so that  $b_3 < c_3$
- **H4:** Productivity spillovers of all origins are larger in capital city regions, so that  $b_4 > 0$  and  $c_4 > 0$

To examine these hypotheses we use data from the Panel II-IV version of the Business Environment and Enterprise Performance Survey (BEEPS). This is an unbalanced panel of individual firm-level data containing approximately 28,000 observations from 28 transition countries over three waves covering the period 2002-2009. After cleaning the data and implementing various adjustments (see Data Appendix for details) we are left with 9,292 observations with data on sales, fixed-assets, number of employees, sector/region/country of operation, and nationality of ownership – which we use in our analysis.

Our main independent variable – the share of foreign-owned production in the sector ('foreign share') – has been constructed using each individual firm's reported share of foreign ownership and information on country, sector and yearly output of each firm. Firm-level output was first multiplied by each firm's foreign-ownership share and aggregated to country-sector-year clusters. Our 'foreign-share' measure was then calculated as the ratio of this variable to total output in the cluster. The same approach was followed for the construction of our origin- and region- specific measures (e.g., foreign shares within region-sector-year clusters and foreign shares associated to ownership of EU15-origin only). We have favoured this output-based definition (following, e.g., Aitken and Harrison, 1999) against alternative measures (e.g.,

employment shares of foreign-owned firms) because there are significant differences in labour productivity between foreign-owned and domestic firms in our sample and thus employment-share differences do not adequately reflect the importance of foreign presence in a sector. The regions used are the administrative regions in each country as reported in BEEPS (variable 'a2').

To separate between foreign-owned and domestic firms (e.g., in our regression specifications), we have used a minimum threshold (>10%) definition. On this definition, foreign-owned firms in our sample comprise 23% of the total number of firms. Globally, the (unweighted) share of total sales accounted for by foreign ownership is 17.9% (of which 64% is of EU15 origin), ranging from 4.5% in Turkey to 36.1% in Latvia. Concerning the European – non-European distinction (see Tables A.1 and A.2 in the Appendix), the sectoral distributions of the two groups are not hugely different, but in relative terms EU15 firms seem to have stronger presence in Other services and lower in Electronics, IT, Retail trade, Basic metals, Chemicals and Textiles. In firms with foreign presence, the average (unweighted) share of foreign ownership is 73.9% (80.9% for EU15-owned firms), ranging between 61.7% in Chemicals and 86.7% in Business services and between 56.7% in Turkey and 89.9% in Montenegro. As should be expected, country variations in the presence of EU15 (versus other) firms are larger. The EU15 share to total output accounted for by foreign presence is on average around 80% for countries in the CEE region (95% in Slovenia and the Czech Republic, closer to 75% for most other cases), 70% in SEE (ranging from 55% in Bosnia to 81% in Albania), and 45% in the ENP (ranging from 17% in Kazakhstan to 70% in Tajikistan).

#### **4. Empirical results**

##### *i. Spillovers and institutional proximity: analysis by origin and destination*

We start our analysis with the examination of the issue of origin-destination at the national level (using sector-wide foreign shares). Table 1 presents the results. As a benchmark, the first column tests the spillover effect of the overall foreign share (EU15 plus non-EU15). Consistent with findings elsewhere in the literature (Javorcik, 2004;

Gorodnichenko et al, 2007; Damijan et al, 2013), this effect is negative, indicating that foreign presence reduces the productivity of domestic firms. To examine our first hypothesis (H1), in col.2 we split the foreign share variable into its EU15 and non-EU15 components. The estimated effect of the non-EU15 variable is statistically significant now at 1% and over twice as large (more negative) as the benchmark estimate (col.1). In contrast, the effect of EU15 presence is only marginally negative and statistically not different from zero (p-value=0.971). Thus, in line with our expectations, the impact of EU15-originating investments is indeed distinctive: although we fail to find positive spillovers at this level, the difference in the two effects is unquestionable (and statistically significant at 1%, based on a Wald test for the equality of the two coefficients). This indicates clearly that European firms are if anything less destructive for domestic productivity than their non-European counterparts. As the model includes sector- and country-level fixed effects, we have to dismiss the possibility that this effect is driven by selectivity of EU15 firms into more productive sectors and/or countries, or indeed to countries with higher levels of development and higher absorptive capacity (Meyer and Sinani, 2009; Farole and Winkler, 2012).<sup>9</sup>

----- *INSERT TABLE 1 AROUND HERE* -----

It is possible, however, that the effect is driven by selectivity into country groups. As we showed in section 2, EU15 presence is significantly higher in the CEE region and lowest in the ENP. To test whether this differentiation may be driving the result of col.2, but also to examine directly our second hypothesis, about the role of institutional linkages for the size (and sign) of spillovers, in the remainder of Table 1 we split the sample into the three regional groups. In columns 3-5 we test the linear model analogous to col.2. Although the results show no statistical significance in any of

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<sup>9</sup> Interestingly, the EU15 effect becomes positive and statistically significant (p-value=0.058) when we drop the country fixed-effects. This confirms the presence of some degree of geographical selectivity for EU15 firms (into countries with higher firm productivity), which our models in Table 1 successfully control for.



the sub-samples, they are nevertheless informative. In all regions, the EU15 effect is positive while that of non-EU15 is always negative. Importantly, the coefficients (and thus the difference between the EU15 and non-EU15 effects) become larger as we move to regions with looser association to the EU. Indeed, despite individual non-significance, the difference between the EU15 and non-EU15 effects turns out statistically significant for the ENP group (F-statistic = 4.66, p-value = 0.045). So, although the differentiation in EU15 versus non-EU15 effect is maintained, our group-specific estimates in this linear model reject our second hypothesis concerning institutional proximity: the EU15 effect is not larger in the CEE group vis-à-vis the SEE group and the latter is not larger vis-à-vis the ENP group – if anything, the opposite is true.

