



# **Spillovers from inward investment – a comparison of Northern Ireland with the rest of the UK**

**ERC Research Report**

**July 2020**

# Spillovers from inward investment – a comparison of Northern Ireland with the rest of the UK

**Nigel Driffield and Katuscia Lavoratori,**  
*Warwick Business School, University of Warwick*

**Nigel.Driffield@wbs.ac.uk**

**Katuscia.Lavoratori@wbs.ac.uk**



The Enterprise Research Centre is an independent research centre which focusses on SME growth and productivity. ERC is a partnership between Warwick Business School, Aston Business School, Queen's University School of Management, Leeds University Business School and University College Cork. The Centre is funded by the Economic and Social Research Council (ESRC); Department for Business, Energy & Industrial Strategy (BEIS); Innovate UK, the British Business Bank and the Intellectual Property Office. The support of the funders is acknowledged. The views expressed in this report are those of the authors and do not necessarily represent those of the funders.

## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>4</b>
1.1 Background .....	4
1.2 FDI and productivity spillovers .....	6
1.3 Why does the literature assume that spillovers from inward investment occur?.....	6
1.4 Why have these taken on such importance for policy? .....	8
1.5 How have they come to be interpreted?.....	8
1.6 What are the measurement issues? .....	9
1.7 How does one explain apparent differences? .....	9
1.8 What types of sectors generate spillovers? .....	10
<b>2. DATA .....</b>	<b>11</b>
2.1 Data sources.....	11
2.2 Descriptive statistics.....	11
<b>3. ANALYSIS .....</b>	<b>14</b>
3.1 Econometric Model .....	14
<b>4. DISCUSSION .....</b>	<b>15</b>
4.1 What is driving these results? .....	16
<b>5. Conclusions.....</b>	<b>19</b>
5.1 Issues worthy of further investigation.....	19
<b>REFERENCES.....</b>	<b>21</b>

## **1. INTRODUCTION**

The purpose of this exercise is to explore the variation in spillovers from inward investment in different parts of the UK. We seek therefore to quantify (and briefly discuss) the average effect for the UK, and subsequently explore differences in this apparent value across locations.

In order to put our analysis in context it is necessary to understand what we mean by spillovers, and how they have come to be interpreted.

Section 1 provides a framework by which one can quantify and subsequently explore the nature of apparent spillovers from Foreign Direct Investment (FDI) between regions. The purpose of this analysis is to report some results concerning the variation in the productivity effects of FDI across UK regions, but also to offer some thoughts as to why this is the case.

### **1.1 Background**

Inward investment is of vital importance to the UK economy. Compared to other G7 countries, the UK has had the highest percentage of inward FDI as a percentage of GDP, at 64 per cent of GDP in 2014 (ONS 2016). However, the latest data from the Department for International Trade (2020) indicate that Northern Ireland only gets a small share of the total inward investment that comes into the UK, even after one allows for the dominance of London. For comparison, the figures in brackets next to the names represent the share of UK Gross value added in by each area. The latest data from the Department for International Trade (2020) indicate that Northern Ireland only gets a small share of the total inward investment that comes into the UK, even after ones allows for the dominance of London, but that this is in line with the size of the economy.

**Table 1: New FDI projects and jobs created into the UK in 2018-19**

UK Region (Percentage of UK GVA)	FDI projects (Percentage of UK total)	New Jobs (Percentage of UK total)
Northern Ireland (2%)	35 (2%)	1,475 (2%)
Scotland (8%)	126 (7%)	3,348 (7%)
Wales (3%)	51 (3%)	2,314 (5%)
<i>English Regions</i>		
North East (3%)	59 (3%)	2,188 (5%)
North West (10%)	142 (8%)	4,663 (10%)
Yorkshire and The Humber (7%)	98 (6%)	2,244 (5%)
East Midlands (6%)	69 (4%)	1,823 (4%)
West Midlands (7%)	155 (9%)	5,044 (11%)
East of England (9%)	87 (5%)	1,513 (3%)
South East (15%)	202 (12%)	3,905 (9%)
South West (7%)	79 (5%)	1,945 (4%)
London (24%)	627 (36%)	14,875 (33%)

Source: adapted from Department for International Trade, 2020.

Post Covid-19 the situation is likely to become even more challenging, which means that both the UK as a whole, and the devolved administrations must develop a clear understanding of how to not only maximise the amount of inward investment they are able to attract, but how to maximise the benefits that accrue to the wider economy from this investment. At the same, there is some cause for optimism, with Belfast performing very well in the attraction of Fintech investments (FDI intelligence 2020). This suggests that Belfast is behind only London and Singapore in the attraction of fintech. Maximising the returns on inward investment requires an understanding of the benefits of inward investment, for example of the benefits to supply chains or through knowledge transfer from inward investors into local firms.

At the same time, a focus of policy makers is the apparent poor performance of the UK in terms of productivity. In the context of inward investment, this means developing an understanding of where (and why) inward investment can generate productivity growth in the host economy. There are essentially two mechanisms by which this can occur. The first is typically referred to as the “batting average” effect – the fact that (new) inward investors have higher productivity than the average level of the region, and as such their presence increases average productivity. The second is whether (and how) the presence of inward investment generates productivity growth in the wider economy, typically explained in terms of a range of effects that have come to be labelled as “FDI spillovers”.

