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Inspire policy making by territorial evidence

The world in Europe, global FDI flows towards Europe

Impacts of extra-European FDI towards Europe

Applied Research

Scientific Report

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The world in Europe, global FDI flows towards Europe

Impacts of extra-European FDI towards Europe

Scope and introduction to the study

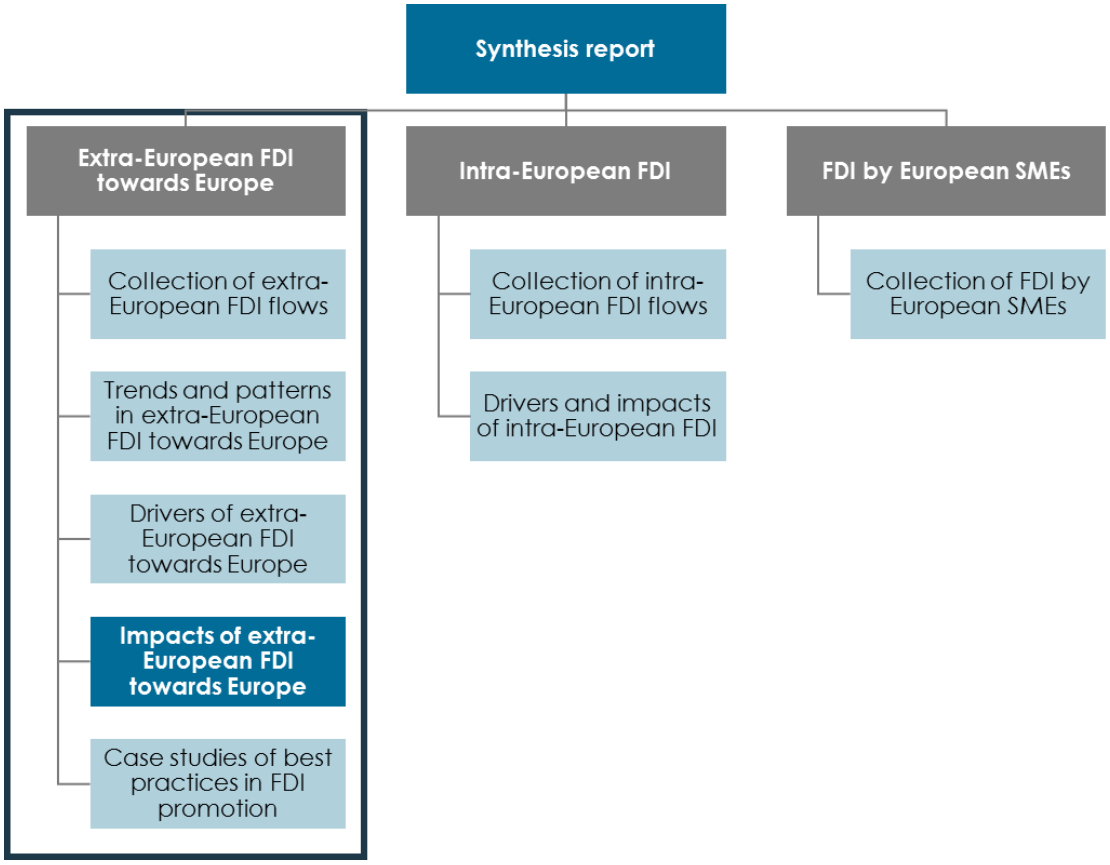
This report is part of the study, *The World in Europe, global FDI flows towards Europe*. The study casts new light on three topics related to the integration of Europe in the world economy:

1. Extra-European FDI towards Europe
2. Intra-European FDI
3. FDI by European SMEs

Key conclusions and recommendations related to each of these questions can be found in three stand-alone reports. Each report is supported by a number of scientific reports that contain detailed methodological descriptions and results. The insights gained from the study are summarised in a synthesis report that cuts across the three topics.

This scientific report *Impacts of extra-European FDI towards Europe* includes background information and documentation for the conclusions and recommendations brought forward in the main report on extra-European FDI towards Europe.

Overview of the study



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Abbreviations

EC	European Commission
ESPON	European Territorial Observatory Network
EU	European Union
FDI	Foreign Direct Investment
FT database	fDi Markets database offered by the Financial Times
M&A	Mergers and acquisitions
NUTS	Nomenclature of Territorial Units for Statistics

Executive summary

This scientific report analyses the impacts of FDI on the regional economies in Europe. In this report, we examine the direct footprint of non-European-owned firms in individual European countries and different European territories. We measure the direct footprint both in terms of the employment and the production they generate.

Based on detailed firm-level data, we furthermore estimate so-called spillover effects from non-European owned firms to local firms. The potential for productivity spillovers arises because foreign firms comprise large amounts of technical, operational and managerial knowledge that may 'spill over' to local firms and enhance their productivity and growth. Research shows that the scope for spillovers increases with geographic proximity between firms, and we therefore estimate the impact of non-European owned firms on the productivity and employment of local firms within the same (NUTS3) region.

Non-European owned firms may impact local firms within the same industry differently than local firms in other industries. Foreign and local firms within the same industry often share the same pool of labour and customers, which means that they are more direct competitors but also that the knowledge inherent in the foreign firms may be more directly transferable to local firms within the same industry. In order to take this into account, we estimate the impact of non-European owned firms on the productivity and employment in local firms within the same industry and region, as well as within the given region more broadly.

Overall impacts of FDI

We find that non-European owned firms make up a relatively small share of the total number of firms in Europe, and that they also have a disproportionately large direct footprint on European economies. Non-European owned firms on average account for one per cent of the total number of firms in Europe, but five per cent of employment, 11 per cent of production and nine per cent of value added.

We furthermore find that FDI is associated with productivity gains among local firms, both within and across industries. Overall, we find that:

- Increasing the concentration of non-European owned firms within a given *industry and region* by one percentage point is associated with an average productivity increase of close to 0.5 per cent among local firms in the same industry and region.
- Increasing the concentration of non-European owned firms within a given *region* by one percentage point is associated with an average productivity increase of close to 2 per cent among local firms in the same region.

Our findings indicate that firms across all industries benefit more from productivity spillovers than firms within the industry. This finding could indicate that the knowledge inherent in the non-European firms is not sector-specific, but benefits all local firms that engage with the foreign firm, e.g. local suppliers or local firms that hire employees from the foreign firm.

Inward FDI may or may not increase employment in the local firms within the same region. In the short term, increased productivity may cause employment in the local firms to fall because the firms can support the same production with fewer workers. Over time, higher productivity will improve the competitiveness of the local firms and help them gain market share – domestically as well as internationally – which is likely to stimulate employment in the firm. Employment can also be reduced in local firms that are in direct competition with the non-European owned firms, whereas employment in local suppliers can be stimulated by the presence of foreign firms in the region.

We find no evidence to suggest that non-European owned firms impact employment levels among local firms. This finding suggests that any positive and negative impacts that foreign firms have on employment among local firms net out on average.

Impacts of FDI across different European territories

In order to examine how FDI affects the overall development of the European territory, we also assess whether the impact of FDI differs across different types of territories (urban, intermediate and rural regions), different metropolitan regions (capital city metropolitan regions, other metropolitan regions and non-metropolitan regions) and across regions with different levels of development (more developed regions, transition regions and less developed regions). The findings are summarised in the table below.

In terms of the direct footprint of non-European owned firms across each of the different types of territories, we find the largest concentration of non-European owned firms in urban regions, capital city metropolitan regions and more developed regions in Europe. Relative to their share in the total number of firms, non-European owned firms account for a disproportionately high share of employment and production in all types of regions. This is so because foreign firms are typically large, whereas local firms comprise both large firms and SMEs.

In urban regions, non-European owned firms account for 1.1 per cent of the total number of firms, but 3.6 per cent of total employment (scale factor of 3.2) and 6.6 per cent of operating revenue (scale factor of 5.9). Non-European owned firms account only for 0.3 per cent of all firms in rural regions, but 0.8 per cent of employment and 1.3 per cent of operating revenue. In intermediate regions, non-European owned firms account only for 0.6 per cent of the total number of firms but 1.3 per cent of employment (scale factor 2.4) and 3.3 per cent of operating revenue (scale factor 5.8). This suggests that the non-European owned firms located in the intermediate and rural regions are less labour intensive than non-European owned firms in urban regions, and that the operating revenue in intermediate and urban regions are larger on average than in rural regions.

The foreign firms in the less developed regions on average create less employment than firms in more developed regions and, in particular transition regions (scale factor 2.1 for less developed regions compared to 2.9 and 6.1 for more developed and transition regions, respectively). In addition, they create less operating revenue than in in urban and transition

regions (scale factor 4.5 for less developed regions compared to 5.8 and 7.2 for more developed and transition regions, respectively). This finding indicates that foreign firms located in the less developed regions are less labour-intensive than foreign firms in more developed regions and in transition regions. Policies that could help these regions attract more labour-intensive foreign firms could help stimulate development and convergence in Europe.

Table 1 Direct impacts of non-European owned firms across different types of territories

	Percentage of all firms	Percentage of total employment	Percentage of operating revenue
Urban regions	1.1%	3.6% (x3.2)	6.6% (x5.9)
Intermediate regions	0.6%	1.3% (x2.4)	3.3% (x5.8)
Rural regions	0.3%	0.8% (x2.3)	1.3% (x4.0)
Capital metropolitan regions	1.7%	4.8% (x2.9)	9.2% (x5.4)
Other metropolitan regions	0.6%	1.8% (x3.1)	3.6% (x6.2)
Non-metropolitan regions	0.4%	1.5% (x3.7)	3.1%(x7.7)
More developed regions	1.1%	3.1% (x2.9)	6.2% (x5.8)
Transition regions	0.4%	2.4% (x6.1)	2.9% (x7.2)
Less developed regions	0.5%	1.0% (x2.1)	2.1% (x4.5)

Note: The table shows the share of the total of each of the three outcome measures accounted for by non-European owned firms in the different types of territories.

Source: ESPON FDI (2018) based on the Amadeus database

The results furthermore indicate that FDI is associated with productivity gains among local firms within the same industry and region (intra-industry productivity spillovers) and within a given region more broadly (broader regional productivity spillovers) in most types of territories. The findings are summarised in the table below.

We find that productivity spillovers from non-European firms are generally larger for local firms in the service sectors than for local firms in the manufacturing sectors. The sub-sector analysis shows that this finding is mainly driven by large intra-industry productivity spillovers on local firms in the wholesale and retail trade sector as well as large broader regional productivity spillovers accruing to local firms engaged in accommodation and food services activities as well as in information and communication services. In the manufacturing sector, productivity spillovers mainly benefit local firms in the textiles, apparel and leather industries, and the machinery industry.

While we find that local firms of all sizes benefit from productivity spillovers, we find that smaller local firms (i.e. micro firms and SMEs) benefit the most. One reason for this may be that these are the firms that have the most to learn so that the potential for knowledge spillovers may be especially large.

In terms of type of investment, we find positive spillovers from mergers and acquisitions (M&As). Due to data limitations, we cannot test for spillovers arising from greenfield investments specifically.

Table 2 Productivity spillovers to local firms

	Intra-industry productivity spillovers	Broader regional productivity spillovers
All	0.5%	2.0%
Manufacturing	0.2%	1.4%
Services	0.8%	2.2%
Urban regions	0.4%	1.7%
Intermediate regions	-	1.4%
Rural regions	0.2%	-
Capital city metropolitan regions	-	1.0%
Other metropolitan regions	0.3%	1.6%
Non-metropolitan regions	0.2%	0.8 %
More developed regions	0.3%	1.7%
Transition regions	0.2%	0.4%
Less developed regions	-	-

Note: The figure summarises the findings related to productivity spillovers from non-European owned firms to local firms in Europe across the different types of territories.

Source: ESPON FDI (2018) based on data from the Amadeus database

Overall, we find that productivity spillovers are lower in more disadvantaged regions (rural, non-metropolitan and less developed regions). There could be several reasons for this. Local firms in these regions may not have the required resources and skills to benefit from knowledge spillovers from non-European owned firms. Similarly local buyer-supplier linkages may not be sufficiently frequent or strong to generate spillovers across industries. Policies to improve the absorption capacity of local firms and the integration of non-European firms in the local economies will increase productivity spillovers, and such policies are particularly important in more disadvantaged regions.

Caveats and possible directions for further research

The analysis carried out in this study is based on very detailed firm-level data for 34 European countries. The analysis of productivity spillovers includes all 34 countries, whereas the analysis of employment spillovers includes only 30 European countries as the Amadeus database applied in this study does not include employment data for Cyprus, Greece, Lithuania and Turkey. We have tested if the results from the productivity analysis change if we also limit this analysis to the 30 countries included in the employment analysis. This does not seem to be the case, and we therefore expect our conclusions to hold for all 34 countries. The analysis is limited to extra-European FDI and impacts of intra-European FDI have been analysed separately.

Other extensions of the analysis could also be useful from a policy perspective. One field of research could be to analyse spillovers on a more aggregate level (e.g. NUTS2) in order to explore the full reach of these spillovers. It may be the case, for example, that less disadvantaged regions attract less FDI themselves but nevertheless benefit from FDI located in other regions. More research to identify the characteristics of labour-intensive firms and the factors that determine their location choice could furthermore help less developed regions develop investment promotion offerings to these types of companies.

1 Channels of impacts from foreign firms

Foreign owned firms are typically larger, more productive and more trade-oriented than local firms. Consequently, these firms can have large direct impacts on employment, production and value added in the regions in which they are located. As these firms have been able to establish themselves in a foreign market, it is generally acknowledged that they comprise large amounts of technical, operational and managerial knowledge.[1] This knowledge can 'spill over' to local firms and enhance their productivity and growth.

In this chapter, we look closer at the channels through which such productivity spillovers many occur and what the implication may be for employment in the local firms.

1.1 Productivity spillovers from foreign firms

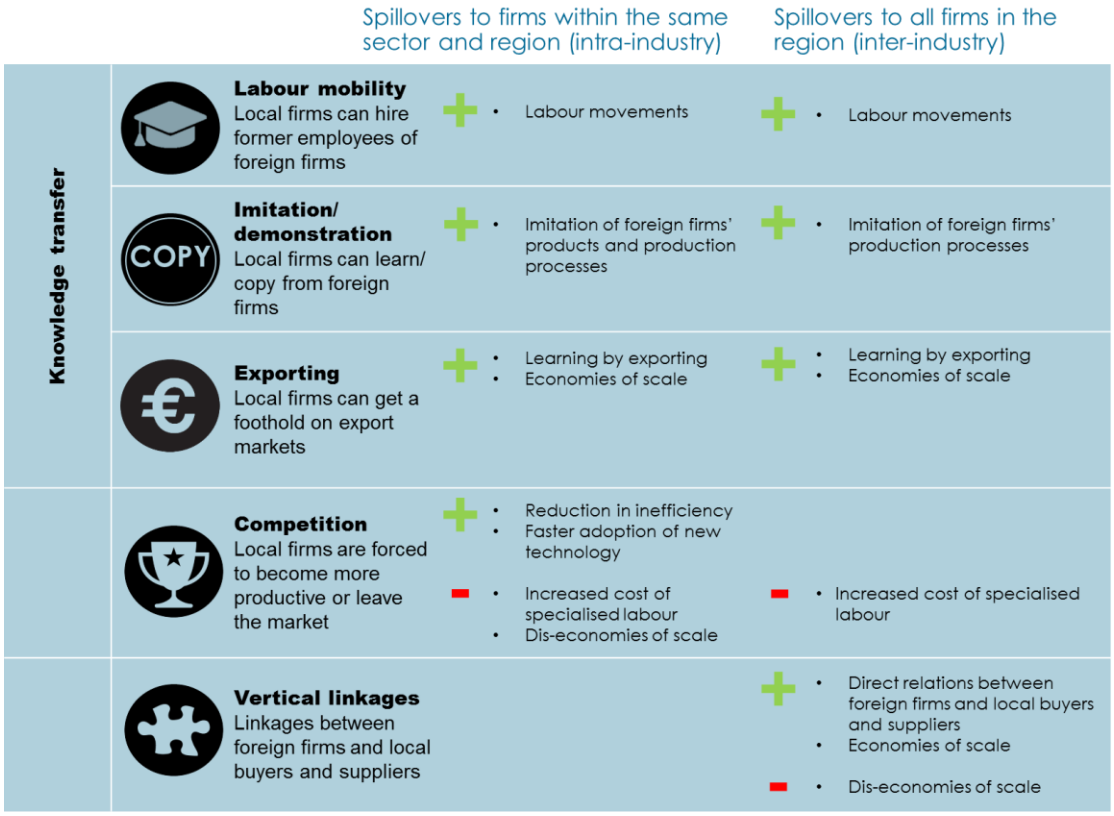
Productivity spillovers can occur via numerous channels and may accrue to local firms within the same industry (*intra-industry spillovers*) or to local firms in other industries (*inter-industry spillovers*). In the international trade literature (e.g. Görg and Greenaway, 2003), the following five channels are typically identified as potential spillover channels:

- Labour mobility
- Imitation/demonstration
- Exporting
- Competition
- Vertical linkages

The first three channels (labour mobility, imitation/demonstration and exporting) materialise through knowledge transfer and can have a positive impact on the productivity of local firms within the same industry as well as firms in other industries. Increased competition from a foreign company can have both positive and negative impacts on the productivity of local firms within the same industry but will have a negative impact on the productivity of local firms in other industries. Spillovers through vertical linkages between the foreign firm and local firms concern only firms in other industries and can be both positive and negative. The five channels of productivity spillovers are summarised in Figure 1 and are described in more details below.

[1] Markusen (1995) refers to such assets as 'knowledge capital', which include factors such as superior production processes, technology, management techniques or marketing and advertisement campaigns.

Figure 1 Channels of productivity spillovers from foreign to local firms



Source: ESPON FDI (2018) based on the literature survey referenced in the scientific report *Impacts of extra-European FDI towards Europe*

1.1.1 Labour mobility

The most obvious channel through which knowledge can 'spill over' from foreign to local firms is via labour movements between firms. When local firms hire former employees of foreign firms, they benefit from the knowledge that these employees have built up from their former positions. This can for example be knowledge about specific ways of doing things, e.g. technical or managerial know-how, which can be transferred to local firms and increase their efficiency directly.

Empirical research supports the importance of this channel. Based on plant-level data from Norway matched with detailed information on employees, Balsvik (2011) thus finds positive productivity spillovers from multinational enterprises (MNEs) to non-MNEs through labour mobility.[2] In specific, the author finds that workers with experience from a MNE contribute 20 per cent more to the productivity of the plant, in which they work, than workers without such experience.

[2] MNEs include both Norwegian and foreign owned MNE.

Stoyanov and Zubanov (2012) also find evidence consistent with labour mobility as a channel of productivity spillovers. They study knowledge transfers in general without a particular focus on the dynamics between MNEs and domestic firms. They find that hiring workers from more productive firms is associated with gains amounting to a 0.35 per cent productivity increase for the average firm one year after hiring.

While labour movements can be a channel of both intra-industry and inter-industry spillovers, specialised labour is more likely to move between firms in the same industry, and this channel may therefore be of more importance for the occurrence of intra-industry spillovers.