We want to investigate this further, in order to examine whether statistical insignificance has to do with the fact that the impact of foreign presence on domestic firm productivity may be non-linear. As we discussed in section 2, evidence for this has been found in a number of studies (Damijan et al, 2003; Chen et al, 2011; Monastiriotis and Alegria, 2011). To do so, in columns 6-8 we introduce quadratic terms of the EU15 and non-EU15 variables. The results from this exercise are mixed. For the non-EU15 variable, the linear and quadratic terms are jointly significant in all three sub-samples, but they are individually significant only in the SEE group. For the EU15 variable, the results are also significant in the case of the SEE group, but not significant in the other two sub-samples. Another important difference emerges however: the EU15 effect tends everywhere to be hump-shaped; while the non-EU15 effect is U-shaped (convex) in the SEE and ENP samples and almost monotonically declining in the CEE sample.

----- *INSERT FIGURE 1 AROUND HERE* -----

To demonstrate these differences more clearly, in Figure 1 we plot the predicted total effects of foreign ownership across all possible values of foreign-firm concentration by region of destination and region of origin. In the EU15 case (left panel), the effect is

increasing for low concentrations of European presence in all country groups. In the ENP region this effect is very flat and increases almost linearly with European concentration, but without ever obtaining any economic (let alone statistical) significance. In the CEE region the effect is clearly hump-shaped, but again lacks any economic or statistical significance, reaching a maximum value (0.047) at foreign-ownership concentrations of 31% and turning negative for concentrations above 62%. In the SEE region the effect is similar (maximum at 32%, turning negative at 65%) but it is much more strongly concave and positive (maximum value of 0.147) and, as noted, also significant statistically. Concerning the spillovers associated to non-EU15 ownership (right panel), the effect in the CEE region is maximised at concentrations of 9% and turns quickly negative (concentrations above 19%), reaching very negative values (over -0.15) for concentrations above 60%. For the ENP region the effect is always negative and reaches very negative values much earlier (e.g., -0.15 for concentrations above 30% and -0.25 for concentrations over 60%). For the SEE region, the effect is also always negative (concentrations above 70%, when this effect turns positive, concern only 7 out of the 2,254 observations in this sub-sample) and reaches its lowest value (-0.276) at concentrations near 37%.

From this evidence, it seems that firms in the SEE region benefit the most from European presence and suffer the most from the presence of non-EU15 firms; while for firms in the ENP region the effect of EU15 presence is also more advantageous (vis-à-vis the presence of non-EU15 firms) although statistical significance here is not strong. These results seem to lend more support to our second hypothesis about the differentiation of the EU15 effect across groups of countries with different degrees of institutional proximity. However, the results found for the CEE sample do not fit this picture: although the EU15 effect is positive numerically, it is never significant statistically and always smaller than in the SEE and ENP regions.

If we were to assume, on the weight of the other results, that the hypothesis concerning institutional proximity is valid, one possible explanation for the different behaviour of the CEE sample may be that, as the countries in the region received European investments much earlier and have by now become fully integrated into the

EU, the initial benefits from foreign presence may have subsided or indeed been exhausted. This however would seem to contradict standard findings in the literature suggesting that the productivity gains from foreign presence are stronger in the case of more developed countries where domestic firms have higher absorptive capacity (Meyer and Sinani, 2009; Zhang et al, 2010; Farole and Winkler, 2012). Be it as it may, it should be noted that when dropping the country fixed effects from our estimations (results not shown but available upon request), the EU15 effect in the CEE region becomes much more positive and significant at 5%, with a maximum total effect (at concentrations of EU15 near 44%) that is noticeably bigger than that found in the SEE sample (0.338 versus 0.147).

On the whole, then, our investigation of the first two hypotheses provides positive, but not overwhelming, evidence in favour of the hypothesised role of institutional proximity. European ownership has been found consistently to be more advantageous for domestic firm productivity than non-EU15 ownership. Although the estimated effect for the CEE region does not fully conform to this pattern, the effects of EU15 presence are notably stronger in the SEE region, which has longer and deeper institutional ties with the EU than in the ENP region where institutional proximity is much weaker.

#### *ii. Geography and localisation of spillovers*

Notwithstanding the findings about the distinctive role of EU15 ownership, our overall results suggest that foreign presence has rather limited intra-industry effects. In this sub-section we examine whether this is due to issues that have to do with geographical scale – examining specifically whether spillovers are (a) localised (i.e., if they are stronger for sectoral concentrations of foreign ownership *within* regions – H3) and (b) different across space and in particular across regions of different agglomeration and development (as proxied by the distinction between capital-city regions versus the rest – H4). We address these issues in the regressions presented in Table 2.

