The impact of multinational enterprises in local labor markets: What drives the effect on domestic workers?

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Abstract

This paper investigates how the presence of multinational enterprises (MNEs) in a local labour market affects wages and employment in domestic firms. Specifically, I focus on the (local) labour demand by MNEs and I use the variation of the share of migrants hired by MNEs to investigate to what extent labour demand or spillovers drive potential wage effects. To circumvent endogeneity of MNE location choice, I use the variation of industry structures across local labour markets to construct a shift-share variable. Using administrative data of the universe of workers and firms from the Netherlands, I find a positive, sizeable and statistically significant effect of MNE presence on wages for newly hired workers in domestic firms. This effect is stronger in local labour markets where MNEs hire relatively few migrants (relatively more domestic workers), suggesting that labour demand drives the positive effect of MNEs on domestic wages.

Keywords: Multinational enterprises, labor migration, wage setting, shift-share instrument

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Results in this paper are based on non-public microdata from Statistics Netherlands (CBS). In principle, part of these microdata are accessible for statistical and scientific research. For further information: microdata@cbs.nl.
1 Introduction

The number of multinational enterprises (MNEs) and their foreign affiliates have been increasing worldwide (OECD (2018)). There is substantial evidence in the literature that MNEs are more productive than a domestic firm and pay higher wages for the same worker.\footnote{For a literature review, see Antrás and Yeaple (2014), Gorg and Strobl (2001) for MNE productivity and Hijzen et al. (2013) for direct wage effects.} In the Netherlands, around 1\% of registered firms are foreign-owned, but account for an employment share of 16\% and around 30\% of value added (CBS (2022)). This shows how few firms account for a substantial share of economic activity and may have a considerable impact on the general economy and especially on the labour market. With this prominence in the general economy, it is important to also investigate indirect wage effects on the local level.

In this paper, I build on the scarce but recent contributions on the effect of MNEs on domestic wages and employment. I investigate the mechanisms of how these effects materialize. I argue that the effect of MNEs on domestic firms may differ according to where MNEs hire their labor force - from the domestic or foreign labour market. Depending on this composition, local labour demand for domestic workers or (productivity) spillovers could be driving the effect on domestic firms.

I examine to what extent employment of foreign workers (migrants) and in turn labour demand for domestic workers in MNEs drives this effect. Several studies (e.g. Setzler and Tintelnot (2021), Alfaro-Urena, Manelici, and Vasquez (2019), Balsvik, Fitzgerald, and Haller (2023)) have found (positive) effects of MNE presence on wage of domestic workers in local labour markets. I seek to extend on this literature and explore how this effect is driven by the MNE’s capacity to hire from other locations.

I argue that an important difference between MNEs and domestic owned firms is the connection with the foreign labour market. Domestic firms likely face relatively higher search costs for recruiting internationally than MNEs, as MNEs are by definition operating in several locations. An employment expansion of MNEs in a local labour market can affect wages for workers in domestic firms via two main channels. Firstly, labour demand and wage competition between firms and secondly, productivity spillovers. When an MNE expands its labor force, it generates additional labour demand in the local labour market. Additionally, it is documented in the literature that MNEs pay a wage premium. Hence, this may drive up wages in the domestic labour market on the one hand through a mechanical labour demand effect but on the other hand domestic firms may bid up wages to compete with MNEs for workers, as shown in the framework of an on-the-job search model by Balsvik,
Fitzgerald, and Haller (2023). However, as MNEs are more internationally connected they may be able to hire foreign workers more easily and less costly. Therefore, the share of foreign workers may be an important driver of the indirect wage effect. On the other hand, productivity spillovers may occur via technological adaption or knowledge exchange. In the case of positive productivity spillovers, domestic firms improve their productivity and hence may be able to pay higher wages. Assuming that technological or knowledge spillovers occur whenever there are MNEs in the local labour market, these spillovers should be mostly unrelated to the amount of migrants in MNEs.

To empirically evaluate how migrant employment in MNEs affects the indirect wage effect, I exploit the spatial variation of MNEs per industry to estimate the effect of MNE exposure on wages for workers in domestic firms. To circumvent endogeneity of MNE location choice, I use a shift-share variable for the change in the MNE employment share in a local labour market using industry shares and national level changes of the foreign employment share similar to the approach in Setzler and Tintelnot (2021) and Alfaro-Urena, Manelici, and Vasquez (2019). I find a sizeable positive and statistically significant effect of MNE exposure (measured by the employment share in a local labour market) on wages for newly hired workers in domestic firms. Moreover, I find that this effect is relatively stronger for local labour markets where MNE hire few migrants (and many domestic workers). This suggests that the wage impact on domestic workers is (partly) driven by additional labour demand instead of solely productivity spillovers.