1.1.2 Imitation/demonstration

Aside from labour movements, local firms may also learn from foreign firms via less tangible channels, such as informal knowledge exchanges or via imitation, which in its classical sense refer to reverse engineering. However, local firms may also imitate foreign firms' production methods or managerial practices (Görg and Greenaway, 2003).

Through their own production methods, foreign firms can also demonstrate the viability of a given technology towards local firms, which may cause the adoption of new technologies among the latter.

Imitation/demonstration can be a channel of both *intra-industry* and *inter-industry* spillovers, however it is most frequently discussed in terms of *intra-industry* spillovers.

1.1.3 Exporting

Productivity gains through knowledge transfer may also arise indirectly via exporting. The knowledge foreign firms hold about foreign markets (e.g. knowledge regarding consumer tastes, international standards, distributional channels, etc.) and their potential network of affiliates across multiple markets can help local firms get a foothold on export markets and increase their international competitiveness (Aitken, Hanson and Harrison, 1997). Foreign firms can also help local firms become more productive and thereby increase their chances of starting to export (Kneller and Pisu, 2007).

An enhanced export performance by local firms is of importance to national and regional economies as export earnings positively affect the balance of payments and are a source of foreign exchange earnings needed to import intermediates and new technological know-how. Furthermore, there is empirical evidence suggesting that firms 'learn' from exporting and as a result enhance their productivity further.[3]

FDI-induced exports can be a channel of both *intra-industry* and *inter-industry* spillovers.

[3] De Locker (2007) finds evidence of productivity gains from exporting for Slovenian firms.

1.1.4 Competition

Productivity spillovers can also arise via competition between foreign and local firms and can be both positive and negative.

If the entry of a foreign firm forces competing firms in the local market to use their resources more efficiently or to adopt new technologies, this can result in productivity increases among local competitors (Blomström and Kokko, 1998).

Via competition, foreign firms may also force some of the least productive local firms to leave the market and cause a restructuring of the market. As the least productive firms leave the market, average productivity in the industry will increase.

However, even if a local firm manages to stay in the market, increased competition does not necessarily cause the firm to become more productive. The entry of a large foreign firm that takes over significant market shares from local firms can push up the average cost of production for the local firms. This occurs because the local firms' fixed costs of production will be spread across fewer units when their market shares are reduced (Aitken and Harrison, 1999). Via dis-economies of scale, productivity may therefore be reduced. This is most likely to occur in industries where production requires relatively large fixed costs.

While competition between foreign and local firms is most likely to affect local firms in the same industry (e.g. local competitors), firms in other industries may also be affected via competition for labour e.g. if regional unemployment is very low, or if the region is short of labour with specific skills and competences. Foreign firms generally have high productivity and tend to pay higher wages than local firms, which will make it easier for the foreign firms to attract labour and critical skills compared to local firms.

1.1.5 Vertical linkages

Inter-industry productivity spillovers may also arise via linkages between foreign owned firms and their local buyers and suppliers. The scope for positive spillovers is generally believed to be larger between foreign firms and their local buyers and suppliers than between foreign firms and their local competitors. The reason for this is that foreign owned firms have a strong incentive to minimise any spillovers that could increase the efficiency of their competitors, while it is in their interest to engage directly with their local buyers and suppliers (Javorcik, 2004).[4]

It is for example in the self-interest of foreign firms to engage directly with their local suppliers in order to raise the quality of their products (Javorcik, 2004). Numerous case studies verify this and show that foreign firms often provide technical assistance to their suppliers and assist with for example the organisation of their production processes and quality control (e.g. Moran, 2001 cited in Javorcik, 2004 and Copenhagen Economics, 2017).

[4] In order to protect their knowledge from diffusing throughout the industry, multinational companies for example pay a wage premium to retain employees (see Fosfuri, Motta and Rønde, 2001).

Foreign firms may also impact productivity levels among local firms in downstream industries (i.e. firms purchasing inputs from the foreign firm) positively, by being a source of new or improved intermediate inputs, possibly accompanied by complementary services that are not accessible when inputs are imported (Javorcik, 2004).

The extent to which knowledge held by foreign firms may spill over to local suppliers and buyers will depend on the degree of interaction they have with local firms. If they purchase very little or no inputs locally, or do not sell or supply any services to other local firms, the scope for knowledge spillovers may be very small.

When large multinational companies enter a region and purchase their inputs locally, they increase the size of the market for local suppliers. A larger market may allow some of the existing suppliers to benefit from economies of scale, attract new suppliers and spur competition (Markusen and Venables, 1997). With intensified competition, the more productive suppliers will gain market share at the expense of less productive firms. This process increases the overall level of productivity in the region.

Foreign owned firms can also have a negative impact on the productivity among local suppliers, if they purchase most of their inputs outside of the region, and at the same time crowd out local competitors, who purchase their inputs from within the region. In these cases, the foreign owned firms push customers of local suppliers out of the market. The fall in demand can cause unit costs to increase, as the fixed cost of production will be spread across a smaller volume of production. As a result, the productivity of local suppliers may fall (Markusen and Venables, 1997). Negative spillovers via such dis-economies of scale, are most likely to affect local suppliers in industries where production requires relatively large fixed costs.

1.1.6 The firm size dimension of spillovers

Spillovers can accrue to local firms of all sizes but impacts may differ between small and large firms. On the one hand, one may expect the largest productivity spillovers to accrue to large local firms, as these may have a larger *absorption capacity* (i.e. ability to absorb new knowledge or technology) than smaller firms.[5] On the other hand, larger firms may also be more likely to be in direct competition with foreign owned firms and any negative productivity impacts arising via this channel may thus be especially large for larger local firms. At the same time, while smaller local firms may have a smaller absorption capacity than larger firms, these may be the firms that have the most to learn from foreign firms and may thus have the largest scope for benefitting from knowledge spillovers. The results from the existing empirical research are not clear cut. At discussed in Damijan et al. (2014), findings from Hungary suggest that larger and more productive firms benefit the most, while results presented in Damijan et al. (2014) show that smaller firms benefit especially from vertical linkages with foreign owned firms.

[5] As noted by Damijan et al. (2014) firm size seems to have a positive influence on domestically owned firms' absorption capacity.

1.1.7 The mode of entry dimension of spillovers

The potential for productivity spillovers is likely to be different for greenfield investments and M&As. As noted by Balsvik and Haller (2011), the two types of investments may, at least in the short run, have different competition effects and differ in the degree to which they are integrated in the local economy (vertical linkages). Greenfield investments expand the production capacity in the region, create new jobs directly in the firm and increase demand for local supplies, which means that there is a potential for spillovers through competition in both the product and labour markets as well as for vertical spillovers. Existing local firms that are being taken over by a foreign company may initially be relatively well-integrated in the local economy but the change of ownership may change this.

Based on Norwegian data, Balsvik and Haller (2011) find that FDI via M&As have a positive impact on the productivity of domestic firms in the same industry, while FDI via greenfield impact negatively on the productivity of domestic firms, both within the same industry and within the same labour market region. They further find that the negative impact arising from greenfield investments is due to crowding out in the product market as well as increased competition for qualified employees. In contrast, they argue that the positive effect arising from M&As is consistent with knowledge spillovers as the target firms have pre-existing linkages with domestic firms that benefit from knowledge spillovers. Similar evidence is found by Javorcik (2005), who finds positive productivity spillovers from partially foreign owned firms (i.e. firms that are jointly owned by foreign and domestic investors) to local suppliers in Lithuania, but not from wholly owned foreign firms, which are less likely to source their inputs locally.

Research thus indicates that the size of spillovers may depend on the mode of entry of FDI.

1.1.8 The regional dimension of spillovers

Research has shown that geographic proximity between domestic firms and MNEs is an important determinant of whether or not spillovers occur (Görg and Greenaway, 2003).

The main argument is that proximity reinforces the different spillover channels. *First*, as geographical distance increases, the scope of knowledge 'spilling' from foreign to domestic owned firms will thus be reduced if e.g. labour mobility across regions is low (Girma and Wakelin, 2002). *Second*, geographical proximity reduces transaction costs and facilitates communication, making it likely that a foreign firm will prefer local suppliers (Crespo et al., 2010). *Third*, competition between foreign firms and domestic firms may be stronger at the local level (Crespo et al., 2010).

Empirical findings support the importance of geographical proximity for the occurrence of spillovers. Girma and Wakelin (2002) thus find evidence of positive productivity spillovers from foreign firms to domestic firms in the UK, but only to domestic firms within the same sector and region as the foreign firms. For domestic firms in the same sector but in different regions, there

is evidence of negative spillovers.[6] Crespo et al. (2010) find evidence of positive spillover across industries at the regional level, but no evidence of spillovers at the national level.

Research thus indicates that the scope for both *intra-industry* and *inter-industry* productivity spillovers increases with geographical proximity.

1.2 Employment spillovers

Foreign owned firms can also impact employment among local firms. We refer to the impact as employment spillovers.

Foreign owned firms can have a *negative* impact on the demand for labour among their local competitors, as well as among other local firms across industries. Such an impact can arise if foreign owned firms crowd out local firms via competition in the final goods market (local competitors) or via competition for labour or other inputs (all firms regardless of industry affiliation).

Foreign owned firms can also have a *positive* impact on employment among local firms. This can arise if foreign firms increase the demand for locally produced inputs or if local firms begin to export or increase existing exports because of their interactions with foreign owned firms.

Finally, employment in local firms may also be affected both *negatively* and *positively* via FDI induced productivity enhancement (productivity spillovers). Initially, as local firms become more productive, they may find it optimal to reduce employment as they can support the same production with less workers. Over time, higher productivity will improve the competitiveness of the local firms and help them gain market share, domestically as well as internationally, causing employment to increase. Also, productivity spillovers may arise via the adoption of new technologies or production processes that are less labour intensive.

1.3 Concluding remarks

Foreign owned firms both have a direct economic footprint in the regions in which they are located and the potential to enhance the productivity of local firms in the region. Such spillovers can arise via the following channels: Labour mobility, imitation/demonstration, competition, exporting and vertical linkages. Productivity spillovers can accrue to both local firms within the same industry, as well as to local firms in other industries, including local buyers and suppliers. The impact on productivity and employment can be both positive and negative.

[6] In the study the authors divide the UK into 14 regions. Girma and Wakelin (2002) argue that the result may be due to e.g. regional labour mobility in the UK being low, and that it is therefore mainly local employers who will gain from knowledge spillovers via labour movements.

2 Empirical methodology and data

As the a priori impact of FDI on productivity and employment among local firms is ambiguous, we use firm-level data to empirically test how non-European firms affect the productivity and employment among local firms in Europe. In this chapter, we describe the methodology and data used.

2.1 Methodology

As research shows that geographical proximity between foreign and local firms is expected to facilitate spillovers, we conduct the analysis of spillovers at the regional level. More specifically, we examine the extent of spillovers from non-European owned firms to local firms (i.e. domestically owned as well as European owned firms) within NUTS3 regions in Europe.

As foreign firms may impact local competitors differently than other local firms, including local buyers and suppliers, we conduct the analysis at two levels. *First*, we examine spillovers arising from non-European owned firms to local firms within the same industry in a given NUTS3 region (i.e. intra-industry spillovers). *Second*, we examine spillovers arising from non-European owned firms to local firms across all industries within a given NUTS3 region (i.e. broader regional spillovers).[7]

In order to test for spillovers at each of these two levels, we set up two distinct models in which we regress local firms' labour productivity or level of employment on a number of firm, industry and regional determinants. The key determinant in both models is a measure of the concentration of non-European owned firms in the region (i.e. their employment share). In the case of the intra-industry spillover model, the share of employment is measured within a given industry and region. In the case of the broader regional spillover model, the share of employment is simply measured within a given region.

In order to test the impact of non-European owned firms on the productivity and employment among local firms, we set up a number of econometric models to test the following:

- *The impact of non-European owned firms on the productivity/ employment of local firms within the same industry and region*
  Based on these models, we estimate the impact of non-European owned firms on the productivity and employment of local firms within the same NUTS3 region and NACE 2 industry.

[7] As the analysis is undertaken at the NUTS3 level, we use a fairly aggregated industry classification (2-digit NACE) to ensure that we have a sufficient number of firms across the different region/industry combinations to undertake the analysis. This means that the analysis conducted at the intra-industry level will pick up spillovers arising from foreign firms to their local competitors as well as to local buyers and suppliers within the same 2-digit industry. The broader analysis will in addition pick up spillovers to local firms in other industries, including local buyers and suppliers outside of the same 2-digit NACE industry.

- *The impact of non-European owned firms on the productivity/employment of local firms within the same region*
  Based on these models, we estimate the impact of non-European owned firms on the productivity and employment of local firms within the same NUTS3 region, regardless of their industry affiliation.

In the first case, the econometric exercise boils down to comparing local firms in *industries and regions* with high levels of non-European foreign investments to other local firms in industries and regions without any significant non-European foreign investment. If local firms in the former industries are more productive or have a higher level of employment, this suggests positive spillover effects.

In the second case, the econometric exercise boils down to comparing local firms in *regions* with high levels of non-European foreign investments to other local firms in regions without any significant non-European foreign investment. If local firms in the former regions are more productive or have a higher level of employment, this suggests positive spillover effects.

Below, we outline the methodology used to estimate productivity and employment spillovers in detail.

2.1.1 Productivity spillovers

In order to test how non-European owned firms affect the productivity of local firms, we follow the standard approach in the literature described in Box 1. We set up a model in which we regress a measure of firm-level productivity on a number of control variables and a measure of the concentration of non-European owned firms. When we look for intra-industry spillovers, the latter term varies at the industry and regional level. When we look for broader regional spillovers, the term varies at the regional level only.

Box 1 Intra-industry spillover model

The model we use to estimate *intra-industry* spillovers looks as follows:

$$ln\ labour\ productivity_{ijk} = f\ (FDI\ concentration_{ji},\ ln\ capital\ intensity_{ijk}\ ,\ age_{ijk},\ age_{ijk}{}^{2},\ region/industrysize_{ij},\ growth\ GDP\ per\ capita_{i},)$$

Where the log of labour productivity of a given firm (*k*) in a given 2-digit NACE industry (*j*) in a given NUTS3 region (*i*) is modelled as a function of *FDI concentration* in the given 2-digit NACE industry and NUTS3 region and a number of firm-, industry- and regional level control variables. The model includes NACE 2 and country dummies.

Note: The model is slightly augmented version of the model used in Copenhagen Economics (2007).

Source: ESPON FDI (2018) based on literature survey

We use a simple measure of labour productivity, which we proxy using operational revenue per employee.[8] This is similar to the measures used by e.g. Ruane and Ugur (2005) who use output per employee to measure labour productivity in their study of productivity spillovers from FDI in the Irish manufacturing sector.

We follow the standard approach in the literature and measure *FDI concentration* by the per cent of employment by non-European owned firms among all other firms than firm k, within a given 2-digit NACE industry in a given NUTS3 region.

At the firm level, we include controls for *capital intensity* and the *age* of the firm (including the squared value of age), which are also used in other studies estimating productivity impacts (e.g. Ruane and Ugur, 2005; Huergo et al., 2004). We measure *capital intensity* as the tangible fixed assets (e.g. machinery) per employee, and we expect firms that are more capital-intensive to have a higher labour productivity. It would also have been preferable to include a measure of intangibles, such as R&D expenses per employee, as this is also expected to be associated with a higher level of labour productivity, but such data is not available for the sample of European regions included in this study. Labour productivity is also expected to increase with the age of a given firm, although at a diminishing rate. Older firms are likely to have survived for many years because of their higher productivity, but their initial advantages will depreciate and become less valuable as new innovative firms emerge.

The equation is estimated only on local firms, i.e. on those where less than 10 per cent is owned by non-EU owners. The estimated impact of FDI concentration thus gives the productivity impact of non-European investments on local firms.

The model is estimated on cross-sectional firm-level data from 2015, and we have included a set of additional control variables to address a number of sources of endogeneity that may potentially bias the results. The most obvious source of potential bias is the fact that foreign investors may choose to invest in industries/regions where productivity is already high. These industries/regions would tend to account for a large part of the economic activity in the country and to attract foreign owned firms.

In order to control for this selection issue, we include a measure of *region/industry size*, which is defined as the per cent of total operating revenue across all firms in a given country, which is generated within a given NUTS3 region and NACE 4 industry.[9] We expect this measure to be positively correlated with labour productivity.

[8] Operating revenue is the sum of net sales, other operating revenues and stock variations. VAT is not included.

[9] We allow this measure to vary at the NUTS3 region and NACE 4 industry level (as opposed to the NUTS3 regions and NACE 2 industry level) in order to control for selection driven by a narrow industry specialisation, and to avoid a high correlation with our measure of FDI concentration. The measure is calculated as the per cent of the country's total operating revenue by *all firms* (as opposed to foreign firms

Furthermore, we also control for the average annual *growth in GDP per capita*, in a given NUTS3 region, over the last three years for which data is available. By including this variable, we thus control for any regional factors that have a productivity enhancing effect and which at the same time attract foreign owned firms. We thus expect this term to be positively correlated with labour productivity.

Finally, we also include NACE 2 dummies to control for differences in labour productivity across industries, as well as country dummies, in order to control for national differences.[10] In doing so, we follow the approach used by Egger (2015), who estimate intra- and inter-industry productivity spillovers for 12 OECD countries.

The model we use to estimate *broader regional* spillovers is very similar. However, as the focus now lies in identifying spillovers from non-European owned firms across all industries within a given NUTS3 region, we measure FDI concentration at the regional level instead.

The main risk of bias in this model lies in the failure to fully control for the possibility that foreign investors choose to invest in regions where productivity is already high. We therefore include a measure of regional size, defined as the per cent of total operating revenue across all firms in a given country, which is generated within a given NUTS3 region. In addition, we also include a similar measure at the NACE 4 industry level to control for foreign firms choosing to invest in particularly productive industries. Standard errors are corrected for clustering at the regional level.

Table 3 contains an overview of all variables used in each of the two models.

only), which means that it can be calculated at a more detailed industry level than our measure of FDI concentration.

[10] As the model seeks to estimate the effect of both firm and industry/region level variables on a firm level outcome, the standard errors are corrected for clustering at the industry/region level. Failure to do so can lead to spurious findings of significant spillover effects, if there is just a slight industry/region correlation between the error terms (cf. Moulton, 1990). Within the spillover literature, Javorcik (2004) was the first paper to correct for clustering. Since then, most academic papers have done so.

