Review of World Economics
https://doi.org/10.1007/s10290-024-00552-6

ORIGINAL PAPER

Do former employees of foreign MNEs boost incumbent workers' wages in domestic firms?

Eoin T. Flaherty[1]

Accepted: 15 June 2024

Abstract
This paper examines whether there are wage spillovers from workers with experience in foreign multinational enterprises (MNEs) to incumbent workers in domestic firms. Using administrative panel data from Ireland, I examine possible heterogeneity for such spillovers across the wage distribution using quantile regressions. I begin by using existing methodology and find that, once industry-year and region-year dummies are added as control variables, the average wage spillover effect on incumbents from former foreign MNE workers moving to domestic firms disappears. Quantile regression results suggest that there are positive spillovers for incumbent workers in the top 50% of the wage distribution only. This indicates that foreign MNEs increase inequality through spillovers to domestic firms via labour mobility.

Keywords Foreign direct investment · Spillovers · Labour mobility · Linked employer-employee data · Wages

JEL Classification F16 · F23 · J31 · J60

1 Introduction

Governments often offer incentives to attract foreign direct investment (FDI) with the intention of benefiting their economies including their domestic firms. MNEs have been shown to be more productive and pay higher wages than firms who are based in only one country (Alfaro-Ureña et al., 2021; Balsvik, 2011; Martins, 2011; Driffield and Girma, 2003; Aitken et al., 1996). These premia may be reflective of

I thank Ron Davies, Benjamin Elsner, Holger Görg, Stefanie Haller, Aoife Hanley, Christopher Jepsen, Pernille Jørgensen, Kevin O'Rourke, participants at the EDGE Jamboree 2020 and the UCD Economics PhD Seminar and anonymous referees for very helpful comments. The views expressed here are not necessarily held by the CSO and are my personal responsibility.

✉ Eoin T. Flaherty
eoin.flaherty@ucdconnect.ie

[1] University College Dublin and the Central Statistics Office, Dublin, Ireland

Published online: 28 July 2024

MNEs' superior labour management, more efficient use of capital, more sophisticated sourcing of inputs and better sales and marketing of the products that they produce. It may also be that MNEs have invested considerable resources in training workers and retain them by paying higher wages (Alfaro-Ureña et al., 2021; Poole, 2013; Balsvik, 2011; Görg et al., 2007). Workers in foreign MNEs may come to embody the sources of these premia and bring this knowledge with them when they move to domestic firms, increasing the productivity and wages of incumbent workers there.

However, workers may also have heterogeneous effects on their peers. For example, Cornelissen et al. (2017) find wage spillovers from higher productivity workers to their co-workers occur in low paid occupations only. Similarly, economic surpluses within a firm may be shared heterogeneously. Kline et al. (2019) find that higher earnings from patent induced surpluses are captured by the top half of the earnings distribution. Former MNE workers may also affect the different incumbent workers productivity heterogeneously, with a corresponding effect on their wages. This in turn can affect wage inequality.

This paper examines whether the MNE wage premium spills over to incumbent workers in domestic firms through labour mobility and whether incumbent workers are affected heterogeneously. I add to the literature in two ways. My first contribution is to follow existing methodology to analyse wage spillovers to incumbent workers on average. Using a similar specification to Poole (2013), I identify positive wage spillovers from former MNE workers to incumbent workers in domestic firms. Poole (2013) uses administrative data from Brazil from 1996–2001 to analyse wage spillovers to incumbent workers from their peers who previously worked in foreign MNEs. This approach assumes productivity to be in line with worker wages and has the potential to capture spillovers to incumbent workers at the worker level. This approach is intended to measure the peer effect of former MNE workers on productivity within the firm. It examines the impact of workers with previous MNE experience on incumbents, over and above the impact of workers with experience in other domestic firms. Poole (2013) uses shares of workers to estimate peer effects; this is intended to capture the probability that an incumbent worker interacts with a former MNE worker.[1] The higher the share of workers from foreign MNEs in a domestic firm, the greater the probability that the incumbent worker interacts with such workers. However, workers from other domestic firms may also bring technology and new skills to the firm. Thus, we also control for the share of workers from other domestic firms. If positive spillovers through worker mobility exist, the coefficients on both shares should be positive. However, if these spillovers are greater from workers with multinational experience than from workers with experience in other domestic firms, we expect them to be higher for former MNE workers. Poole finds that a 10% point increase in the share of workers with foreign MNE experience is consistent with a wage increase among their incumbent co-workers of 0.5%.

[1] This circumvents the reflection problem by focusing on the outcomes of incumbent workers only. The reflection problem occurs when an individual's outcome variable is both affected by and affects peer outcomes (measured as one or more of the explanatory variables) (Manski, 1993).

Using the same methodology as Poole (2013) and matched employer-employee administrative data from Ireland, I find that a 10% point increase in the share of workers with foreign MNE experience is consistent with a wage increase among their incumbent co-workers of 1.1%. However, this result is not robust to controlling for industry-year and region-year dummies. Once this is included, I also do not find evidence for spillovers in sample splits of the data including by manufacturing and services, detailed sector category, and men and women.

My second contribution to the literature is to examine possible heterogeneity of FDI spillovers across the wage distribution of incumbent workers using quantile regressions. Running unconditional quantile regressions, I find positive effects for workers in the top 40% of the wage distribution. This indicates that, taking account of potential wage growth associated with greater shares of workers with experience from other domestic firms, higher shares of former MNE workers are associated with increased wages for higher paid workers. A 10% point increase in the share of former MNE workers is associated with wage increases for these workers of between 1.2 and 3.4%. Former MNE workers appear be complementary to higher income incumbents. Both former MNE workers and higher paid incumbent workers are likely to be among the better skilled workers in the firm. Higher paid incumbent workers may be consequently better placed to learn from them. The results for workers at the 50th and 60th percentile are not statistically significantly different from zero, indicating that there are no FDI spillover effects for them. The consequence of this is to increase wage inequality among incumbent workers in domestic firms.

These results suggest that there are positive spillovers for workers in the top 40% of the wage distribution. Newly hired former MNE workers tend to be younger than incumbent workers while also earning income levels similar to higher paid incumbent workers. This suggests that they are higher up the firm's hierarchy and relatively better skilled than lower income incumbent workers. Incumbents with higher income, who are also likely to be better skilled, may be consequently better placed to learn from them.

These findings contribute to research on the distributional consequences of FDI, an area that has not received much attention to date. Host countries typically attract FDI with the intention of benefiting their economies. However, FDI may also have negative effects on the hosts' countries, including increasing various dimensions of inequality. Hale and Xu (2016) find that foreign MNEs pay their workers higher wages than domestic firms and increase the premium on skilled workers, increasing income inequality within the economy. This also indicates that they can outcompete domestic firms for better workers. Their higher productivity rates, larger size and lower borrowing costs may also allow them to outcompete domestic firms for more scarce intermediate inputs by paying more for them, such as the most attractive locations for their premises, further increasing the productivity gap.

This paper demonstrates how MNE spillovers can also be a source of income inequality through former MNE workers only benefiting higher paid incumbents. These findings complement the findings of Setzler and Tintelnot (2021) who show that increased employment in foreign firms in a commuting area increases the wages of high-paid workers and has no effect on low-income workers, increasing inequality. The paper also complements the work of Alfaro-Ureña et al. (2021) that the

MNE wage premium for workers with a college education is higher than for workers without one (12% versus 8%) and that higher training costs allow domestic workers to take some of the increase in employer rents resulting from higher sales to MNEs. The findings of Alfaro-Ureña et al. (2021) also have relevance for this paper. If higher wage incumbents have higher training costs than their lower paid peers, this may be partly responsible for their increased wages after former MNE workers join, since it would consequently be more costly for their employers to lose them. Using data on China for 2003–06, Girma et al. (2019) also provide broader evidence on why mixed results on FDI spillovers may occur. They find that a relatively low presence of foreign MNEs has a small positive effect on average workers' wages in domestic firms while a high presence negatively affects their wages.

The remainder of the paper proceeds as follows. Section 2 reviews the broader literature. Section3 describes the administrative panel data used in this analysis. Section 4 describes the theoretical background. Section 5 describes the regression approach. Section 6 presents the results. Section 7 concludes.

2 Literature review

FDI is a component of globalisation. The effect of globalisation on inequality is an increasing source of concern. Globalisation shocks have played an important role in the rise of right wing populist movements (Rodrik, 2021). Theory and empirical analysis find that the beneficiaries of globalisation are often the wealthiest while the losers are the poorest workers with less education and those in regions that are already negatively affected by de-industrialisation (Case and Deaton, 2020). More broadly, policies that increase globalisation lead to long lasting declines in the labour share of income and corresponding increases in income inequality (Furceri et al., 2019). Freeing capital to cross borders also increases the exposure of workers to idiosyncratic economic shocks (Buch and Pierdzioch, 2014). However, the distributional consequences of FDI, in particular its effect in host countries, has not received much attention to date.

This paper contributes to the wider literature on FDI spillovers. More generally, FDI spillovers refer to knowledge created by a foreign MNE that is used by a host country firm for which the host country firm does not, or does not fully, compensate the MNE (Smeets, 2008). Spillovers are assumed to occur based on a domestic firm's proximity to an MNE. The literature distinguishes horizontal and vertical spillovers through labour mobility. Firms may be horizontally proximate, in the sense that they operate in the same industry. Horizontal spillovers may boost the domestic firm's productivity through increased competition, through a potential reduction in costs or due to learning about and adapting a new technology or through knowledge spillovers from worker mobility.

There are two types of vertical spillovers. They can occur through backward linkages, where a domestic firm improves their production processes through selling products to foreign MNEs. They can also take the form of forward linkages when

a domestic firm boosts their productivity through purchasing a large share of their intermediate inputs from foreign MNEs (Smeets, 2008).[2]

The literature on both horizontal and vertical FDI spillovers is characterised by a mix of positive, negative and non-significant results. For surveys see Keller (2021) Smeets (2008) and Görg and Greenaway (2004). One of the earliest papers in the horizontal spillovers literature is Aitken and Harrison (1999) who find evidence of negative horizontal spillovers for Venezuela using data for 1976–89. The seminal paper in the vertical spillover literature is Smarzynska Javorcik (2004) who finds positive evidence vertical spillovers through backward linkages only using Lithuanian data for 1996–2000.

To the best of my knowledge, only four other papers have empirically analysed FDI spillovers through the channel of worker mobility. After Poole (2013), this paper is perhaps closest to Balsvik (2011). Using comprehensive data on manufacturing firms in Norway for 1990–2000, she finds evidence that workers with MNE experience contribute 20% more to the total factor productivity (TFP) of their plant than workers without such experience. However, she points out that this spillover may be more a purchased factor of production rather than an externality. Unlike Poole (2013), this spillover combines both the direct and indirect (i.e., the peer) effect of former MNE workers on firm level productivity.

It is also possible that only some workers transfer spillovers. A third empirical paper on FDI spillovers through labour mobility is Görg and Strobl (2005). Using World Bank survey data from Ghana for 1991–97, they find that domestic firms who have owners with prior experience in an MNE in the same industry are more productive than other domestic firms. A fourth is Fons-Rosen et al. (2018). They find that inventor mobility between sectors is a channel to transfer technology between foreign and domestic firms, although this is not the primary focus of their paper. Similarly, Markusen and Trofimenko (2009) develop a model to understand how foreign experts visit a local plant and train its workers. Using fixed effects and nearest neighbour matching estimators on a panel of Colombian plant-level data for 1977–91, they find that these experts have positive effects on the wages of domestic workers.