## **1.2 FDI and productivity spillovers**

The term “spillovers” simply means any positive benefit of an activity that is not captured through the market mechanism. Though typically it is common to see these expressed in terms of productivity (growth), in the context of inward investment they are also commonly expressed in terms of innovation, or even in terms of wage effects.

The original literature on spillovers essentially sought to determine spillovers in output – that is if output increases in one sector, does that lead to an increase in productivity in other sectors (Caballero and Lyons 1990, 1992). Subsequently one could then ask how these effects occur; whether they are generic “demand spillovers” driven by for example firms capturing further scale economies as the economy grows, or related to knowledge transfer between sectors. So, the fundamental point here that one must remember is that productivity is seen as an outcome of some form of non-market benefit from an activity, in this case inward investment.

## **1.3 Why does the literature assume that spillovers from inward investment occur?**

The academic literature on spillovers from FDI essentially assumes one of two processes, based on the analysis of foreign direct investment. The first is that multinational firms have some form of firm specific advantage over other firms, that translates into a technology or productivity advantage. This advantage is in some sense embedded in FDI flows, either in terms of superior technology embedded in physical capital, or superior products, and superior managerial knowledge. Following the FDI, some of this knowledge or technology somehow is transferred to local firms, through a series of mechanisms.

These arguments have been explored in a voluminous academic literature that dates back nearly 20 years, see for example Driffield (2001), but to summarise:

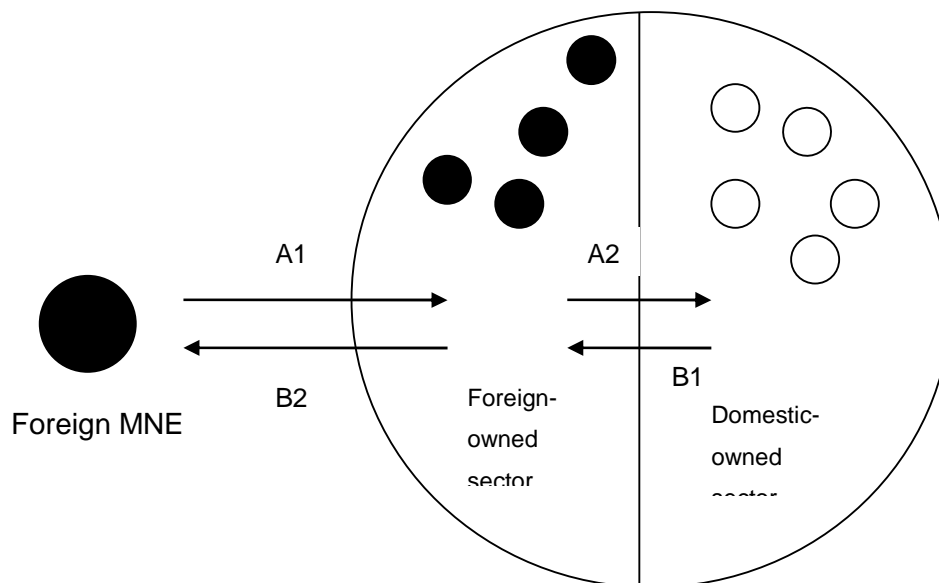
- The presence of Multinational Enterprises (MNEs), as leaders in both technological and capital accumulation, will serve to stimulate further the possibility for agglomeration in such locations. This will serve to increase the potential for technology transfer, and therefore improvements in the technological capabilities of domestic firms.
- The non-technological advantages, such as managerial abilities, the exploitation of scale economies, or superior co-ordination of resources, if adopted by host

country industry, may improve performance, sometimes referred to as the 'demonstration effect'. The so called 'Japanisation of UK industry' is a case in point.

- Knowledge capital is likely to be a more important source of ownership advantages, than is physical capital. Knowledge capital is clearly more easily transferable internationally than is physical capital.
- Finally, while this is distinct from the pure spillover process, potentially more important is that technology transfer occurs directly, through the licensing of a particular technology, through supplier networks or subcontracting arrangements, or indirectly as knowledge becomes public, and spillovers are assimilated by the domestic sector.

This is best summarised by the following figure (adapted from Driffield, Love and Menghinello 2010).

**Figure 1: FDI spillover process**



Source: adapted from Driffield, Love and Menghinello, 2010.

If one starts with the premise, developed from analysis of the multinational enterprise, that the foreign multinational has some form of firm specific advantage over other firms, that allows it to internationalise, then the necessary condition for spillovers to occur is that at least some of the knowledge or technological advantage is transferred into its affiliates abroad (A1). The next condition is that at least some of this knowledge is then transferred into the local sector, either through formal measures such as supplier arrangements, or through informal mechanisms such as spillovers, or through labour

mobility. These processes are discussed in more detail in Driffield and Love (2007) for example. Of course, there is also the possibility that FDI occurs not to transfer knowledge into the affiliate, but to acquire knowledge from the local environment (the process labelled B in the figure above). This is one reason why we observe variations in the levels of productivity growth resulting from inward investment.

#### **1.4 Why have these taken on such importance for policy?**

It is argued that one reason that spillovers assumed such importance for policy makers is that the social returns to such investments initially justified the size of subsidies that were offered to potential inward investors through the 1980s and 1990s.