Table 3 Variables used in the productivity spillover model

Variable	Definition	Intra-industry spillover model	Broader regional spillover model	Expected impact
Labour productivity (dependent variable)	Operating revenue per employee (log)	x	x	
FDI concentration (industry/ region)	The sum of employees among non-European foreign owned firms in a given NACE 2 industry and NUTS3 region, as a percent of total employment by all firms (less firm k) in a given NACE 2 industry and NUTS3 region	x		+/-
FDI concentration (region)	The sum of employees among non-European foreign owned firms in a given NUTS3 region as a percent of total employment by all firms (less firm k) in a given NUTS3 region		x	+/-
Capital intensity	Tangible fixed assets per employee (log)	x	x	+
Age	The firm's age	x	x	+
Age squared	The square of the firm's age	x	x	-
Region/industry size	Per cent of total operating revenue across all firms in a given country, which is generated within a given NUTS3 region and NACE 4 industry	x		+
Region size	Per cent of total operating revenue across all firms in a given country, which is generated within a given NUTS3 region		x	+
Industry size	Per cent of total operating revenue across all firms in a given country, which is generated within a given NACE 4 industry		x	+
Growth GDP per capita	The average annual growth in regional (NUTS3) GDP per capita over the period 2010-2013	x	x	+

Note: Country and industry (NACE 2) dummies are also included in both models. All variables, except growth in GDP per capita, are based on data from the Amadeus database. Data on regional GDP per capita are obtained from Eurostat's regional statistics.

Source: ESPON FDI (2018) based on the Amadeus database and Eurostat

2.1.2 Employment spillovers

In contrast to productivity spillovers, the literature on the impacts of FDI on employment among local firms is much smaller. The only study we are aware of, which has examined this impact using firm level data, is Copenhagen Economics (2007).

Box 2 Intra-industry employment model

The model, we use to estimate intra-industry effects look as follows:

$$ln\ employment_{ijk} =$$

$$f(FDI\ concentration_{ij}, ln\ operating\ revenue, ln\ wage_{ijk}, ln\ capital\ intensity_{ijk}, age_{ijk},\ age_{ijk}^2, region/\ industry\ size_{ij}, growth\ GDP\ per\ capita_i)$$

Where the log of employment of a given firm (k) in a given NACE 2 industry (j) in a given NUTS3 region (I) is modelled as a function of a measure of *FDI concentration* and a number of firm-, industry-, and regional level control variables. The model includes NACE 2 and NUTS 2 dummies.

Note: The model is a slightly augmented version of the model used in Copenhagen Economics (2007).

Source: ESPON FDI (2018)

As in the productivity models, we measure *FDI concentration* by the percent of employment by foreign firms among all other firms than firm *k*, within a given NACE 2 industry in a given NUTS3 region.

At the firm level, we control for the volume of production (proxied by operating revenue), wage costs, capital intensity and age. These are standard control variables in the literature (e.g. Layard and Nickell, 1986). We expect employment by local firms to increase with *operating revenue* (production) and the *age* of a given firm, but less so over time. We expect employment by local firms to decrease with higher *wage* costs and *capital intensity*.

As in the case of the productivity models, the equation is estimated on all other firms in the region that are not non-European owned firms (i.e. firms where 10 per cent or more is owned by non-EU owners). The estimated impact of the industry and regional concentration of FDI thus gives us the implied effect of non-European firms on local firms' demand for labour.

As discussed above, foreign investors may choose to invest in sectors/regions where productivity is high. As more productive firms also tend to be larger than less productive firms, this is also a potential source of bias in this model. In order to control for this issue, we follow the method outlined above and include controls for the *region/industry size*, as well as for the annual average *growth in GDP per capita* over the last three years for which data is available.

In order to control for differences in employment across industries, we include NACE 2 dummies. This way, we ensure that the results are not driven by differences in industry composition between NUTS3 regions with high and low levels of FDI.

Finally, we know from the driver analysis that labour supply is among the regional attraction factors for FDI. As employment levels among local firms is also likely correlated with regional labour supply, any differences in the employment levels of local firms across NUTS3 regions with high and low levels of FDI, may simply be due to differences in the supply of labour. In order to control for this, we include NUTS 2 dummies.[11]

Table 4 contains an overview of all variables used in each of the two models.

Table 4 Variables used in the employment models

Variable	Definition	Intra industry model	Broader regional model	Expected impact
Employment (log) (dependent variable)	The number of employees	x	x	
FDI concentration (industry/region)	The sum of employees among non-European foreign owned firms in a given NACE 2 industry and NUTS3 region as a percent of total employment by all firms (less firm k) in a given NACE 2 industry and NUTS3 region	x		+/-
FDI concentration (region)	The sum of employees among non-European foreign owned firms in a given NUTS3 region as a percent of total employment by all firms (less firm k) in a given NUTS3 region		x	+/-
Operational revenue	Operational revenues (log)	x	x	+
Wage costs	The average cost per employee (log)	x	x	-
Capital intensity	Tangible fixed assets per employee (log)	x	x	-
Age	The firms age	x	x	+
Age squared	The square of the age of the firm	x	x	-
Region/industry size	Per cent of total operating revenue across all firms in a given country, which is generated within a given NUTS3 region and NACE 4 industry	x		+
Region size	Per cent of total operating revenue across all firms in a given country, which is generated within a given NUTS3 region		x	+
Industry size	Per cent of total operating revenue across all firms in a given country, which is generated within a given NACE 4 industry		x	+
Growth GDP per capita	The average annual growth in regional (NUTS3) GDP per capita over the period 2010-2013	x	x	+

Note: NUTS2 and industry (NACE 2) dummies are also included in both models. All variables, except growth in GDP per capita, is based on data from the Amadeus database. Data on regional GDP per capita is obtained from Eurostat's regional statistics.

Source: ESPON FDI (2018) based on the Amadeus database and Eurostat

[11] The standard errors are again corrected for clustering at the same level, at which the measure of FDI concentration varies.

2.2 Data

The firm-level data used is cross-section data for 2015 obtained from Bureau van Dijk's Amadeus database, which contains ownership and accounting data for a large sample of firms across Europe. The database contains firm ownership structures, including information on shareholders and subsidiaries, as well as accounting statistics.[12]

We treat a firm as being foreign owned if a single foreign (non-European) shareholder owns at least 10 per of the firm.[13] Our definition of foreign owned firms only includes direct ownership linkages and does therefore not take into account indirect foreign ownership via e.g. a domestic holding companies. This means that if a US firm owns a French firm, which in turn owns another French firm, only the former French firm is considered foreign owned. In short, for a firm to be considered foreign owned at least 10 percent of the firm must be directly owned by a non-European owner.

Based on information regarding the location (NUTS3 region) and industry affiliation of the firms, which we define as non-European owned as well as all other firms in the database (domestically owned plus firms owned by European owners), we calculate the key measures of FDI concentration. Hereafter, we drop all non-European owned firms and estimate the model on local firms only, where the latter include domestically owned firms, as well as European owned firms.[14]

The productivity analysis includes 34 European countries, whereas only 30 European countries are included in the employment analysis. This is so because the Amadeus database applied in this study does not include employment data for Cyprus, Greece, Lithuania and Turkey.

[12] For some firms, the database covers both consolidated and unconsolidated accounts. Where possible, we employ the latter.

[13] The OECD also employs this threshold in their definition of FDI (https://www.oecd.org/daf/inv/investment-policy/2487495.pdf).

[14] In order to avoid the results being biased by outliers, we remove all observations that lie more than 10 standard deviations about the country median. We do so for all firm-level variables. We also drop observations with negative values for employment, wage costs, tangible fixed assets or operating revenue.

Table 5 Country coverage of the spillover and employment analyses

Austria	Hungary	Poland
Belgium	Iceland	Portugal
Bulgaria	Ireland	Romania
Croatia	Italy	Slovakia
Cyprus*	Latvia	Slovenia
Czech Republic	Liechtenstein	Spain
Denmark	Lithuania*	Sweden
Estonia	Luxembourg	Switzerland
Finland	The former Yugoslav Republic of Macedonia (fYROM)	Turkey*
France	Malta	United Kingdom
Germany	Netherlands	
Greece*	Norway	

Note: The table contains a list of all 34 countries, which are included in the data used for the spillover analyses. Observations from all 34 countries are included in the productivity spillover analyses. No observations from countries with an (*) are included in the employment models, due to missing information on wage costs.

Source: ESPON FDI (2018)

3 Impacts of FDI on European regions

In this chapter, we examine the impact of non-European owned firms on the European territories. We assess the direct impact of non-European owned firms on employment, production and value added. Furthermore, we examine the extent to which non-European owned firms impact the productivity and employment among local firms within the same region.

3.1 The direct footprint of non-European owned firms across Europe

In order to quantify the direct footprint of non-European owned foreign firms across Europe, we rely on data from Eurostat's Inward Foreign Affiliate Statistics (IFATS) and Eurostat's Structural Business Statistics, cf. Box 3.

The former database contains information on the number of foreign owned firms across individual European countries, as well as data on key measures of the importance of these firms in each country (e.g. their total number of employees) and information on their country of origin. Eurostat's structural business statistics contains similar information, but covers all enterprises (i.e. both foreign and non-foreign owned). Combining these two data sources allows us to assess the relative importance of non-European owned enterprises across European regions.[15]

Box 3 Eurostat data on non-European owned firms

Eurostat's Inward Foreign Affiliate Statistics (IFATS) contains data on the overall activity of foreign affiliates in a given European host country. The data describe how many jobs, how much turnover, etc. are generated by foreign investors in a given European host economy.

A foreign affiliate within the terms of IFATS is an enterprise, which is resident in a given European host country but which is controlled by an institutional unit not resident in that country. In simpler terms this means an enterprise, where foreign owners hold a direct or indirect ownership share of more than 50 per cent.

The IFATS statistics is primarily based on official statistical business registers and has the main advantage of being largely harmonised among the European Members States ensuring a level field for comparisons of businesses and ownership across countries.

Since 2007, Eurostat has had a harmonised methodology for statistics on foreign-controlled businesses at the EU level. One of the most important concepts of this methodology is that it tracks the ultimate rather than the immediate owner. This method places the ownership more correctly than the more basic method of looking only at the immediate owner, as the immediate owner is often placed in countries with low corporate tax and other financial benefits.

Eurostat's Structural Business Statistics is the official Eurostat statistics of all firms in the EU, regardless of size and ownership.

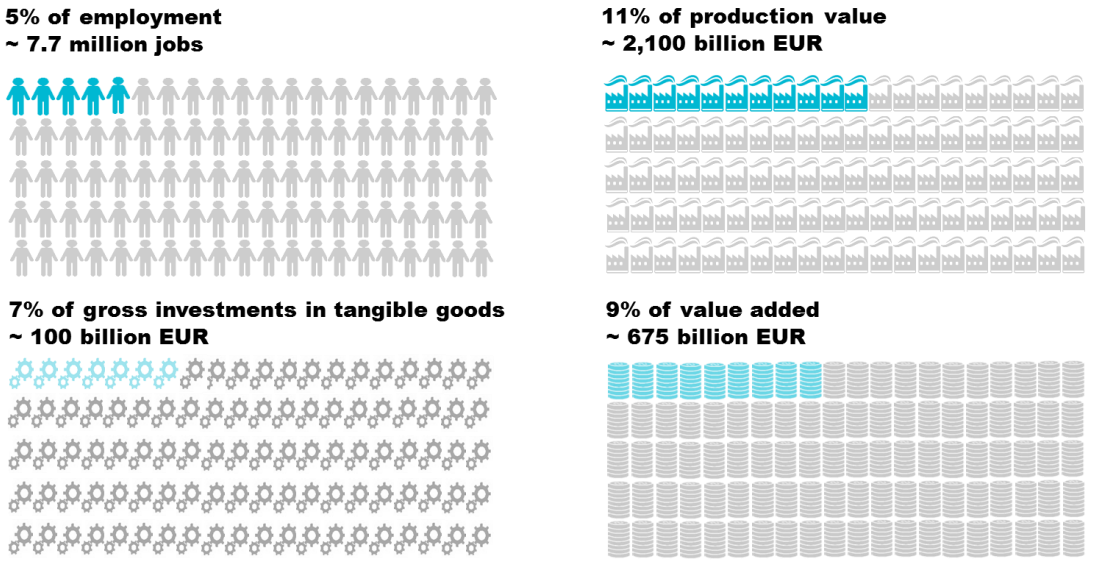
Source: ESPON FDI (2018) based on Eurostat's Foreign Affiliates Statistics http://ec.europa.eu/eurostat/statistics-explained/index.php/Foreign_affiliates_statistics_-_FATS

[15] The data covers 29 European countries. See Table A.1 in Appendix A for a list of included countries.

In the IFATS data, foreign owned firms are defined as enterprises where foreign owners hold a direct or indirect ownership share of more than 50 per cent. This definition thus deviates from the definition of foreign ownership used for the spillover analyses in two ways. *First*, a higher ownership threshold (50 per cent compared to 10 per cent) is imposed in the IFTAS data. *Second,* the IFATS data include indirectly foreign owned firms (e.g. a French firm owned by another French firm, which is foreign owned), while the definition of foreign ownership employed for the spillover analyses is limited to direct foreign ownership. These underlying differences mean that the country wide findings presented below, which are based on the IFATS data, cannot be compared to the equivalent regional findings presented in Chapter 4-6.

The Eurostat data show that non-European owned firms account for a very small share of European firms, but contribute disproportionately to the European economy. Thus, while non-European owned firms on average account for only approximately one per cent of the total number of firms, they account for an average of five per cent of employment, 11 per cent of production and nine per cent of value added, cf. Figure 2. Non-European owned firms also account for a disproportionately high share (seven per cent) of investments in tangible goods, which cover investments in capital goods, including land.

Figure 2 Key performance indicators of non-European owned firms in Europe

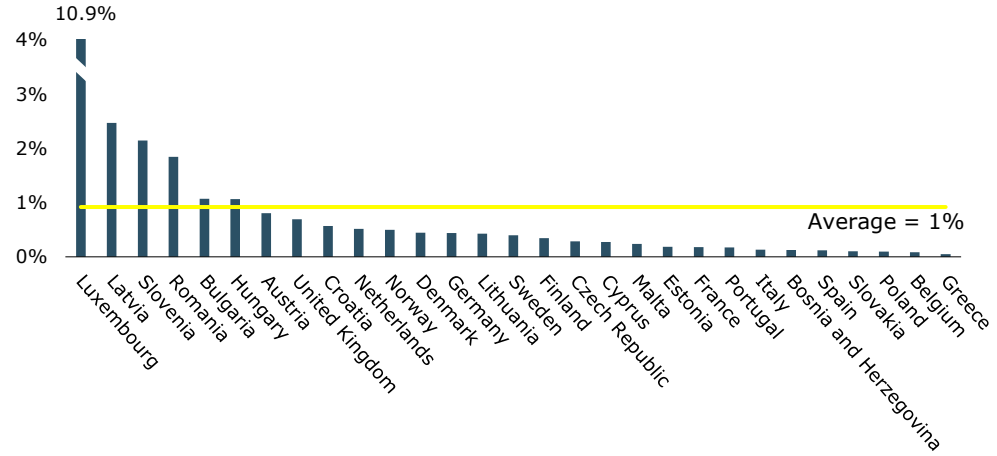


Note: The average share of each of the four outcome measures accounted for by non-European owned firms across individual European countries. This is measured as the simple average across all 29 European countries for which data is available. The country specific results are contained in Table A.1 in Appendix A.

Source: ESPON FDI (2018) based on Eurostat's Foreign Affiliates and Structural Business Statistics

The presence of non-European owned firms varies heavily between individual European countries. In Belgium, Greece, Spain, Italy, Poland, Slovakia and Bosnia and Herzegovina, these firms account for only 0.1 per cent of enterprises, compared to 11 per cent in Luxembourg, cf. Figure 3.

Figure 3 Per cent of enterprises that are non-European owned



Note: The share of enterprises is based on the number of foreign enterprises registered in the business register of each individual European country.

Source: ESPON FDI (2018) based on Eurostat's Foreign Affiliates and Structural Business Statistics

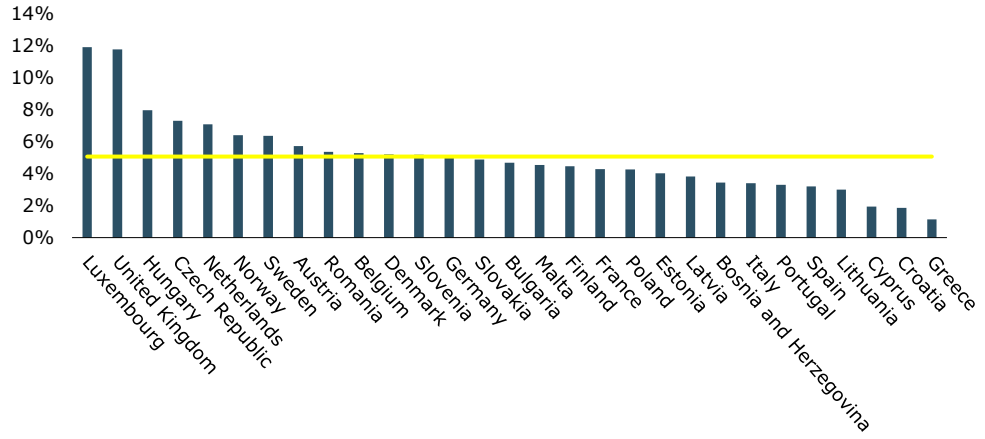
The relative large share of non-European owned firms in Luxembourg is partly due to Luxembourg being a particularly attractive place for foreign investors to set up holding companies. Luxembourg has a favourable tax regime for dividends and capital gains, which allows for a range of tax exemptions. As a result, it may be more profitable for foreign investors to structure their European investments via Luxembourg rather than directly into a given European country (KPMG, 2013).

In terms of the direct footprint that these firms have on the national economies, there are also large differences across individual European countries. In Luxembourg and the UK, non-European owned firms thus account for close to 12 per cent of employment, compared to Greece, where the equivalent share is just above 1 per cent, cf. Figure 4.

Non-European owned firms account for the largest share of value added in Hungary (19 per cent), the UK (18 per cent) and Luxembourg (17 per cent), and the smallest share of value added in Croatia (2 per cent), Greece (3 per cent) and Cyprus (5 per cent), cf. Figure 5.

While the direct importance of non-European owned firms differs significantly across countries, they consistently account for a relatively larger share of employment, than enterprises, which suggests, that these firms on average are larger than other firms. Moreover, they also consistently account for a larger share of value added than employment. This suggests that the average value generated per employee among these firms exceeds the average value generated per employee across each of the individual countries. Thus, while non-European owned firms make up a relative small share of European enterprises, they have a disproportionately large direct footprint on European economies.

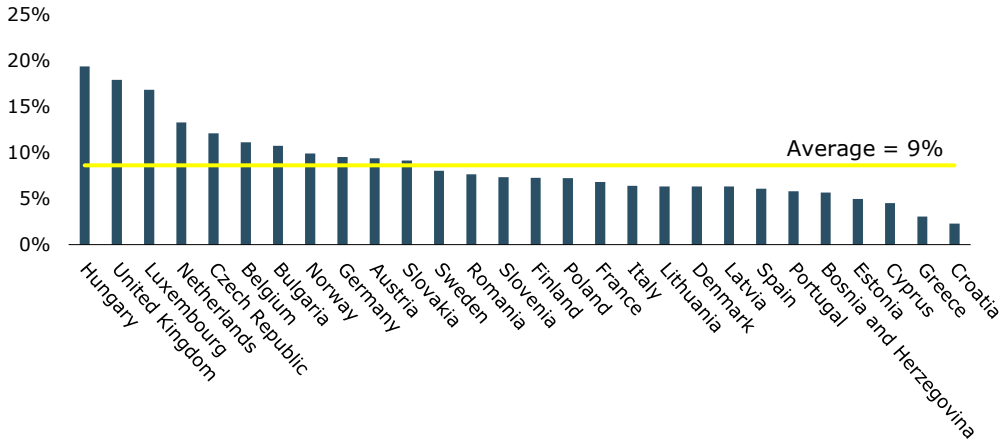
Figure 4 Per cent of employment by non-European owned firms



Note: The share of employment is based on the number of persons employed (i.e. the average yearly headcount of persons employed and paid by a given enterprise including unpaid workers and persons absent for a short time). Ireland is excluded due to missing data.