Other literatures suggest that productivity spillovers can take place through labour mobility. This includes Serafinelli (2019) in the labour literature who examines labour-market based spillovers from 'good firms' (defined as high wage firms using a wage decomposition method outlined in Abowd et al. (1999)) to 'bad firms' (defined as low wage firms) using extensive data from the Veneto region in Italy for 1992–2001. His findings suggest that worker flows can explain about 10% of the TFP gains by incumbent firms when new highly productive firms are added to the local market. Using Danish manufacturing data for 1995–2007, Stoyanov and Zubanov (2012) find gains from hiring from

[2] Industry linkages to estimate spillovers through backward or forward linkages are typically estimated using input–output tables. Earlier papers use the input–output table of the host country to estimate the likely input industries of foreign MNEs, while later ones, beginning with Barrios et al. (2011), use the input–output tables of the foreign MNE's home country to do so.

more productive firms equal to 0.35% per year. Mas and Moretti (2009) suggest that having high productivity co-workers increases the marginal productivity of existing workers using data from six stores of a large supermarket chain in a metropolitan region in the United States between 2003 and 2006.

Greenstone et al. (2010) find TFP in incumbent plants in USA counties that attract a large manufacturing plant increases by 12% more than in similar counties that do not. This effect is particularly pronounced when incumbent firms in these same counties have a large share of labour market pooling with the manufacturing plants' industry. Their data is for 1973–98.

However, there is also evidence within the FDI literature to suggest why spillovers might not occur through labour mobility. Instead, the foreign MNE wage premium may be mostly related to foreign MNEs selecting better workers. Using administrative data from Portugal for 1991–2000, Martins (2011) finds that foreign firms can attract what he defines as the 'best' workers as they offer them large wage increases and that domestic firms tend to hire 'below-average' workers from foreign firms who tend to take pay cuts when coming to domestic firms. He suggests that FDI spillovers through labour mobility are unlikely to be large as a result.

Becker et al. (2020) is another paper within the FDI literature that suggests why spillovers might not occur through labour mobility. Using firm-level microdata on high tech sectors where skill shortages exist in 28 European countries for 2002–10, they find that FDI crowds out employment opportunities for the domestic sector, improves the position of skilled workers and increases inequality. Moreover, the benefits from FDI are lowest in regions where labour markets are least flexible and there is low absorptive capacity (ability to learn from foreign MNEs).

This paper also contributes to a strand of the FDI spillovers literature that uses Irish data. Foreign MNEs form a large share of the Irish economy. They are mostly US-owned firms and are concentrated in the manufacturing, information and communications, and the financial and insurance sectors (OECD, 2021). Much like the broader literature, findings on horizontal and vertical FDI spillovers using Irish data are mixed. Di Ubaldo et al. (2018) examine the potential for both horizontal and vertical FDI spillovers to domestic firms in manufacturing and services sectors in Ireland for 2008–2014 through backward and forward linkages. They find little evidence that MNEs affect domestic firm productivity. In contrast, Barrios et al. (2011) find robust evidence for positive backward FDI spillovers in Irish manufacturing sectors for 1990–98. Haller (2014) analyses horizontal spillovers from foreign MNEs in Irish services sectors for 2001–07. She finds negative FDI spillovers in two sectors (wholesale and retail trade; and transport, storage and communication) and non-significant results in a third (real estate, renting and business activities). Ruane and Uğur (2004) measure the effect of horizontal spillovers on domestic plants' labour productivity in manufacturing firms for 1991–98. They find only weak evidence of spillovers. None of the papers using Irish data have analysed FDI spillovers through the channel of worker mobility to date.

3 Data

3.1 Data sources

My main dataset is a worker-level administrative panel tracking the universe of formal workers in the Irish economy from 2005 to 2016. This dataset is based on tax records filed by employers through the P35 tax form on behalf of their workers to the Irish Revenue Commissioners. It is then combined with additional worker characteristics from the Irish Department of Social Protection's Client Record System using a unique worker identifier.

I further combine this with data at the firm level from the Irish Central Statistics Office (CSO) Business Register. The CSO Business Register covers all firms in the Irish economy and is based on data collected by the Irish Companies Registration Office. All firms in Ireland are required to register with the Companies Registration Office and file an annual return with them. Firms that are incorporated outside Ireland and establish a subsidiary within Ireland must also register an Irish firm with the Companies Registration Office. I obtain data on firms' country of ultimate ownership and their address within Ireland from the Business Register and match it at the firm level using a unique firm identifier. This data is used to define whether a firm is a foreign MNE and the region where they are located within the country. A full variable description is available in the appendix.

3.2 Data preparation

I take several steps to prepare the data. The worker-level data contains a separate entry for every registered employment position in Ireland in each year from 2005 to 2016. I isolate workers based on their main social welfare category. Some workers are in one or all of the following categories; pensioner, director or employee. I assign workers to the category in which they have the most weeks of employment per year that are liable for social insurance contributions. Where they have 52 of each, I classify them as an employee. If they have 52 weeks as both a pensioner and a director, I classify them as a pensioner. I drop workers classified as pensioners. I also exclude workers over 60 and workers under 25.

Since I am interested in analysing market firms, I exclude workers currently employed in households and international/external government employers (NACE letters T and U) and workers in the public sector or similar (NACE letters O, P and Q). These steps leave me with 18.5 million worker-year observations in market firms over 10 years. This consists of three million unique workers in 272 thousand unique firms.[3]

While I have information on how many weeks a worker worked, I do not have information on the number of hours worked per year. Therefore, I take steps to

[3] 2006 to 2016. The year 2006 is the first year in my regression sample as I do not have information on previous firm experience for workers in 2005.

exclude workers who likely work a low number of hours in a given year. Former MNE workers who work few hours are unlikely to have as much interaction with their peers, reducing the likelihood of spillovers. Incumbent workers may experience large annual wage increases due to going from part-time work with low hours to full-time work. I exclude many such part-time workers by dropping all workers with wages of less than 15,051 euros per year. The wage of 15,051 corresponds to the approximate wage one would earn from working full-time for one year at the national minimum wage in 2011. Excluding workers earning less than 15,051 per year reduces the number of worker-year observations to 13.9 million. I exclude such workers before defining former MNE workers and analysing their effect on incumbent workers. Once I have defined the shares of former MNE workers and workers with experience in other domestic firms, I only keep incumbent workers in domestic firms with no known experience outside their current firm. Isolating incumbent workers leaves me with 3.4 million worker-year observations.

I exclude firms with less than 10 workers to ensure the variables measuring shares of former MNE workers remain meaningful (i.e. to ensure that when one former MNE worker joins the firm their effect on the share variable is to increase it by 0.1 or less).[4] This reduces the number of worker-year observations by 30% to 2.4 million. This consists of 573,213 unique workers in 22,4245 unique firms. Table 8 in the appendix displays more detail on the data preparation process. The sectors with the largest absolute declines in workers are wholesale and retail, construction, followed by professional and scientific activities. Real estate has the largest percentage decline in workers but does not cover many sectors (Fig. 9, appendix). Dropping these workers preserves the shape of the wage distribution for the sample but at an overall higher level of income (Fig. 10, appendix).

3.3 Definitions and data description

My definition of an incumbent worker is someone who did not move firms since 2005 or since the year that they started to work if they started later than 2005.[5] I do not know workers' employment experience prior to 2005. For example, it could be that workers who I have only observed working for the same domestic firm may have had experience in a foreign MNE prior to the beginning of my sample.

The former foreign MNE and former domestic worker share variables refer to the shares of workers in a domestic firm in a particular year who previously worked for a foreign MNE or a domestic firm respectively. Former MNE workers are workers in a domestic market firm who have been in an MNE for at least one year since 2005. Workers previously in another domestic firm are workers in a domestic market firm who have been in another domestic market firm for at least

[4] As a robustness check, I also analyse the effect on incumbent workers in firms with less than 10 workers.

[5] I also analyse the effect on incumbent workers who were in the same firm in each year throughout the period as a robustness check.

Table 1 Worker summary statistics

	N	Mean	Std dev.	Median	P10	P90
	Workers in market firms, excluding low paid workers					
ln(wage)	13,890,695	10.488	0.519	10.445	9.844	11.144
Age	13,890,695	39.697	9.590	38.000	28.000	54.000
Weeks	13,890,695	50.093	5.865	52.000	46.000	52.000
Non-Irish worker	13,890,695	0.186	0.389	0.000	0.000	1.000
Share female workers in firm	13,890,695	0.454	0.282	0.448	0.071	0.832
	Incumbent workers in domestic firms with 10+ workers					
ln(wage)	2,396,452	10.517	0.555	10.459	9.852	11.234
Age	2,396,452	40.465	9.655	40.000	28.000	55.000
Weeks	2,396,452	50.253	5.590	52.000	47.000	52.000
Non-Irish worker	2,396,452	0.227	0.419	0.000	0.000	1.000
Share female workers in firm	23,96,452	0.343	0.232	0.292	0.067	0.667

Table 2 Workers with other domestic firm experience based in domestic firms with 10+ workers

	N	Mean	Std dev.	Median	P10	P90
ln(wage)	1,665,405	10.445	0.456	10.420	9.863	10.991
Age	1,665,405	39.701	9.493	38.000	28.000	54.000
Weeks	1,665,405	51.131	3.708	52.000	51.000	52.000
Non-Irish worker	1,665,405	0.155	0.362	0.000	0.000	1.000
Share female workers in firm	1,665,405	0.533	0.301	0.576	0.087	0.857

one year since 2005. If a worker has been in an MNE and another domestic firm they are counted as a former MNE worker.

Table 1 provides worker-level summary statistics for workers in market firms and incumbent workers in domestic firms with 10 or more workers. The median worker-year observation in the dataset for 2006–2016 earns $e^{10.445}$ (34,372) euros in wages, is aged 38 and works 52 weeks of employment per year that are liable for social insurance contributions. The median incumbent worker-year observation in domestic firms of 10 or more earns $e^{10.459}$ (34,857) euros in wages, is aged 40 and works 52 weeks of employment per year that are liable for social insurance contributions. The median incumbent worker is Irish and works in a firm where 29% of the workers are female.

Table 2 provides worker-level summary statistics for workers with experience in other domestic firms in their second year of working in a domestic firm with 10 or more workers. The median worker-year observation in the dataset for 2006–2016 earns $e^{10.42}$ (33,523) euros in wages, is aged 38 and works 52 weeks of employment per year that are liable for social insurance contributions. The median worker with experience in other domestic firms is Irish and works in a firm where 58% of the workers are female.

Table 3 Workers with experience in MNEs based in domestic firms with 10+ workers

	N	Mean	Std dev.	Median	P10	P90
ln(wage)	258,349	10.484	0.502	10.425	9.889	11.132
Age	258,349	36.650	8.452	35.000	27.000	49.000
Weeks	258,349	51.215	3.522	52.000	51.000	52.000
Non-Irish worker	258,349	0.152	0.360	0.000	0.000	1.000
Share female workers in firm	258,349	0.473	0.271	0.480	0.098	0.852

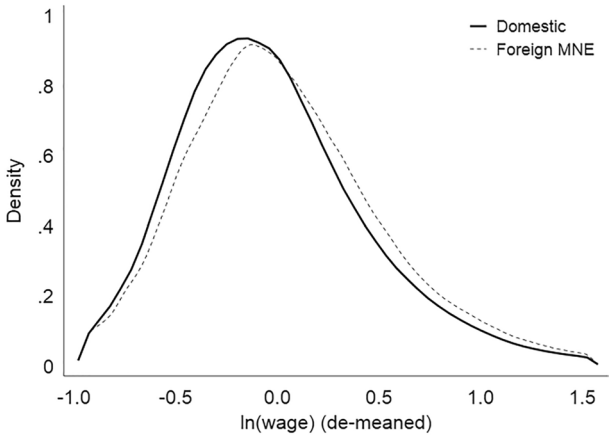

Fig. 1 Wages in market firms by firm type Results (ln(wage)) de-meaned for NUTS 3 digit region and NACE 3 digit sectoral differences. Chart excludes top and bottom one percent of de-meaned wage distribution. Sample covers all market firms excluding low paid workers (Stage 2 in Table 8)

Table 3 provides worker-level summary statistics for workers with experience in foreign MNEs in their second year of working in a domestic firm with 10 or more workers. The median worker-year observation in the dataset for 2006–2016 earns $e^{10.425}$ (33,691) euros in wages, is aged 35 and works 52 weeks of employment per year that are liable for social insurance contributions. The median worker with experience in foreign MNEs is Irish and works in a firm where 48% of the workers are female.