As can be seen, defining the presence of foreign ownership at the regional level makes a noticeable difference in the obtained results, in line with our expectations and consistent with the balance of evidence in the literature (Driffield and Hughes, 2003; Mullen and Williams, 2007; Jordaan, 2008a; Monastiriotes and Jordaan, 2010). In the linear model (col.1), the effect of foreign presence is non-significant but positive and statistically very different from the effect found for foreign presence at the national-sectoral level (see col.1 in Table 1). This leads us to investigate the non-linearity of foreign ownership spillovers (col.2) which in the case of the national-sectoral variable were not significant (and thus not reported). Local-level spillovers appear now very strong statistically and hump-shaped. At its maximum (for concentrations near 36%), the estimated effect reaches a value of 0.073; and it only turns negative for concentrations above 71%, which concern just over 5% of observations in our sample.

----- INSERT TABLE 2 AROUND HERE -----

In col.3 of Table 2 we use this new evidence to return to the question of institutional proximity, separating again between foreign presence of EU15 and non-EU15 origin this time in a quadratic specification and measuring foreign presence within regions.<sup>10</sup> The results offer strong support to our hypothesis that presence of firms of EU15 origin has a distinctively different effect than presence of foreign firms from other parts of the world. As is depicted in Figure 2, the EU15 effect is hump-shaped and similar to that found for the total foreign-share variable, but it reaches a higher maximum value (0.923) at a higher level of concentration of foreign firms (46%) and only turns negative at concentrations over 93% that are found in less than 1% of our sample. In contrast, the effect of non-EU15 presence is statistically non-significant, U-shaped and always negative within the 0-100% range of foreign-ownership shares.

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<sup>10</sup> We also examined this for the three sub-samples of CEE, SEE and ENP. The results were qualitatively very similar to those obtained for the foreign presence shares defined at the national-sectoral level (Table 1) and are thus not reported or discussed any further here.

----- INSERT FIGURE 2 AROUND HERE -----

In the remainder of Table 2 we test in turn our fourth hypothesis, about the differentiation of the spillovers across regions of different types. To do so, we introduce a dummy for firms located in capital-city regions and interact this with our foreign share variable(s). We do this both for the region-specific measure (col.4), so as to capture the effect from the concentration of foreign firms in the specific region where each firm is located; and for the nation-wide measure (col.5), to examine the same effect but this time for sectoral concentrations of foreign presence anywhere in the country. From the results it is clear that capital-city regions are less negatively affected by foreign ownership spillovers than other regions. For the latter, the effect is always negative and statistically significant.<sup>11</sup> For capital-city regions the interaction effect with foreign presence at the local level is instead positive and statistically significant. Moreover, it is larger in absolute value than the level effect, suggesting that this type of regions enjoy positive productivity spillovers from foreign presence.

This, then, provides confirmation for our last hypothesis (H4), showing not only that positive spillovers are linked specifically with localisation but also that they accrue mainly – if not exclusively – to firms located in capital-city regions. In line with our earlier discussion, we interpret this as suggesting that spillovers are greater (more positive) in areas of high agglomeration and economic development. This is consistent with evidence and arguments found both in the literature examining the localisation and regional differentiation of spillovers (Driffield and Munday, 2001; Sgrad, 2001; Monastiriotis and Jordaan, 2010) and in the wider literature that identifies

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<sup>11</sup> Note that the difference in the two estimates suggests also the presence of negative spatial spillovers, as concentration at the national level (col.5) is found to produce a more negative effect than concentration locally (col.4). This is at variance with the findings in some of the spatial spillovers literature (Driffield and Munday, 2001; Jordaan, 2008b) but in line with the results of Monastiriotis and Jordaan (2010) for the case of Greece. Negative spatial spillovers are also implied in the case of capital-city regions, as the effect of col.5 is again smaller than that of col.4 and not significant statistically.

development and absorptive capacity as key intervening variables (Jordaan, 2005; Meyer and Sinani, 2009; Zhang et al, 2010; Chen et al, 2011; Farole and Winkler, 2012).

To sum up, our empirical investigation has found evidence that is broadly in line with all four of our hypotheses. Foreign-firm presence is not universally beneficial. Rather, positive spillovers (when they exist) are mostly associated with concentrations of firms of EU15 origin and accrue mainly to firms located in capital-city regions and probably in countries with stronger forms of association with the EU (on the basis of the comparison between the SEE and ENP results). Moreover, positive spillovers appear to be rather localised (geographically concentrated) and concern medium-to-high sectoral concentrations (due to the non-linearity found in col.3 of Table 2). We discuss the implication of these findings in the concluding section.

## **5. Conclusions**

The literature on the intra-industry productivity spillovers of foreign firm ownership has produced a large body of empirical evidence on the nature of these spillovers and the range of factors that condition them. Despite this, only a limited number of studies exist that examine the issue of the origin of the foreign investor as one of the mediating factors determining the size and direction of spillovers. Similarly, and despite the theoretical origins of this literature in the broader literatures of knowledge spillovers and agglomeration economies, studies that examine the geographical scale and spatial differentiation of these productivity spillovers are scarce.