MNEs are different from (large) domestic firms, and therefore worth studying, for three main reasons. Firstly, as established theoretically by Helpman, Melitz, and Yeaple (2004), only the most productive firms can export and expand. This implies that MNEs are on average more productive than domestic firms. Secondly, it is well documented across countries that MNEs pay higher wages. The indirect (wage) effect on workers in local labour markets is however not fully understood. Lastly, as argued by Larch and Lechthaler (2011), MNEs are by definition more internationally connected and hence have access to a larger pool of human resources. This connection may simplify foreign recruitment by reducing search costs. This point is especially salient in the context of free mobility of labour in the European Union.

This paper speaks to the literature on labour market impacts of multinational and globally interconnected firms (as summarized in Bernard et al. (2018), Schroeder (2020)). There is substantial evidence on productivity and wages in foreign owned and multinational firms (Antràs and Yeaple (2014) for a review of multinational firms, Helpman, Itskhoki,  

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2See Martins (2004) and Girma and Görg (2007) for an overview of the literature on MNE wage premia.
and Redding (2011) for theory of trade and labor markets, Görg and Görlich (2011) for a literature review on direct wage effects and Javorcik (2015) for FDI and job quality).

A small but growing strand of literature investigates indirect labour market effects of MNEs. Overall, most studies find a positive wage effect of MNEs on domestic wages, although the magnitude varies across settings. These include Hijzen et al. (2013) for wage effects upon foreign acquisition in Germany, Portugal, England, Brazil and Indonesia; Alfaro-Urena, Manelici, and Vasquez (2019) for labour market effects in Costa Rica and Setzler and Tintelnot (2021) in the US respectively; Rösch et al. (2022) for a decomposition of the foreign acquisition premium. However, it is yet not clear what channel drives this wage impact.

The main contribution of this study is to examine how MNE exposure affects wages for workers in domestic firms and through which channel. I exploit the heterogeneity in where MNEs hire from to investigate to what extent labour demand by MNEs drives wage growth for domestic workers.

The paper is organized as follows. Section 2 gives an overview of the data and descriptive statistics on MNEs in the Netherlands. Section 3 explains the approach of using a shift-share variable to estimate indirect wage effects. Section 4 presents results for indirect wage effects of MNE exposure in local labour markets. Lastly, Section 5 concludes.

## 2 Data

I use matched employer-employee data from Statistics Netherlands covering the universe of firms and workers in the Netherlands. Firm level data is derived from the Dutch firm registry and foreign affiliate statistics (FATS) and covers firm structure, location, ownership status, sector and number of employees per firm. The ownership status indicates if a firm is (in majority) domestic or foreign owned. I match the firm registry data with an employment data set covering employment spells, wages and working hours of all employees in the Netherlands. Additionally, I match demographic characteristics for the entire population and migration movements for all immigrants in the Netherlands. The matched sample spans the years 2006 to 2021 and contains 70% of firms and 97% of all employees.

Next, I construct a sample consisting of privately owned firms (excluding self employed workers). Furthermore, I only consider firms that are observed for at least two years.

3 Algemeene Bedrijven Register (ABR)

4 The definition of ownership status and Ultimate Controlling Unit (UCI) is harmonized with Eurostat Foreign Affiliate Statistics manual. A UCI is defined as "the institutional unit, proceeding up an affiliate’s chain of control, which is not controlled by another institutional unit", including but not limited to owning a controlling share of voting rights. Country of UCI is defined as "the country of residence of the UCI". 
as I estimate changes of employment and wages. Moreover, I focus on market-oriented firms and exclude firms which are classified as main activity either public administration, education, health or arts. Additionally, I only consider firms with at least one employee at any point in time to avoid 'postbox' firms that are registered in the Netherlands potentially for tax reasons, but do not contribute to economic activity. I assign employees to a primary employer by their highest income in a given year. I calculate the hourly wage based on their taxable income for the time that they are employed. Then I average hourly wages of employees by firm. The main outcomes of interest will be on the local labour market level. When referring to local labour market outcomes, I aggregate firm level average wages by calculating a weighted average by firm shares on the local labour market level. The resulting sample covers 70% of all firm identifiers in the firm registry and around 97% of all employees in the Netherlands.