Figure 1 and Table 4 demonstrate that foreign MNEs pay their workers more than domestic firms. This is consistent with previous literature (Balsvik, 2011; Driffield and Girma, 2003; Girma et al., 2001; Aitken et al., 1996) and indicates a productivity gap between foreign MNEs and domestic firms. This is also in line with the evidence for Ireland using TFP at the firm level (Papa et al., 2021; Haller, 2012).

Figure 2 illustrates how this wage gap also exists for workers with MNE experience within domestic firms. Here I compare the wages of all incumbent workers with wages of new workers from domestic firms and foreign MNEs in their second year of employment in the new firm. This avoids any issues around first

Table 4 Wages in foreign and domestic firms

Dependent variable: ln(wage)		
Foreign MNE	0.015	(0.004) ***
Domestic firm	(Omitted category)	
Constant	8.304	(0.047) ***
N	9,575,578	
Adj. R^2	0.837	

Standard errors in parentheses are clustered at the firm level
Control variables: ln(firm size), non-Irish worker, firm's share of female workers, age, age^2, weeks
Includes worker, NUTS3-year and NACE3-year fixed effects
$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

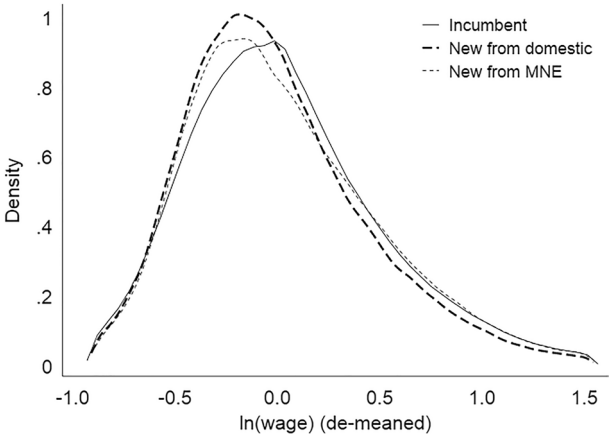

Fig. 2 Wages for different groups of workers Results (ln(wage)) de-meaned for NUTS digit region and NACE 3 digit sectoral differences. Chart excludes top and bottom one percent of de-meaned wage distribution. New from domestic and new from MNE are in second year of employment in new firm. Sample covers all market firms excluding low paid workers (Stage 2 in Table 8)

year effects associated with wages of the previous job, redundancies and spells of unpaid absence between jobs. This figure shows that workers previously working in domestic firms are paid less than incumbent workers while former MNE workers are better paid than both, suggesting a productivity differential that they may be able to transfer. This evidence of a wage premium is further confirmed by a simple regression of wage on former worker status in domestic firms (Table 5). Workers with experience in another domestic firm earn 3% more than incumbent workers while workers with experience in a foreign MNE earn 4% more.

Taken together, we can say that former MNE workers in domestic firms earn a little more than workers previously in other domestic firms. However, they are younger and earn 3.5% more than incumbent workers and 0.8% more than workers previously in other domestic firms when controlling for other factors. Consequently,

Table 5 Returns to extra-firm experience

Dependent variable: ln(wage)		
Formerly in MNE	0.037	(0.002) ***
Formerly in domestic firm	0.026	(0.002) ***
Incumbent	(Omitted category)	
Constant	8.328	(0.052) ***
MNE - dom wage	0.011	(0.002)***
N	5,611,949	
Adj. R^2	0.840	

Standard errors clustered at the firm level in parentheses
Control variables: ln(firm size), non-Irish worker, firm's share of female workers, age, age^2, weeks
Includes worker, NUTS3-year and NACE3-year fixed effects
$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

while they are younger, former MNE workers are coming in largely at the same point of the distribution as workers previously in other domestic firms.

4 Theory

This paper examines whether there is evidence consistent with peer effects of former MNE workers on incumbent workers in domestic firms. Cornelissen et al. (2017) provide a helpful theoretical model on peer effects in this context. The model states that workers increase productivity as a result of either peer pressure or knowledge spillover from more productive workers within the firm. More productive activity costs more effort to workers. Firms compensate this cost of effort though workers' wages. The individual level production function is as follows:

$$f_i = y_i + \varepsilon_i = a_i + e_i\left(1 + \lambda^K \bar{a}_i\right) + \varepsilon_i \tag{1}$$

where f_i is output of worker i, y_i refers to worker i's productive capacity. ε_i refers to random output variation that is beyond the worker's control and has an expected mean of zero. y_i depends on individual ability a_i, individual effort e_i, knowledge spillovers λ^K and average peer ability $\bar{a}_i$. In this paper, where positive spillovers take place, λ^K is expected to be an increasing function of the share of former MNE workers.

For the worker, this is subject to a cost of effort and social pressure function:

$$c_i = C(e_i) + P\left(e_i, \bar{f}_{\sim i}\right) = ke_i^2 + \lambda^P(m - e_i)\bar{f}_i \tag{2}$$

where c_i, the cost of effort, depends on individual cost of effort $C(e_i)$ and a social peer pressure function $P\left(e_i, \bar{f}_{\sim i}\right)$ that depends on one's effort e_i and everyone else's average output $\bar{f}_{\sim i}$.

The individual cost of effort $C(e_i)$ is a factor of e_i^2, meaning that it increases more quickly than effort. However while e_i is worker-specific, the term k is the same for all workers at the firm. k can be interpreted as the underlying level of difficulty of the work within the firm.

As for the social peer pressure function $P\left(e_i,\bar{f}_{\sim i}\right)$, the strength of peer pressure λ^P is not assumed to vary across the firm. Neither does m, a certain threshold of expected effort from every worker. Social peer pressure is increasing in everyone else's average output $\bar{f}_{\sim i}$. The worker can reduce the cost associated with social pressure, which can even turned negative if e_i is greater than m. A negative social peer pressure value can be interpreted as the enjoyment associated with outperforming social expectations.

The resulting worker's equilibrium effort is as follows:

$$e_i = \frac{\lambda^P}{2K}\bar{e}_{\ i} + \frac{b}{2k} + \frac{\lambda^P + b\lambda^k}{2k}\bar{a}_{\ i} \tag{3}$$

where b denotes the slope of the wage contract with respect to worker output. Equilibrium effort is increasing in peer ability or through peer pressure or knowledge spillover.

Firms reward workers effort with wages based on the following optimisation problem:

$$Ew_i = v(a_i) + C\left(e_i^*\right) + P\left(e_i^*, \bar{y}_{\ i}\right) \tag{4}$$

meaning that firms pay workers wages based on the value of ability, the cost of effort to the worker and the effort induced by others. In my empirical model, ability a_i is captured within workers' fixed effects. Effort e_i is affected by knowledge spillovers from workers from foreign MNEs S_{jt}^M and domestic firms S_{jt}^D, captured within λ^P. I cannot empirically separate knowledge spillovers from peer pressure.

5 Regressions

An incumbent worker's wage depends on their characteristics and those of their firm:

$$lnY_{i(j)t} = \gamma_M S_{jt} + \beta_1 W_{i(j)t} + \beta_2 X_{jt} + FE + \epsilon_{i(j)t} \tag{5}$$

where i refers to the individual, j refers to the firm, t indexes the time, $lnY_{i(j)t}$ denotes the individual's log wage, and S_{jt} refers to the share of the firm's workforce with previous experience in another firm. $W_{i(j)t}$, X_{jt} and FE refers to worker characteristics, other firm characteristics and relevant fixed effects respectively. This share of workers with previous experience S_{jt} can be split into experience in a foreign MNE S_{jt}^M or a domestic firm S_{jt}^D. This brings us to the following regression specification to examine the correlation between incumbent workers' wages and the extent of their potential exposure to workers from foreign MNEs:

$$lnY_{i(j)t} = \gamma_M S^M_{jt} + \gamma_D S^D_{jt} + \beta_1 W_{i(j)t} + \beta_2 X_{jt} + FE + \varepsilon_{i(j)t} \quad (6)$$

A domestic incumbent worker is a worker in a domestic firm who has no experience in any other firm during the time period. They may be in the sample throughout the period but may also join or leave the sample at any point during the period. The share of former MNE workers relates to the probability that the domestic incumbent worker interacts with new workers that have previous experience of working at a foreign MNE. The higher the share of workers from foreign MNEs in a domestic firm, the greater the probability that the incumbent worker interacts with such workers. However, workers from other domestic firms may also bring technology and new skills to the firm. Thus, I also control for the share of workers from other domestic firms. If positive spillovers through worker mobility exist, we expect both $\gamma_M > 0$ and $\gamma_D > 0$. If these spillovers are greater from workers with multinational experience than from workers with experience in other domestic firms, we expect $\gamma_M > \gamma_D$. The base specification follows Poole (2013).[6] This approach circumvents the reflection problem by focusing on the outcomes of incumbent workers only. The reflection problem occurs when an individual's outcome variable is both affected by and affects peer outcomes (measured as one or more of the explanatory variables) (Manski, 1993).

In addition to this, I control for worker-level characteristics $W_{i(j)t}$. These are non-Irish worker, age, age^2 and number of weeks eligible for social insurance contributions. I also control for time-varying firm-specific characteristics X_{jt}. These are log firm size (i.e. number of workers in the firm) and the firm's share of female workers. Log firm size controls for the fact that firm growth may increase wages for all workers in a firm.

I control for three sets of fixed effects (FE): worker $\left(FE^W_{i(j)}\right)$, industry-year $\left(FE^{IY}_{ik}\right)$ and region-year $\left(FE^{RY}_{il}\right)$ fixed effects. Adding the detailed fixed effect structure, the regression equation is as follows:

$$lnY_{i(jkl)t} = \gamma_M S^M_{jt} + \gamma_D S^D_{jt} + \beta_1 W_{i(j)t} + \beta_2 X_{jt} + \beta_3 FE^W_{i(j)} + \beta_4 FE^{IY}_{ik} + \beta_5 FE^{RY}_{il} + \varepsilon_{i(j)t} \quad (7)$$

Worker fixed effects control for time-invariant differences across workers and firms. Worker fixed effects are identical to worker-firm fixed effects in this setting as incumbent workers are defined as workers who do not change firms. Firm fixed effects are thus also implicitly controlled for. The industry-year and region-year fixed effects control for industry and region-specific business cycles. This implies that identification comes from variation in wages within workers and within firms over time. Regions refer to three digit NUTS (2016 version) regions. There are eight of these in Ireland. I use three digit NACE rev. 2 codes, covering 238 industry

[6] Poole's main regression has different worker characteristics, no lag firm growth control and separate worker, firm and year fixed effects. I use a comparable set of fixed effects to Poole's main regression in my first regression. My second regression uses the same set of fixed effects as a more robust specification later in her paper. My preferred specification includes a lag firm growth control variable in addition to this.