Taking on these observations, this paper sought to examine the role that a particular origin-related factor, namely institutional proximity between the sending and receiving countries, may play for the size and geography of such spillovers. Our hypothesis is that processes of EU association create an environment of deepening economic relations and institutional convergence which not only favours European investments in the associated countries but also creates the scope for larger productivity spillovers to accrue domestically – especially so in the more developed capital-city regions.

Our results support this hypothesis. Whereas, in line with the majority of findings in the literature, the estimated intra-industry spillovers are globally non-positive (Table 1, col.1), concentration of European-owned firms is associated with greater productivity spillovers for domestic firms – especially so when measured at the local level. Moreover, the size of this effect seems to be at least to an extent related to the intensity of the process of political-institutional approximation. In particular, comparing between the SEE and ENP regions where foreign capital deepening is still below potential, we find that – for all but the highest sectoral concentrations of foreign ownership – spillovers are strongest in the SEE region, where the process of association is more advanced and the prospect of accession clearer, and weakest in the ENP region, where association is looser and there is no clear prospect of accession.

It is of course possible that other factors, rather than institutional approximation, may be driving these results – for example, differences in levels of development among the recipient countries, differences between EU15 and non-EU15 firms in a range of characteristics (degree of ownership; degree of concentration within sectors; technological content and capital intensity; sectoral composition), or indeed differences among recipient countries in their composition of EU15 country-origins. In our analysis we tried to control for some of these possible effects (e.g., the use of time-varying country fixed effects eliminates the influence of national-level characteristics such as level of development or geographical distance), but we were of course unable to control for all possible influences. In this sense, the results presented here should be read with caution and treated only as an indication, than as a proof, of the existence of a positive ‘institutional proximity’ effect. Separately, it should be kept in mind that the obtained results concern only the case of intra-industry spillovers. It is possible that patterns of inter-industry spillovers will be different and indeed the institutional proximity effect, if it exists, may even go in the opposite direction – as has been shown to be the case with the geographical proximity effect (Javorcik and Spatareanu, 2011).

Besides these issues, our further exploration of the geography of spillovers has unveiled another interesting dimension to the issue of institutional proximity. The

effects of foreign presence, especially for EU15 firms, are rather localised and significantly more beneficial for capital-city regions than for other regions in each country. This effect is not present for non-EU15 firms but it is very strong in the case of EU15 firms, resulting in positive net spillovers in capital-city regions and net negative spillovers in all other regions. As capital-city regions are typically the most developed within each national economy, this means that EU15 spillovers act to amplify existing regional disparities in the recipient countries.<sup>12</sup>

This ultimately suggests the presence of a crucial trade-off between, on the one hand, higher productivity spillovers accruing from the inflow of EU-originating investments within the process of EU association and, on the other hand, higher regional disparities resulting from the spatial selectivity of these spillovers. This in turn has strong implications for the scope and design of EU association policies. As the ‘gravitation pull’ of the EU makes deeper association almost inevitable for the countries in the EU neighbourhood, the EU shares in a way a responsibility to address the adverse consequences generated by the processes of approximation and integration – including the spatial imbalances found here. Association policies should thus have a clear geographical dimension, seeking to develop and support actions that compensate for the spatial imbalances that EU association and economic openness may bring about. Recent policy developments, both in the SEE region (e.g., the opening of the ‘regional development’ component of the Instrument for Pre-Accession Assistance to all beneficiary countries) and in the ENP (e.g., the initiation of a ‘regional policy dialogue’ and the inclusion of an ‘inter-regional programme’ within the European Neighbourhood and Partnership Instrument), are partly in this direction. Future policy should aim at strengthening the technological content and absorptive capacity of firms located in peripheral regions so as to enable them to share the gains from the increasing foreign-firm presence in their sectors and regions.

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<sup>12</sup> It is still possible, of course, that concentration of foreign/EU15 firms in capital-city regions creates positive spatial spillovers to other regions – as has been shown, for example, by Jordaan (2005) for the case of Mexico. Although we could not formally test for this, we note that the evidence obtained in the last two columns of Table 2 goes against this possibility. In any case, for spatial spillovers to contribute towards *declining* regional disparities, these spillovers would have to be larger than the local-level effects – a condition which is both intuitively and empirically rather unlikely.





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## Data Appendix

### Details on the dataset

The main data used in this paper come from the Panel II-IV version of the Business Environment and Enterprise Performance Survey (BEEPS). BEEPS is an enterprise-level survey implemented jointly by the EBRD and the World Bank. The survey enquires individual firms across 28 transition countries (see Table A.1 for a list of countries) in Eastern Europe and Central Asia about their business and business environment and contains information on a number of firm data, including sales, employment, fixed assets, share of foreign ownership, share of exports, sector (NACE two-digit classification), country and region where the firm is located and origin of foreign investor (if any). The Panel II-IV version of BEEPS is an unbalanced panel containing approximately 28,000 observations from three waves – 2002, 2005 and 2009 – with additional information from an intermediate wave conducted in a sub-set of countries in 2007. Turkey and Montenegro are not covered in the 2002 wave while Azerbaijan was not included in the 2005 wave. Some problems concerning the currency at which monetary values are reported in this dataset were identified and corrected in the November 2013 version. Full details about the dataset are available at [http://ebrd-beeps.com/wp-content/uploads/2013/09/beeps\\_panel\\_020509r.pdf](http://ebrd-beeps.com/wp-content/uploads/2013/09/beeps_panel_020509r.pdf).