2.1 Descriptive statistics

Firm characteristics

In the analysis, I focus on foreign owned multinationals as opposed to Dutch multinationals. I define a foreign multinational firm as a firm that is foreign owned with at least one foreign affiliate and that has at least one employee in the Netherlands. The sample contains on average an annual stock of 5,410 foreign-owned firms and 224,615 domestic, non-multinational firms. Over the sample period, both the total number for foreign-owned firms and the total stock of employment in foreign-owned firms has increased substantially, while the number and employment in domestic-owned firms has changed relatively little, see Figure 1. This is reflected in the increase in the share for foreign employment across market sectors and regions (see A.4 in the Appendix).

I document three main differences between foreign-owned and domestic firms in table 1: Firstly, foreign owned firms grow faster in terms of employment than domestic firms. While the average employment size of foreign and domestic firms is similar in the first year of observation, foreign firms are around thrice as big as domestic firms after three years, employing on average 619 people. Secondly, foreign-owned firms hire more migrants than domestic firms. In the first year of observation, the average fraction of migrants in a foreign firm is around 25% of all employees, while the stock of employees in a domestic firm consists of slightly more than 5% migrants. Thirdly, foreign owned firms pay on average higher wages and bonuses to their employees. The (simple) average hourly wage is around 8.6% higher and the average bonus payment is around 77% higher in foreign firms compared to domestic firms of similar size.
Across sectors, foreign and domestic firms locate mainly in similar regions. The share of foreign and domestic firms per region is highly correlated (0.95). Most firms are settled in the capital (Amsterdam) and surroundings or in places that tend to be more populated. However, it seems that this spatial allocation is roughly stable. Considering the 5 year change in the stock of firms, there does not seem to be systemic relation in the change of domestic and foreign firms (see Figure A.1 and Figure A.2 in the Appendix). However, economic activity is spatially distributed (see Figure A.4 in the Appendix). Firms from different sectors are settled in different regions. For example, while firms in the services sector settle mainly in the urban centers, firms active in the wholesale and retail sector are more dispersed across space.

**Local labour markets**

The main analysis will be carried out on the local labour market level. I construct a local labour market as the interaction of a 'labour market region' (from Statistics Netherlands, see Figure B.5 in the Appendix) and the market sector (industry, services, wholesale, utilities). Each local labour market contains between 8 and 30 industries, defined as 2-digit industry classifications (see Table C.1 in the appendix for a breakdown of industries and sectors). With 35 regions and 4 market sectors, this yields up to 140 local labour markets.

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5. Firm share per region $\frac{\text{number of foreign firms in region}}{\text{total number of foreign firms}}$, capturing what fraction of firms are settled in a specific region.
Table 1: Descriptive statistics for foreign-owned and domestic firms

<table>
<thead>
<tr>
<th></th>
<th>Domestic</th>
<th>Foreign</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg number of employees (year 1)</td>
<td>309</td>
<td>224</td>
<td>−133 (−)</td>
</tr>
<tr>
<td>Avg number of employees (year 2)</td>
<td>290</td>
<td>452</td>
<td>237 ***</td>
</tr>
<tr>
<td>Avg number of employees (year 3)</td>
<td>265</td>
<td>619</td>
<td>402 ***</td>
</tr>
<tr>
<td>Fraction of migrants (year 1)</td>
<td>5.2%</td>
<td>24.8%</td>
<td>17.4 ***</td>
</tr>
<tr>
<td>Fraction of new migrants (year 1)</td>
<td>0.99%</td>
<td>6.8%</td>
<td>17.4 ***</td>
</tr>
<tr>
<td>Avg wage per employee (year 1)</td>
<td>27 292 €</td>
<td>27 698 €</td>
<td>2354 ***</td>
</tr>
<tr>
<td>Avg bonus per employee (year 1)</td>
<td>2 352 €</td>
<td>4 174 €</td>
<td>2055 ***</td>
</tr>
</tbody>
</table>

Note: Averages over firms by ownership status. Migrants are defined as non-Dutch employees with previous residence abroad. Average wages and bonuses are not adjusted for employee composition in a firm. Difference is based on a t-test, in a regression of a foreign ownership dummy and including year FE and controlling for firm size bins. Sample as described in Section 2.