Most “cost per job” analysis suggested high figures per job, but social returns in the form of more general employment or productivity growth rendered these more palatable. More recently however, these are seen in the wider debate concerning UK productivity, and the importance of productivity growth, especially outside the south east of England.

#### **1.5 How have they come to be interpreted?**

The general assumption is that any apparent productivity gain from inward investment is the combined effect of the direct and indirect effects discussed above, but net of any adverse effect on productivity of the local economy. This may occur for example through greater competition in product markets, or more likely at a local level, competition in factor markets that reduce the efficiency of the domestic sector. These effects are discussed in detail in Driffield (1999), Driffield et al (2004).

Becket et al (2020) explore this for a set of high-tech sectors in Europe. They demonstrate that FDI into a location tends to increase demand for skilled labour in high-tech, research-intensive sectors. Specifically, that the presence of foreign firms has a positive effect on domestic wages in such labour markets, but that labour market flexibility and the capacity to absorb spillovers matters here. Inward investment significantly increases labour costs in the Continental countries where higher levels of labour market inflexibilities and the potential of firms to absorb spillovers allow the domestic firms to increase earnings while retaining their workers. Similarly, the high levels of labour market inflexibility in the Mediterranean countries is also associated with an important increase in wages: however, due to the lower potential of domestic firms to absorb spillovers from FDI those firms experience a loss in employment in the short run,



in particular due to the pressure of FDI from outside their regions. In contrast, the effects of FDI on labour cost in countries with higher levels of labour market flexibility are smaller (i.e. in the Transition Economies) or insignificant (i.e. in the Nordic and Anglo-Saxon countries), which in turn translates into less significant employment effects.

## **1.6 What are the measurement issues?**

Continuing the theme from above, if one is seeking to determine the nature of spillovers in productivity, one needs to first of all consider the issues surrounding productivity measurement. There is voluminous literature in the applied economics / econometrics field surrounding measurement of productivity (Olley and Pakes 1996; Levinsohn and Petrin 2003; Wooldridge 2009). We do not intend to go into this here, beyond the fact that we use total factor productivity in this analysis, as suggested by Wooldridge (2009) to allow for the endogeneity of inputs when calculating productivity. We eschew labour productivity as unreliable here, given the importance of capital investment in our analysis.

## **1.7 How does one explain apparent differences?**

Before moving to the analysis, it is important to consider the factors that the academic literature finds influence the scale and scope of spillovers / knowledge transfer between the foreign owned and domestic sector. These are:

- Absorptive capacity – the ability of the domestic sector to assimilate any spillovers.
- Horizontal / vertical links between inward investors and local firms – the greater the transactions linkages between the two, the greater the knowledge transfer.
- FDI motive - Firms seeking to exploit their new technology in new markets are more likely to engage in international technology transfer between parent and affiliate, and as such generate more productivity growth locally. Compared with then investors who are seeking either to access technology that is in the host location, or simply find lower cost inputs, the spillovers will be greater.
- Institutions and intellectual property rights protection – the better these are, the more they encourage international technology transfer by the MNE, but also encourage innovation in the host economy.

## 1.8 What types of sectors generate spillovers?

Much of the discussion of spillovers, particularly that with an economic geography focus, majors on the idea of agglomeration and the co-creation of knowledge. This emphasises for example the importance of co-location, with an emphasis on clusters of high-tech sectors. It is important however to remember that such examples, such as Cambridge, the biotech clusters of Massachusetts, or software in Bengaluru represent only a small percentage of aggregate activity. Rather one needs to consider the pattern of spillovers in the context of the overall distribution of firm productivity.

When considering the “productivity problem”, it is assumed that within a given sample the distribution of firms follows something akin to a normal distribution, as depicted in Figure 2(a), the assertion being that to improve productivity one needs to move the distribution to the right. However, in the absence of technological change, this is unlikely, so one needs to consider the shape of the distribution. In some recent analysis, Haldane (2017) asserted that the “problem” in the UK was in the tails of the distribution. One assertion is that the UK has a somewhat more skewed distribution (say) than Germany, depicted by the red line in Figure 2(a).

**Figure 2: Firm productivity distribution**

Fig. 2(a)

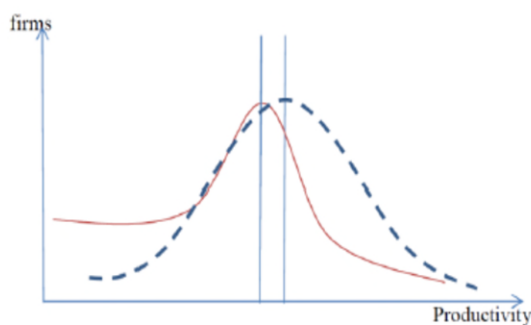
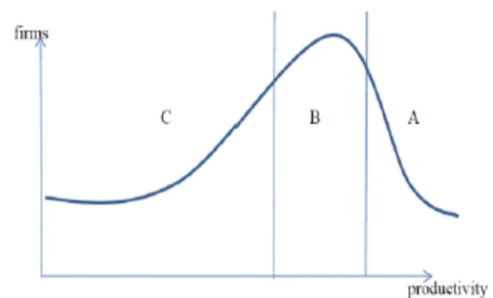


Fig. 2(b)



Source: authors' elaboration

This is independent of the nature of the activity undertaken, and is not simply about high tech versus low tech, but rather that, within a given location or sector, there is a distribution of firms with certain characteristics that define their productivity. At the heart of this is the so-called “productivity puzzle”, why the UK appears to have lower

productivity than comparable economies, and equally why some regions of the UK appear to lag behind others. If one sees the developed world as an integrated whole in terms of the production of goods and services, as expounded for example by Baldwin (2016) or Melitz (2003), then our standard normal, or near normal distribution of productivity should become more skewed, as depicted in Figure 2(b).