Monetary values in this revised dataset have been converted by the survey team in current US dollars for the 2002 and 2005 waves but are reported in current local currency units for subsequent waves. Thus, in processing the survey data we first converted all local-currency data into current US dollars and subsequently deflated them and expressed them in constant 2005 US dollars (using data from IMF's IFS database).

The Panel II-IV dataset has some gaps concerning some key variables of interest in this paper, namely the share and nationality of foreign presence and the region and sector of economic activity. Where possible, we filled these gaps by projecting the values available in previous years or in the cross-sectional editions of BEEPS. This assumes that the region, sector, or share of foreign ownership has not changed between two survey years. Gaps and missing information also concerns the data on employment and capital (fixed assets). In the case of data gaps (i.e., information available for a firm in one wave but not in another) we interpolated (or extrapolated) the missing data, using data from the available years and adjusting for the missing years assuming that the change in the aggregate of interest (employment or fixed assets) for any particular firm with missing data was proportionately the same as with the region-sector to which this firm belonged. This affected 61 observations for the employment variable and 323 observations for the capital variable and has no influence on the obtained results.

Besides this, a large number of missing values exist for the case of information on fixed assets (questions 6a, 6b, 7a and 7b in the BEEPS). This caused a sample-size reduction of some 12,000 observations out of the 22,009 observations for which data on all other variables of interest were available. We have checked whether non-reporting of fixed-assets information varies systematically across different concentrations of foreign-ownership, but found no evidence for this. Given this, and given the importance of controlling for firms' capital when estimating productivity spillovers, we decided to work with the smaller sample. An additional factor for this was that we considered availability of information of fixed assets to be also an indicator of data quality more generally also for the other variables.

Tables A.1 and A.2 below report some key features of the data (long dataset) along the main dimensions of interest (distribution across countries and sectors and sectoral and national shares of foreign ownership, both total and EU15). As can be seen there, sample sizes vary notably across countries, with only 82 observations in Montenegro and between 1,000 and 1,600 observations in Bulgaria, Ukraine, Russia, Turkey, Poland, Romania, Kazakhstan and Croatia. The main sectors where firms are located are Food, Retail trade, Wholesale trade, Construction and Other services. The sectoral distribution of foreign-owned firms follows a similar pattern, although with some exceptions (e.g., foreign firms are significantly over-represented in the IT sectors). Higher shares of foreign firm presence are found in the CEE sample (especially Latvia and Hungary) while differences between the SEE and ENP samples are not too large.

Firms of EU15 origin have a stronger presence in sectors such as Computer & consultancy, Telecommunications, Other services, Transport, Wholesale trade, Machinery and equipment, Non-metallic mineral products, and Garments; while they have a disproportionately low presence in Electronics, IT, Retail trade, as well as in Basic metals, Chemicals and Textiles. They are also over-represented, relative to non-EU15 firms, in the CEE sample and less so in the SEE sample.

**Table A.1.** Sample size and foreign ownership shares by country and region

| <i>Country</i> | <i>Domestic firms</i>           |  | <i>Foreign firms</i> |                            | <i>EU15 firms</i>          |
|----------------|---------------------------------|--|----------------------|----------------------------|----------------------------|
|                | <i>No of obs,<br/>all years</i> | <i>Firms in more<br/>than one wave</i> | <i>No of firms*</i>  | <i>% sales<sup>‡</sup></i> | <i>% sales<sup>‡</sup></i> |
| <b>CEE</b>     |                                 |  |                      |                            |                            |
| Bulgaria       | 1,423                           | 311                                    | 205                  | 27.8%                      | 12.2%                      |
| Czech Rep.     | 556                             | 92                                     | 84                   | 28.2%                      | 27.3%                      |
| Estonia        | 512                             | 240                                    | 116                  | 32.9%                      | 25.7%                      |
| Hungary        | 777                             | 207                                    | 180                  | 33.5%                      | 23.3%                      |
| Latvia         | 481                             | 193                                    | 100                  | 36.1%                      | 27.4%                      |
| Lithuania      | 540                             | 175                                    | 75                   | 20.3%                      | 16.0%                      |
| Poland         | 1,249                           | 253                                    | 136                  | 14.2%                      | 11.5%                      |
| Romania        | 940                             | 253                                    | 149                  | 14.8%                      | 10.5%                      |
| Slovakia       | 418                             | 101                                    | 70                   | 18.4%                      | 14.1%                      |
| Slovenia       | 575                             | 231                                    | 79                   | 18.8%                      | 17.8%                      |
| <b>SEE</b>     |                                 |  |                      |                            |                            |
| Albania        | 437                             | 123                                    | 70                   | 18.2%                      | 14.8%                      |
| Bosnia         | 461                             | 80                                     | 54                   | 8.5%                       | 4.7%                       |
| Croatia        | 897                             | 165                                    | 116                  | 14.7%                      | 11.1%                      |
| FYROM          | 429                             | 157                                    | 64                   | 20.3%                      | 15.2%                      |
| Montenegro     | 77                              | 3                                      | 5                    | 8.0%                       | 6.0%                       |
| Serbia         | 532                             | 204                                    | 78                   | 25.2%                      | 19.8%                      |
| Turkey         | 1,165                           | 625                                    | 38                   | 4.5%                       | 2.6%                       |
| <b>ENP</b>     |                                 |  |                      |                            |                            |
| Armenia        | 638                             | 231                                    | 65                   | 12.8%                      | 6.0%                       |
| Azerbaijan     | 393                             | 142                                    | 51                   | 22.5%                      | 15.7%                      |
| Belarus        | 558                             | 182                                    | 100                  | 9.1%                       | 4.9%                       |
| Georgia        | 493                             | 186                                    | 59                   | 15.0%                      | 5.8%                       |
| Kazakhstan     | 962                             | 217                                    | 91                   | 10.3%                      | 1.7%                       |
| Kyrgyz         | 378                             | 162                                    | 78                   | 17.2%                      | 7.9%                       |
| Moldova        | 638                             | 260                                    | 88                   | 20.2%                      | 5.6%                       |
| Russia         | 1,328                           | 138                                    | 115                  | 7.8%                       | 1.9%                       |
| Tajikistan     | 550                             | 140                                    | 51                   | 10.8%                      | 7.6%                       |
| Ukraine        | 1,061                           | 399                                    | 379                  | 21.5%                      | 10.0%                      |
| Uzbekistan     | 711                             | 246                                    | 134                  | 13.4%                      | 4.1%                       |
| <b>Total</b>   | <b>19,179</b>                   | <b>5,716</b>                           | <b>2,830</b>         | <b>17.9%</b>               | <b>11.5%</b>               |