The median local labour market contains around 150 firm establishments and with around 6000 employees. Table 2 shows the average stock of firms and employment per market sector per year. Firstly, the 'services' sector is the largest in terms of both number and firms and employment, regardless of the ownership status. Secondly, however, the sector 'Industry' is the largest in terms of the employment share in foreign firms. While both the number of firms and employment per local labour markets vary substantially across local labour markets, the ranking of local labour markets in terms of size is roughly constant. This can be interpreted as a sign that local labour markets have similar levels of amenities or unobserved characteristics over time.

Table 2: Average stock of firms and employment by market sector

<table>
<thead>
<tr>
<th>Market sector</th>
<th>Avg. number of firms</th>
<th>Avg. fraction of foreign firms</th>
<th>Avg. employment in foreign</th>
<th>Avg. employment in domestic</th>
<th>Avg. fraction of employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>foreign</td>
<td>domestic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>877</td>
<td>20 242</td>
<td>4.2%</td>
<td>150 741</td>
<td>683 966</td>
</tr>
<tr>
<td>Wholesale</td>
<td>2 264</td>
<td>52 251</td>
<td>4.3%</td>
<td>243 798</td>
<td>1 432 998</td>
</tr>
<tr>
<td>Services</td>
<td>2 067</td>
<td>138 812</td>
<td>1.4%</td>
<td>258 655</td>
<td>2 033 217</td>
</tr>
<tr>
<td>Utilities</td>
<td>202</td>
<td>18 720</td>
<td>1.1%</td>
<td>26 591</td>
<td>352 918</td>
</tr>
</tbody>
</table>

Note: The table shows the average stock of the number of firms by ownership and employment per type of firms by market sector. The average is calculated over all local labour markets in a market sector and over the years 2006 - 2020. The average fraction of foreign firms (foreign employment) is calculated as the average of annual foreign firm share (number of foreign-owned firms relative to all firms in a given market sector) across years and employment in foreign firms relative to total employment respectively. Market sectors are defined in Table C.1.
3 Empirical strategy

The main analysis focuses on estimating the (indirect) wage effect of an increase in MNE exposure for workers in domestic firms within the same local labour market. To estimate the indirect wage effect, I relate the change in MNE exposure to the change in wages for workers in domestic firms in a local labour market. In other words, I examine how a stronger presence of MNEs in a local labour market changes average wages in domestic firms. I define exposure of MNEs as the employment share of MNEs in a local labour market. This concept captures the relevance of MNE employment within the local labour market.

I argue that the expansion of MNE employment in local labour markets can affect wages in domestic firms through two main channels: (increase in) labour demand and productivity spillovers. To disentangle how this indirect wage effect is driven by the labour demand for domestic workers, I use the variation in local and foreign workers hired by MNEs. If labour demand is a relevant factor in the change of local wages, I expect heterogeneous effects in local labour markets with high and low shares of migrants hired. If, however, productivity spillovers are the main reason for indirect wage effects, the effect should be similar regardless of the share of foreign workers hired. I stratify local labour markets by the tercile of migrants hired in foreign owned firms in a given year.

As firm location choice is potentially endogenous to labour market conditions, I instrument the change in MNE exposure using the variation in local industry structures and the national level change in MNE exposure. This identification strategy is applied in a similar setting by Setzler and Tintelnot (2021) who study indirect wage effects of multinational enterprises in the US. Conceptually, the shift share instrument distributes national level industry shocks by the shares local industry structure. For example, if the financial industry takes a larger share of employment in Amsterdam than in Rotterdam, a national change in foreign employment in the financial sector is more likely to occur in Amsterdam than in Rotterdam.