Table 6 Baseline results

	(1)		(2)	
Dependent variable: ln(wage)				
γ_M	0.114	(0.034) ***	0.020	(0.025)
γ_D	0.005	(0.019)	0.009	(0.013)
Constant	7.997	(0.082) ***	8.076	(0.074) ***
$\gamma_M - \gamma_D$	0.110		0.011	
SE	0.031		0.026	
Worker FE	Yes		Yes	
Year FE	Yes		No	
NACE3-year FE	No		Yes	
NUTS3-year FE	No		Yes	
N	2,251,181		2,251,167	
N firms	17,527		17,524	
Adj. R^2	0.900		0.904	

Standard errors clustered at the firm level in parentheses

Control variables: non-Irish worker, age, age^2, weeks, ln(firm size), firm's share of female workers

$^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

categories in Ireland. The appendix contains a full description of the variables used in this paper.

6 Regression results

6.1 Baseline results

Table 6 presents my baseline results. In Column 1, I control for year, firm and worker fixed effects in addition to worker and firm characteristics. This specification follows Poole (2013)'s baseline regression in her Table 2. Year fixed effects control for features of the business cycle. Firm fixed effects control for any fixed factor that may affect an establishment's decision to hire workers from foreign MNEs, such as time-invariant management style or time-invariant productivity levels. Worker fixed effects control for time-invariant, unobservable worker characteristics. These include innate ability, motivation and, in the vast majority of cases, gender. The coefficient on the share of MNE workers γ_M is 0.11, while the coefficient for domestic workers γ_D is 0.005, resulting in $\gamma_M - \gamma_D$ equalling 0.11. This suggests that, under the same assumptions as Poole (2013), a 10% point increase in the share of former MNE

workers in domestic firms is associated with a 1.2% increase in incumbent worker wages.[7] For comparison, Poole (2013) has a coefficient of 0.056 for MNE workers and 0.006 for former domestic workers and a combined $\gamma_M - \gamma_D$ coefficient of 0.051, suggesting a 10% point increase in the share of former MNE workers in domestic firms is associated with a 0.5% increase.

In column 2 and in all further specifications I control for region-year, industry-year and worker-firm fixed effects. Worker-firm fixed effects allow for time invariant differences across workers and firms. The industry and region-year fixed effects control for industry and region-specific business cycles. This combination of fixed effects allows me to compare the same worker in the same firm, independent of region-time invariant characteristics and industry-time invariant characteristics. This causes the coefficient on the share of former MNE workers to fall to 2% and become non-significant, resulting in $\gamma_M - \gamma_D$ being equal to 0.011 and not statistically significant. Poole (2013) uses this specification as a robustness check. For comparison, she obtains a coefficient of 0.050 for MNE workers and 0.004 for former domestic workers and a combined $\gamma_M - \gamma_D$ coefficient of 0.046, significant only at the 10% level. This suggests that there is no relationship between the share of former MNE workers and the average wages of an incumbent worker.

Using the same specifications with a balanced panel where only incumbent workers present throughout the entire sample are included, I also do not find $\gamma_M - \gamma_D$ to be statistically significant different from zero (see Table 9, appendix). As an alternative specification, I replace S_{jt}^M and S_{jt}^D with a variable for the share of new workers in the firm and a second variable for the share of these new workers who are from MNEs (see Table 10, appendix). Controlling for the share of new employees, the coefficient on the share of these new employees who are from foreign MNEs is not significant. New workers are defined as workers who have joined the firm in the last 3 years. This suggests that while firms that hire new workers increase the wages of their incumbent staff, whether these new workers are from foreign MNEs or domestic firms doesn't make a difference the possiblity of spillovers to incumbent workers.

Another alternative approach to infer worker productivity is to estimate worker ability. As a further robustness check, I run a Mincer wage equation, with age, age^2, weeks, firm's share of non-Irish workers, firm's share of female workers, and worker and year fixed effects. I take the worker fixed effects from this regression as a measure of worker ability. Table 11 in the appendix uses these estimates of workers' ability in several ways. None of the joint coefficients from this are statistically significant. Column 1 follows the baseline regression but substitutes worker wages for firm ability. This results in the model being fully specified. Removing worker fixed effects results in a joint coefficient on worker ability of −0.02. Removing worker and firm fixed effects results in a joint coefficient of 0.6. I also try analysis

[7] The following formula should be use to precisely calculate the effects of coefficients when using a log linear model: $e^{(\gamma_M - \gamma_D)} - 1$.

Table 7 Firm size

	(1) < 10	(2) 10–49	(3) 50–99	(4) 100–249	(5) 250+
γ_M	0.048***	−0.014	0.235**	0.168	−0.187
	(0.008)	(0.020)	(0.104)	(0.112)	(0.158)
γ_D	0.001	−0.020	0.055	0.098*	0.118
	(0.004)	(0.012)	(0.045)	(0.059)	(0.130)
Constant	9.095***	8.285***	7.947***	8.057***	8.575***
	(0.097)	(0.084)	(0.309)	(0.135)	(0.320)
$\gamma_M - \gamma_D$	0.048	0.006	0.180	0.069	−0.305
SE	0.008	0.021	0.096	0.124	0.227
N	796,642	908,458	262,350	230,713	849,584
N firms	72,989	15,708	1149	451	207
Adj. R^2	0.835	0.883	0.910	0.921	0.928

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, year, NACE3-year, NUTS3-year

Firm size bracket based on firm size in the year the firm is first observed in the dataset

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

on worker wages, splitting the sample into high ability and low ability workers. The joint coefficients are not statistically significant for both.[8]

Table 12 (appendix) examines the impact of former MNE and workers from other domestic firms on incumbent wages by sector. Incumbent workers in both manufacturing and services firms do not appear to experience FDI spillovers. Splitting the analysis into further industry detail (Table 13 in the appendix) does not yield significant results either.[9] These findings apply that that FDI spillovers through labour mobility do not occur on average in any sector or industry of the economy.

Other sub-samples of the data also confirm these results. These included limiting workers previous employment experience counted in creating the share variables to 3, 5 and 6 years (Tables 14 and 15 in the appendix); separate regressions for men and women (Table 16, appendix); focusing on new firms only (Table 17, appendix); restricting the sample to workers with only one job per year (also Table 17, appendix); and lagging the shares of former MNE workers (Table 18, appendix). The intuition associated with lagged shares is that it may take time for former MNE workers to affect the productivity (and thus wages) of incumbent workers. Column

[8] As another robustness check (table not included), I run the baseline analysis, including workers first observed in 2006 or later only. This approach excludes some but not all workers with unknown experience. I am unable to identify workers that were not working in 2005 but were working in previous periods. These will continue to be included. Similar to here, the joint $\gamma_M - \gamma_D$ results for columns 2 statistically significantly different from zero.

[9] A set of more full length sector descriptions can be found in Fig. 10 in the Appendix.

1 does so for t-1 shares, column 2 does so for shares in t-1 and column 3 does so for t-3. In none of these case do we see shares of former MNE workers increase. These tables are available in the appendix. In summary, I do not find evidence for spillovers across industry, by gender, for new firms only, for workers with only one job per year or when examining if there is a delayed effect through lagging the shares of former MNE workers.

6.2 Firm size

Table 7 displays separate regressions for firms of different sizes (based on their number of workers). Here I also include a column on workers in firms with less than 10 workers for completeness. I do not find significant effects for firms with less than 250 workers. I find a negative and significant coefficient of −0.5 for workers in firms employing 250 or more people. This indicates that a 10% point increase in the share of former MNE workers is associated with a decline in wages of 5%. It is worth noting that while the number of worker-years is high (657 thousand) the numbers of firm-years is relatively small (178).

Smaller firms typically have lower shares of former MNE and former domestic workers $\left(S^M \text{ and } S^D\right)$. However, they also have greater variation in shares relative to their mean. This corresponds to intuition; if one former MNE worker joins a firm of four, this will cause the share of former MNE workers to increase by 20% points. However, if the same worker joins a firm with 99 employees, the share of former MNE workers will only increase by one percentage point.

Firms with 250+ workers do not have much difference in their share of former MNE workers and former domestic workers compared to firms in brackets 100–249, 20–299 or 10–49. Larger firms may be more like foreign MNEs in that they pay higher wages and are more likely to export and engage in FDI. This may mean that former MNE workers are less valuable to the largest domestic firms. It may be the case that increased shares of former MNE workers are associated with worker churn in these firms.

Splitting out the 250+ bracket into firms sized 250–399 and firms sized 400+, I find that firms with 400+ workers are driving the result (table not included). However, there is little difference in there characteristics compared to firms in the bracket 250–399.

6.3 Unconditional quantile regression

One aspect of FDI spillovers through labour mobility that has not been examined to date is its effect across the wage distribution. This can be analysed using within-year worker quantile regressions. These unconditional quantile regressions measure the effect of a covariate on the dependent variable for workers at different points in the wage distribution in a given year.

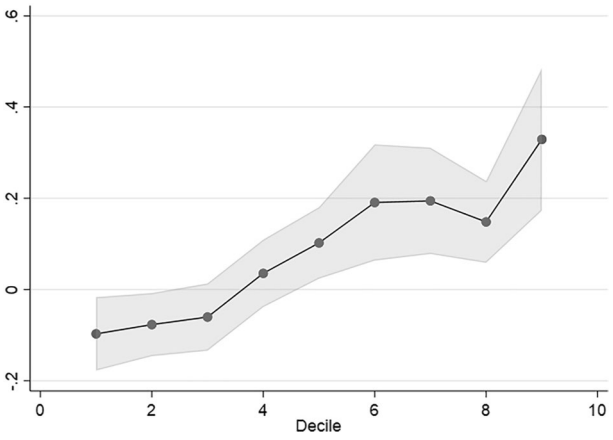

Fig. 3 Quantile regression with $\gamma_M - \gamma_D$ displayed Shaded area refers to 95% confidence interval

Figure 3 displays the results of unconditional quantile regressions on incumbent worker wages, where quantiles are within-year wage deciles (see also Table 19 and Fig. 5 for γ_M and γ_D displayed separately, both in the appendix).[10] The coefficients on the share of former MNE workers are significant from the fifth decile upwards as well as for the lowest decile. The MNE coefficients indicate positive effects for workers at higher quantiles and negative effects for workers at the lowest decile. The coefficients on the share of workers from other domestic firms indicate a positive effect at each decile but is only significant for the third one.

With the exception of the fourth to the sixth wage deciles, the joint coefficients are statistically significant. The incumbent worker at the highest decile has a $\gamma_M - \gamma_D$ coefficient of 3.29, indicating that a 10% point increase in the share of former MNE workers is associated with a 3% increase in the wage of the incumbent worker at the 90th percentile. For the incumbent worker at the 80th, 70th and 60th percentile, a 10% point increase in the share of former MNE workers is associated with a 1.5, 1.9 and 1.9% increase in wages respectively.

The incumbent worker at the lowest decile has a negative $\gamma_M - \gamma_D$ coefficient of -1%. This indicates that a 10% point increase in the share of former MNE workers is associated with a 1% decline in the wages of the incumbent worker at the 10th percentile of the worker wage distribution. Workers at the 20th and 30th percentile also have negative $\gamma_M - \gamma_D$ coefficients. A 10% point increase in

[10] It is more useful to run an unconditional quantile regression using within-year worker quantiles than quantiles based on the distribution of workers across the whole period. Workers tend to earn higher wages in later periods and, by construction, higher shares of former MNE workers are found in later periods. This means that disproportionately more worker-year observations from later years are in higher quantiles and disproportionately more worker-year observations from earlier years are in lower quantiles, potentially biasing the results. An unconditional quantile regression on all worker years can be found in Table 23 in the appendix. The results display a similar pattern but have a wider gap between the top and the bottom.