Source: Author's calculations based on data from the BEEPS Panel II-IV.

\*: Firms with a foreign ownership share of at least 10%. ‡: Sales of all firms multiplied by each firm's share of foreign ownership as a share of total sales (all firms).

**Table A.2.** Sample size and foreign ownership shares by sector of economic activity

| Sector                                | Domestic firms  |                | Foreign firms   |                |                     | EU15-owned firms |                |                     |                                |
|---------------------------------------|-----------------|----------------|-----------------|----------------|---------------------|------------------|----------------|---------------------|--------------------------------|
|                                       | Number of firms | Sectoral share | Number of firms | Sectoral share | Share in the sector | Number of firms  | Sectoral share | Share in the sector | Share to foreign in the sector |
| Basic metals                          | 94              | 0.5%           | 15              | 0.5%           | 14%                 | 2                | 0.3%           | 2%                  | 13%                            |
| Chemicals                             | 310             | 1.6%           | 70              | 2.5%           | 18%                 | 12               | 1.5%           | 3%                  | 17%                            |
| Computer programming, consulting, etc | -               | 0.0%           | 3               | 0.1%           | 100%                | 2                | 0.3%           | 67%                 | 67%                            |
| Construction                          | 2,041           | 10.6%          | 164             | 5.8%           | 7%                  | 38               | 4.8%           | 2%                  | 23%                            |
| Electronics                           | 162             | 0.8%           | 31              | 1.1%           | 16%                 | 2                | 0.3%           | 1%                  | 6%                             |
| Fabricate metal products              | 930             | 4.8%           | 109             | 3.9%           | 10%                 | 29               | 3.6%           | 3%                  | 27%                            |
| Food                                  | 2,527           | 13.2%          | 521             | 18.4%          | 17%                 | 152              | 19.1%          | 5%                  | 29%                            |
| Garments                              | 1,009           | 5.3%           | 113             | 4.0%           | 10%                 | 34               | 4.3%           | 3%                  | 30%                            |
| Hotel and restaurants: section H      | 823             | 4.3%           | 122             | 4.3%           | 13%                 | 35               | 4.4%           | 4%                  | 29%                            |
| IT                                    | 240             | 1.3%           | 71              | 2.5%           | 23%                 | 6                | 0.8%           | 2%                  | 8%                             |
| Machinery and equipment               | 687             | 3.6%           | 112             | 4.0%           | 14%                 | 36               | 4.5%           | 5%                  | 32%                            |
| Non-metallic mineral products         | 345             | 1.8%           | 51              | 1.8%           | 13%                 | 18               | 2.3%           | 5%                  | 35%                            |
| Other manufacturing                   | 1,246           | 6.5%           | 194             | 6.9%           | 13%                 | 54               | 6.8%           | 4%                  | 28%                            |
| Other services                        | 1,801           | 9.4%           | 240             | 8.5%           | 12%                 | 105              | 13.2%          | 5%                  | 44%                            |
| Plastics & rubber                     | 198             | 1.0%           | 38              | 1.3%           | 16%                 | 9                | 1.1%           | 4%                  | 24%                            |
| Retail trade                          | 3,072           | 16.0%          | 268             | 9.5%           | 8%                  | 34               | 4.3%           | 1%                  | 13%                            |
| Telecommunications                    | 2               | 0.0%           | 1               | 0.0%           | 33%                 | 1                | 0.1%           | 33%                 | 100%                           |
| Textiles                              | 406             | 2.1%           | 65              | 2.3%           | 14%                 | 12               | 1.5%           | 3%                  | 18%                            |
| Transport                             | 1,085           | 5.7%           | 176             | 6.2%           | 14%                 | 54               | 6.8%           | 4%                  | 31%                            |
| Wholesale trade                       | 2,201           | 11.5%          | 466             | 16.5%          | 17%                 | 161              | 20.2%          | 6%                  | 35%                            |
| <b>Total</b>                          | <b>19,179</b>   | <b>100.0%</b>  | <b>2,830</b>    | <b>100.0%</b>  | <b>13%</b>          | <b>796</b>       | <b>100.0%</b>  | <b>4%</b>           | <b>28%</b>                     |