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6 This argument holds with the notion that the presence of an MNE would induce positive spillovers. This could be either through agglomeration effects or by domestic firms adapting production processes.
7 Shift-share instruments are also commonly used in other strands of literature, for example immigration (Card (2001)) or trade (Autor et al. (2014)).
8 For an extensive explanation of the shift-share instrument, see Goldsmith-Pinkham, Sorkin, and Swift (2020) and Bartik (1991).
Shift-Share Instrument

I regress the change in the outcome \( y \) on the change in MNE intensity.\(^9\) If a change in MNE intensity in a local labour market \( r \) in time period \( t \) affects the change the outcome, this is captured by the coefficient \( \beta \) in the following specification.

\[
\log(y_{r,t}) - \log(y_{r,t-1}) = \beta \left( \log(x_{r,t}^F) - \log(x_{r,t-1}^F) \right) + \varepsilon_{r,t} \tag{1}
\]

where \( x_{r,t}^F \) stands for the employment share in foreign firms in local labour market \( r \) and time \( t \). The outcome \( y_{r,t} \) is the wage for workers in domestic firms in local labour market \( r \) and time \( t \).

\[
x_{r,t}^F = \frac{L_{r,t}^F}{L_{r,t}^D} \tag{2}
\]

where \( L_{r,t}^F \) and \( L_{r,t}^D \) stand for the number of employees in foreign- and domestic-owned firms respectively.

The change in the foreign employment share may be endogenous due to selection of firms into local labour markets. Therefore, I use a shift-share variable with the industry employment shares and national level growth rate of the foreign employment share \( (g_{k,t}) \). I compute the national level growth rate as a leave-one-out and calculate national growth for all regions except the region of interest \( (\not r) \).

\[
\hat{B}_{r,t} = \sum_k \left( \frac{L_{r,k,t-1}}{L_{r,t-1}} \times g_{k,t,\not r} \right)
\]

where \( L_{r,k,t} \) stands for total employment (in all firms) in local labour market \( r \), industry \( k \) and year \( t \).

For a local labour market \( r \) in time \( t \), the variable predicts the change in the employment share by summing over the national industry level year-on-year changes in foreign employment share ("shifts" \( g_{k,t} \)) weighted by industry employment shares in the local labour market ("shares"). In this application, industry employment shares capture the relative importance of each industry in the local labour market. The national level industry shift is then the change in foreign employment share in an industry but across all regions.

\(^9\)All changes are defined as log differences
Identification assumptions

As outlined in Goldsmith-Pinkham, Sorkin, and Swift (2020), the idea of the shift-share variable is based on a pooled exposure design, where the shares capture how much each unit is affected by a common (national level) shock. In this setting, industry employment shares reflect the local industry structure. In the framework of the shift-share variable, the shares distribute the national level growth to local labour markets. Goldsmith-Pinkham, Sorkin, and Swift (2020) argue that identification should come from the exogeneity of the shares. Importantly, they point out that the shares need to be uncorrelated with the changes in the outcome, while a correlation of the shares with the level of the outcome does not pose a threat to identification.

In relation to this application, local industry structure need to be uncorrelated with future wage changes. As the industry structure weighs the exposure to the shift, the identifying assumption is that there are no other shocks correlated with the shares.

4 Results

4.1 Main results: domestic wages

The main results refer to the average wage of newly hired employees in domestic firms as an outcome. The reason for focusing on newly hired employees is that wages are likely more flexible as they can be negotiated upon the start of employment. In case of an expansion of MNEs in a local labour market, MNEs exert additional labour demand for domestic workers. Moreover, domestic firms may want to adjust their wage offers upwards to compete with MNEs. First, I present results of the shift-share instrument for the entire sample and after that I refer to the results by share of migrants hired in foreign firms.

Table 3 shows the results for the full sample of local labour markets. The table contains the coefficients from the second stage of the shift-share instrumental variable regression. The results reflect a positive effect of a change in the foreign employment share (MNE intensity) on the average wage for workers in domestic firms. In the simplest specification (first column), if the employment share of foreign firms grows by one percent, the average wage of new workers in domestic firms increases by 0.024%. Allowing for growth rates to vary by year, this effect is even stronger with a magnitude of 0.034% (column 2). These

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10 Goldsmith-Pinkham, Sorkin, and Swift (2020) show that the two-stage least squares estimator with the shift-share variable is numerically equivalent to a GMM estimator using the shares as an instrument the shifts as a weight matrix.
estimated effects are sizeable considering that average wage growth for new workers in domestic firms is around 3% per year, across all local labour markets and years.