Source: ESPON FDI (2018) based on Eurostat's Foreign Affiliates and Structural Business Statistics

Figure 5 Per cent of value added by non-European owned firms



Note: The share of value added is measured based on value added at factor costs. Malta and Ireland are excluded due to missing data.

Source: ESPON FDI (2018) based on Eurostat's Foreign Affiliates and Structural Business Statistics

3.2 Spillovers from non-European owned firms to local firms across all regions

In order to test for spillovers from non-European owned firms to local firms, we conduct the spillover analyses across all regions.

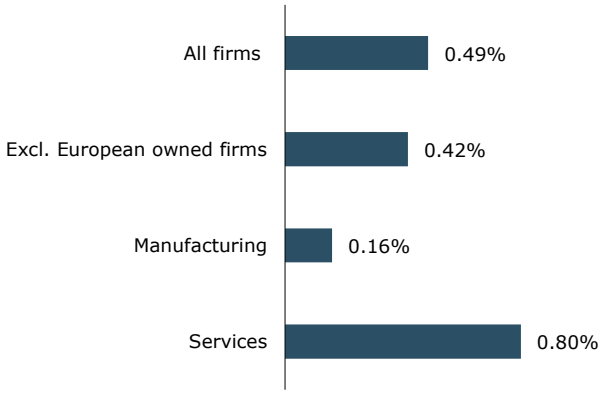
3.2.1 Results: Intra-industry productivity spillovers

The results show that all control variables have the expected sign, cf. Column (1) in Table A.2 in Appendix A. The coefficient on the key measure of FDI concentration is positive and statistically significant and thereby indicates the presence of positive productivity spillovers. The magnitude of the estimate implies that a one percentage point increase in the FDI concentration, within a given region and industry, is on average associated with a 0.5 per cent increase in labour productivity among local firms within the same region and industry, cf. Figure 6.[16]

As local firms include both domestically and European owned firms (e.g. a German owned firm in a region in France), we undertake a sensitivity check, in which we exclude all European owned firms. The result is very similar and thus shows that the results is not driven by the European owned firms, cf. column (2) in Table A.2 in Appendix A.

In order to test whether the effect differs across firms in the manufacturing and service sectors, we conduct the same analysis, separately for each of these sectors. The results show evidence of positive and significant productivity spillovers in both sectors, with largest impacts found in the service sector, cf. Figure 6.

Figure 6 Intra-industry productivity spillovers



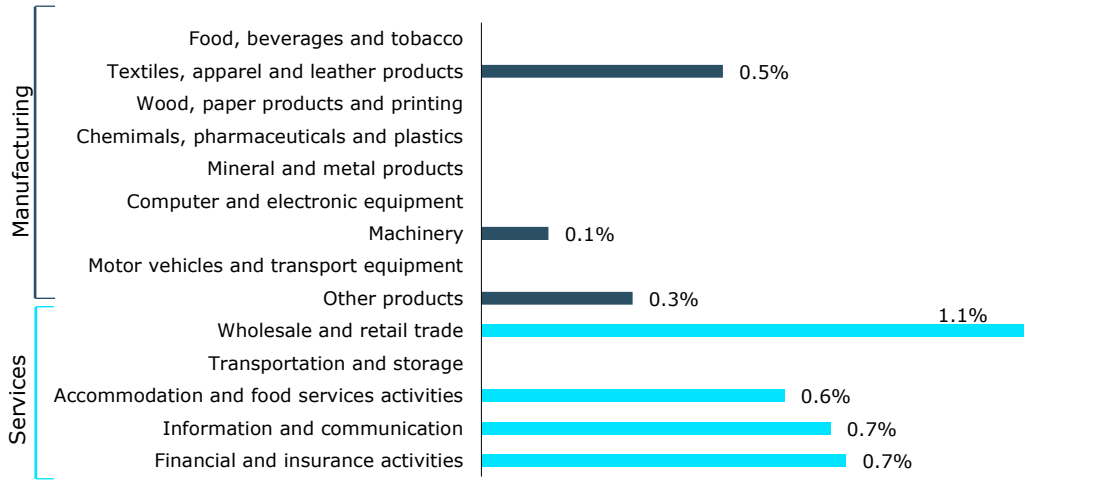
Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given industry and region. Regression results are shown in Table A.2 in Appendix A.

Source: ESPON FDI (2018) based on data from the Amadeus database

[16] The results thus imply that doubling the regional concentration of FDI, is associated with an average productivity increase of 0.7 per cent among local firms in the same industry and region.

Across sub-sectors within manufacturing, we find evidence of spillovers for manufacturing of *textile, apparel and leather products,* manufacturing of *machinery*, and for manufacturing of *other products*, which among others include manufacturing of furniture, jewellery, sports goods and games and toys. Within services, we find evidence of spillover effects in most sub-sectors, excluding transportation and storage. Productivity spillovers to local firms within wholesale and retail trade are found to especially large, cf. Figure 7.

Figure 7 Intra-industry productivity spillovers by subsectors



Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given industry and region. Regression results are shown in Table A.3 – Table A.5 in Appendix A. The category other products include NACE chapters 31-33.

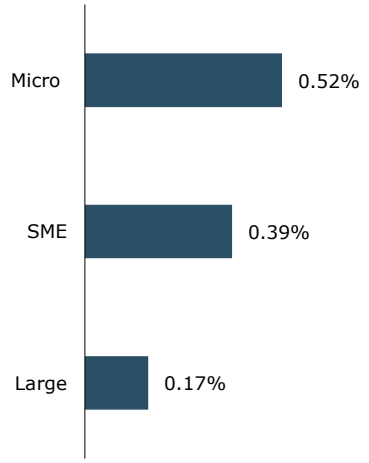
Source: ESPON FDI (2018) based on data from the Amadeus database

In order to test whether the size of spillovers depends on the size of the local firms, we conduct the same analysis separately for micro firms, SMEs and large firms. We define a firm as being an SME if it has between 10 and 250 employees, operating revenue between 2 and EUR 50 million or total assets between 2 and EUR 43 million.[17] Firms that have more than 250 employees, operating revenues in excess of EUR 50 million or total assets exceeding EUR 43 million are classified as large. All remaining firms (i.e. less than 10 employees or with operating revenue or total assets less than EUR 2 million) are classified as micro firms.

The results show that all three types of firms benefit from productivity spillovers. The largest impact is found for micro firms, followed by SMEs and large firms, cf. Figure 8.

[17] See the report, FDI by European SMEs for more information about how we defines SMEs.

Figure 8 Intra-industry productivity spillovers across SMEs and other firms



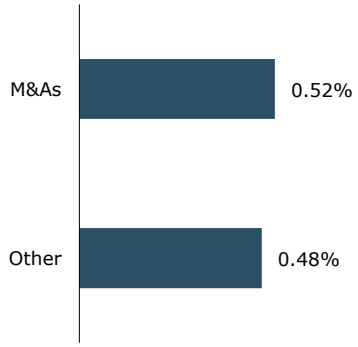
Note: The figure shows the average percentage increase in labour productivity for SME's and other firms, associated with a one percentage point increase in the employment share of foreign owned firms within a given industry and region. Regression results are shown in Table A.6 in Appendix A.

Source: ESPON FDI (2018) based on data from the Amadeus database

In order to test for spillovers for different types of FDI, we test for spillovers arising from non-European owned firms where we have identified the mode of entry to be M&As as well as for spillovers from all other modes of entry. Due to data limitations, however, the latter group is likely also to contain some M&As, which we have not been able to identify.[18] This means that while we can test whether spillovers arise from non-European owned firms, which we know are M&As, the remaining non-European owned firms may be greenfield investments, reinvestments or M&As, which means that conclusions regarding impacts of greenfield investments cannot not be drawn. The results do, however, show that spillovers do arise from both groups of non-European owned firms.

[18] In order to identify firms from our dataset that have entered into non-European ownership via M&As, we rely on the BvD's Zephyr database. However, there are a number of limitations to this database, which means that we cannot capture all of the non-European owned firms in our data, where the investment has occurred via M&As. Firstly, the Zephyr database only covers M&A deals that have occurred since 2000. This means that we cannot identify firms which have been acquired by a non-European investor prior to this year. Furthermore, the unique ID number, which we use to match firms from Amadeus to Zephyr, may change over time if a firm has been absorbed into the acquirer's company. In this case we cannot find them in Zephyr, where we search for the targets ID number.

Figure 9 Intra-industry productivity spillovers by type of investment



Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given industry and region, which have been acquired via M&As and via other types of investments. Regression results are shown in Table A.7 in Appendix A.

Source: ESPON FDI (2018) based on data from the Amadeus database

3.2.2 Results: Broader regional productivity spillovers

As in the case of intra-industry spillovers, the results on broader regional productivity indicate a presence of positive productivity spillovers. The effect is almost four times larger than for intra-industry spillovers, cf. Figure 10.[19] As broader regional productivity spillovers is the net effect of productivity effects arising both within (intra-industry) and across (inter-industry) sectors in a given region, it suggests that local firms benefit particularly from the presence of foreign firms in different sectors than their own. This result is consistent with findings in the existing literature by e.g. Javorcik (2004), who finds evidence of productivity spillovers from foreign firms to their local suppliers in Lithuania.

An additional reason why positive spillovers mainly accrue to local firms outside the industry may be that positive spillover effects between firms in the same industry are more often offset by negative competition effects. Similarly, these results also indicate that the knowledge inherent in the non-European firms is not sector-specific but benefits all firms that engage with the foreign firm, e.g. local suppliers or local firms that hire employees from the foreign firm.

Local firms in both the manufacturing and service sectors benefit from broader regional spillovers, with the largest estimate found for the service sector.cf. Figure 10.

[19] The results thus imply that doubling the regional concentration of FDI, is associated with an average productivity increase of 3.2 per cent among local firms in the same NUTS3 region.

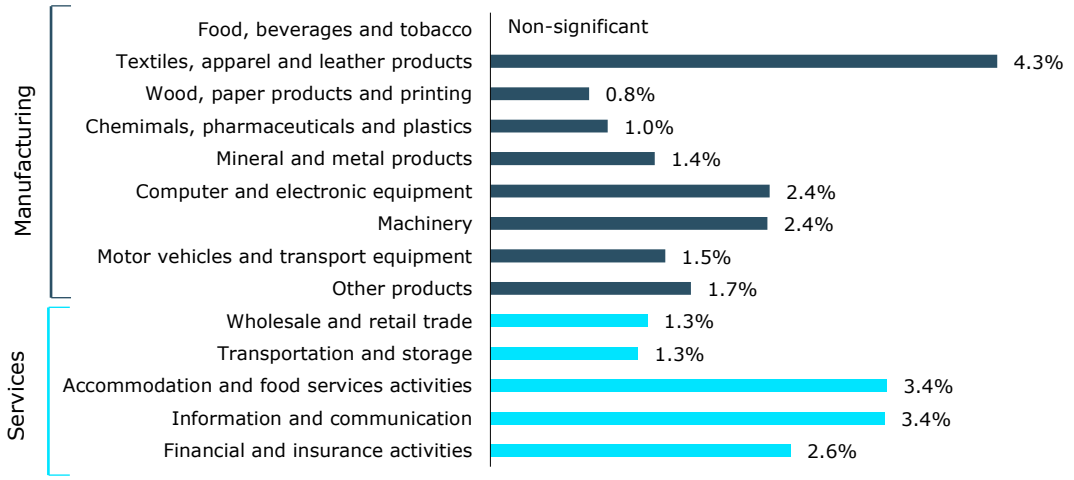
Figure 10 Broader regional productivity spillovers

Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given region. Regression results are shown in Table A.8 in Appendix A.

Source: ESPON FDI (2018) based on data from the Amadeus database

Across sub-sectors, we find evidence suggesting that local firms in most industries and services benefit from regional spillovers. The one exception to this is local firms manufacturing *food, beverages and tobacco,* for which we find no significant effects, cf. Figure 11. Within manufacturing, we find that the largest spillovers accrue to local firms in the textile, apparel and leather industry. In the service sector, the largest productivity spillovers are found to accrue to local firms engaged in accommodation and food activities as well as information and communication services.

Figure 11 Broader regional productivity spillovers by subsectors

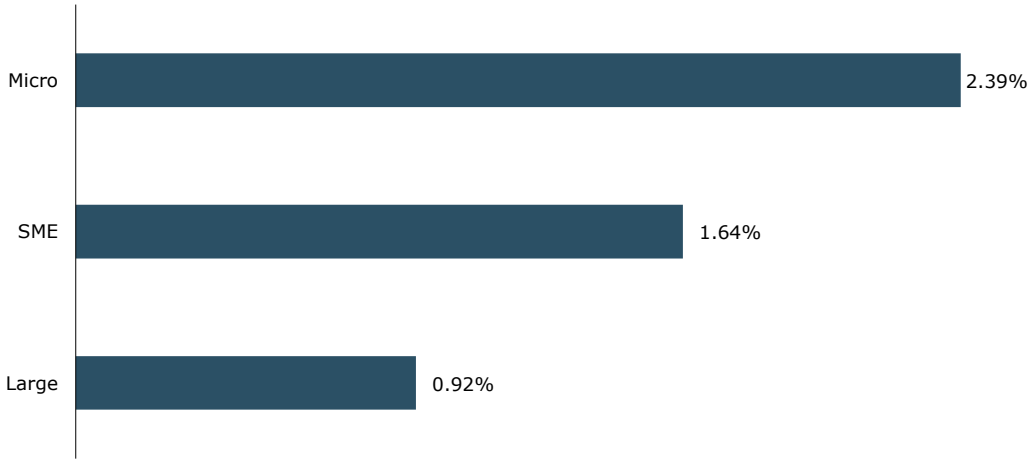


Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given region. Regression results are shown in Table A.9 – Table A.11 in Appendix A.

Source: ESPON FDI (2018) based on data from the Amadeus database

Across firm size, we find evidence suggesting that all three types of firms benefit from regional productivity spillovers. The largest impact is again found for micro firms, followed by SMEs and large firms, cf. Figure 12.

Figure 12 Broader regional productivity spillovers across SMEs and other firms



Note: The figure shows the average percentage increase in labour productivity for SME's and other firms, associated with a one percentage point increase in the employment share of foreign owned firms within a given region. Regression results are shown in Table A.12 in Appendix A.

Source: ESPON FDI (2018) based on data from the Amadeus database

Across types of investments, we find spillovers arising from M&As as well as other types of investment, cf. Figure 13.

Figure 13 Broader regional productivity spillovers by type of investment

Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given region, which have been acquired via M&As and via other types of investments. Regression results are shown in Table A.13 in Appendix A.

Source: ESPON FDI (2018) based on data from the Amadeus database

3.2.3 Results: Employment spillovers

The results show that all control variables have the expected sign, cf. Column (1) in Table A.14 – A.15 in Appendix A. However, in neither case, do we find any evidence to suggest that non-European owned firms affect labour demand among local firms, whether or not these are in same industry. This suggests that any positive and negative effects that foreign firms have on employment among local firms, via e.g. FDI-induced productivity enhancements, increased demand for local produced goods and services, or via competition effects, net out on average. This result holds when we test the impact of FDI on labour demand among local firms across different regional typologies.

3.3 Concluding remarks

Non-European owned firms make up a relatively small share of European firms, but have a disproportionately large direct footprint on European regions. We thus find that non-European owned firms, on average, account for five per cent of employment, 11 per cent of production and nine per cent of value added.

In addition, we also find evidence to suggest that local firms benefit from productivity spillovers from non-European owned firms in the same region and even within the same industry, although the effects from broader regional spillovers are largest.

In contrast, we find no evidence to suggest that non-European owned firms affect employment among their local firms.

4 Impacts of FDI across different types of regions

In this chapter, we examine the footprint of non-European owned firms across urban, intermediate and rural regions. First, we assess the direct impact of these firms across each type of region. Hereafter, we examine whether productivity spillovers differ between regions.

4.1 Definition of urban-rural regions

In order to divide all individual NUTS3 regions into urban, intermediate and rural regions, we rely on a typology from Eurostat, cf. Box 4.

Box 4 Urban-rural typology

NUTS3 regions are classified as urban, intermediate or rural using the following three-step approach:

1. Populations in rural areas are identified, where rural areas are all areas outside urban clusters. The latter is defined by clusters of contiguous grid cells of 1 km² with a density of at least 300 inhabitants per km² and a minimum population of 5,000. NUTS3 regions smaller than 500 km² have been combined with one or more of their neighbours.
2. Based on the share of their population in rural areas, NUTS3 regions are classified as follows:
   Predominantly rural if the share of the population living in rural areas is higher than 50 per cent
   Intermediate if the share of the population living in rural areas is between 20 and 50 per cent
   Predominantly urban if the share of the population living in rural areas is below 20 per cent
3. The size of urban centres in the region is considered and a predominantly rural region, which contains an urban centre of more than 200,000 inhabitants making up at least 25 per cent of the regional population, is classified as intermediate. An intermediate region which contains an urban centre of more than 500,000 inhabitants making up at least 25 per cent of the regional population is classified as predominantly urban.

Note: The urban-rural typology is developed by DG Regional and Urban Policy in co-operation with DG Agriculture and Rural Development, Eurostat, DG Joint Research Centre and OECD.

Source: ESPON FDI (2018) based on http://ec.europa.eu/eurostat/web/rural-development/methodology

The way in which FDI affects local firms is likely to depend on characteristics of the regional economy. There are several reasons to expect spillovers to differ between urban and more rural areas.

Urban areas have a higher density than rural areas, larger pools of labour and higher levels of education, which facilitates productivity growth and makes it more likely that local firms will have the capacity to learn from foreign firms. Research thus indicates that local firms, which benefit from productivity spillovers tend to be those, which are already relatively productive, as only these firms are able to 'absorb' the knowledge 'spilling' over from foreign firms. Using data from the UK, Girma (2002) thus finds that only domestic firms above a certain so-called 'absorptive capacity threshold' (i.e. firms with a certain level of productivity) benefit from productivity spillovers from multinational firms. Below this threshold, spillovers become negative or non-existent.

Other regional factors also matters. As discussed in Chapter 1, important channels of spillovers include buyer and supplier linkages between foreign and local firms. The scope for such linkages increases with density and is thus likely to be higher in urban areas. Similarly, more dense areas may have a larger scope for competition between foreign owned firms and local firms, which is also an important channel of spillovers. Konwar et al. (2015), thus argue that MNEs are forced to commit more resources to their affiliates in areas with stronger competition, such as e.g. more sophisticated technology. This in turn, increases the potential gains from spillovers.