Source: Author's calculations based on data from the BEEPS Panel II-IV.



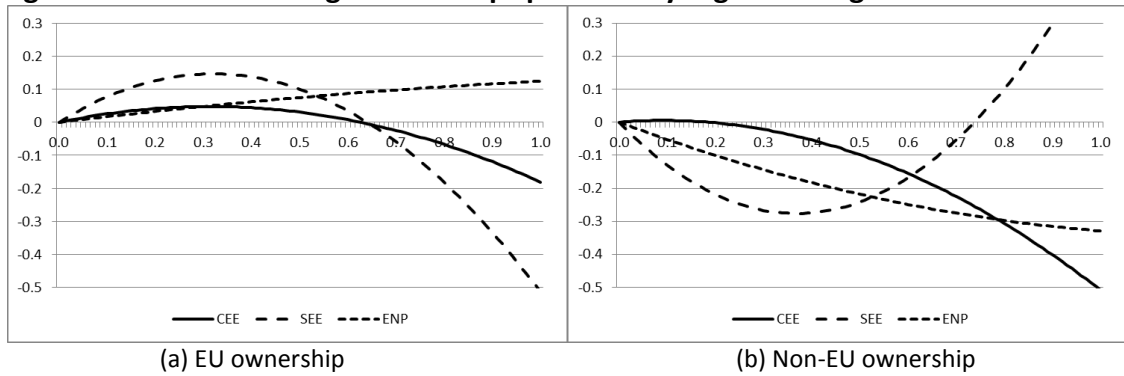
TABLES AND FIGURES

**Table 1. Impact of foreign ownership by region of origin and destination**

| <i>Dependent: ln(sales)</i>                      | (1)                 | (2)                  | (3)                 | (4)                 | (5)                 | (6)                 | (7)                  | (8)                 |
|--|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
|  | ALL                 | ALL                  | CEE                 | SEE                 | ENP                 | CEE                 | SEE                  | ENP                 |
| Employment                                       | 0.852***<br>(0.013) | 0.852***<br>(0.013)  | 0.876***<br>(0.011) | 0.757***<br>(0.041) | 0.880***<br>(0.023) | 0.876***<br>(0.010) | 0.758***<br>(0.041)  | 0.880***<br>(0.023) |
| Fixed assets                                     | 0.183***<br>(0.018) | 0.183***<br>(0.018)  | 0.166***<br>(0.014) | 0.231***<br>(0.043) | 0.174***<br>(0.018) | 0.167***<br>(0.014) | 0.230***<br>(0.043)  | 0.174***<br>(0.018) |
| Foreign share                                    | -0.123**<br>(0.055) |                      |                     |                     |                     |                     |                      |                     |
| EU15 share                                       |                     | -0.00177<br>(0.048)  | 0.00452<br>(0.079)  | 0.0524<br>(0.090)   | 0.140<br>(0.182)    | 0.303<br>(0.314)    | 0.914**<br>(0.342)   | 0.175<br>(0.500)    |
| EU15 share squared                               |                     |                      |                     |                     |                     | -0.484<br>(0.412)   | -1.428***<br>(0.440) | -0.0508<br>(0.860)  |
| Non-EU15 share                                   |                     | -0.293***<br>(0.092) | -0.214<br>(0.166)   | -0.269<br>(0.215)   | -0.411<br>(0.265)   | 0.116<br>(0.335)    | -1.498***<br>(0.508) | -0.542<br>(0.636)   |
| Non-EU15 share squared                           |                     |                      |                     |                     |                     | -0.624<br>(0.406)   | 2.031**<br>(0.814)   | 0.213<br>(0.643)    |
| Constant   | 7.132***<br>(0.266) | 7.107***<br>(0.271)  | 8.067***<br>(0.161) | 6.804***<br>(0.492) | 6.712***<br>(0.222) | 8.024***<br>(0.170) | 6.713***<br>(0.470)  | 6.709***<br>(0.222) |
| Observations                                     | 9,292               | 9,292                | 4,225               | 2,024               | 3,043               | 4,225               | 2,024                | 3,043               |
| R-squared  | 0.825               | 0.825                | 0.856               | 0.769               | 0.786               | 0.856               | 0.770                | 0.786               |
| Wald-tests for joint significance                |                     |                      |                     |                     |                     |                     |                      |                     |
| EU15 terms                                       |                     |                      |                     |                     |                     | 0.93                | 7.91***              | 0.41                |
| Non-EU15 terms                                   |                     |                      |                     |                     |                     | 4.57**              | 4.46**               | 8.66***             |
| F-test for equality of EU15 and non-EU15 effects |                     | 8.15***              | 1.71                | 1.07                | 4.66**              |                     |                      |                     |

Notes: Clustered standard errors in parentheses; \*, \*\* and \*\*\* show significance at the 10%, 5% and 1% levels. All regressions include sector dummies and interacted year-country fixed effects.