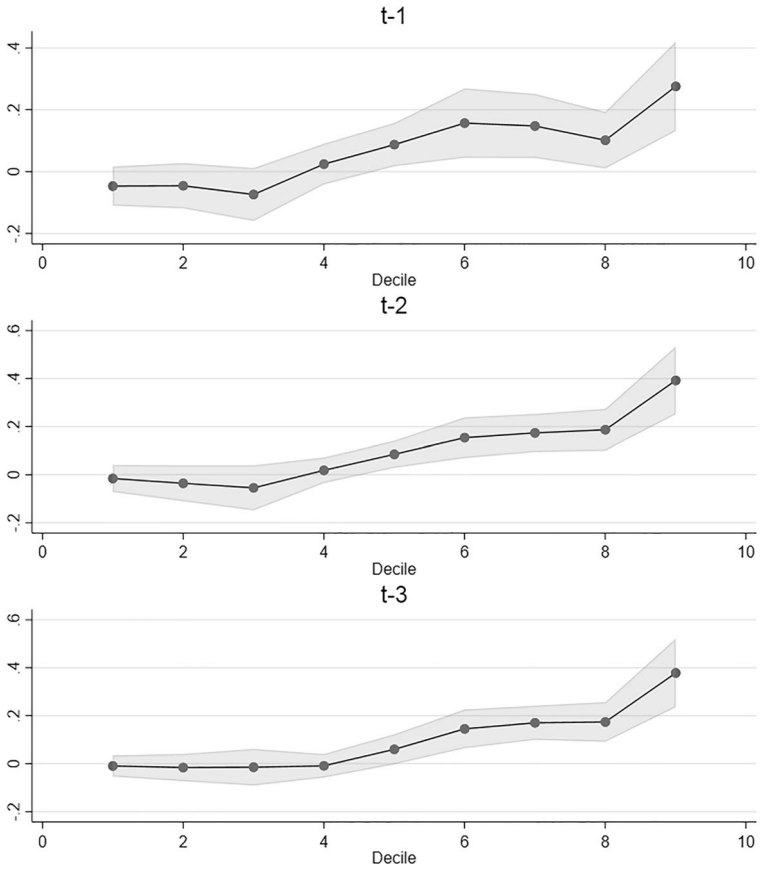

Fig. 4 Quantile regressions with lagged shares: $\gamma_M - \gamma_D$ displayed Shaded area refers to 95% confidence interval

the share of former MNE workers is associated with a 0.8 and 0.6% decline in wages. The results at the 40th and 50th percentile are not statistically significantly different from zero. This indicates that we cannot reject the hypothesis that there are no FDI spillover effects for them.

The quantile results above suggest that former MNE workers have different spillover effects on different incumbent workers in domestic firms. If former MNE workers are indeed affecting incumbent workers' wages, we should expect this to occur over more than the initial year. One can test this idea by running quantile regressions using lagged shares of former MNE workers and workers previously in other domestic firms. For lagged shares in t-1 (Fig. 4), the coefficient on the share of former MNE workers in the previous period is significant at 5% or better in the top three deciles. The coefficients for the remaining deciles are either not significant or significant only at the 10% level. The coefficients on

the share of former MNE workers progress from negative to positive values. The coefficients on the shares of workers previously in other domestic firms is not significant throughout. The joint coefficients are positive, significant and increasing from quantile 0.5 upwards. However, they are not significant below quantile 0.5.

For the lagged t-2 shares (Fig. 4), most of the coefficients on the shares of former MNE workers are significant throughout, going from negative to positive. The coefficients on the shares of previously domestic workers are only significant for the lower quantiles where they are negative. Similarly, the joint coefficients are positive and significant for quantile 0.5 and above and are not significant below this.

For the lagged t-3 shares (Fig. 4), the coefficients on former MNE workers tend to be less significant than those in t-2 but are more significant than in t-1 and continue to show a negative to positive trend. Again, for shares of workers from other domestic firms, the coefficients on the lowest shares are negative and mostly significant. As before, the joint coefficients are positive and significant for the higher quantiles and are not significant for the lower quantiles.

The pattern for the joint coefficients in these regressions with lagged shares exhibit the same negative to positive values as the quantile regression with contemporaneous shares (Fig. 3). Tables 20, 21 and 22 in the appendix display these quantile regression results in tabular form. Unlike the contemporaneous results, the coefficients for the lower quantiles are not significant using lagged shares. However, the positive coefficients on higher wage deciles persist. This suggests that higher shares of former MNE workers result in higher income for higher paid incumbent workers within domestic firms while they do not have an effect on incumbents who are lower paid. The negative coefficients for lower quantile workers associated with increased shares of former MNE workers in the contemporaneous regressions are due to compositional effects. Former MNE workers may be be substitutable for lower income workers or associated with technological change that benefits higher income workers but makes the roles of lower income incumbents less important within the firm. Employers who hire former MNE workers may be doing so as part of a wider strategy whereby lower paid workers are less likely to be rewarded with wage increases in the same year. Hiring of former MNE workers may also see the departure of incumbent workers in lower income quantiles and their replacement with incumbents who are paid less.

Running quantile regressions with ability as the dependent variable yields a similar pattern of negative to positive values (Table 24, appendix), although it is only statistically significant at the 80th and 90th percentiles. Just like in Column 1 in Table 11 (appendix), ability is estimated here as worker fixed effects from a Mincer wage regression. This result supports the hypothesis that FDI spillovers occur for higher skilled incumbent workers only and are increasing in workers' skill level.

The evidence from these quantile regressions tells us several things. Former MNE workers are complementary to higher income incumbents (the 60th percentile and above), particularly those at the top of the wage distribution (the 90th percentile). The positive and significant coefficients for the lagged shares of former MNE workers joining the firm indicate that former MNE workers provide a positive spillover. Newly hired former MNE workers tend to be younger than incumbent workers (the median age is 35 rather than 40, see Tables 1 and 3 respectively) and to earn income

levels similar to higher paid incumbent workers (Table 5). This suggests that they are higher up the firm's hierarchy and relatively better skilled than lower income incumbent workers. Incumbents with higher income, who are also likely to be better skilled, may be consequently better placed to learn from them. The corollary of this is to increase wage inequality among incumbent workers in domestic firms.

Finally, I run quantile regressions based on workers' within-firm wage distribution. Due to computing challenges in running the analysis for smaller firms, I restrict the population to firms with 100 workers or more. The results are available in Figs. 7 and 8, and Tables 25 and 26 in the appendix.

Figure 7 (also Table 25) suggests that spillovers are positive and typically between 2 and 4% across the within-firm wage distribution. However, the results are not statistically significant, except for quantiles two and four. Figure 8 (also Table 26) shows across-firm analysis (the same as that in the original analysis) on the same population as that in Fig. 7. Here, the results are more likely to be statistically significant and suggest positive spillovers for higher waged workers and negative ones for lower waged workers. These results suggests that inequality between workers increases between rather than within firms.

7 Conclusion

In this paper I investigate the possibility of FDI spillovers through labour mobility using administrative panel data from Ireland. In the first part of the paper, I follow existing methodology to analyse wage spillovers to incumbent workers on average. Using a similar specification to Poole (2013), I identify positive wage spillovers from former MNE workers to incumbent workers in domestic firms. However, these results are not robust to controlling for industry-year and region-year dummies. Once these are included, I do not find evidence for spillovers even when checking for potentially heterogeneous effects through various sample splits.

In the second part of the paper, I examine possible heterogeneity of FDI spillovers across the wage distribution of incumbent workers using quantile regressions. The results suggest that there are spillovers only for workers in the top 50% of the wage distribution. Former MNE workers appear be complementary to higher income incumbents. Newly hired former MNE workers tend to be younger than incumbent workers while also earning incomes at levels similar to higher paid incumbent workers. This suggests that they are higher up the firm's hierarchy and relatively better skilled than lower income incumbent workers. Incumbents with higher income, who are also likely to be better skilled, may be consequently better placed to learn from them.

The existing evidence indicates that MNEs can have negative effects on domestic firms and that they increase wage inequality by paying their workers more. This analysis confirms the evidence of a wage gap for foreign MNEs relative to domestic firms. It also indicates that there are no overall spillover effects through worker

mobility on average. Only higher income workers gain from such spillovers, increasing income inequality.

These findings have implications for policy. Government policy should be designed to ensure that income inequality is not greatly exacerbated by FDI spillovers. One solution is to maintain or increase the progressivity of the income tax system to ensure that, while the pre-tax income gap may widen, the gap after taxation does not. A second area of policy action is to improve opportunities for lower paid workers to upskill and re-train. This may increase their capacity to benefit from spillovers from former MNE workers. Finally, there is also a role for domestic firms. Increasing workplace equality and opportunities for lower paid workers, including through increased participation in decision making, coaching and mentoring opportunities, and involvement in organisational strategy may enable FDI spillovers to be shared more equally.

Appendix

Additional tables

See to Figures 5, 6, 7, 8, 9, 10 and Tables 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26.

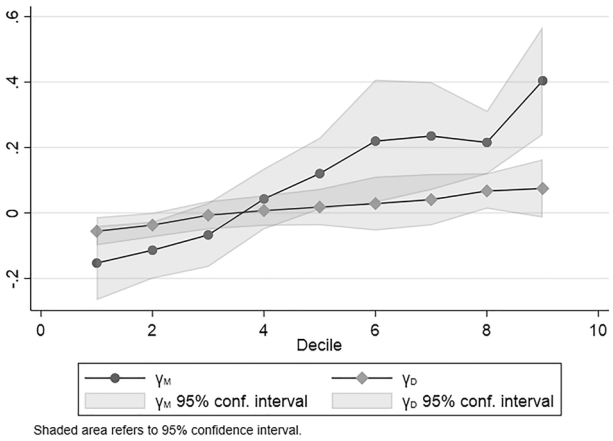

Fig. 5 Quantile regression with γ_M and γ_D displayed separately

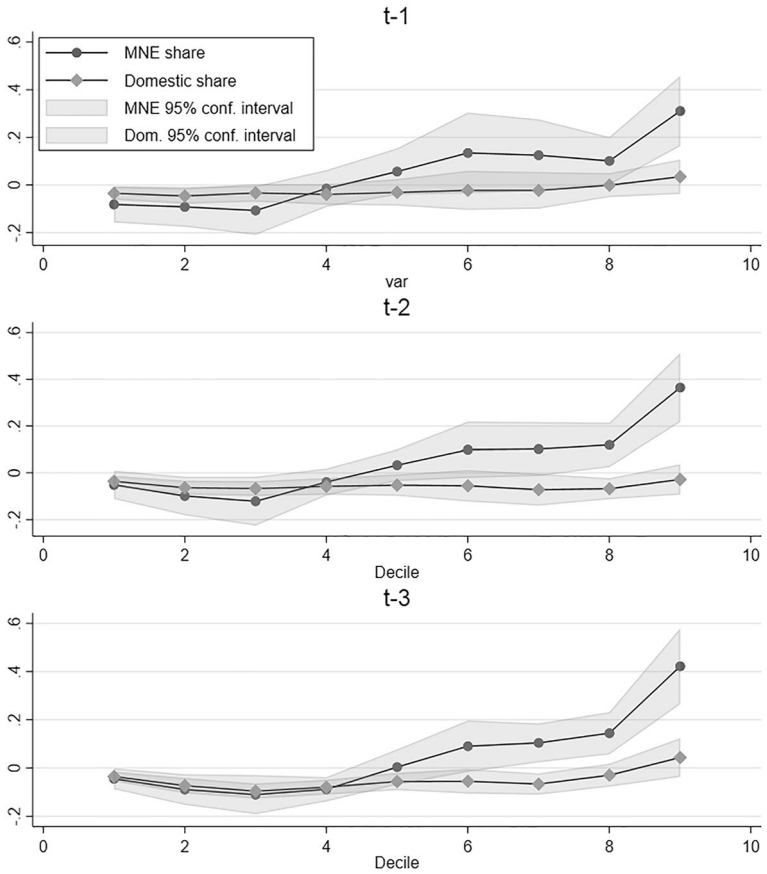

Fig. 6 Quantile regression with γ_M and γ_D displayed separately

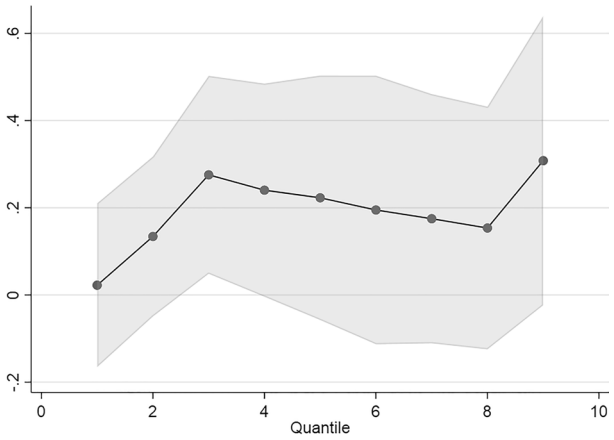

Fig. 7 Within-firm quantile regression. Shaded area refers to 95% confidence interval. Firms with 100+ workers only