When thinking about spillovers in this context, one could argue that there are three distinct problems. Type A firms may already be close to the technology frontier, such that the scope for learning from other firms is limited. Equally type C firms may have plenty of scope for improvement, but may lack the absorptive capacity or resources (such as skilled labour or access to finance) to facilitate growth through spillovers. Type B firms, that is to say those some distance from the frontier, but with the capacity to develop may be best placed to gain from FDI. Often such firms are firms which are performing above average, but in medium or even low-tech sectors.

## **2. DATA**

### **2.1 Data sources**

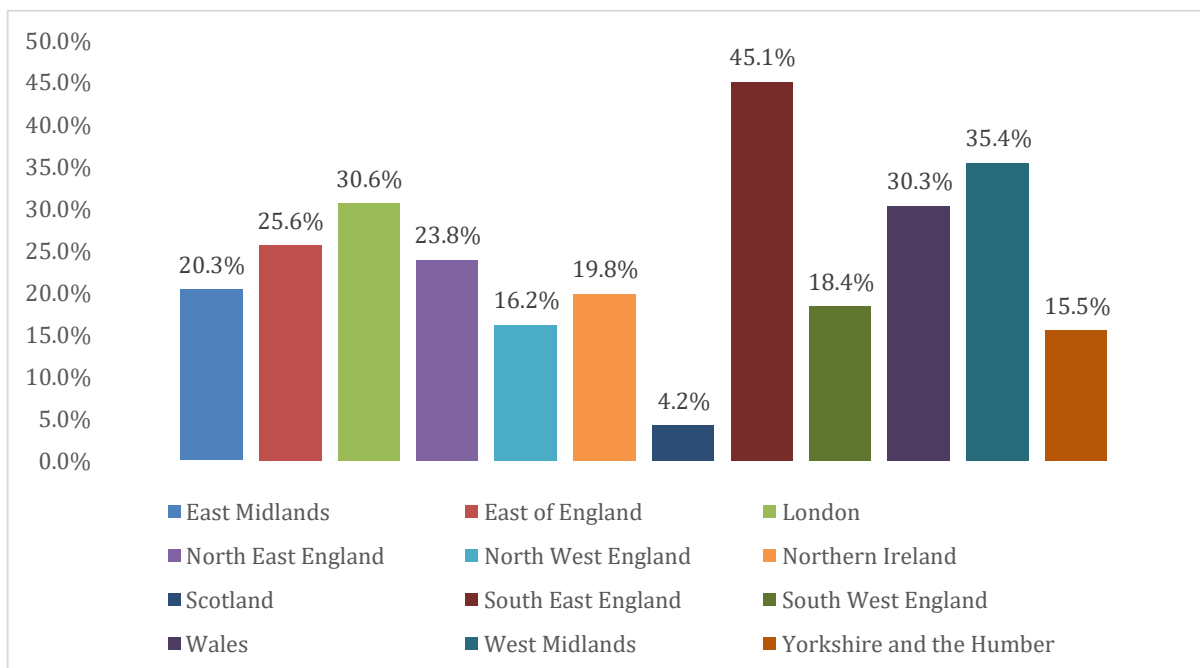
The analysis relies on firm-level data from the Fame database, which collects data from Profit Loss and Balance sheets accounts of companies operating in the United Kingdom provided by Bureau Van Dijk. We focus on the manufacturing sector for a number of reasons. Firstly, the potential for technology transfer is greater in the manufacturing sector, where knowledge is embedded in capital. Secondly, the service sector contains many more micro firms, with low absorptive capacity, and are also missing from the data. Thirdly, the manufacturing sector is more evenly distributed across the UK, allowing for more precise comparison with Wales and Scotland as well as the English regions.

### **2.2 Descriptive statistics**

In the period 2011-2018, the database contains around 101,000 firms, operating in 18 sectors (at 1-digit NACE Rev. 2 classification), 2.4% of these firms are located in Northern Ireland. Although we focus the analysis of productivity effects on manufacturing, we use the total sample for computing the foreign presence at the regional and sectoral level.

We define a company as foreign-owned following the criteria identified by Merlevede et al. (2015) and using information on shareholder % available from Fame. A firm is foreign-controlled when at least 50% of shares are controlled by owners with a known nationality different from the home country nationality (i.e. UK), and at least 10% of shares are owned by a single foreign investor. We measure the foreign presence as the total assets of foreign-controlled companies in the region. We refer to the NUTS-3 regions as geographical unit<sup>1</sup>. Figure 3 shows the distribution of foreign assets to total assets across regions. In Northern Ireland, 19.8% of total assets are foreign-owned.