<table>
<thead>
<tr>
<th>Outcome: $\Delta$ wage, new workers in domestic firms</th>
<th>Full sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSIV</td>
<td>0.024**</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.046***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
</tr>
<tr>
<td>Year FE x</td>
<td>x</td>
</tr>
<tr>
<td>LLM FE x</td>
<td></td>
</tr>
<tr>
<td>R$^2$</td>
<td>0.005</td>
</tr>
<tr>
<td>N</td>
<td>1199</td>
</tr>
</tbody>
</table>

Table 3: Results from second stage shift-share variable regression

Note: The table shows the coefficients from the second stage using the predicted values from the shift-share instrument based on industry employment shares and the national change in the foreign employment share (‘SSIV’ in the table). The first stage regresses the change in the employment share on the shift-share term, yielding a positive and significant coefficient of 0.682 with an F-statistic of 578. The unit of observation is the local labour market. Standard errors in parenthesis.

The positive effect of foreign firm exposure in a local labour market on wages for new workers in domestic firms can be rationalized by two main channels: labour demand effects and productivity spillovers. In the first channel, foreign firms exert additional labour demand for domestic labour, if they hire from the local labour market. Firstly, this increases wages mechanically via an increase in labour demand. Secondly, if domestic firms compete with foreign firms for (skilled) employees, this may induce domestic firms to increase their wages to attract and retain (skilled) employees. The second channel refers to productivity spillovers from foreign to domestic firms. The main argument is that foreign-owned firms are more productive than domestic owned firms (e.g. in terms of knowledge, for example Poole (2013) and Balsvik (2011)). Productivity spillovers can occur for example via technological spillovers or worker mobility. As foreign firms become more prevalent in a local labour market, domestic firms may become more productive and hence are able to pay their employees higher wages.

To disentangle the main channels, I stratify the sample by the share of migrants newly hired in foreign firms. The hypothesis is that the more migrants are hired in foreign firms in a given year, the less an expansion of foreign firms affects wages for domestic workers.
through excess labour demand. If the amount of foreign labour is relevant via the labour demand channel, I expect to see heterogeneity of the indirect wage effect. If, however, productivity spillovers are the main driver, it is unlikely that the effect is heterogeneous.

<table>
<thead>
<tr>
<th>share of migrants at foreign firms:</th>
<th>low</th>
<th>medium</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSIV</td>
<td>0.040** (0.020)</td>
<td>0.031** (0.015)</td>
<td>0.025 (0.027)</td>
</tr>
<tr>
<td>Intercept</td>
<td>−0.023 (0.352)</td>
<td>0.12 (0.11)</td>
<td>0.235 (0.375)</td>
</tr>
<tr>
<td>year FE</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>R²</td>
<td>0.217</td>
<td>0.206</td>
<td>0.187</td>
</tr>
<tr>
<td>N</td>
<td>357</td>
<td>471</td>
<td>355</td>
</tr>
</tbody>
</table>

Table 4: Results from second stage shift-share instrumental variable regression, stratified by terciles of migrants hired

Note: The table shows the coefficients from the second stage using the predicted values from the shift-share instrument based on industry employment shares and the national change in the foreign employment share. The first stage regresses the change in the employment share on the shift-share term, yielding a positive and significant coefficient of 0.682 with an F-statistic of 578.

The columns show the second stage results stratified by the fraction of migrants relative to all new hires in foreign firms per year. "Low": fraction \( \leq \) 30th percentile, "high": fraction \( \geq \) 70th percentile. Standard errors in parenthesis.

Table 4 shows the coefficients of the second stage regression stratified by the share of migrants relative to new hires in foreign firms. The results suggest that the labour demand channel matters for the indirect wage effect: The indirect wage effect is stronger in local labour markets where foreign firms hire a relatively small fraction of migrants and hence relatively more domestic workers. On the other hand, the coefficient capturing the indirect wage effect is smaller in magnitude and not significantly different from zero in local labour markets where the fraction of migrants in newly hired employees at foreign firms is relatively high.

Overall, the results suggest a positive impact of MNE exposure on wages for new workers in domestic firms. This effect is stronger in local labour markets where MNEs hire a relatively low fraction of migrants. This heterogeneity suggests that hiring foreign labour partially drive the indirect wage effect via the labour demand channel in a local labour market. While productivity spillovers may contribute to the indirect wage effect of foreign firms, they are likely to materialize in the medium to long run.
5 Summary

This paper examines how the multinational enterprises (MNE) affect wages for workers in domestic firms. Building on the scarce evidence of indirect wage effects from MNEs, I examine what drives the effect on domestic workers. I exploit the variation of foreign workers hired by MNEs to investigate whether labour demand or spillovers drive the wage effect on domestic workers.