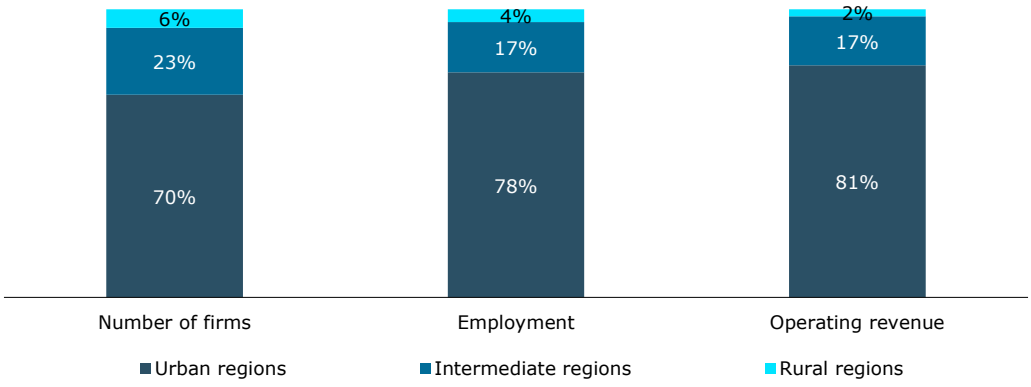
Finally, it has also been suggested in the literature that social network ties between foreign and local firms matter, as 'effective network ties' are a 'conduit' through which local firms can learn about new practices and technologies (McEvilly and Zaheer, 1999, cited in Konwar et al. (2015). The density and depth of social network ties may be larger in urban areas, where there is higher density of population.

4.2 The direct footprint of non-European owned firms in urban-rural regions

We rely on firm-level data from the Amadeus database (see Chapter 2) to break down the direct footprint of non-European owned firms, across the different types of regions.

In total, the data cover foreign and local firms across 1389 NUTS3 regions in 34 European countries. 28 per cent of these regions, are classified as urban, while 40 per cent are classified as intermediate and 32 per cent as rural regions.

Figure 14 Distribution of non-European owned firms across urban and rural regions



Note: The figure shows the distribution of non-European foreign owned firms across the different types of regions in Europe.

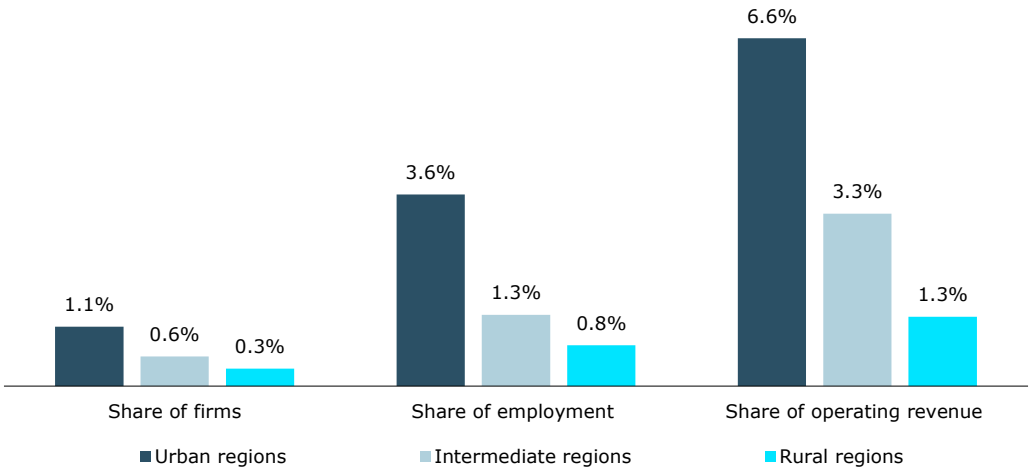
Source: ESPON FDI (2018) based on data from the Amadeus database

The data shows that 70 per cent of all of the non-European owned firms present across the 34 European countries[20] are located in urban regions, while 23 per cent are located in intermediate regions, and only 6 per cent are located in rural regions, cf. Figure 14.

Non-European owned firms in urban regions account for 78 per cent of the employment and 81 per cent of the production (measured by operating revenue) generated by these firms across all regions. As this far exceeds the share of non-European owned firms located in urban regions, this suggests that the non-European owned firms in urban regions, tend to be larger than their counterparts in intermediate and rural regions, cf. Figure 14.

Relative to the overall level of economic activity within each type of region, urban regions are also the type of region in which non-European owned firms account for the largest share of firms, employment and production. In urban regions, non-European owned firms thus, on average, account for just over 1 per cent of all firms, compared to 0.6 per cent in intermediate regions and 0.3 per cent in rural areas. In urban regions, non-European owned firms furthermore account for 3.6 per cent of employment and 6.6 per cent of production (operating revenue), exceeding the equivalent shares in both intermediate and rural areas, cf. Figure 15.

Figure 15 The importance of non-European owned firms in urban and rural regions



Note: The figure shows the average share of the total of each of the three outcome measures accounted for by non-European owned firms in the different types of territories. The country specific results are contained in Table B.16 in Appendix B.

Source: ESPON FDI (2018) based on data from the Amadeus database

[20] In total, there is just under 117,000 non-European foreign owned firms across the 34 European countries.

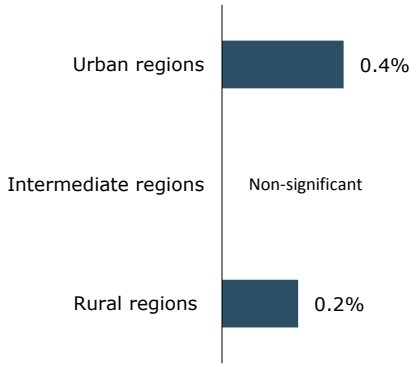
4.3 Spillovers from non-European owned firms to local firms across urban-rural regions

In order to test whether productivity spillovers from foreign to local firms differ between the three types of regions, we conduct the spillover analysis separately for each type of region.

4.3.1 Results: Intra-industry productivity spillovers

We find evidence of productivity spillovers from non-European to local firms within the same industry, in urban and rural regions. We find no statistically significant effect in intermediate regions. The effect is largest in urban regions, where the results imply that a one percentage point increase in the concentration of FDI is associated with an average increase of approximately 0.4 per cent in productivity among local firms within the same region and industry. In rural regions the equivalent effect is approximately 0.2 per cent[21], cf. Figure 16.

Figure 16 Intra-industry productivity spillovers by types of regions



Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given industry and region, across each of the three types of regions. Underlying regression results are shown in Table B.17 in Appendix B. The difference between the estimates for urban and rural regions is statistically significant at the one per cent level.

Source: ESPON FDI (2018) based on data from the Amadeus database

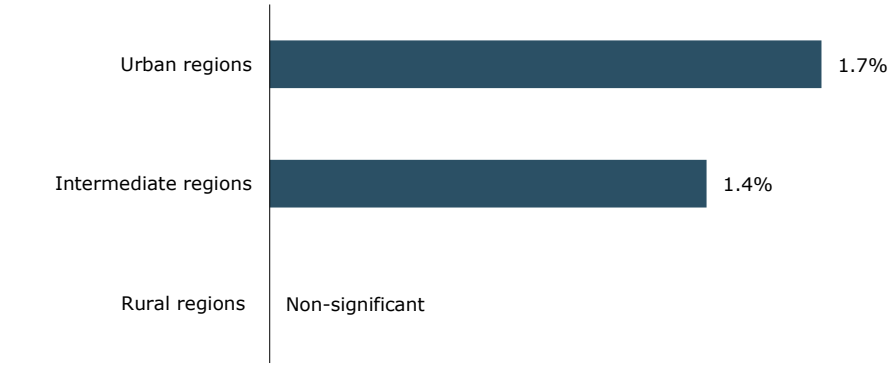
4.3.2 Results: Broader regional productivity spillovers

When we allow for spillovers across different industries within the same region, the results change somewhat and we now find no evidence of spillover effects in rural regions, but positive and significant effects in both urban and intermediate regions. The effect is largest in urban areas, where the scope for buyer-supplier linkages between foreign and local firms is highest due to a higher density. In terms of magnitude, the size of the estimated spillover effect is more than four times as large as the intra-industry spillover effect, underlining the importance of linkages between foreign and local firms across industries via e.g. buyer-supplier linkages.[22]

[21] The results thus imply that doubling the FDI concentration (the industry/region share of employees among non-European foreign owned firms),is associated with an average productivity increase of 0.8 per cent among local firms in the same industry and region in urban regions, and 0.1 per cent in rural regions.

[22] The results thus imply that a doubling of the FDI concentration (the regional share of employees among non-European foreign owned firms) is associated with an average productivity increase of 4 per cent among local firms in the same region in urban regions and 1.8 per cent in intermediate regions.

Figure 17 Broader regional productivity spillovers by types of regions



Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a region, across each of the three types of regions. Underlying regression results are shown in Table B.18 in Appendix B. The difference between the estimates for urban and intermediate regions is statistically significant at the one per cent level.

Source: ESPON FDI (2018) based on data from the Amadeus database

The fact that we find evidence of only intra-industry productivity spillovers in rural areas and only broader regional spillovers intermediate regions, suggest that spillover effects arise via different channels in the two types of regions. In rural regions, where relatively low densities imply less scope for diversification and cross-industry linkages, spillover effects are thus likely to be driven by e.g. labour movements across firms in the same industry. In contrast, the spillover effects in intermediate regions, seem to arise via linkages between foreign owned firms and e.g. local suppliers in other industries.

4.4 Concluding remarks

Non-European owned firms have the largest direct footprint in urban regions. In terms of spillover effects, we find evidence of intra-industry productivity spillovers in urban and rural regions and evidence of broader regional spillovers in urban and intermediate regions. This suggests that spillover effects arise via different channels in the different types of regions. In urban regions, where density is highest, spillovers seem to be driven by both intra-industry channels, such as e.g. labour movements and competition effects, and inter-industry channels such as buyer-supplier linkages between foreign and local firms. In intermediate regions, the results suggest that spillovers arise especially via the latter channel. Finally, in rural regions, spillovers seem to arise within industries only, which is consistent with a relatively low density and a lower degree of economic diversification.

5 Impacts of FDI across metropolitan regions

In this chapter, we examine the footprint of non-European owned firms across different metropolitan regions. First, we assess the direct impact of non-European owned firms across each type of metropolitan region. Hereafter, we examine whether productivity spillovers differ between regions.

5.1 Definition of different metropolitan regions

We rely on a typology from Eurostat in order to divide all individual NUTS3 regions, into capital metropolitan regions (includes the national capital city) and other metropolitan regions. Furthermore, we group all regions that are not classified as belonging to either type of metropolitan region as non-metropolitan regions.

The typology is based on the agglomeration of inhabitants. Specifically, metropolitan regions are defined as a single or a combination of NUTS3 regions, which cover agglomerations of at least 250,000 inhabitants across a city and its commuting zones, cf. Box 5.

Box 5 Metropolitan typology

Metropolitan regions are NUTS3 regions or a combination of NUTS3 regions, which represent agglomerations of at least 250,000 inhabitants.

These agglomerations were identified using the Urban Audit's Functional Urban Area (FUA).

Each agglomeration is represented by at least one NUTS3 region. If in an adjacent NUTS3 region more than 50 per cent of the population also lives within this agglomeration, it is included in the metropolitan region.

Note: A Functional Urban area (FUA) is a city and its commuting zone.

Source: ESPON FDI (2018) based on http://ec.europa.eu/eurostat/web/metropolitan-regions/overview

As metropolitan regions are based on agglomerations of inhabitants across cities and their commuting zones, it is not the case that all NUTS3 regions belonging to a metropolitan region are also classified as urban regions.[23] The capital metropolitan region of Vienna, for instance covers the NUTS3 regions of Nordburgenland (rural), Weinvirtel (rural), Wiener Umland/Nordteil (urban), Wiener Umland/Südteil (intermediate) and Wien (urban). Similarly, not all urban NUTS3 regions belong to a larger metropolitan region.[24] This is for example the case for the NUTS3 regions of East Lancashire and Warrington in the UK.

[23] 54 per cent of all NUTS3 regions that belong to a metropolitan region are defined as urban regions, while 38 per cent are defined as Intermediate regions and 8 per cent as rural regions.

[24] 74 per cent of urban NUTS3 regions belong to a metropolitan region.

By focusing on metropolitan regions, we therefore do not merely zoom in on urban regions, rather, we rely on a different grouping of the regions, which distinguishes between urban regions and takes into account that some rural or intermediate regions are relatively close to a large city centre.

Due to the same reasoning as discussed in regards to urban and rural areas, we may expect that the scope for spillovers is higher in metropolitan regions (capital metropolitan and other metropolitan regions) than non-metropolitan regions.

Ranging the scope for spillovers occurring in capital metropolitan regions versus other metropolitan regions, is however not straightforward.

Capital city regions tend to be different from other regions in many aspects. They tend to be especially attractive to foreign firms. E&Y (2015) thus find that London, Paris and Berlin are the three most attractive cities in Europe to foreign investors and that this is especially due to a strong international business culture.

Monastiriotis et al. (2013) also note that capital cities typically host larger agglomerations of firms than their hinterlands, which means that learning opportunities and competitive pressure may already be relatively high in capital regions. The marginal benefit from spillovers occurring from the presence of foreign firms may therefore be limited (Monastiriotis et al., 2013).

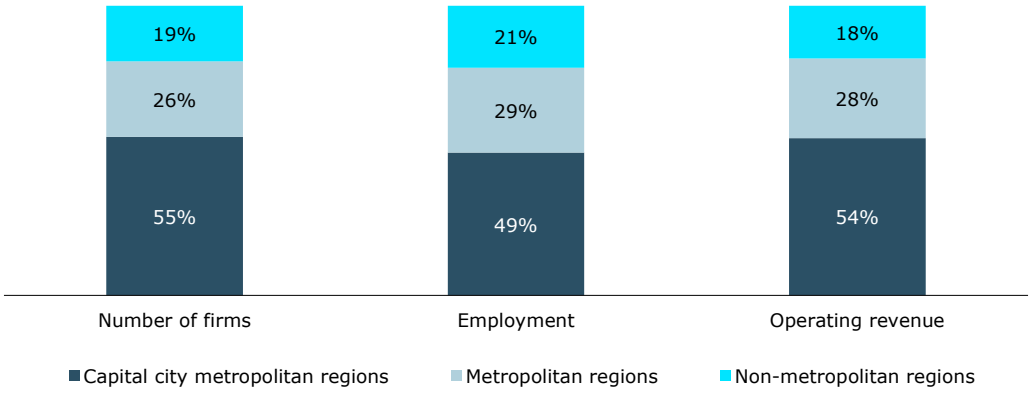
However, these factors may also facilitate the occurrence of spillovers, via increased absorption capacity and a higher ability to compete successfully against foreign firms.

Empirically, there is very little research done on the impacts of FDI in capital metropolitan regions versus other regions. One exception is Monastiriotis et al. (2013), who find that firms located in the capital-city regions across Eastern and central European countries, tend to benefit more from FDI, than firms located outside of these regions.

5.2 The direct footprint of non-European owned firms in metropolitan regions

Based on this classification and the firm-level data from Amadeus, we find that the majority of non-European owned firms present across the 34 European countries, are located in capital metropolitan regions, cf. Figure 18. These regions also account for the relatively largest share of employment and output by non-European owned firms. Thus while, capital metropolitan regions, account for 55 per cent of non-European owned firms, they also account for 49 per cent of employment and 54 per cent of the output generated by non-European firms.

Figure 18 Distribution of non-European owned firms across metropolitan regions



Note: The figure shows the distribution of non-European foreign owned firms across the different types of regions.

Source: ESPON FDI (2018) based on data from the Amadeus database

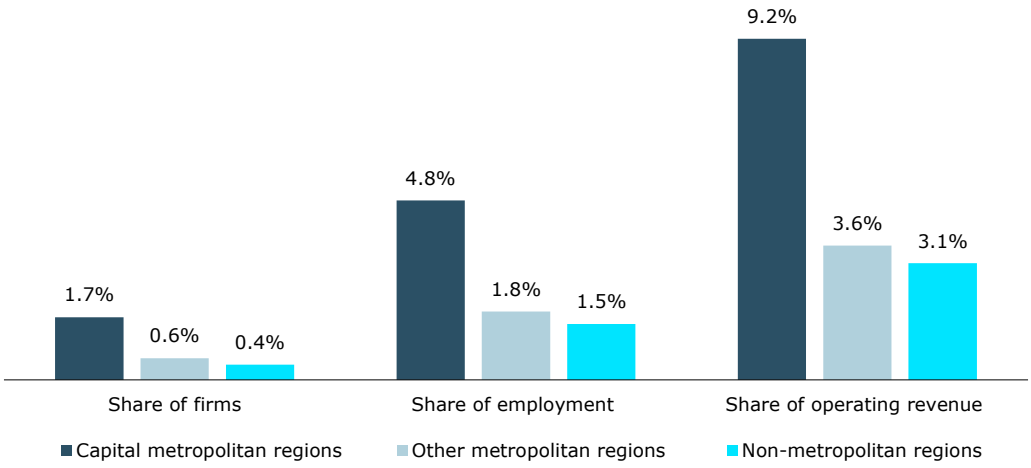
In comparison, other metropolitan regions account for 26 per cent of non-European owned firms, 29 per cent of employment among these firms and 28 per cent of output generated by these firms.[25]

Non-European owned firms have the largest direct footprint in capital metropolitan regions, where they, on average, account for close to 2 per cent of all firms, 5 per cent of employment and 9 per cent of output, cf. Figure 19.

In other metropolitan regions and in non-metropolitan regions, non-European owned firms, on average, account for a much smaller share of firms (approximately 0.5 per cent). However, relative to their limited presence in these regions, they account for a disproportionately high share of employment and operating revenue. In other metropolitan regions, non-European owned firms thus account for just under 2 per cent of employment and close to 4 per cent of output. In non-metropolitan regions, the equivalent shares 1.5 per cent and 3.1 per cent.

[25] As data on employment and operating revenues are missing for a substantially larger share of non-European owned firms in capital metropolitan cities than in the other types of regions, no conclusions regarding differences in the average size of these firms across the different types of regions can be drawn on the basis of Figure 18.

Figure 19 The importance of non-European owned firms in metropolitan regions



Note: The figure shows the average share of each of the three outcome measures accounted for by non-European owned foreign firms in capital city metropolitan, other metropolitan and non-metropolitan NUTS3 regions. The country specific results are contained in Table C.19 in Appendix C.

Source: ESPON FDI (2018) based on data from the Amadeus database

5.3 Spillovers from non-European owned firms to local firms across metropolitan regions

In order to test whether spillovers from non-European owned firms differ between the three types of metropolitan regions, we conduct our spillover analysis separately for each type of region.