**Figure 3: Distribution of foreign assets (% of total assets) by region**



Source: authors' elaboration from Fame database

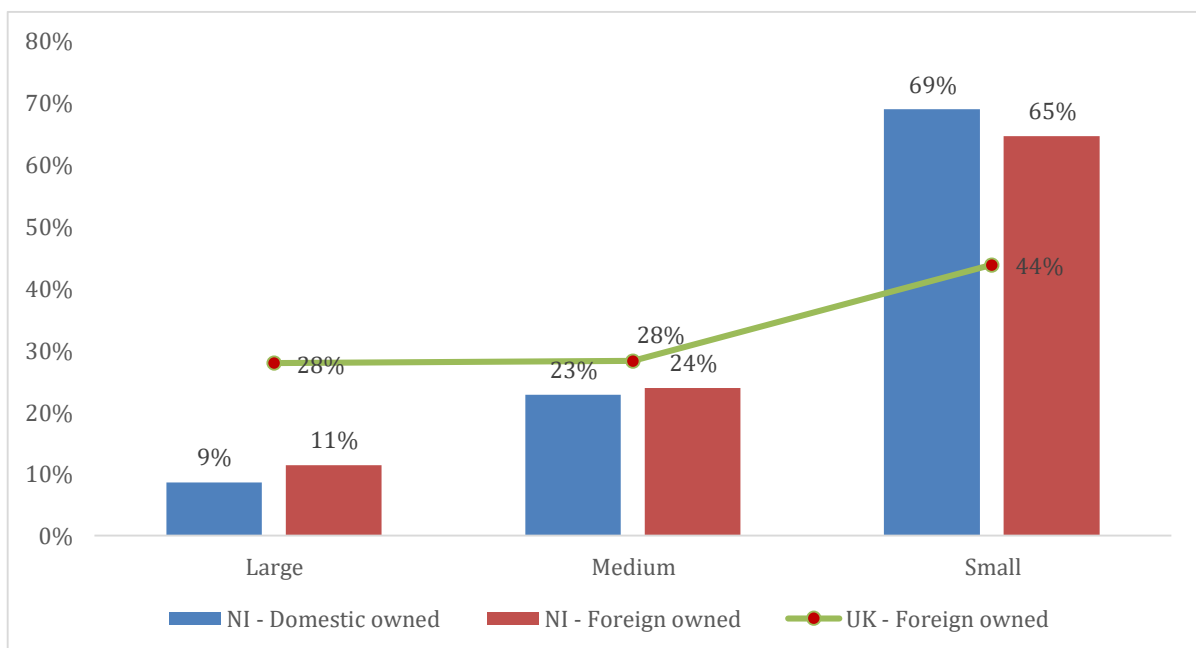
Companies are classified as medium and small if their balance sheet does not exceed EUR 43 million and 10 million<sup>2</sup>, while firms are classified as large if they have a balance sheet greater than EUR 43 million. In the UK, 60% of total firms are small, 15% and 25% are large and medium, respectively. In Northern Ireland, 66% are small, 9% are large

<sup>1</sup> The NUTS (Nomenclature of Units for Territorial Statistics) classification is a hierarchical system for dividing territory of the EU countries and the UK developed by Eurostat (Eurostat, 2018). The NUTS-3 level is the smallest region. We assign each firm to its corresponding NUTS-3 using the postcode information. In our sample, firms are located in the 179 NUTS-3 across the country, relying on the 2016 NUTS classification.

<sup>2</sup> Micro firms – with a balance sheet which not exceed EUR 2 million – are excluded, due to the relatively huge amount of missing data.

and 25% medium. Figure 4 shows the distribution of firms by size and ownership (domestic vs. foreign) in Northern Ireland, and the distribution of foreign firms by size in the UK as a benchmark. Although the distribution of size between domestic and foreign firms in Northern Ireland region is similar, we can see that they tend to be smaller compared to the UK average, where there is a higher presence of large and medium firms.

**Figure 4: Distribution of firm by size and ownership**



Source: authors' elaboration from Fame database

In terms of sectoral composition, Table 2 shows the distribution of foreign assets (to total assets) by 1-digit (NACE Rev. 2 classification) sector in Northern Ireland compared to the UK composition. While the ratio of foreign assets to total assets is lower than the average UK ratio in the majority of sectors, the data shows a stronger foreign presence in 'Mining and quarrying' sector, as well as a strong presence in 'Financial and insurance activities' and 'Manufacturing', where the foreign presence is relatively close to the UK average. Indeed, in the manufacturing sector 32.7% of total assets is foreign-owned, similar to the UK threshold (i.e. 36.89%). According to the Fame data, 15.9% of firms operate in manufacturing, 2.9% are located in Northern Ireland.