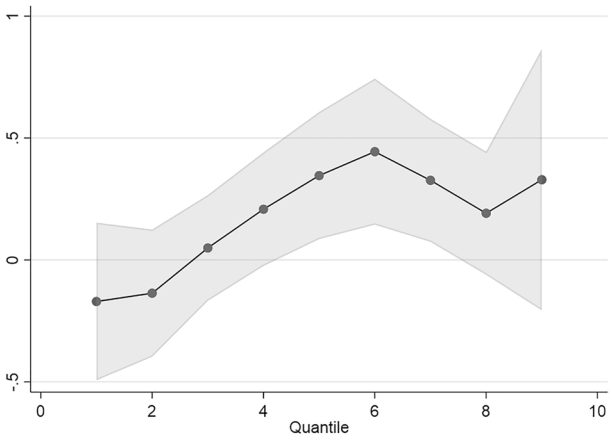

Fig. 8 Across-firm quantile regression. Shaded area refers to 95% confidence interval. Firms with 100+ workers only

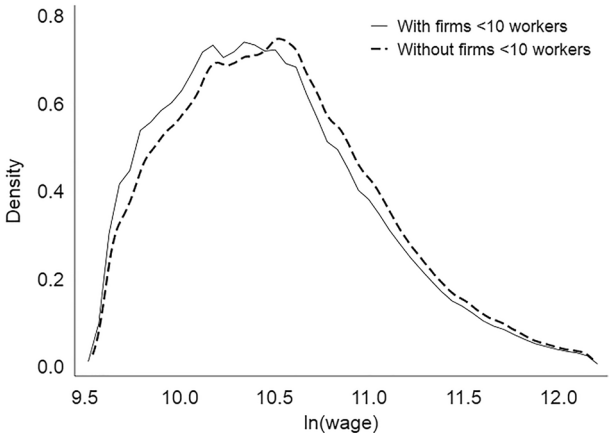

Fig. 9 Impact of introducing threshold for firms with 10+ workers on wage distribution. Chart excludes top 1% of wage distribution. Chart compares wage distribution of workers in Stage 1 and 2 in Table 8

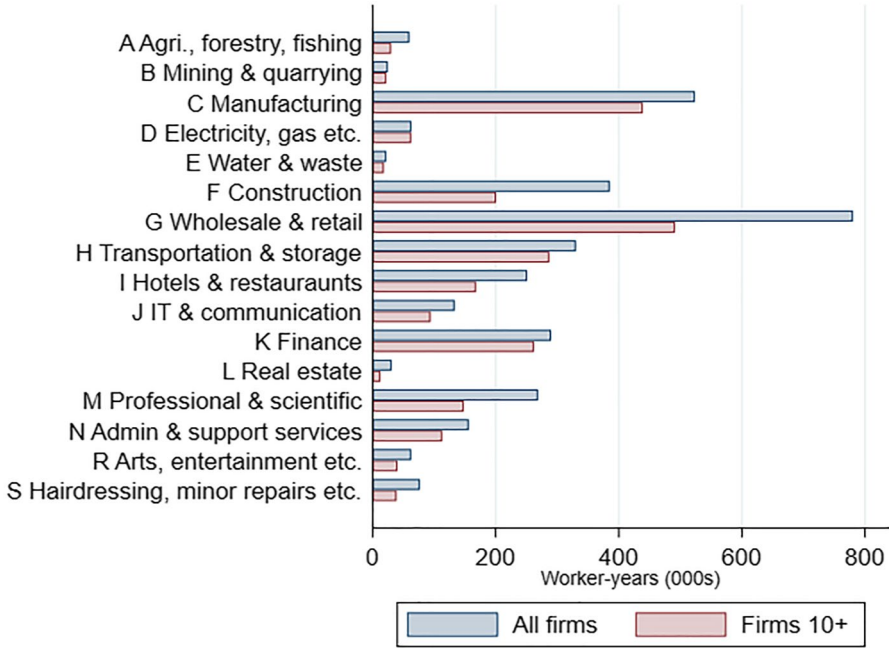

Fig. 10 Sectoral composition of incumbent workers in market firms with less than 10 workers included and excluded

Table 8 Breakdown of market firms

Stage	Worker-years	Workers	Firm-years	Firms
1	18,456,652	2,959,595	1,416,497	272,450
2	13,890,695	2,260,593	1,078,825	214,212
3	11,101,867	2,020,926	1,049,346	211,526
4	10,203,154	1,801,935	1,012,742	202,309
5	3,418,027	800,733	611,161	116,825
6	2,396,452	573,213	110,900	22,425

Stage 1: Population of workers in market firms

Stage 2: Exclude workers with low pay (less than 15,051 euros per year)

Stage 3: Exclude foreign MNEs

Stage 4: Exclude workers with foreign MNE experience

Stage 5: Exclude workers with experience in other domestic firms

Stage 6: Exclude firms with less than 10 workers

Table 9 Balanced panel

	(1)		(2)	
Dependent variable: ln(wage)				
γ_M	0.339	(0.052) ***	0.239	(0.040) ***
γ_D	0.236	(0.032) ***	0.227	(0.026) ***
Constant	8.758	(0.130) ***	8.826	(0.115) ***
$\gamma\_M - \gamma\_D$	0.103		0.012	
SE	0.056		0.047	
Worker FE	Yes		No	
Year FE	No		Yes	
NACE3-year FE	No		Yes	
NUTS3-year FE	No		Yes	
N	768,042		768,031	
N firms	3865		3864	
Adj. R^2	0.898		0.905	

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

$* p < 0.10$, $** p < 0.05$, $*** p < 0.01$

Table 10 Alternative share specification

	(1)		(2)	
Share new workers	0.136	(0.010) ***	0.105	(0.007) ***
Share new workers from MNEs	0.007	(0.010)	0.004	(0.008)
Constant	8.621	(0.080) ***	8.680	(0.073) ***
Worker FE	Yes		No	
Year FE	No		Yes	
NACE3-year FE	No		Yes	
NUTS3-year FE	No		Yes	
N	2,251,181		2,251,167	
N firms	17,527		17,524	
Adj. R^2	0.898		0.903	

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

$* p < 0.10$, $** p < 0.05$, $*** p < 0.01$

Table 11 Analysis using worker ability

	(1) Ability	(2) Ability	(3) Ability	(4) ln(y)	(5) ln(y)
γ_M	−0.000	0.094***	0.736***	−0.041	0.061**
	(0.000)	(0.015)	(0.056)	(0.029)	(0.029)
γ_D	−0.000	0.109***	0.105***	−0.006	0.017
	(0.000)	(0.011)	(0.024)	(0.011)	(0.017)
Constant	−0.000***	−0.182***	0.115	8.416***	7.983***
	(0.000)	(0.063)	(0.077)	(0.082)	(0.128)
$\gamma_M - \gamma_D$	−0.000	−0.015	0.631	−0.035	0.044
SE	0.000	0.015	0.058	0.028	0.029
N	2,251,167	2,251,167	2,251,170	1,144,816	1,106,261
N firms	17,524	17,524	17,526	12,349	16,207
Adj. R^2	1.000	0.573	0.425	0.884	0.857
Worker FE	Yes	No	No	Yes	Yes
Firm FE	(Implicit)	Yes	No	(Implicit)	(Implicit)

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: NACE3-year, NUTS3-year

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 12 Manufacturing and services

	(1) Manufacturing		(2) Services	
γ_M	0.030	(0.028)	−0.027	(0.046)
γ_D	0.019	(0.015)	−0.023	(0.021)
Share prev MNE*sector	−0.058	(0.053)	0.058	(0.053)
Share prev domestic*sector	−0.042	(0.026)	0.042	(0.026)
Constant	8.076	(0.074) ***	8.076	(0.074) ***
$\gamma_M - \gamma_D + \gamma_{Mi} - \gamma_{Di}$	−0.004		0.012	
SE	0.045		0.029	
N	2,251,167		2,251,167	
N firms	17,524		17,524	
Adj. R^2	0.904		0.904	

Standard errors are clustered at the firm level in parentheses

Control variables: non-Irish worker, age, age^2, weeks, ln(firm size), firm's share of female workers

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 13 Analysis by A10 sector

	(1) A Agri	(2) B-E Indust	(3) A Cons	(4) G-I Retail	(5) J IT	(6) K Fin	(7) L Real est	(8) MN Prof	(9) R-U Othr
γ_M	−0.035	0.030	−0.012	−0.048	−0.022	0.177**	0.014	0.074	0.145**
	(0.140)	(0.046)	(0.062)	(0.041)	(0.114)	(0.081)	(0.561)	(0.062)	(0.067)
γ_D	−0.034	0.007	0.076**	−0.037*	−0.085	0.018	0.399***	0.090**	0.026
	(0.059)	(0.023)	(0.032)	(0.021)	(0.079)	(0.064)	(0.142)	(0.044)	(0.042)
Constant	8.735***	8.364***	7.500***	8.064***	7.117***	8.800***	11.883***	7.303***	8.309***
	(0.205)	(0.134)	(0.539)	(0.112)	(0.698)	(0.225)	(0.883)	(0.339)	(0.280)
$\gamma_M - \gamma_D$	−0.001	0.023	−0.088	−0.011	0.063	0.159	−0.384	−0.015	0.119
SE	0.144	0.044	0.063	0.040	0.092	0.084	0.538	0.074	0.064
N	27,954	515,634	175,235	882,875	85,023	248,822	10,923	225,719	74,599
N firms	257	2526	2616	7185	854	568	195	2765	793
Adj. R^2	0.916	0.910	0.853	0.898	0.884	0.924	0.890	0.899	0.909

Standard errors are clustered at the firm level in parentheses

Control variables: non-Irish worker, age, age^2, weeks, ln(firm size), firm's share of female workers

* p <0.10, ** p <0.05, *** p <0.01

Table 14 Limiting experience counted

	(1) 6 year exp.		(2) 3 year exp.	
γ_M	−0.002	(0.012)	−0.006	(0.011)
γ_D	0.002	(0.010)	−0.001	(0.008)
Constant	8.070	(0.075) ***	8.069	(0.075) ***
$\gamma_M - \gamma_D$	−0.003		−0.004	
SE	0.016		0.013	
N	2,251,167		2,251,167	
N firms	17,524		17,524	
Adj. R^2	0.904		0.904	

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

Table 15 Splitting MNE shares by manufacturing and services

	(1)		(2)		(3)	
	All		Manufacturing		Services	
$\gamma_{M(<3years)}$	0.001	(0.035)	0.043	(0.067)	−0.007	(0.039)
$\gamma_{M(3-5years)}$	−0.014	(0.041)	0.016	(0.081)	−0.016	(0.046)
γ_D	0.006	(0.013)	0.006	(0.023)	0.007	(0.015)
Constant	8.071	(0.074) ***	8.360	(0.134) ***	7.964	(0.092) ***
$\gamma_{M(<3years)}$ $+\gamma_{M(3-5years)} - \gamma_D$	−0.020		0.053		−0.030	
SE	0.068		0.117		0.076	
N	2,251,167		515,634		1,705,564	
N firms	17,524		2526		14,849	
Adj. R^2	0.904		0.910		0.903	