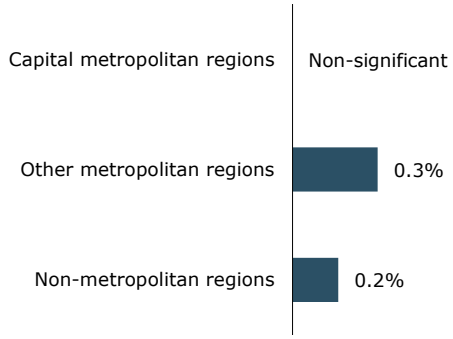
5.3.1 Results: Intra-industry productivity spillovers

We find evidence of positive productivity spillovers in other metropolitan regions and non-metropolitan regions, while we find no evidence of this in capital city metropolitan regions. The largest effect is found for other metropolitan regions, where the results imply that a one percentage point increase in the concentration of FDI is associated with an average increase of approximately 0.3 per cent in productivity among local firms within the same region and industry. In non-metropolitan regions the equivalent effect is approximately 0.2 per cent[26], cf. Figure 20.

There may be several reasons why we do not find any evidence of intra-industry spillovers in capital regions. The scope for knowledge spillovers from foreign to local firms via e.g. labour movements or other channels may be relative low if local firms are already relatively productive. In addition, negative competition effects may also be counteracting any positive learning effects that may arise, and this may be the reason we find no significant effect.

[26] The results thus imply that a doubling of the FDI concentration (the industry/region share of employees among non-European foreign owned firms), is associated with an average productivity increase of 0.4 per cent among local firms in the same industry and region in other metropolitan regions and 0.1 per cent in non-metropolitan regions.

Figure 20 Intra-industry productivity spillovers by metropolitan regions



Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given industry and region, across each of the three types of regions. Underlying regression results are shown in Table C.20 in Appendix C.

Source: ESPON FDI (2018) based on data from the Amadeus database

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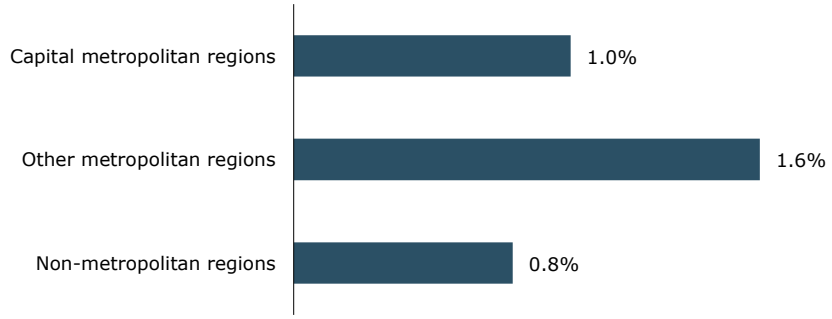
5.3.2 Results: Broader regional productivity spillovers

We find evidence of broader regional productivity spillovers, in all three types of regions, with the largest impact found in other metropolitan regions, cf. Figure 21. The magnitudes of the estimates, compared to the intra-industry effects, again suggest the importance of inter-industry linkages as a channel for productivity spillovers.[27]

Figure 21 Broader regional productivity spillovers by metropolitan regions



Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given region, across each of the three types of regions. Underlying regression results are shown in Table C.21 in Appendix C.

Source: ESPON FDI (2018) based on data from the Amadeus database

[27] The results thus imply that a doubling of the FDI concentration (the regional share of employees among non-European foreign owned firms), is associated with an average productivity increase of 2.7 per cent among local firms in the same industry and region in capital metropolitan regions, 2.4 per cent in other metropolitan regions and 0.8 per cent in non-metropolitan regions.

The fact that we find evidence of broader regional spillovers also in capital metropolitan regions, suggest that local firms in these regions may indeed be benefitting from knowledge spillovers from foreign firms, but that such spillovers especially occur between foreign and local firms in different industries.

5.4 Concluding remarks

Relative to the small share of firms that are non-European owned, they account for a disproportionately high share of employment and output in all three types of metropolitan regions, but have the largest direct footprint in capital metropolitan regions.

In terms of spillover effects, we find evidence of positive intra-industry productivity spillovers in other metropolitan regions and non-metropolitan regions, while no significant effect is found in capital metropolitan regions. However, we do find evidence of broader regional productivity spillovers in all three types of regions, underlining the importance of inter-industry linkages between foreign and local firms.

6 Impacts of FDI across regions with different levels of economic development

In this chapter, we examine the footprint of Non-European owned firms across regions, with different levels of economic development. First, we assess the direct impact of non-European owned firms across each type of region. Hereafter, we examine whether productivity spillovers differ between regions.

6.1 Definition of regions with different levels of economic development

In order to analyse how the footprint of non-European owned firms, differ across regions with different levels of income, we split regions into three groups. We do so on the basis of the average regional GDP per capita over the period 2010-2013.[28] Based on this information, we classify regions as:

- More developed regions, if the average GDP per capita over the period 2010-2013 was more than 90 % of the EU-28 average
- Transition regions, if the average GDP per capita over the period 2010-2013 was between 75 % and 90 % of the EU-28 average
- Less developed regions, if the average GDP per capita over the period 2010-2013 was less than 75 % of the EU-28 average[29]

The level of regional development can be a determining factor for the occurrence and magnitude of spillovers.

Local firms' capacity to absorb new technology and knowledge from foreign owned firms, will likely differ across regions with different levels of development and be highest in the most developed regions. As local firms absorption capacity has been shown to facilitate the occurrence of positive productivity spillovers, the scope for spillovers occurring should be highest in more developed regions.[30]

However, while absorption capacity may be lower in less developed regions, these may also be the regions in which there is the largest 'gap' between the technologies used by local and foreign firms, and where local firms therefore have the most to learn from foreign owned firms. Given that the local firms are able to absorb new knowledge from foreign owned firms, these may therefore be the regions in which we see the largest spillover effects from foreign owned firms.

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[28] GDP per capita at the NUTS3 level is measured in purchasing power standard and obtained from Eurostat.

[29] This classification use the same thresholds as the classification used to determine regional eligibility for the European Regional Development Fund (ERDF) and the European Social Fund (ESF). The classification used for this purpose, classifies NUTS 2 regions into the same three groupings, based on annual average GDP per capita (PPS) over the period 2007-2009 (http://ec.europa.eu/eurostat/web/regions/overview).

[30] Based on Portuguese firm-level data, Crespo et al. (2010), find that productivity spillovers from foreign owned MNEs only occur in the most developed regions of Portugal, where the level of regional development is defined use regional data on the Human Development Index.

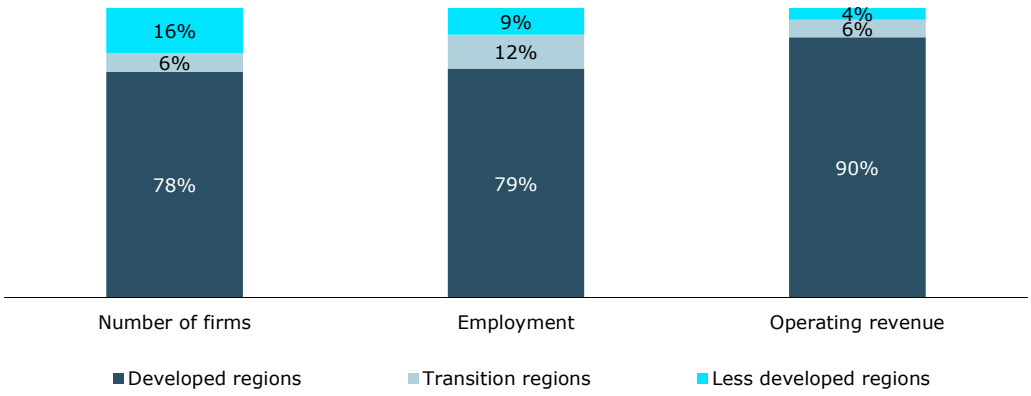
Finally, the scope for any effects occurring via competition and industry linkages will all else be larger in regions, with a higher density and in regions where the local market is large enough to attract foreign firms that wish to sell their products on the local market (i.e. market seeking FDI).

A priori, it is thus indeterminate which type of region will benefit the most.

6.2 The direct footprint of non-European owned firms in regions with different levels of economic development

The majority of non-European owned firms located in the 34 individual European countries, are located in more developed regions. These regions thus account for 78 per cent of all non-European owned foreign firms, but 79 percent of employment generated by these firms and 90 per cent of output, cf. Figure 22. In comparison, transition regions account for only 6 per cent of non-European owned firms, while less developed regions account for the remaining 16 per cent.

Figure 22 Distribution of foreign firms across regions with different levels of economic development



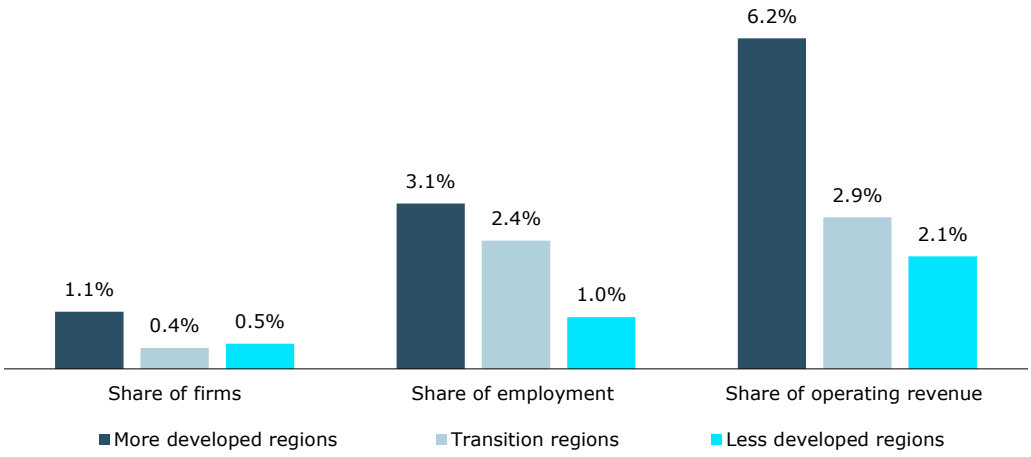
Note: The figure shows the distribution of non-European foreign owned firms across the different types of regions.

Source: ESPON FDI (2018) based on data from the Amadeus database

Non-European owned firms also have the largest direct footprint in more developed regions. On average, they only account for 1 per cent of firms in these regions but 3 percent of employment and 6 per cent of output.

In transition regions and in less developed regions, non-European owned firms account for a slightly smaller share of firms (approximately 0.5 per cent). However, as in more developed regions, they account for a disproportionately high share of employment and operating revenue. Non-European owned firms thus account for just over 2 per cent of employment and close to 3 per cent of output. In less developed regions, the equivalent shares are 1.0 per cent and 2.1 per cent, cf. Figure 23.

Figure 23 The importance of foreign firms across regions with different level of economic development



Note: The figure shows the average share of each of the three outcome measures accounted for by non-European owned foreign firms in capital city metropolitan, other metropolitan and non-metropolitan NUTS3 regions. The country specific results are contained in Table D.22 in Appendix D.

Source: ESPON FDI (2018) based on data from the Amadeus database

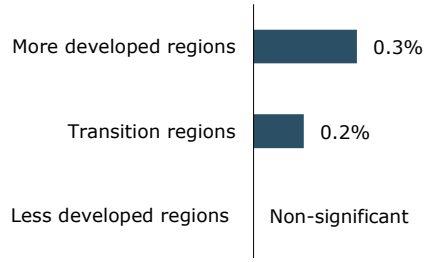
6.3 Spillovers from non-European owned firms to local firms across regions with different levels of economic development

In order to test whether spillovers from non-European owned firms differ between regions with different levels of economic development, we conduct our spillover analysis separately for each type of region.

6.3.1 Results: Intra-industry productivity spillovers

We find evidence of positive productivity spillovers in more developed regions and transition regions, while we find no evidence of this in less developed regions, cf. Figure 24.

Figure 24 Intra-industry productivity spillovers across regions with different levels of economic development



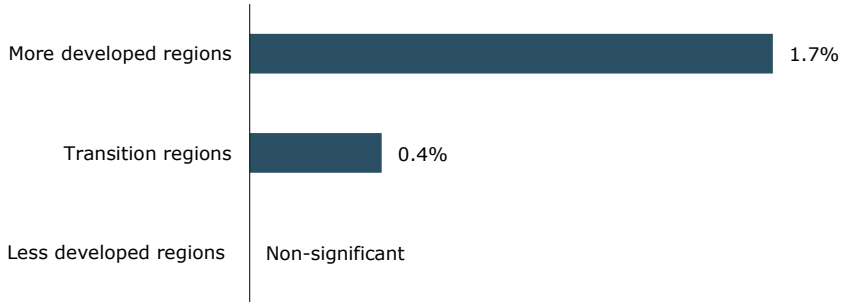
Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given industry and region, across each of the three types of regions. Underlying regression results are shown in Table D.23 in Appendix D.

Source: ESPON FDI (2018) based on data from the Amadeus database

6.3.2 Results: Broader regional productivity spillovers

In terms of broader regional productivity spillovers, we also only find positive and significant effects for more developed regions and for transition regions. In both cases the magnitude of the estimates is several times the magnitude of the intra-industry effects, and again underlines the importance of inter-industry linkages.[31]

Figure 25 Broader regional productivity spillovers across regions with different levels of economic development



Note: The figure shows the average percentage increase in labour productivity associated with a one percentage point increase in the employment share of foreign owned firms within a given region, across each of the three types of regions. Underlying regression results are shown in Table D.24 In Appendix D.

Source: ESPON FDI (2018) based on data from the Amadeus database

The fact that we find no evidence of spillover effects in less developed regions may be due to several factors. Local firms in these regions may not have the necessary resources and skills to benefit from knowledge spillovers from foreign owned firms. Similarly local buyer-supplier linkages may not be sufficiently frequent or deep enough to generate spillovers across industries. This means that FDI attraction efforts may need to be complemented by other supporting policies. This is an area that should be looked into further, in order to develop the necessary policy recommendations.

6.4 Concluding remarks

Non-European owned firms account for a small share of firms in all three types of regions, but are most prevalent in more developed regions. Despite their relatively small numbers, they account for a disproportionately high share of employment and output in all three types of regions, but have the largest direct footprint in more developed regions.

In terms of spillover effects, we find evidence of positive productivity spillovers occurring in more developed regions and in transition regions, but no evidence of spillovers is found in less developed regions.

[31] The results thus imply that a doubling of the FDI concentration (the regional share of employees among non-European foreign owned firms), is associated with an average productivity increase of 3.2 per cent among local firms in the same region in more developed regions and 0.6 per cent in transition regions.

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A. Appendix: Tables referenced in Chapter 3

Table A.1 The importance of non-European foreign owned firms in Europe

	Enterprises	Employment	Production value	Value added	Gross investment in tangible goods
Belgium	0.1%	5.3%	14.7%	11.1%	9.7%
Bulgaria	1.1%	4.7%	9.1%	10.7%	8.2%
Czech Republic	0.3%	7.3%	14.3%	12.1%	9.8%
Denmark	0.4%	5.2%	5.0%	6.3%	3.6%
Germany	0.4%	5.1%	9.9%	9.5%	8.5%
Estonia	0.2%	4.0%	4.9%	4.9%	3.4%
Greece	0.1%	1.1%	2.7%	3.1%	1.4%
Spain	0.1%	3.2%	8.9%	6.1%	7.6%
France	0.2%	4.3%	7.8%	6.8%	4.5%
Croatia	0.6%	1.8%	2.7%	2.3%	4.2%
Italy	0.1%	3.4%	8.1%	6.4%	6.5%
Cyprus	0.3%	1.9%	5.0%	4.5%	9.9%
Latvia	2.5%	3.8%	6.8%	6.3%	5.8%
Lithuania	0.4%	3.0%	6.6%	6.3%	3.4%
Luxembourg	10.9%	11.9%	32.7%	16.8%	7.8%
Hungary	1.1%	7.9%	22.0%	19.3%	13.1%
Malta	0.2%	4.5%			
Netherlands	0.5%	7.1%	18.9%	13.3%	8.0%
Austria	0.8%	5.7%	11.4%	9.4%	7.1%
Poland	0.1%	4.2%	7.6%	7.2%	6.6%
Portugal	0.2%	3.3%	6.4%	5.8%	4.8%
Romania	1.8%	5.4%	10.0%	7.6%	5.2%
Slovenia	2.1%	5.2%	7.5%	7.3%	6.8%
Slovakia	0.1%	4.9%	15.7%	9.1%	4.2%
Finland	0.3%	4.4%	6.7%	7.3%	7.1%
Sweden	0.4%	6.4%	10.2%	8.0%	5.7%
United Kingdom	0.7%	11.7%	21.0%	17.9%	17.3%
Norway	0.5%	6.4%	10.5%	9.9%	5.4%
Bosnia and Herzegovina	0.1%	3.4%	10.2%	5.6%	6.0%
Average	**0.9%**	**5.1%**	**10.6%**	**8.6%**	**6.8%**

Note: Non-European foreign owned firms are defined as firms owned by an operator from a non-EU country (EU+ Norway and Bosnia and Herzegovina). If available, data for 2014 has been used. Otherwise, data is for 2013. Ireland is excluded due to missing values in both years. Due to the limited coverage of the foreign affiliate's statistics, most of the non-EU ESPON countries have been excluded. The share of enterprises is based on the number of foreign enterprises registered in the business register of each individual European country. The share of employment is based on the number of persons employed (i.e. the average yearly headcount of persons employed and paid by a given enterprise including unpaid workers and persons absent for a short time). Production is measured as production value and includes as the amount actually produced, based on sales, including changes in stocks and resale of goods and services. Value added is based on value added at factor costs. Gross investment in tangible goods is defined as investment in existing or new tangible capital goods including land.