**Table 2: Distribution of foreign assets (% of total assets) by sector**

Sector (NACE 1-digit code)	United Kingdom	Northern Ireland
A. Agriculture, forestry and fishing	14.5%	2.2%
B. Mining and quarrying	28.5%	42.0%
C. Manufacturing	36.9%	32.7%
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	21.1%	13.0%
H. Transporting and storage	17.3%	5.3%
I. Accommodation and food service activities	18.2%	8.6%
J. Information and communication	38.5%	17.1%
K. Financial and insurance activities	26.1%	20.1%
L. Real estate activities	13.7%	4.2%
M. Professional, scientific and technical activities	30.2%	12.7%
N. Administrative and support service activities	32.3%	20.3%
O. Public administration and defence; compulsory social security	11.9%	0.0%
P. Education	2.5%	0.0%
Q. Human health and social work activities	18.7%	3.5%
R. Arts, entertainment and recreation	19.5%	8.1%
S. Other services activities	23.5%	16.0%
U. Activities of extraterritorial organisations and bodies	50.1%	0.0%

Source: authors' elaboration from Fame database

### 3. ANALYSIS

#### 3.1 Econometric Model

We measure productivity as the total factor productivity (TFP) of manufacturing firm  $i$ , in year  $t$  (2012-2018). TFP is computed as the residual of a Cobb–Douglas production function by sector (at NACE 2-digit level), where the firm value-added is regressed on capital and labour, including the cost of materials to control for unobservable productivity shocks. We derive such information from Fame database. We compute the TFP applying the semi-parametric technique developed by Wooldridge (2009), which implements a one-step GMM estimation. The estimated TFP is then related to the foreign presence in the region, modelled as follows:

$$\ln TFP_{irst} = \alpha_i + \beta FDI_{rt-1} + \sum_{j=1}^J \theta_j Controls_{jt-1} + \sum_{t=1}^T \delta_t D_t + \sum_{s=1}^S \delta_s D_s + \sum_{r=1}^R \delta_r D_r + \varepsilon_{it}$$

Where  $FDI$  is the stock of foreign capital, that is the total assets of foreign-controlled companies in the region  $r$  (NUTS-3) at time  $t-1$ . Additionally, we include a set of  $j$  *Controls*, such as firm age, number of employees and domestic-owned assets in the region, as well as year  $t$ , sector  $s$  and region  $r$  dummies. We estimate the model using a

panel fixed effects (FE) estimator, thus variables are expressed as within (firm-mean) transformation. Standard errors are corrected for the correlation between observations located in the same region, computing clustered standard errors at the NUTS-3 level. Descriptive statistics are reported in table 3.

**Table 3: Descriptive statistics**

Variable	Obs.	Mean	Std. Dev.	Min	Max
DV: TFP	58,744	12.50	1.05	-2.80	18.78
FDI (log)	58,744	22.48	2.07	0.00	28.98
Domestic assets (log)	58,744	23.77	1.76	17.43	29.55
Age (log)	58,744	3.14	0.85	0.00	5.02
No. of employees (log)	58,744	4.67	1.13	0.00	11.80

Source: authors' elaboration from Fame database

Note: The final sample is composed of 10,857 manufacturing firms, 2.73% located in Northern Ireland, due to the missing data for all relevant variables.

## 4. DISCUSSION

The full results are reported in table 4. Essentially these show the drivers of productivity, controlling for everything else as being age and size, and these are consistent across all regions. The main variable of interest is the FDI term, which captures the average spillover effect across all UK regions. This shows that on average impact of FDI on firm productivity is about 0.015, or that on average a doubling of FDI would increase the average UK firm productivity by 1.5%. This may seem small, but when considered that year on year productivity growth in the UK is well under 2%, this gives an indication of the importance of FDI.

We subsequently focus on the inter-regional differences, by estimating a model that incorporates a dummy for each of the UK regions in turn. Overall there are only two regions that differ significantly from the UK average, which are, Northern Ireland which is positive, and the North East of England which is negative. In productivity terms, Northern Ireland benefits more from inward investment than any other part of the UK. The magnitude of this effect suggests that if the stock of FDI in Northern Ireland was to double, that would on average add just under 9% to average productivity of the domestic sector in Northern Ireland. The percentage of foreign owned businesses in Northern Ireland is lower than for the UK overall, so our results suggest that if the foreign share in Northern Ireland were to increase to the level of the UK average, this would add just over 3% to Northern Ireland productivity, or the equivalent of some 18 months productivity

growth. If Northern Ireland were to catch up with Wales in terms of foreign share, it would add 4.5% to productivity, and if Northern Ireland were to catch up with the South East, it would be the equivalent to 11% productivity growth. In practical terms, this would vary depending on the sector that the FDI was in.

Northern Ireland is typically compared with other peripheral parts of the UK, such as Scotland, Wales and the North of England. These regions have all been proactive over a number of years in attracting FDI, but the evidence has been that the additionality from these has been limited (see for example the various reports analysing the gains from Regional Selective Assistance<sup>3</sup>, known as Selective Financial Assistance in Northern Ireland). However, our results suggest that Northern Ireland is now bucking this trend, with gains from FDI exceeding the UK average.

#### 4.1 What is driving these results?

In terms of explaining inter-regional differences in spillovers, there are essentially only two explanations. Firstly, that there is something specific to the region that facilitates greater interaction between inward investors and local firms, either in terms of geography, institutions, cultural distance etc, or there is a difference in the sector distribution when compared with other regions, either in terms of the overall sector breakdown of the economy, or the types of inward investment attracted.

It is possible for example that some “foreign” firms in Northern Ireland are from the Republic of Ireland, and certain co-location benefits encourage spillovers between the two sets of firms. If this is a line of enquiry that is of interest, it requires further more detailed analysis of the data, and the use of more complex modelling to capture these differential effects.