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

* p <0.10, ** p <0.05, *** p <0.01

Table 16 Separate analysis for men and women

	(1)		(2)	
	Men		Women	
γ_M	0.042	(0.028)	−0.015	(0.029)
γ_D	0.018	(0.014)	−0.012	(0.016)
Constant	7.862	(0.099) ***	8.458	(0.113) ***
$\gamma_M - \gamma_D$	0.024		−0.003	
SE	0.029		0.027	
N	1,479,880		771,152	
N firms	16,528		14,009	
Adj. R^2	0.908		0.881	

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 17 Further sample breakdowns

	(1)		(2)		(3)	
	New firms		One job		Main job	
γ_M	−0.002	(0.056)	0.083	(0.022) ***	0.069	(0.020) ***
γ_D	−0.043	(0.032)	0.025	(0.011) **	0.027	(0.011) ***
Constant	8.294	(0.185) ***	8.287	(0.067) ***	8.220	(0.068) ***
$\gamma_M - \gamma_D$	0.042		0.058		0.042	
SE	0.051		0.023		0.020	
N	188,497		1,934,138		2,251,167	
N firms	3766		15,981		17,524	
Adj. R^2	0.924		0.928		0.913	

Standard errors clustered at the firm level in parentheses. Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

High growth defined as above or equal to median growth rate in $t-1$

Column 1 only includes new firms. New firms are defined as firms that were established in 2005 or later

Column 2 only includes the income from the most valuable job a worker has in a given year. Workers' wages in the other regressions refer to their total taxable pay for the full year in euros, regardless of whether it came from more than one job

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 18 Lag shares by 1, 2 and 3 years

	(1)		(2)		(3)	
	t-1		1-2		t-3	
γ_{Mt-1}	−0.012	(0.024)				
γ_{Dt-1}	−0.012	(0.013)				
γ_{Mt-2}			0.017	(0.021)		
γ_{Dt-2}			−0.013	(0.011)		
γ_{Mt-3}					0.014	(0.020)
γ_{Dt-3}					−0.021	(0.009) **
Constant	8.240	(0.075) ***	8.513	(0.078) ***	8.537	(0.099) ***
$\gamma_M - \gamma_D$	−0.000		0.031		0.035	
SE	0.025		0.023		0.021	
N	1,714,190		1,354,416		1,078,791	
N firms	13,663		10,969		9204	
Adj. R^2	0.916		0.935		0.942	

Standard errors clustered at the firm level in parentheses

Control variables: non-Irish worker, age, age^2, weeks, ln(firm size), firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 19 Quantile regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_M	−0.153***	−0.114**	−0.067	0.043	0.120**	0.220**	0.235***	0.216***	0.404***
	(0.058)	(0.044)	(0.050)	(0.047)	(0.056)	(0.096)	(0.084)	(0.050)	(0.085)
γ_D	−0.056**	−0.037*	−0.007	0.007	0.018	0.029	0.041	0.067**	0.075
	(0.022)	(0.019)	(0.022)	(0.024)	(0.029)	(0.042)	(0.040)	(0.028)	(0.045)
Constant	7.690***	7.534***	7.753***	8.065***	8.221***	8.276***	8.355***	8.161***	8.004***
	(0.191)	(0.161)	(0.111)	(0.123)	(0.140)	(0.167)	(0.130)	(0.199)	(0.322)
$\gamma_M - \gamma_D$	−0.097	−0.077	−0.060	0.036	0.102	0.191	0.194	0.148	0.329
SE	0.041	0.035	0.038	0.038	0.040	0.065	0.060	0.046	0.080
N	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181
N firms	17,527	17,527	17,527	17,527	17,527	17,527	17,527	17,527	17,527
Adj. R^2	0.585	0.706	0.749	0.771	0.769	0.766	0.764	0.753	0.734

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Each column refers to a decile, e.g. 0.1 refers to workers at the point of the lowest wage decile and 0.5 refers to the median

Fixed effects: worker, NACE3-year, NUTS3-year

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 20 Quantile regression with lagged t-1 shares

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_{Mt-1}	−0.081**	−0.092**	−0.107**	−0.015	0.057	0.135	0.125	0.101**	0.311***
	(0.039)	(0.043)	(0.052)	(0.040)	(0.050)	(0.087)	(0.077)	(0.051)	(0.075)
γ_{Dt-1}	−0.035**	−0.046***	−0.033*	−0.039*	−0.031	−0.022	−0.023	−0.000	0.035
	(0.014)	(0.016)	(0.019)	(0.022)	(0.028)	(0.042)	(0.039)	(0.026)	(0.037)
Constant	8.173***	7.867***	7.951***	8.180***	8.326***	8.341***	8.426***	8.237***	8.207***
	(0.188)	(0.191)	(0.132)	(0.130)	(0.166)	(0.172)	(0.144)	(0.215)	(0.308)
$\gamma_{Mt-1} - \gamma_{Dt-1}$	−0.047	−0.046	−0.074	0.025	0.087	0.157	0.148	0.102	0.276
SE	0.032	0.037	0.044	0.034	0.036	0.057	0.053	0.047	0.074
N	1,714,200	1,714,200	1,714,200	1,714,200	1,714,200	1,714,200	1,714,200	1,714,200	1,714,200
N firms	13,666	13,666	13,666	13,666	13,666	13,666	13,666	13,666	13,666
Adj. R^2	0.586	0.712	0.760	0.786	0.786	0.786	0.788	0.777	0.761

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

Each column refers to a decile, e.g. 0.1 refers to workers at the point of the lowest wage decile and 0.5 refers to the median

$* p < 0.10$, $** p < 0.05$, $*** p < 0.01$

Table 21 Quantile regression with lagged t-2 shares

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_{Mt-2}	−0.051	−0.098**	−0.121**	−0.039	0.033	0.099	0.102*	0.119**	0.365***
	(0.031)	(0.042)	(0.053)	(0.030)	(0.035)	(0.061)	(0.059)	(0.048)	(0.075)
γ_{Dt-2}	−0.036***	−0.063***	−0.067***	−0.058***	−0.052**	−0.055	−0.072**	−0.067***	−0.028
	(0.012)	(0.015)	(0.016)	(0.018)	(0.023)	(0.034)	(0.035)	(0.023)	(0.033)
Constant	8.255***	7.970***	8.122***	8.195***	8.420***	8.556***	8.710***	8.710***	8.599***
	(0.210)	(0.217)	(0.153)	(0.126)	(0.167)	(0.185)	(0.175)	(0.252)	(0.341)
$\gamma\_M - \gamma\_D$	−0.015	−0.035	−0.055	0.019	0.085	0.154	0.174	0.187	0.392
SE	0.029	0.038	0.048	0.027	0.029	0.043	0.040	0.044	0.072
N	1,354,426	1,354,426	1,354,426	1,354,426	1,354,426	1,354,426	1,354,426	1,354,426	1,354,426
N firms	10,970	10,970	10,970	10,970	10,970	10,970	10,970	10,970	10,970
Adj. R^2	0.596	0.726	0.777	0.810	0.812	0.817	0.825	0.819	0.808

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

Each column refers to a decile, e.g. 0.1 refers to workers at the point of the lowest wage decile and 0.5 refers to the median

$* p < 0.10$, $** p < 0.05$, $*** p < 0.01$

Table 22 Quantile regression with lagged t-3 shares

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_{Mt-3}	−0.045**	−0.089***	−0.110***	−0.088***	0.004	0.091*	0.104**	0.145***	0.422***
	(0.022)	(0.033)	(0.041)	(0.026)	(0.038)	(0.054)	(0.041)	(0.045)	(0.080)
γ_{Dt-3}	−0.035***	−0.073***	−0.096***	−0.080***	−0.056***	−0.055**	−0.066***	−0.030	0.044
	(0.010)	(0.016)	(0.016)	(0.016)	(0.018)	(0.026)	(0.023)	(0.024)	(0.041)
Constant	8.287***	8.002***	8.179***	8.243***	8.305***	8.501***	8.721***	8.895***	8.586***
	(0.239)	(0.276)	(0.182)	(0.168)	(0.194)	(0.228)	(0.239)	(0.310)	(0.561)
$\gamma_{Mt-3} - \gamma_{Dt-3}$	−0.009	−0.016	−0.015	−0.009	0.060	0.145	0.171	0.174	0.379
SE	0.023	0.029	0.039	0.025	0.032	0.041	0.036	0.042	0.073
N	1,078,803	1,078,803	1,078,803	1,078,803	1,078,803	1,078,803	1,078,803	1,078,803	1,078,803
N firms	9207	9207	9207	9207	9207	9207	9207	9207	9207
Adj. R^2	0.612	0.737	0.788	0.822	0.825	0.832	0.840	0.835	0.824

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NACE3-year, NUTS3-year

Each column refers to a decile, e.g. 0.1 refers to workers at the point of the lowest wage decile and 0.5 refers to the median

$* p < 0.10$, $** p < 0.05$, $*** p < 0.01$

Table 23 Quantile regression on all worker-years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_M	−0.142***	−0.126***	−0.119**	−0.021	0.057	0.134*	0.143*	0.251***	0.489***
	(0.053)	(0.047)	(0.055)	(0.039)	(0.047)	(0.078)	(0.080)	(0.058)	(0.081)
γ_D	−0.059***	−0.034*	−0.007	0.018	0.017	0.023	0.023	0.045	0.081**
	(0.020)	(0.020)	(0.023)	(0.020)	(0.025)	(0.037)	(0.041)	(0.029)	(0.035)
Constant	7.794***	7.522***	7.712***	7.885***	8.131***	8.045***	8.073***	8.274***	8.319***
	(0.181)	(0.162)	(0.113)	(0.118)	(0.136)	(0.162)	(0.140)	(0.196)	(0.277)
$\gamma_M - \gamma_D$	−0.083	−0.092	−0.112	−0.038	0.040	0.111	0.120	0.206	0.408
SE	0.039	0.037	0.041	0.034	0.035	0.054	0.054	0.050	0.081
N	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181
N firms	17,527	17,527	17,527	17,527	17,527	17,527	17,527	17,527	17,527
Adj. R^2	0.585	0.705	0.749	0.771	0.771	0.768	0.768	0.759	0.738

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Each column refers to a decile, e.g. 0.1 refers to the lowest wage decile and 0.5 refers to the median

Fixed effects: worker, NACE3-year, NUTS3-year

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 24 Quantile regression with ability as dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_M	−0.171	−0.115**	−0.068	−0.035	0.004	0.057	0.126***	0.151***	0.145***
	(0.163)	(0.055)	(0.054)	(0.050)	(0.041)	(0.047)	(0.048)	(0.044)	(0.031)
γ_D	−0.086	−0.064**	−0.047*	0.001	0.023	0.052***	0.064***	0.070***	0.041***
	(0.055)	(0.025)	(0.028)	(0.023)	(0.017)	(0.018)	(0.020)	(0.018)	(0.013)
Constant	−0.899***	−0.433**	−0.387***	−0.121	−0.025	0.155*	0.289***	0.552***	0.934***
	(0.191)	(0.181)	(0.088)	(0.078)	(0.073)	(0.080)	(0.084)	(0.066)	(0.112)
$\gamma_M - \gamma_D$	−0.085	−0.051	−0.021	−0.036	−0.019	0.005	0.062	0.081	0.104
SE	0.110	0.038	0.033	0.031	0.028	0.033	0.035	0.033	0.025
N	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181	2,251,181
N firms	17,527	17,527	17,527	17,527	17,527	17,527	17,527	17,527	17,527
Adj. R^2	0.889	0.904	0.913	0.922	0.930	0.937	0.947	0.960	0.976