I argue that MNEs are by definition more internationally connected and hence may be able to recruit from the foreign labour market more easily and less costly. The more foreign labour MNEs hire - and hence relatively less domestic labour - the less additional demand for domestic workers they exert in a local labour market. The amount of additional labour demand by MNEs may drive up wages in domestic firms through a mechanical effect and by domestic firms bidding up wages to compete for (skilled) workers. If this is a driver for the indirect wage effect on workers in domestic firms, the effect is expected to vary with the share of migrants in local labour markets. If, however, productivity spillovers are the main driver of the indirect wage effect, the impact is unlikely to be associated with the share of migrants in the local labour market.

I employ a shift-share instrumental variable strategy exploiting the variation of industry structures and the change in the employment shares of MNEs per local labour markets. I find a positive effect of the change in MNE exposure on the wage growth of workers in domestic firms. Next, I stratify by the share of migrants hired in MNEs to examine how labour demand for foreign and domestic workers is associated with the indirect effect. I find that the indirect effect is larger for local labour markets where MNEs hire relatively few migrants and hence relatively more domestic workers. This suggests that the labour demand channel does play a role in the indirect wage effect of MNE presence in local labour markets on wages of workers in domestic firms.
References


A Additional descriptive charts

Figure A.1: Share of domestic and foreign firms by region and year

Note: The chart shows the fraction of the stock of firms per region, relative to all firms in NL. Market-oriented sectors (NACE A-U). Correlation between foreign and domestic firm shares is 0.95.

Figure A.2: 5 year change of the stock of firms.

Note: The chart shows the 5 year change of the stock of firms per region. The correlation between the change rates is 0.2.
Figure A.3: Fraction of foreign firms per labour market region and market sector (2022)

Note: The chart shows the fraction of foreign firms relative to all firms by labour market region in the Netherlands in 2022. For each of the 35 labour market region, I calculate the total number of foreign firms and divide by the total number of firms in a given year.
Figure A.4: Share of foreign firms per local labour market

*Note:* The chart shows the fraction of foreign firms by market sector. Each line represents a local labour market.
B Labour market regions in the Netherlands

Note: LHS: Labour market regions in the Netherlands. These are defined by the Uitvoeringsinstituut Werknemersverzekeringen (Institute for Employee Insurance) and are on a geographical level between municipality and provinces. RHS: OECD defined 35 commuting zones, where a "commuting zone is composed of the local administrative units for which at least 15% of their workforce commute to the city.
Source: OECD functional urban areas

Figure B.5: Labour market regions in the Netherlands (2022) and OECD Functional Urban Areas
### Sectors & Industries

<table>
<thead>
<tr>
<th>Market sector</th>
<th>NACE code (Industry)</th>
<th>Number of 2digit sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Agriculture, forestry and fishing</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>Mining and quarrying</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>Manufacturing</td>
<td>24</td>
</tr>
<tr>
<td>Utilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Electricity, gas, steam and air conditioning supply</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>Water supply; sewerage; waste management and remediation activities</td>
<td>4</td>
</tr>
<tr>
<td>F</td>
<td>Construction</td>
<td>3</td>
</tr>
<tr>
<td>Wholesale and transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Wholesale and retail trade</td>
<td>3</td>
</tr>
<tr>
<td>H</td>
<td>Transporting and storage</td>
<td>5</td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Accommodation and Food Services</td>
<td>2</td>
</tr>
<tr>
<td>J</td>
<td>Information and communication</td>
<td>6</td>
</tr>
<tr>
<td>K</td>
<td>Financial and Insurance activities</td>
<td>3</td>
</tr>
<tr>
<td>L</td>
<td>Real Estate</td>
<td>1</td>
</tr>
<tr>
<td>M</td>
<td>Professional Scientific and Technical Activities</td>
<td>7</td>
</tr>
<tr>
<td>N</td>
<td>Administrative and Support service activities</td>
<td>6</td>
</tr>
</tbody>
</table>

Table C.1: Market sectors, NACE codes and industries

*Note:* The table shows the correspondence of market sectors, NACE codes and 2 digit industry codes. NACE codes and description refer to the official classification (Source: European Commission). The number of 2 digit industry codes refer to the sample in the firms registry from CBS
D Description of datasets

This research is based on administrative, population wide data from Statistics Netherlands (CBS). Several datasets are merged based on firm identifiers (BE ID) or individual identifiers (RINPERSON). This creates a linked employer-employee dataset for the years 2006 - 2022.