---

<sup>3</sup> Hart, M., Driffield, N. L., Roper, S., & Mole, K. F. (2008). *Evaluation of regional selective assistance (RSA) and selective finance for investment in England (SFIE) 2000-2004 Report for the DTI*. Department for Business Enterprise and Regulatory Reform. (available at [Warwick Research Archive Portal](#), University of Warwick)

Hart, M., Driffield, N. L., Roper, S., & Mole, K. F. (2007) *Evaluation Of Selective Financial Assistance (SFA) In Northern Ireland, 1998-2004* (available at [Northern Ireland – Department for the Economy, publications](#))

Hart, M., Driffield, N. L., Roper, S., & Mole, K. F. (2007) *Evaluation of Regional Selective Assistance (RSA) in Scotland*. (available at [The Scottish Government](#))



Turning to the second explanation however, our data suggest that four of the sectors that appear to generate the greatest spillovers, NACE sectors 11 (“Manufacture of beverages”), 16 (“Manufacture of wood and of products of wood and cork, except furniture”), 17 (“Manufacture of paper and paper products”) and 24 (“Manufacture of basic metals”) all sectors that appear to demonstrate spillovers above the average. They are also sectors that have a greater foreign representation in the Northern Ireland economy, than the UK average. It is reasonable to assume that the local firms are “Type B” in figure 2b above, that they have sufficient absorptive capacity to assimilate spillovers, but also, sufficient distance to travel to the frontier. This is illustrative of the point made in the introduction, that spillovers are not simply features of high tech “cutting edge sectors”.

**Table 4: Estimating spillover effects on firm productivity across regions**

DV: TFP	Mod_1	Mod_2	Mod_3	Mod_4	Mod_5	Mod_6	Mod_7	Mod_8	Mod_9	Mod_10	Mod_11	Mod_12	Mod_13
FDI (log)	0.0157*** (0.0052)	0.0139*** (0.0052)	0.0156*** (0.0052)	0.0172*** (0.0054)	0.0154*** (0.0055)	0.0161*** (0.0053)	0.0148*** (0.0052)	0.0188*** (0.0067)	0.0152*** (0.0053)	0.0165*** (0.0055)	0.0150*** (0.0053)	0.0161*** (0.0053)	0.0149*** (0.0056)
Age (log)	0.0643** (0.0260)	0.0649** (0.0260)	0.0643** (0.0261)	0.0642** (0.0260)	0.0644** (0.0260)	0.0644** (0.0260)	0.0643** (0.0260)	0.0644** (0.0260)	0.0644** (0.0260)	0.0644** (0.0260)	0.0643** (0.0260)	0.0643** (0.0260)	0.0642** (0.0260)
No. of employees (log)	0.1418*** (0.0166)	0.1413*** (0.0166)	0.1419*** (0.0166)	0.1419*** (0.0166)	0.1419*** (0.0166)	0.1418*** (0.0166)	0.1419*** (0.0166)	0.1418*** (0.0166)	0.1419*** (0.0166)	0.1419*** (0.0166)	0.1419*** (0.0166)	0.1419*** (0.0166)	0.1418*** (0.0166)
Domestic assets (log)	0.0183 (0.0147)	0.0203 (0.0147)	0.0183 (0.0147)	0.0189 (0.0146)	0.0182 (0.0147)	0.0179 (0.0146)	0.018 (0.0148)	0.0164 (0.0144)	0.0185 (0.0148)	0.0185 (0.0147)	0.018 (0.0147)	0.0183 (0.0147)	0.0178 (0.0149)
FDI * Northern Ireland		0.0739*** (0.0244)											
FDI * London			0.0017 (0.0286)										
FDI * East Midlands				-0.0148 (0.0154)									
FDI * East of England					0.0047 (0.0144)								
FDI * North East England						-0.0160** (0.0066)							
FDI * North West England							0.0087 (0.0200)						
FDI * Scotland								-0.0141 (0.0108)					
FDI * South East England									0.0047 (0.0164)				
FDI * South West England										-0.0087 (0.0124)			
FDI * Wales											0.0094 (0.0204)		
FDI * West Midlands												-0.0074 (0.0150)	
FDI * Yorkshire and the Humber													0.0076 (0.0240)
Constant	10.8339*** (0.4229)	10.7856*** (0.4233)	10.8317*** (0.4235)	10.8163*** (0.4221)	10.8339*** (0.4232)	10.8451*** (0.4195)	10.8367*** (0.4241)	10.8286*** (0.4218)	10.8251*** (0.4297)	10.8232*** (0.4230)	10.8483*** (0.4221)	10.8438*** (0.4252)	10.8428*** (0.4241)
NUTS-3 fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
NACE 2-digit Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
No. of observations	58,744	58,744	58,744	58,744	58,744	58,744	58,744	58,744	58,744	58,744	58,744	58,744	58,744
R-squared	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015

Note: The dependent variable is the total factor productivity among firms operating in manufacturing sectors, throughout 2012-2018. Clustered standard errors at the region level (NUTS-3) are reported in parentheses. Asterisks denote confidence levels: \*p<0.10, \*\*p<0.05 and \*\*\*p<0.001.