Standard errors clustered at the firm level in parentheses

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Fixed effects: worker, NUTS3-year

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Table 25 Quantile regression on within-firm wage distribution

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_M	0.030	0.149	0.298***	0.283**	0.257**	0.195	0.144	0.136	0.198
	(0.099)	(0.092)	(0.111)	(0.117)	(0.122)	(0.126)	(0.123)	(0.124)	(0.130)
γ_D	0.007	0.015	0.022	0.043	0.035	−0.000	−0.031	−0.018	−0.111
	(0.070)	(0.070)	(0.074)	(0.075)	(0.078)	(0.073)	(0.072)	(0.069)	(0.077)
Constant	8.136***	7.826***	7.838***	7.868***	8.030***	8.075***	8.242***	8.818***	8.891***
	(0.368)	(0.237)	(0.232)	(0.215)	(0.240)	(0.266)	(0.244)	(0.228)	(0.288)
$\gamma_M - \gamma_D$	0.022	0.134	0.276	0.240	0.223	0.195	0.175	0.154	0.308
SE	0.096	0.094	0.116	0.125	0.143	0.157	0.146	0.142	0.169
N	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950
N firms	915	915	915	915	915	915	915	915	915
Adj. R^2	0.649	0.723	0.757	0.777	0.794	0.803	0.813	0.812	0.797

Standard errors are clustered at the firm level

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Each column refers to a decile, e.g. 0.1 refers to workers at the point of the lowest wage decile and 0.5 refers to the median

Fixed effects: worker, firm, year, NACE3-year, NUTS3-year

Firms with < 100 workers excluded

$* p < 0.10$, $** p < 0.05$, $*** p < 0.01$

Table 26 Quantile regression (firms with 100 workers or more)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
γ_M	−0.346	−0.200	0.012	0.231**	0.372**	0.465**	0.394***	0.270***	0.489**
	(0.231)	(0.150)	(0.095)	(0.117)	(0.161)	(0.181)	(0.131)	(0.097)	(0.201)
γ_D	−0.175*	−0.064	−0.037	0.023	0.026	0.021	0.067	0.079	0.160
	(0.089)	(0.072)	(0.065)	(0.079)	(0.094)	(0.109)	(0.086)	(0.075)	(0.121)
Constant	7.283***	7.583***	7.736***	8.299***	8.494***	8.669***	8.879***	8.578***	8.853***
	(0.602)	(0.393)	(0.236)	(0.254)	(0.264)	(0.240)	(0.333)	(0.365)	(0.546)
$\gamma_M - \gamma_D$	−0.170	−0.136	0.049	0.208	0.346	0.444	0.327	0.192	0.329
SE	0.165	0.133	0.111	0.119	0.133	0.153	0.129	0.129	0.273
N	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950	1,142,950
N firms	915	915	915	915	915	915	915	915	915
Adj. R^2	0.639	0.742	0.786	0.789	0.779	0.784	0.785	0.775	0.766

Standard errors are clustered at the firm level

Control variables: age, age^2, weeks, ln(firm size), firm's share of non-Irish workers, firm's share of female workers

Each column refers to a decile, e.g. 0.1 refers to workers at the point of the lowest wage decile and 0.5 refers to the median

Fixed effects: worker, firm, year, NACE3-year, NUTS3-year

Firms with < 100 workers excluded

$* p < 0.10, ** p < 0.05, *** p < 0.01$

Variable descriptions

$Wage_{i(j)t}$ - Worker's total taxable pay for the full year in euros (regardless of whether it came from more than one job), deflated using the Consumer Price Index.
$lnY_{i(j)t}$ - Log of $Wage_{i(j)t}$
S^{M}_{jt} - Share of firm's workforce with previous experience in a foreign MNE.
S^{D}_{jt} - Share of firm's workforce hired from another domestic establishment (with no previous experience in a foreign MNE).
Age_i - Worker age
$Size_j$ - Log firm size, measured by number of workers.
$NonIrish_{i(j)t}$ - Anyone with non-Irish nationality, as recorded by the Irish Department of Social Protection when assigning someone with a Personal Public Service (PPS) number. The nationality recorded must be supported by documentation such as a birth certificate or passport from the person's country of origin.
$Weeks_{i(j)t}$ - Total number of weeks of employment per year that are liable for social insurance contributions.
MNE_{jt} - Foreign MNE is based on the country of ownership of a firm that is recorded in firms' filings to the Irish Companies Registration Office.
$Industry_{jt}$ - Three digit NACE rev. 2 industry code.
Regions - EU NUTS 3 digit 2016 regions for Ireland: Border Region IE041 (Cavan, Donegal, Leitrim, Monaghan, Sligo), West Region IE042 (Mayo, Roscommon, Galway and Galway City), Mid-West Region IE051 (Clare, Tipperary, Limerick City & County), South-East Region IE052 (Carlow, Kilkenny, Wexford, Waterford City & County), South-West Region IE053 (Kerry, Cork and Cork City), Dublin Region IE061 (Dublin City, Din Laoghaire-Rathdown, Fingal and South Dublin), Mid-East Region IE062 (Kildare, Meath, Wicklow, Louth), Midlands Region IE063 (Laois, Longford, Offaly, Westmeath).

Funding Open Access funding provided by the IReL Consortium.

References

Abowd, J. M., Kramarz, F., & Margolis, D. N. (1999). High wage workers and high wage firms. *Econometrica, 67*(2), 251–333.

Aitken, B., Harrison, A., & Lipsey, R. E. (1996). Wages and foreign ownership: A comparative study of Mexico, Venezuela, and the United States. *Journal of International Economics, 40*(3–4), 345–371.

Aitken, B. J., & Harrison, A. E. (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. *American Economic Review, 89*(3), 605–618.

Alfaro-Ureña, A., Manelici I., & Vasquez, J. P. (2021). *The effects of multinationals on workers: Evidence from Costa Rica* (IRLE Working Paper No. 112-19).

Balsvik, R. (2011). Is labor mobility a channel for spillovers from multinationals? Evidence from Norwegian manufacturing. *The Review of Economics and Statistics, 93*(1), 285–297.

Barrios, S., Görg, H., & Strobl, E. (2011). Spillovers through backward linkages from multinationals: Measurement matters! *European Economic Review, 55*(6), 862–875.

Becker, B., Driffield, N., Lancheros, S., & Love, J. H. (2020). The implications of the war for talent. FDI in hot labour markets. *Journal of International Business Policy, 3*, 107–133.

Buch, C. M., & Pierdzioch, C. (2014). Labor market volatility, skills, and financial globalization. *Macroeconomic Dynamics, 18*(5), 1018–1047.

Case, A., & Deaton, A. (2020). *Deaths of despair and the future of capitalism*. Princeton University Press.

Cornelissen, T., Dustmann, C., & Schönberg, U. (2017). Peer effects in the workplace. *American Economic Review, 107*(2), 425–456.

Di Ubaldo, M., Lawless, M., & Siedschlag, I. (2018). *Productivity spillovers from multinational activity to local firms in Ireland* (OECD Productivity Working Papers (2018-16)).

Driffield, N., & Girma, S. (2003). Regional foreign direct investment and wage spillovers: Plant level evidence from the UK electronics industry. *Oxford Bulletin of Economics and Statistics, 65*(4), 453–474.

Fons-Rosen, C., Kalemli-Ozcan, S., Sørensen, B. E., Villegas-Sanchez, C., & Volosovych, V. (2018). *Foreign investment and domestic productivity: Identifying knowledge spillovers and competition effects* (NBER Working Paper 23643).

Furceri, D., Loungani, P., & Ostry, J. D. (2019). The aggregate and distributional effects of financial globalization: Evidence from macro and sectoral data. *Journal of Money, Credit and Banking, 51*, 163–198.

Girma, S., Greenaway, D., & Wakelin, K. (2001). Who benefits from foreign direct investment in the UK? *Scottish Journal of Political Economy, 48*(2), 119–133.

Girma, S., Görg, H., & Kersting, E. (2019). Which boats are lifted by a foreign tide? Direct and indirect wage effects of foreign ownership. *Journal of International Business Studies, 50*(6), 923–947.

Görg, H., & Greenaway, D. (2004). Much ado about nothing? Do domestic firms really benefit from foreign direct investment? *The World Bank Research Observer, 19*(2), 171–197.

Görg, H., & Strobl, E. (2005). Spillovers from foreign firms through worker mobility: An empirical investigation. *Scandinavian Journal of Economics, 107*(4), 693–709.

Görg, H., Strobl, E., & Walsh, F. (2007). Why do foreign-owned firms pay more? The role of on-the-job training. *Review of World Economics, 143*(3), 464–482.

Greenstone, M., Hornbeck, R., & Moretti, E. (2010). Identifying agglomeration spillovers: Evidence from winners and losers of large plant openings. *Journal of Political Economy, 118*(3), 536–598.

Hale, G., & Xu, M. (2016). *FDI effects on the labor market of host countries* (Federal Reserve Bank of San Fransisco Working Paper Series, 2016-25).

Haller, S. A. (2012). Intra-firm trade, exporting, importing, and firm performance. *Canadian Journal of Economics/Revue Canadienne d'économique, 45*(4), 1397–1430.

Haller, S. A. (2014). Do Domestic firms benefit from foreign presence and import competition in Irish services sectors? *The World Economy, 37*(2), 219–243.

Keller, W. (2021). *Knowledge spillovers, trade, and foreign direct investment* (NBER Working Paper 28739).

Kline, P., Petkova, N., Williams, H., & Zidar, O. (2019). Who profits from patents? Rent-sharing at innovative firms. *The Quarterly Journal of Economics, 134*(3), 1343–1404.

Manski, C. F. (1993). Identification of endogenous social effects: The reflection problem. *The Review of Economic Studies, 60*(3), 531–542.

Markusen, J. R., & Trofimenko, N. (2009). Teaching locals new tricks: Foreign experts as a channel of knowledge transfers. *Journal of Development Economics, 88*(1), 120–131.

Martins, P. S. (2011). Paying more to hire the best? Foreign firms, wages, and worker mobility. *Economic Inquiry, 49*(2), 349–363.

Mas, A., & Moretti, E. (2009). Peers at work. *American Economic Review, 99*(1), 112–45.

OECD (2021). *FDI qualities assessment of Ireland*. OECD.
Papa, J., Rehill, L., & O'Connor, B. (2021). Patterns of firm-level productivity in Ireland. *The Economic and Social Review, 52*(3, Autumn), 241–268.
Poole, J. P. (2013). Knowledge transfers from multinational to domestic firms: Evidence from worker mobility. *Review of Economics and Statistics, 95*(2), 393–406.
Rodrik, D. (2021). Why does globalization fuel populism? Economics, culture, and the rise of right-wing populism. *Annual Review of Economics, 13*, 133–170.
Ruane, F., & Uğur, A. (2004). Foreign direct investment and productivity spillovers in Irish manufacturing industry: Evidence from plant level panel data. *International Journal of the Economics of Business, 12*(1), 53–66.
Serafinelli, M. (2019). "Good'' firms, worker flows, and local productivity. *Journal of Labor Economics, 37*(3), 747–792.
Setzler, B., & Tintelnot, F. (2021). The effects of foreign multinationals on workers and firms in the united states. *The Quarterly Journal of Economics, 136*(3), 1943–1991.
Smarzynska Javorcik, B. (2004). Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review, 94*(3), 605–627.
Smeets, R. (2008). Collecting the pieces of the FDI knowledge spillovers puzzle. *The World Bank Research Observer, 23*(2), 107–138.
Stoyanov, A., & Zubanov, N. (2012). Productivity spillovers across firms through worker mobility. *American Economic Journal: Applied Economics, 4*(2), 168–98.