Source: ESPON FDI (2018)

Table A.2 Intra-industry productivity spillovers: Results across all regions

	All firms	Excl. European owned firms	Manufacturing	Services
	(1)	(2)	(3)	(4)
FDI concentration	0.00487***	0.00418***	0.00160***	0.00802***
	(0.000693)	(0.000715)	(0.000387)	(0.00110)
Capital intensity (log)	0.186***	0.186***	0.209***	0.178***
	(0.00154)	(0.00144)	(0.00271)	(0.00185)
Age	0.00191***	0.00194***	0.00230***	0.00183***
	(0.000152)	(0.000145)	(0.000198)	(0.000230)
Age squared	-6.37e-06***	-6.28e-06***	-5.49e-06***	-7.32e-06***
	(9.51e-07)	(9.45e-07)	(9.86e-07)	(1.67e-06)
Region/industry size	0.143***	0.143***	0.314*	0.136***
	(0.0422)	(0.0421)	(0.161)	(0.0436)
GDP per capita growth	-0.00168	-2.12e-05	-0.00215	-0.00118
	(0.00205)	(0.00198)	(0.00230)	(0.00255)
Constant	4.158***	4.148***	3.940***	4.667***
	(0.0317)	(0.0309)	(0.0298)	(0.0259)
Observations	1,709,822	1,632,831	261,871	1,150,315
R-squared	0.423	0.428	0.462	0.432

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.3 Intra-industry productivity spillovers by sub-sectors

	Food	Textiles	Wood and paper	Chemicals
	(1)	(2)	(3)	(4)
FDI concentration	-0.00144	0.00495**	0.000925	0.000701
	(0.00170)	(0.00206)	(0.00155)	(0.000720)
Capital intensity (log)	0.328***	0.215***	0.203***	0.211***
	(0.00662)	(0.0114)	(0.00632)	(0.00713)
Age	0.00775***	0.00510***	-0.000497	0.00110***
	(0.000563)	(0.00111)	(0.000376)	(0.000389)
Age squared	-1.42e-05***	-4.22e-05***	2.40e-06**	-2.97e-06***
	(2.14e-06)	(8.67e-06)	(1.02e-06)	(1.11e-06)
Region/industry size	0.151**	0.596*	0.998***	1.004***
	(0.0589)	(0.326)	(0.342)	(0.210)
GDP per capita growth	-0.00118	0.00333	-0.00104	-0.0152***
	(0.00549)	(0.00675)	(0.00555)	(0.00517)
Constant	3.246***	3.948***	4.000***	4.435***
	(0.0776)	(0.122)	(0.0644)	(0.123)
Observations	39,535	19,044	31,621	23,919
R-squared	0.513	0.549	0.492	0.467

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.4 Intra-industry productivity spillovers by sub-sectors

	Mineral and metals	Computer equipment	Machinery	Motor vehicles	Other products
	(1)	(2)	(3)	(4)	(5)
FDI concentration	-0.000520	0.000871	0.00140**	0.000598	0.00311***
	(0.000930)	(0.000807)	(0.000644)	(0.000807)	(0.00110)
Capital intensity (log)	0.207***	0.147***	0.0976***	0.169***	0.161***
	(0.00482)	(0.00758)	(0.00674)	(0.0117)	(0.00497)
Age	0.000757***	0.000588	-0.00192***	0.00207	0.00228***
	(0.000275)	(0.000917)	(0.000628)	(0.00137)	(0.000682)
Age squared	-2.48e-06**	-3.43e-06	1.15e-05**	-2.38e-05*	-1.82e-05***
	(1.04e-06)	(7.34e-06)	(4.87e-06)	(1.22e-05)	(6.78e-06)
Region/industry size	1.224***	1.144***	2.463***	0.744***	1.234***
	(0.327)	(0.427)	(0.471)	(0.118)	(0.245)
GDP per capita growth	-0.00375	-0.0176***	-0.0114**	-0.0310**	0.00830**
	(0.00398)	(0.00634)	(0.00574)	(0.0123)	(0.00413)
Constant	4.022***	4.259***	4.444***	4.114***	4.102***
	(0.0487)	(0.0927)	(0.0771)	(0.162)	(0.0513)
Observations	65,950	16,654	22,445	6,907	35,796
R-squared	0.415	0.327	0.321	0.332	0.482

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include NUTS 2 and country dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.5 Intra-industry productivity spillovers by sub-sectors

	Wholesale and retail	Transportation	Accommodation	Information	Financial
	(1)	(2)	(3)	(4)	(5)
FDI concentration	0.0110***	0.000225	0.00626***	0.00715**	0.00748***
	(0.00264)	(0.00204)	(0.00125)	(0.00286)	(0.00146)
Capital intensity (log)	0.159***	0.223***	0.177***	0.148***	0.191***
	(0.00336)	(0.00647)	(0.00566)	(0.0114)	(0.00254)
Age	0.00358***	0.00514***	0.00728***	0.00507***	0.00140***
	(0.000592)	(0.000765)	(0.00124)	(0.00183)	(0.000239)
Age squared	-2.97e-05***	-6.20e-05***	-5.56e-05***	-1.88e-05	-7.95e-07
	(4.50e-06)	(7.90e-06)	(1.83e-05)	(1.27e-05)	(1.10e-06)
Region/industry size	0.179*	0.523***	0.531***	0.110***	0.0809***
	(0.0969)	(0.0500)	(0.0863)	(0.0331)	(0.0272)
GDP per capita growth	0.00283	-0.0139***	-0.00792	-0.0141*	0.000804
	(0.00480)	(0.00379)	(0.00557)	(0.00833)	(0.00309)
Constant	4.600***	4.011***	4.509***	4.629***	4.066***
	(0.0349)	(0.0497)	(0.0461)	(0.126)	(0.0445)
Observations	431,318	105,801	60,341	13,940	434,222
R-squared	0.400	0.437	0.332	0.334	0.392

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.6 Intra-industry productivity across SMEs and other firms

	Micro firms	SMEs	Large firms
	(1)	(2)	(3)
FDI concentration	0.00524***	0.00391***	0.00168**
	(0.00125)	(0.000435)	(0.000655)
Capital intensity (log)	0.187***	0.170***	0.216***
	(0.00175)	(0.00170)	(0.00511)
Age	0.000328	0.00129***	0.000475*
	(0.000219)	(0.000149)	(0.000255)
Age squared	-5.75e-07	-4.89e-06***	-1.58e-06*
	(1.26e-06)	(1.11e-06)	(8.17e-07)
Region/industry size	0.158***	0.146***	0.0305
	(0.0493)	(0.0495)	(0.0263)
GDP per capita growth	0.000489	-0.00629***	-0.00694*
	(0.00233)	(0.00187)	(0.00381)
Constant	4.606***	3.810***	3.894***
	(0.0318)	(0.0375)	(0.107)
Observations	1,129,399	547,108	33,315
R-squared	0.414	0.458	0.480

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.7 Intra-industry productivity spillovers by types of investment

	All firms
	(1)
FDI concentration (M&As)	0.00518***
	(0.00142)
FDI concentration (Other)	0.00483***
	(0.000760)
Capital intensity (log)	0.186***
	(0.00154)
Age	0.00191***
	(0.000152)
Age squared	-6.37e-06***
	(9.51e-07)
Region/industry size	0.143***
	(0.0422)
GDP per capita growth	-0.00168
	(0.00205)
Constant	4.158***
	(0.0317)
Observations	1,709,822
R-squared	0.423

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.8 Broader regional productivity spillovers: Results across all regions

	All firms	Excl. European owned firms	Manufacturing	Services
	(1)	(2)	(3)	(4)
FDI concentration	0.0200***	0.0189***	0.0135***	0.0216***
	(0.00319)	(0.00323)	(0.00233)	(0.00384)
Capital intensity	0.185***	0.186***	0.211***	0.177***
	(0.00335)	(0.00326)	(0.00456)	(0.00335)
Age	0.00187***	0.00192***	0.00229***	0.00174***
	(0.000281)	(0.000265)	(0.000259)	(0.000361)
Age squared	-6.65e-06***	-6.56e-06***	-5.80e-06***	-7.37e-06***
	(1.23e-06)	(1.20e-06)	(1.21e-06)	(1.90e-06)
Industry size	0.0559***	0.0575***	0.0443***	0.0601***
	(0.00794)	(0.00785)	(0.0119)	(0.00887)
Regional size	0.00616***	0.00532***	0.00569***	0.00643***
	(0.000601)	(0.000560)	(0.000524)	(0.000618)
GDP per capita growth	-0.00259	-0.000720	-0.00151	-0.00234
	(0.00264)	(0.00233)	(0.00346)	(0.00296)
Constant	4.134***	4.127***	3.894***	4.576***
	(0.0382)	(0.0373)	(0.0423)	(0.0290)
Observations	1,719,633	1,642,225	263,462	1,151,995
R-squared	0.428	0.433	0.464	0.436

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.9 Broader regional productivity spillovers by manufacturing sub-sectors

	Food	Textiles	Wood and paper	Chemicals
	(1)	(2)	(3)	(4)
FDI concentration	0.00509	0.0431***	0.00846*	0.0100***
	(0.00464)	(0.0103)	(0.00434)	(0.00299)
Capital intensity	0.329***	0.214***	0.205***	0.211***
	(0.00666)	(0.0132)	(0.00662)	(0.00843)
Age	0.00770***	0.00522***	-0.000632	0.00106**
	(0.000591)	(0.00107)	(0.000407)	(0.000423)
Age squared	-1.46e-05***	-4.25e-05***	2.71e-06**	-3.10e-06***
	(2.40e-06)	(8.32e-06)	(1.06e-06)	(1.15e-06)
Industry size	0.0346	-0.137***	0.214***	0.0553*
	(0.0317)	(0.0356)	(0.0520)	(0.0304)
Regional size	0.00293***	0.00574***	0.00642***	0.00504***
	(0.000734)	(0.00119)	(0.000715)	(0.000872)
GDP per capita growth	-0.000922	0.00303	0.000170	-0.0127**
	(0.00507)	(0.00727)	(0.00574)	(0.00533)
Constant	3.224***	3.889***	3.920***	4.418***
	(0.0851)	(0.0986)	(0.0589)	(0.121)
Observations	39,685	19,283	31,829	24,267
R-squared	0.511	0.551	0.493	0.465

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.10 Broader regional productivity spillovers by manufacturing sub-sectors

	Mineral and metals	Computer equipment	Machinery	Motor vehicles	Other products
	(1)	(2)	(3)	(4)	(5)
FDI concentration	0.0140***	0.0238***	0.0236***	0.0148**	0.0172***
	(0.00322)	(0.00482)	(0.00361)	(0.00709)	(0.00341)
Capital intensity	0.210***	0.148***	0.100***	0.168***	0.163***
	(0.00527)	(0.00785)	(0.00688)	(0.0121)	(0.00533)
Age	0.000677**	0.000577	-0.00187***	0.00228*	0.00232***
	(0.000272)	(0.000930)	(0.000614)	(0.00133)	(0.000718)
Age squared	-2.34e-06**	-3.76e-06	1.14e-05**	-2.44e-05**	-1.85e-05***
	(1.00e-06)	(7.45e-06)	(4.76e-06)	(1.21e-05)	(7.00e-06)
Industry size	0.0384**	0.0730	0.0522*	0.0638**	0.0245
	(0.0190)	(0.0446)	(0.0279)	(0.0253)	(0.0223)
Regional size	0.00610***	0.00829***	0.00457***	0.00737***	0.00688***
	(0.000768)	(0.00101)	(0.000861)	(0.00150)	(0.000827)
GDP per capita growth	-0.000529	-0.0149**	-0.00929	-0.0319***	0.00841**
	(0.00437)	(0.00629)	(0.00575)	(0.0113)	(0.00392)
Constant	3.982***	4.188***	4.428***	4.076***	4.070***
	(0.0494)	(0.0935)	(0.0738)	(0.168)	(0.0493)
Observations	66,140	16,749	22,479	7,105	35,925
R-squared	0.416	0.332	0.319	0.336	0.484

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.11 Broader regional productivity spillovers by services sub-sectors

	Wholesale and retail	Transportation	Accommodation	Information	Financial
	(1)	(2)	(3)	(4)	(5)
FDI concentration	0.0134***	0.0127***	0.0339***	0.0336***	0.0257***
	(0.00382)	(0.00444)	(0.00400)	(0.00755)	(0.00510)
Capital intensity	0.159***	0.213***	0.179***	0.148***	0.192***
	(0.00396)	(0.00513)	(0.00648)	(0.0130)	(0.00353)
Age	0.00323***	0.00617***	0.00726***	0.00449**	0.00126***
	(0.000684)	(0.000808)	(0.00134)	(0.00209)	(0.000320)
Age squared	-2.80e-05***	-6.43e-05***	-5.39e-05***	-1.63e-05	-6.01e-07
	(4.99e-06)	(8.02e-06)	(1.88e-05)	(1.32e-05)	(1.21e-06)
Industry size	0.0646***	0.224***	0.0465*	0.0260	0.00732*
	(0.0141)	(0.00760)	(0.0249)	(0.0235)	(0.00402)
Regional size	0.00586***	0.00350***	0.0120***	0.0157***	0.00790***
	(0.000797)	(0.000634)	(0.00102)	(0.00153)	(0.000771)
GDP per capita growth	0.000807	-0.00685***	-0.00908	-0.00961	-0.00273
	(0.00447)	(0.00240)	(0.00663)	(0.00799)	(0.00387)
Constant	4.514***	3.668***	4.350***	4.396***	3.987***
	(0.0394)	(0.0373)	(0.0556)	(0.147)	(0.0379)
Observations	431,336	106,136	60,622	14,007	435,166
R-squared	0.403	0.462	0.343	0.347	0.398

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.12 Broader regional productivity spillovers across SMEs and other firms

	Micro firms	SMEs	Large firms
	(1)	(2)	(3)
FDI concentration	0.0239***	0.0164***	0.00919***
	(0.00465)	(0.00254)	(0.00211)
Capital intensity	0.187***	0.170***	0.217***
	(0.00341)	(0.00327)	(0.00635)
Age	0.000393	0.00133***	0.000419
	(0.000418)	(0.000217)	(0.000257)
Age squared	-2.08e-06	-5.16e-06***	-1.54e-06*
	(1.90e-06)	(1.23e-06)	(8.48e-07)
Industry size	0.0467***	0.0709***	0.0182*
	(0.00914)	(0.00680)	(0.00951)
Regional size	0.00527***	0.00834***	0.00778***
	(0.000623)	(0.000604)	(0.000766)
GDP per capita growth	-0.00101	-0.00467*	-0.00382
	(0.00282)	(0.00249)	(0.00432)
Constant	4.588***	3.757***	3.819***
	(0.0382)	(0.0430)	(0.0976)
Observations	1,135,622	550,276	33,735
R-squared	0.418	0.464	0.484

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.13 Broader regional productivity spillovers by type of investment

	All firms
	(1)
FDI concentration (M&As)	0.0205*
	(0.0115)
FDI concentration (Other)	0.0200***
	(0.00337)
Capital intensity	0.185***
	(0.00335)
Age	0.00187***
	(0.000281)
Age squared	-6.65e-06***
	(1.23e-06)
Industry size	0.0559***
	(0.00794)
Regional size	0.00617***
	(0.000601)
GDP per capita growth	-0.00259
	(0.00264)
Constant	4.134***
	(0.0382)
Observations	1,719,633
R-squared	0.428

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.14 Intra-industry employment effects: Results across all regions

	All firms	Excl. European owned firms	Manufacturing	Services
	(1)	(2)	(3)	(4)
FDI concentration	0.000269	6.35e-05	-0.000226	0.000112
	(0.000373)	(0.000383)	(0.000333)	(0.000561)
Operational revenue	0.674***	0.670***	0.750***	0.659***
	(0.00297)	(0.00297)	(0.00211)	(0.00395)
Wage costs	-0.339***	-0.339***	-0.400***	-0.336***
	(0.00417)	(0.00402)	(0.00600)	(0.00536)
Capital intensity	-0.126***	-0.127***	-0.115***	-0.123***
	(0.00119)	(0.00116)	(0.00207)	(0.00151)
Age	0.0118***	0.0119***	0.00772***	0.0126***
	(0.000277)	(0.000270)	(0.000243)	(0.000463)
Age squared	-2.26e-05***	-2.22e-05***	-1.22e-05***	-2.58e-05***
	(3.03e-06)	(2.98e-06)	(1.84e-06)	(5.86e-06)
Region/industry size	-0.0303	-0.0341	-0.00466	-0.0348
	(0.0226)	(0.0232)	(0.0278)	(0.0251)
GDP per capita growth	0.00160	0.00163	0.000324	0.00133
	(0.00153)	(0.00158)	(0.00198)	(0.00197)
Constant	0.0490	0.194	-0.148	-0.0413
	(0.158)	(0.149)	(0.237)	(0.233)
Observations	1,408,700	1,345,731	216,170	951,309
R-squared	0.781	0.777	0.830	0.760

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of employment. All regressions include NUTS 2 and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table A.15 Broader regional employment effects: Results across all regions

	All firms	Excl. European owned firms	Manufacturing	Services
	(1)	(2)	(3)	(4)
FDI concentration	-0.000572	-0.000870	-0.00100	0.000559
	(0.00101)	(0.00103)	(0.00139)	(0.00116)
Operational revenue	0.675***	0.671***	0.749***	0.660***
	(0.00706)	(0.00735)	(0.00454)	(0.00834)
Wage costs	-0.340***	-0.339***	-0.398***	-0.338***
	(0.0125)	(0.0121)	(0.0115)	(0.0140)
Capital intensity	-0.126***	-0.126***	-0.115***	-0.122***
	(0.00197)	(0.00195)	(0.00318)	(0.00210)
Age	0.0118***	0.0119***	0.00778***	0.0125***
	(0.000475)	(0.000475)	(0.000315)	(0.000626)
Age squared	-2.26e-05***	-2.21e-05***	-1.23e-05***	-2.57e-05***
	(3.28e-06)	(3.23e-06)	(1.87e-06)	(5.93e-06)
Industry size	-0.0161***	-0.0162***	0.0799***	-0.0214***
	(0.00433)	(0.00417)	(0.0125)	(0.00469)
Regional size	-0.00182***	-0.00185***	-0.00389***	-0.00110***
	(0.000289)	(0.000293)	(0.000436)	(0.000373)
GDP per capita growth	0.00258**	0.00258**	0.00202	0.00175
	(0.00114)	(0.00112)	(0.00156)	(0.00111)
Constant	0.0563	0.201	-0.200	-0.0295
	(0.174)	(0.146)	(0.170)	(0.212)
Observations	1,414,984	1,351,688	217,318	952,506
R-squared	0.781	0.777	0.831	0.761

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of employment. All regressions include NUTS 2 and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

B. Appendix: Tables referenced in Chapter 4

Table B.16 The importance of non-European foreign owned firms by urban-rural regions