## 5. CONCLUSIONS

What we have been able to demonstrate here is that the average spillovers from FDI in Northern Ireland is greater than the average effect for the UK, and it is important to recognise that the average effect for the UK is positive. The results highlight the potential benefits accrued to Northern Ireland of attracting FDI, and that while the volume of FDI attracts is low, the returns in terms of productivity are significant. If one adopts Krugman's mantra that "Productivity isn't everything, but, in the long run, it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker." Then it is clear that the attraction of inward investment as an important element of Northern Ireland's industrial strategy.

### 5.1 Issues worthy of further investigation

These results raise a number of issues that may warrant further investigations, exploring for example differences in motivation, ownership structure, intangible assets and the performance of the foreign owned sector. As we hint above, the motivation for firms to engage in FDI affects the extent to which they engage in international technology transfer, and also the extent to which they interact with the local sector. Both of these are key factors in determining the scale and scope of spillovers.

In turn, nationality of ownership of the foreign sector, and mode of entry are also important, as are the level of investment in innovation or intangible assets locally. Finally, as we outline above, the approach used here generates an average effect of what are essentially two positive effects (direct knowledge transfer and spillovers) and one potentially adverse effect (increased competition in either goods or factor markets). Further work could seek to unpick these average effects, both within and across sectors, and to link these to the individual drivers, such as location, motive and international technology transfer.

Finally, while these results are very positive in terms of the apparent benefits of inward investment, one may consider that it there is merit in for example comparing the returns to FDI attraction, with other initiatives designed to boost productivity, such as support for small firms, or initiatives on skills or innovation for example. This is not to suggest that one is more important than the other, and often (through supply chains) SME development and inward investment promotion go hand in hand, but our findings

certainly indicate that a greater emphasis on inward investment promotion would generate positive returns in terms of productivity.

## REFERENCES

- Baldwin, R. (2016). The World Trade Organization and the Future of Multilateralism. *Journal of Economic Perspectives*, 30 (1): 95-116.
- Becker, B., Driffield, N., Lancheros, S. and Love, J. (2020). FDI in hot labour markets: the implications of the war for talent. *Journal of International Business Policy*, forthcoming.
- Caballero, R.J. and Lyons, R.K. (1990). Internal versus external economies in European industry. *European Economic Review*, Vol. 34, No. 4, pp. 805-30.
- Caballero, R.J. and Lyons, R.K. (1992). External effects in US procyclical productivity. *Journal of Monetary Economics*, Vol. 29, No. 2, pp. 209-225.
- Driffield, N.L. (2001). The impact on domestic productivity of inward investment in the UK. *The Manchester School*, Vol. 69(1) pp103-119.
- Driffield, N.L. (2004) Regional Policy and Spillovers from FDI in the UK. *Annals of Regional Science*, 38 (4) pp 579-574.
- Driffield, N.L. Munday, M. and Roberts, A. (2004). Inward investment, transactions linkages, and productivity spillovers. *Papers in Regional Science*, Vol. 83 (4), pp. 699-722.
- Driffield, N. and Love, J. (2007) Linking FDI motivation and host economy productivity effects: conceptual and empirical analysis, *Journal of International Business Studies*, vol 38 (2) 460-473.
- Driffield, N. Love, J.H. and Menghinello, S. (2010) The Multinational Enterprise as a Source of International Knowledge Flows: Direct Evidence from Italy. *Journal of International Business Studies*, 41 (2) pp. 350-359.
- Driffield, N.L., Munday, M. and Roberts, A. (2002). Foreign Direct Investment, Transactions Linkages, And The Performance Of The Domestic Sector. *International Journal of the Economics of Business*, Vol. 9(3) pp. 335-351.
- Dept for international trade (2020) Department for International Trade Inward Investment Results 2018-19. available at [DIT inward investment results](#).
- FDI intelligence (2020) Fintech Locations of the Future 2019/20. Available at: [FDI intelligence](#).
- Haldane, A. (2018) The UK's productivity problem. Available at [Bank of England](#).
- Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *Review of Economic Studies*, 70: 317–341.
- Melitz, M.T. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica*, 71(6), 1695-1725.

- Merlevede B., De Zwaan, M., Lenaerts, K., and Purice, V. (2015). Multinational Networks, Domestic, and Foreign Firms in Europe. Working Papers of Faculty of Economics and Business Administration, Ghent University, Belgium 15/900, Ghent University, Faculty of Economics and Business Administration.
- Olley, G. S., and Pakes, A. (1996). The Dynamics of Productivity in the Telecommunications Equipment Industry. *Econometrica*, 64(6), 1263.
- Wooldridge, J. M. (2009). On estimating firm-level production functions using proxy variables to control for unobservables. *Economics Letters*, 104: 112–114.



Centre Manager  
Enterprise Research Centre  
Aston Business School  
Birmingham B4 7ET  
[CentreManager@enterpriseresearch.ac.uk](mailto:CentreManager@enterpriseresearch.ac.uk)

Centre Manager  
Enterprise Research Centre  
Warwick Business School  
Coventry, CV4 7AL  
[CentreManager@enterpriseresearch.ac.uk](mailto:CentreManager@enterpriseresearch.ac.uk)



[www.enterpriseresearch.ac.uk](http://www.enterpriseresearch.ac.uk)