D.1 Variables in firm registry

Sources. The dataset ABR (Algemeen Bedrijven Register) contains all registered firms that are active in the Netherlands. The source is the basic firm registry (Basis Bedrijvenregister (BBR)), the tax authorities (Belastingsdienst) and the Chamber of Commerce (Kamer van Koophandel).\(^{12}\) The firm registry as compiled from these sources is supposed to be complete, including establishments in the Netherlands from foreign firms.\(^{13}\)

Statistical entities. The ABR distinguishes three statistical entities by hierarchy: Company group (ondernemingengroep, OG), company unit (bedrijfseenheid, BE) and local establishment (lokale bedrijfseenheid, LBE).
The first unit, company group, is defined as the actor in financial processes and dictates the legal status and the status of foreign ownership. The second one, company unit, is defined as autonomous and market oriented. It determines the sector activity. The third one, local establishment, is part of a company unit established in a certain location. Statistics such as firm size and performance are available on the BE level. For the establishment level, only the date of commencement (discontinuation) and the location are available.

Statistical events. One or more changes to a statistical unit are collected over a set period and summarized in an “event”. An “event” is defined as an event that affects units, attribute values, or links. An event may involve multiple statistical units and is available on the establishment (LBE), firm (BE) and organisational (OG) level. The following statistical events are distinguished in the ABR: birth of a unit, death of a unit, merger of several units, restructuring of (a) unit(s), demerger of units, breakup of units, combination of birth and death, takeover from one unit to another.

\(^{12}\)As of 2014, a change in the registration rules of the Chamber of Commerce implies that firms only need to be registered for commercial activities where there is a legally regulated registration obligation. This holds for commercial activities which are charged with a price above costs and sold to clients other than family.  
\(^{13}\)Firms that are active in the Netherlands, but do not have an establishment, are not taken in to the registry.
Variables.

<table>
<thead>
<tr>
<th>Statistical entity</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>OG</td>
<td>Date of commencement and discontinuation, OG sector classification</td>
</tr>
<tr>
<td></td>
<td>Date of commencement and discontinuation, Sector of (main) activity,</td>
</tr>
<tr>
<td></td>
<td>Number of employees, Legal status, Number of establishments, Location</td>
</tr>
<tr>
<td></td>
<td>(municipality)</td>
</tr>
<tr>
<td>BE</td>
<td>Date of commencement and discontinuation, Sector of (main) activity,</td>
</tr>
<tr>
<td></td>
<td>Number of employees, Legal status, Number of establishments, Location</td>
</tr>
<tr>
<td></td>
<td>(municipality)</td>
</tr>
<tr>
<td>LBE</td>
<td>Date of commencement and discontinuation, Location (municipality)</td>
</tr>
</tbody>
</table>

Table D.2: Variables per level of hierarchy

**Foreign Affiliates Statistics.** The dataset for foreign affiliate statistics contains data for affiliates of foreign firms in the Netherlands, for the years 2008 - 2018. It can be matched to the firm registry based on the firm identifiers (BE ID). This dataset is key to identify multinational firms. Variables include the sector of activity (NACE Rev 2), country of Ultimate Controlling Unit and firm performance measures, such as turnover, production value, value added, gross operating surplus, gross investment in tangible goods, R&D expenditure.

**D.2 Employer-Employee data**

Linked employer employee data is available for the year 2006 - 2023 and derived from tax records. The dataset contains employment, wages, working hours and a firm identifier for

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14 coordinated with the Eurostat Foreign Affiliate Statistics manual
every employed person on a monthly basis. That way, a complete labour market history of every employee is available and changes across firms can be traced. The individual identifier can be linked to demographic information and migration information. The firm identifier (BE ID) can be matched with the firm registry\textsuperscript{15}.

D.3 Individual level datasets

Individual level data include demographic data, such as date of birth, gender and country of birth, for all individuals that reside legally in the Netherlands since 1995. The migration dataset contains information on every move in and out of the country for individuals: both for natives emigrating and for migrants immigrating, the date and location of previous (future) residence are recorded. It covers the years 1995 - 2022.

\textsuperscript{15}Some firm identifiers from the employee datasets cannot be matched with the firm registry. This happens mainly to small firms (1 employee), firms in the non-financial, non-commercial sectors.