	Share of employment			Share of operating revenue			Share of number of firms		
	Urban	Interme diate	Rural	Urban	Interme diate	Rural	Urban	Interme diate	Rural
Austria	1.0%	0.6%	0.4%	2.4%	1.6%	1.5%	1.3%	0.5%	0.3%
Belgium	3.1%	2.1%	1.5%	8.7%	6.8%	6.2%	0.3%	0.1%	0.1%
Bulgaria	0.5%	0.6%	1.2%	0.3%	0.9%	2.1%	0.1%	0.2%	0.4%
Croatia	1.3%	1.8%	0.7%	2.6%	3.1%	0.7%	0.7%	0.6%	0.4%
Cyprus		1.0%			50.8%			20.3%	
Czech Republic	3.2%	1.8%	0.8%	4.2%	3.6%	1.3%	7.3%	1.8%	0.9%
Denmark	1.8%	1.2%	0.9%	1.5%	2.9%	0.6%	1.5%	0.6%	0.5%
Estonia	1.6%	0.6%	0.2%	3.2%	5.5%	0.4%	1.2%	0.7%	0.1%
Finland	1.9%	1.2%	0.8%	2.8%	2.2%	1.4%	0.2%	0.1%	0.0%
France	2.6%	1.5%	0.9%	3.7%	1.6%	0.9%	0.5%	0.2%	0.1%
Germany	1.9%	0.9%	0.6%	4.6%	1.5%	0.7%	2.1%	0.8%	0.7%
Greece	3.4%	1.0%	0.3%	3.5%	1.3%	0.2%	1.1%	0.2%	0.3%
Hungary	1.8%	0.9%	0.1%	2.9%	2.4%	0.0%	0.1%	0.0%	0.0%
Iceland	0.6%		0.2%	0.4%		0.3%	0.1%		0.1%
Ireland	8.3%	0.2%	2.0%	16.6%	0.3%	8.1%	2.3%	0.4%	0.5%
Italy	1.2%	0.8%	0.8%	1.9%	0.8%	0.7%	0.9%	0.6%	0.4%
Latvia	5.7%	4.5%	1.2%	7.6%	4.8%	1.9%	7.3%	3.2%	1.5%
Liechtenstein	1.2%			0.7%			0.3%		
Lithuania	1.1%	0.6%	0.4%	2.4%	3.0%	0.2%	0.6%	0.2%	0.1%
Luxembourg		4.2%			7.5%			7.0%	
Malta	1.6%			3.1%			1.0%		
Netherlands	3.0%	1.2%	0.2%	15.1%	2.8%	4.2%	0.5%	0.1%	0.1%
Norway	0.5%	0.5%	0.2%	1.0%	0.9%	0.5%	0.2%	0.1%	0.1%
Poland	0.2%	0.1%	0.1%	2.8%	2.6%	1.2%	0.2%	0.0%	0.0%
Portugal	1.2%	0.4%	0.7%	2.2%	0.9%	1.3%	0.5%	0.3%	0.2%
Romania	4.4%	2.0%	1.1%	5.2%	2.6%	1.5%	5.3%	1.3%	0.7%
Slovakia	1.2%	2.5%	2.0%	1.9%	5.2%	3.2%	2.4%	1.2%	1.1%
Slovenia		1.7%	1.5%		2.4%	1.9%		0.6%	0.3%
Spain	1.4%	0.6%	0.3%	2.4%	0.7%	0.5%	0.2%	0.0%	0.0%
Sweden	1.0%	0.7%	0.3%	1.8%	1.1%	0.5%	0.2%	0.1%	0.0%
Switzerland	1.4%	1.1%	0.4%	1.9%	1.3%	0.7%	0.5%	0.4%	0.2%
The former Yugoslav Republic of Macedonia (fYROM)	1.9%	0.6%		2.3%	1.8%		1.0%	0.3%	
Turkey	1.3%		0.0%	2.3%		11.1%	0.3%		0.4%
United Kingdom	8.3%	5.5%	5.4%	10.8%	8.3%	6.2%	0.9%	0.4%	0.2%
Weighted average	**3.6%**	**1.3%**	**0.8%**	**6.6%**	**3.3%**	**1.3%**	**1.1%**	**0.6%**	**0.3%**

Note: The table shows the percent of employment and operating revenue accounted for by non-European foreign owned firms across each type of region in each country, as well as the per cent of firms in each type of region in each country, that is non-European foreign owned. Some countries do only have some types of regions and thus have missing values for some region types. The average is weighted by the number of firms in each type of region.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table B.17 Intra-industry productivity spillovers: Results across urban-rural regions

	Urban regions	Intermediate regions	Rural regions
	(1)	(2)	(3)
FDI concentration	0.00361***	0.000996	0.00236**
	(0.000855)	(0.000673)	(0.00103)
Capital intensity (log)	0.175***	0.193***	0.206***
	(0.00264)	(0.00201)	(0.00279)
Age	0.00264***	0.00173***	0.000520**
	(0.000314)	(0.000204)	(0.000237)
Age squared	-8.97e-06***	-5.09e-06***	-4.32e-06***
	(2.65e-06)	(1.44e-06)	(1.19e-06)
Region/industry size	0.0667*	0.204***	0.285***
	(0.0359)	(0.0589)	(0.0830)
GDP per capita growth	-0.0142***	0.00593**	-0.00277
	(0.00357)	(0.00264)	(0.00261)
Constant	4.164***	4.183***	4.100***
	(0.0662)	(0.0463)	(0.0481)
Observations	707,700	609,398	392,722
R-squared	0.370	0.451	0.450

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table B.18 Broader regional productivity spillovers: Results across urban-rural regions

	Urban regions	Intermediate regions	Rural regions
	(1)	(2)	(3)
FDI concentration	0.0174***	0.0137***	0.00672
	(0.00379)	(0.00386)	(0.00600)
Capital intensity	0.175***	0.191***	0.204***
	(0.00572)	(0.00416)	(0.00425)
Age	0.00256***	0.00170***	0.000559
	(0.000498)	(0.000381)	(0.000454)
Age squared	-9.36e-06***	-5.14e-06***	-4.46e-06***
	(3.31e-06)	(1.86e-06)	(1.29e-06)
Industry size	0.0384***	0.0719***	0.0645***
	(0.0135)	(0.00954)	(0.0105)
Regional size	0.00534***	0.00809***	0.0120***
	(0.00117)	(0.00223)	(0.00117)
GDP per capita growth	-0.00994**	0.00515	-0.00486**
	(0.00493)	(0.00360)	(0.00226)
Constant	4.086***	4.123***	4.087***
	(0.0699)	(0.0524)	(0.0573)
Observations	710,828	613,287	395,516
R-squared	0.372	0.455	0.454

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

C. Appendix: Tables referenced in Chapter 5

Table C.19 The importance of non-European owned firms by metropolitan regions

	Share of employment			Share of operating revenue			Share of number of firms		
	Capital city	Metropolitan	Non-metropolitan	Capital city	Metropolitan	Non-metropolitan	Capital city	Metropolitan	Non-metropolitan
Austria	1.0%	0.8%	0.3%	2.5%	1.6%	1.4%	1.4%	0.4%	0.3%
Belgium	3.8%	1.9%	2.5%	11.3%	5.4%	6.7%	0.4%	0.2%	0.1%
Bulgaria	1.5%	0.9%	0.3%	2.3%	0.8%	0.7%	0.4%	0.3%	0.1%
Croatia	1.1%	2.4%	1.1%	2.1%	5.3%	1.4%	0.6%	0.7%	0.5%
Cyprus	1.0%			50.8%			20.3%		
Czech Republic	3.2%	2.0%	1.2%	4.2%	3.8%	2.1%	7.3%	1.0%	2.0%
Denmark	1.7%	1.2%	0.9%	1.8%	1.1%	3.2%	1.3%	0.6%	0.5%
Estonia	1.6%		0.3%	3.2%		1.1%	1.2%		0.2%
Finland	1.9%	1.6%	0.8%	2.8%	2.9%	1.3%	0.2%	0.1%	0.0%
France	3.4%	1.4%	0.9%	4.5%	1.7%	1.0%	0.6%	0.2%	0.1%
Germany	1.5%	1.7%	0.7%	1.6%	4.0%	1.2%	2.6%	1.7%	0.7%
Greece	3.5%	2.5%	0.6%	3.6%	2.7%	0.7%	1.3%	0.2%	0.2%
Hungary	1.7%	0.3%	0.6%	3.2%	2.1%	1.2%	0.1%	0.0%	0.0%
Iceland			0.5%			0.4%			0.1%
Ireland	7.9%	2.0%	2.0%	16.4%	13.8%	5.3%	2.1%	0.6%	0.4%
Italy	1.1%	1.2%	0.8%	1.8%	1.7%	0.9%	0.9%	0.9%	0.6%
Latvia	6.5%		3.1%	8.6%		3.5%	8.4%		3.0%
Liechtenstein			1.2%			0.7%			0.3%
Lithuania	1.1%	0.2%	0.8%	2.4%	0.5%	4.3%	0.6%	0.2%	0.2%
Luxembourg	4.2%			7.5%			7.0%		
Malta	1.6%		0.0%	3.1%		0.0%	1.0%		0.0%
Netherlands	7.0%	1.9%	1.3%	19.4%	12.3%	9.2%	1.0%	0.4%	0.2%
Norway	0.6%	0.6%	0.3%	1.0%	0.6%	0.8%	0.2%	0.1%	0.1%
Poland	0.4%	0.1%	0.1%	3.8%	1.8%	2.0%	0.3%	0.1%	0.0%
Portugal	1.4%	0.7%	0.6%	2.5%	0.7%	1.5%	0.6%	0.2%	0.4%
Romania	4.2%	2.3%	1.1%	5.1%	2.9%	1.5%	5.0%	1.4%	0.7%
Slovakia	1.2%	1.4%	2.4%	1.9%	1.7%	4.8%	2.4%	1.4%	1.1%
Slovenia	1.6%	1.4%	1.7%	2.6%	1.7%	1.9%	0.6%	0.4%	0.3%
Spain	2.2%	0.9%	0.6%	3.8%	1.4%	0.8%	0.4%	0.1%	0.1%
Sweden	1.3%	0.9%	0.4%	2.2%	1.3%	0.7%	0.2%	0.1%	0.0%
Switzerland	0.6%	1.7%	1.0%	1.1%	2.4%	1.2%	0.2%	0.6%	0.4%
The former Yugoslav Republic of Macedonia (fYROM)			1.5%			2.1%			0.8%
Turkey			1.2%			2.6%			0.3%
United Kingdom	10.7%	5.2%	6.5%	14.5%	5.3%	8.2%	1.4%	0.4%	0.4%
Weighted average	**4.8%**	**1.8%**	**1.5%**	**9.2%**	**3.6%**	**3.1%**	**1.7%**	**0.6%**	**0.4%**

Note: The table shows the percent of employment and operating revenue accounted for by non-European foreign owned firms across each type of region in each country, as well as the per cent of firms in each type of region in each country, that is non-European foreign owned. Some countries do only have some types of regions and thus have missing values for some region types. The average is weighted by the number of firms in each type of region.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table C.20 Intra-industry productivity spillovers: Results across metropolitan regions

	Capital metropolitan regions	Other metropolitan regions	Non-metropolitan regions
	(1)	(2)	(3)
FDI concentration	0.00171	0.00291***	0.00180***
	(0.00135)	(0.000568)	(0.000657)
Capital intensity (log)	0.170***	0.185***	0.198***
	(0.00404)	(0.00233)	(0.00182)
Age	0.00230***	0.00156***	0.00176***
	(0.000506)	(0.000205)	(0.000166)
Age squared	-7.33e-06**	-4.85e-06***	-6.73e-06***
	(3.62e-06)	(1.45e-06)	(1.05e-06)
Region/industry size	0.0402	0.789***	0.284***
	(0.0245)	(0.0778)	(0.0599)
GDP per capita growth	-0.00976**	-0.00420	-0.000665
	(0.00407)	(0.00377)	(0.00212)
Constant	4.207***	4.132***	4.102***
	(0.0914)	(0.0632)	(0.0365)
Observations	391,366	581,570	731,191
R-squared	0.363	0.409	0.460

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table C.21 Broader regional productivity spillovers: Results across metropolitan regions

	Capital metropolitan regions	Other metropolitan regions	Non-metropolitan regions
	(1)	(2)	(3)
FDI concentration	0.00951**	0.0160***	0.00784**
	(0.00477)	(0.00354)	(0.00348)
Capital intensity	0.170***	0.185***	0.196***
	(0.00855)	(0.00545)	(0.00364)
Age	0.00221**	0.00147***	0.00176***
	(0.000885)	(0.000371)	(0.000302)
Age squared	-7.35e-06**	-5.18e-06**	-6.84e-06***
	(3.71e-06)	(2.04e-06)	(1.28e-06)
Industry size	0.0238	0.0662***	0.0755***
	(0.0155)	(0.0109)	(0.00670)
Regional size	0.00535***	0.0172***	0.00797***
	(0.00110)	(0.00224)	(0.000963)
GDP per capita growth	-0.00916*	-0.00236	-0.000541
	(0.00514)	(0.00475)	(0.00234)
Constant	4.110***	4.022***	4.086***
	(0.101)	(0.0744)	(0.0450)
Observations	393,707	584,072	736,153
R-squared	0.366	0.411	0.464

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database

D. Appendix: Tables referenced in Chapter 6

Table D.22 The importance of non-European owned firms across regions with different levels of economics development

	Share of employment			Share of operating revenue			Share of number of firms		
	Developed	Transition	Less developed	Developed	Transition	Less developed	Developed	Transition	Less developed
Austria	0.6%	0.8%	0.2%	1.9%	1.5%	0.0%	0.8%	0.2%	0.1%
Belgium	2.7%	3.0%	2.3%	8.5%	5.1%	5.1%	0.2%	0.1%	0.1%
Bulgaria	0.5%		0.8%	0.3%		1.5%	0.1%		0.2%
Croatia	1.3%		1.2%	2.6%		1.8%	0.7%		0.5%
Cyprus	1.0%			50.8%			20.3%		
Czech Republic	3.8%	1.6%	1.6%	4.3%	2.4%	3.2%	8.6%	1.1%	1.9%
Denmark	1.4%	0.5%		2.0%	0.4%		0.9%	0.5%	
Estonia	1.6%		0.3%	3.2%		1.1%	1.2%		0.2%
Finland	1.4%	0.2%		2.3%	0.3%		0.1%	0.0%	
France	2.4%	0.8%	0.8%	3.2%	0.9%	1.6%	0.4%	0.1%	0.1%
Germany	1.5%	0.8%	0.8%	3.4%	1.4%	1.0%	1.6%	0.7%	0.7%
Greece	3.9%	2.1%	1.1%	3.9%	1.7%	1.3%	1.2%	1.4%	0.2%
Hungary	1.8%	0.8%	0.7%	2.9%	1.1%	2.1%	0.1%	0.0%	0.0%
Iceland									
Ireland	6.8%	1.2%	0.0%	16.0%	1.0%	0.0%	1.6%	0.4%	0.4%
Italy	1.3%	0.3%	0.1%	1.6%	0.5%	0.2%	1.0%	0.4%	0.2%
Latvia	6.5%		3.1%	8.6%		3.5%	8.4%		3.0%
Liechtenstein									
Lithuania	1.1%		0.6%	2.4%		2.8%	0.6%		0.2%
Luxembourg	4.2%			7.5%			7.0%		
Malta		1.6%	0.0%		3.1%	0.0%		1.0%	0.0%
Netherlands	2.7%	0.1%	0.5%	13.6%	0.1%	5.1%	0.4%	0.1%	0.1%
Norway	0.4%			0.8%			0.1%		
Poland	0.3%	0.1%	0.1%	3.2%	3.0%	1.6%	0.3%	0.1%	0.0%
Portugal	1.4%	1.0%	0.6%	2.5%	2.3%	1.1%	0.6%	1.1%	0.2%
Romania	4.5%	4.7%	1.5%	4.8%	7.6%	2.0%	5.4%	6.0%	1.0%
Slovakia	1.2%	3.5%	2.1%	1.9%	6.8%	4.0%	2.4%	0.8%	1.2%
Slovenia	1.6%	1.7%	1.6%	2.6%	2.4%	1.6%	0.6%	0.4%	0.3%
Spain	1.6%	0.5%	0.4%	2.5%	0.8%	0.7%	0.2%	0.1%	0.1%
Sweden	0.8%			1.5%			0.1%		
Switzerland									
The former Yugoslav Republic of Macedonia (fYROM)			1.5%			2.1%			0.8%
Turkey									
United Kingdom	8.6%	6.8%	3.8%	11.7%	6.1%	4.6%	1.0%	0.3%	0.3%
Weighted average	**3.1%**	**2.4%**	**1.0%**	**6.2%**	**2.9%**	**2.9%**	**1.1%**	**0.4%**	**0.5%**

Note: The table shows the percent of employment and operating revenue accounted for by non-European foreign owned firms across each type of region in each country, as well as the per cent of firms in each type of region in each country, that is non-European foreign owned. Some countries do only have some types of regions and thus have missing values for some region types. The average is weighted by the number of firms in each type of region.

Source: ESPON FDI (2018) based on data from the Amadeus database

Table D.23 Intra-industry productivity spillovers: Results across regions with different levels of development

	More developed regions	Transition regions	Less developed regions
	(1)	(2)	(3)
FDI concentration	0.00335***	0.00163**	0.00164
	(0.000741)	(0.000706)	(0.00102)
Capital intensity (log)	0.167***	0.190***	0.232***
	(0.00204)	(0.00251)	(0.00278)
Age	0.00194***	0.00201***	9.75e-05
	(0.000184)	(0.000302)	(0.000338)
Age squared	-6.93e-06***	-7.00e-06***	8.23e-07
	(1.15e-06)	(1.84e-06)	(1.25e-06)
Region/industry size	0.0827**	0.369**	0.441***
	(0.0337)	(0.155)	(0.0899)
GDP per capita growth	-0.00512**	-0.00221	0.00128
	(0.00251)	(0.00410)	(0.00205)
Constant	4.117***	3.830***	4.013***
	(0.0424)	(0.0447)	(0.0727)
Observations	994,114	201,583	509,070
R-squared	0.314	0.333	0.394

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3/2-digit NACE level.

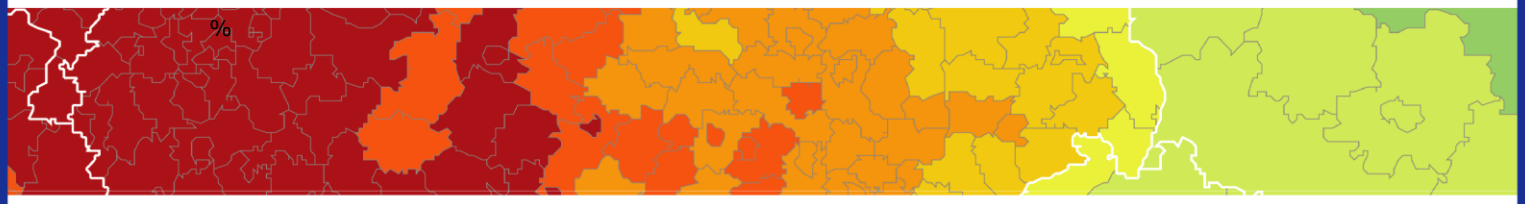
Source: ESPON FDI (2018) based on data from the Amadeus database

Table D.24 Broader regional productivity spillovers: Results regions with different levels of development

	More developed regions	Transition regions	Less developed regions
	(1)	(2)	(3)
FDI concentration	0.0170***	0.00429**	-0.00288
	(0.00379)	(0.00185)	(0.00533)
Capital intensity	0.168***	0.189***	0.231***
	(0.00404)	(0.00390)	(0.00375)
Age	0.00191***	0.00197***	4.81e-05
	(0.000331)	(0.000457)	(0.000690)
Age squared	-7.13e-06***	-7.00e-06***	9.02e-07
	(1.43e-06)	(2.23e-06)	(2.45e-06)
Industry size	0.0393***	0.0614***	0.0660***
	(0.0108)	(0.00994)	(0.0112)
Regional size	0.00585***	0.0172**	0.00893***
	(0.00142)	(0.00838)	(0.000676)
GDP per capita growth	-0.00284	-0.00376	-0.00125
	(0.00483)	(0.00608)	(0.00238)
Constant	4.072***	3.814***	4.019***
	(0.0520)	(0.0500)	(0.0531)
Observations	997,474	202,878	514,219
R-squared	0.316	0.333	0.398

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the log of operating revenue per employee. All regressions include country and NACE 2 dummies. Standard errors are clustered at the NUTS3 level.

Source: ESPON FDI (2018) based on data from the Amadeus database



ESPON 2020 – More information

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