**Figure 1. Estimated foreign ownership spillovers by region of origin and destination**



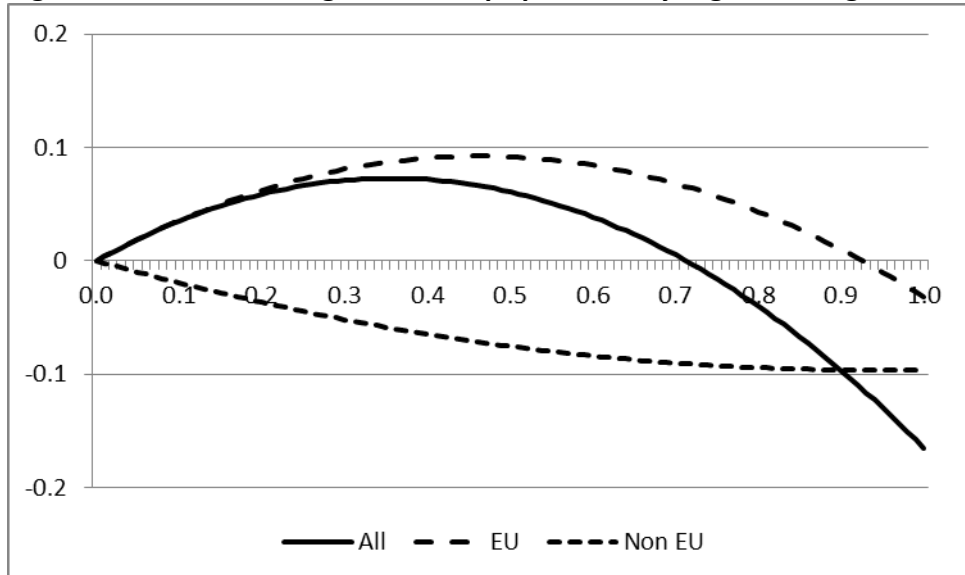
Note: Estimated total effects of foreign ownership (sectoral share of foreign-owned firms) on domestic firms' productivity (vertical axis) across different shares of foreign concentration (horizontal axis), by origin of foreign investors and region of destination – derived from cols 6-8 of Table 1.

**Table 2. Localisation and regional differentiation of the impact of foreign ownership**

| Foreign-share measure: | Localised (region-sector) |                      |                     |                       | Nationwide (sector)   |
|------------------------|---------------------------|----------------------|---------------------|-----------------------|-----------------------|
|                        | (1)                       | (2)                  | (3)                 | (4)                   | (5)                   |
| Employment             | 0.853***<br>(0.013)       | 0.853***<br>(0.013)  | 0.853***<br>(0.013) | 0.831***<br>(0.00834) | 0.831***<br>(0.00834) |
| Fixed assets           | 0.183***<br>(0.018)       | 0.183***<br>(0.018)  | 0.183***<br>(0.018) | 0.189***<br>(0.00652) | 0.189***<br>(0.00652) |
| Capital region         |                           |                      |                     | 0.107***<br>(0.0258)  | 0.124***<br>(0.0278)  |
| Foreign share          | 0.0154<br>(0.064)         | 0.409***<br>(0.114)  |                     | -0.136**<br>(0.0613)  | -0.227***<br>(0.0614) |
| “ “ squared            |                           | -0.574***<br>(0.139) |                     |                       |                       |
| ... (x) capital        |                           |                      |                     | 0.246**<br>(0.0998)   | 0.0788<br>(0.101)     |
| EU15 share             |                           |                      | 0.399**<br>(0.189)  |                       |                       |
| “ “ squared            |                           |                      | -0.431*<br>(0.222)  |                       |                       |
| Non-EU15 share         |                           |                      | -0.205<br>(0.219)   |                       |                       |
| “ “ squared            |                           |                      | 0.109<br>(0.275)    |                       |                       |
| Constant               | 7.092***<br>(0.280)       | 7.065***<br>(0.277)  | 7.060***<br>(0.276) | 7.413***<br>(0.112)   | 7.430***<br>(0.112)   |
| Observations           | 9,292                     | 9,292                | 9,292               | 9,292                 | 9,292                 |
| R-squared              | 0.825                     | 0.826                | 0.825               | 0.809                 | 0.809                 |

Notes: Clustered standard errors in parentheses; \*, \*\* and \*\*\* show significance at the 10%, 5% and 1% levels. All regressions include sector dummies and interacted year-country fixed effects.

**Figure 2. Localised foreign ownership spillovers by region of origin**



Note: Estimated total effects of foreign ownership on domestic firms' productivity (vertical axis) across different shares of foreign concentration (horizontal axis), by origin of foreign investors – derived from cols 2-3 of Table 2.