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

Lisa Marie Timm[*]

November 1, 2024

## Abstract

This paper examines the impact of multinational enterprises (MNEs) on wages and employment in domestic firms, using detailed administrative data from the Netherlands. To address endogeneity of firm location choice, I construct a shift-share instrumental variable based on the sectoral composition of local labour markets. I find that an increase in the employment share of MNEs in a region leads to higher wages for newly hired workers in domestic firms, while firm size and profits decline. As a mechanism, I analyze how MNEs' access to foreign labour markets mediates local wage dynamics. Using the share of migrants hired by MNEs as a proxy for their access to the foreign labour market, the results indicate a stronger impact in regions where MNEs hire fewer migrants. This suggests that the wage increase is partly driven by greater demand for local labour.

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

# 1  Introduction

The number of of multinational enterprises (MNEs) and their foreign affiliates has been increasing worldwide (OECD (2018)). There is substantial evidence in the economic literature that MNEs are more productive, larger and pay higher wages for the same worker, compared to domestic firms.[1] With this increasing prominence in the global economy, it is important to investigate how MNEs affect wages and employment in domestic firms. The literature on the economic impact of MNEs commonly distinguishes between a direct and indirect wage effect for workers in MNEs. Direct effect refers to the finding that the same individual receives a higher compensation in an MNE compared to a domestic firms, for example through a wage premium or other amenities. An indirect wage effect is defined as the effect from MNEs on workers in domestic firms via mechanisms on the labour market or product market. Several studies have found positive indirect effects of MNE presence on wage of domestic workers in local labour markets. The key contributions are Setzler and Tintelnot (2021) for the US, Alfaro-Urena, Manelici, and Vasquez (2019) for Costa Rica and Balsvik, Fitzgerald, and Haller (2023) for Norway. All papers find an overall positive effect of MNEs on wages in domestic firms, although magnitudes vary. However, it is still not clear which factors drive an impact of MNEs on domestic firms.

In this paper, I examine how the presence of MNEs affects wages, employment and productivity in domestic firms, and to what extent MNEs' access to the foreign labour market drives this effect. I argue that an important difference between domestic and foreign firms is the ability to hire from abroad - as MNEs by definition operate in several locations, they are likely to have direct access to hire from locations of their subsidiaries. I study firms and local labour markets in the Netherlands, a small open economy and one of the top recipients of FDI inflows across OECD countries (OECD (2024)). There, a small share of foreign-owned (MNEs) account for a disproportionate share of employment and value added: around 1% of registered firms are foreign-owned, but account for an employment share of 16% and around 30% of value added (CBS (2022)). Indeed, I document supporting descriptive evidence that MNEs employ a sizeably larger share of migrants than domestic firms. An important channel through which MNEs affect domestic firms is the demand for local labour. An expansion of MNE activity in a host region, potentially due to a global demand shock or other factors related to global activity, creates excess demand for local workers and hence drives up wages. This is mediated by MNEs' access to the

---

[1]For a literature review of the direct wage effects of MNEs, see Hijzen et al. (2013), for a review of MNE productivity see Gorg and Strobl (2001) and for a synthesis of the international trade literature on MNEs, see Antràs and Yeaple (2014).

foreign labour market: If MNEs hire more migrants, they in turn exert a lower demand for domestic workers. I use a shift-share instrumental variable approach and leverage the industry structure of local labour markets. Additionally, I use the share of migrants hired by MNEs in a local labour market as a proxy for MNEs' access to the foreign labour market.

How do MNEs affect wages and employment in domestic wages? When an MNE expands its labor force, it generates additional labour demand in the local labour market. Assuming an upward sloping labour supply curve, this increase in demand for local workers will increase wages in the local labour market. Moreover, as MNEs are more productive and likely to pay a wage premium, they may improve outside options of domestic workers. As incumbent workers observe vacancies in MNEs, they may bargain up wages in their current position or change employers all together. This wage competition effect is likely to exert upward pressure on wages for domestic workers and therefore augments the positive labour demand effect. I describe this mechanism in detail using an on-the-job search model below. Conversely, MNEs may also absorb a share of the local talent pool, leading to job displacement or wage pressure in less competitive domestic firms. The impact on the wage distribution in domestic firms then depends on which workers are taken over by MNE: If MNEs predominantly poach high-skill or high wage workers, average wages in domestic firms may decline, unless domestic firms can replace the poached workers at a similar wage.

How does access to the foreign labour market play a role? As MNEs are internationally connected they face lower frictions for hiring foreign workers through labour market pooling (as shown theoretically by Larch and Lechthaler (2011)). This is constituted in lower search and screening costs when MNEs hire from a location of a subsidiary. The share of foreign workers affects the strength of the labor demand channel: the more workers MNEs hire from abroad, the less additional labour demand they exert. At the same time, hiring from abroad may reduce the probability that MNEs poach workers from domestic firms as MNEs can fill vacancies by hiring abroad. Therefore, I expect that the wage effect of MNE exposure on domestic firms varies with the share of workers hired from abroad in MNEs.

To address 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 estimate the effects of MNEs for outcomes on the local labour market level and on the firm level. Next, I use the share of migrants hired in MNEs as a proxy for MNEs' access to the foreign labour market, in order to investigate whether the effect of MNEs on domestic firms differs.

On the local labour market level, I find sizeable positive effects of MNEs on wage of workers on domestic firms, suggesting that the presence of MNEs indeed drive up wages.

At the same time, employment and value added in domestic firms decline with an increase in MNE employment share in the same local labour market. This is in line with the concept that workers bargain up their wage at domestic firms, but may not become more productive, resulting in a decline in value added in domestic firms. The decrease in aggregate employment in domestic firms may result from workers moving from domestic firms to MNEs or domestic firms closing down due to heightened competition with MNEs. I find that these effects are heterogeneous by the share of migrants hired by MNEs: the increase in wages for workers in domestic firms is positive in regions where MNEs hire relatively few migrants but is not statistically different from zero in local labour markets where MNEs hire relatively more migrants. This suggests that the wage impact on domestic workers is (partly) driven by additional labour demand. Aggregate employment and aggregate value added decrease more in regions where MNEs hire relatively fewer migrants. The combination of an increase in wages and a decline in employment size and value added is consistent with the concept of wage competition between MNEs and domestic firms: with improved outside options, workers bargain up wages although they do not necessarily improve in productivity. The workers receiving significantly better outside options may move to MNEs, which results in lower aggregate employment in domestic firms.

MNEs are different from (large) domestic firms, and therefore worth studying, for three main reasons: productivity advantages, wage premium, and global interconnection. Firstly, as established 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 beyond economies of scale and internalization advantages. The overview of empirical studies in Bernard et al. (2018) confirms that MNEs are on average more productive than domestic firms across countries of ownership and operation. In this research I examine the labour market consequences for incumbent domestic firms, when these large and productive MNEs in the same region expand.

Secondly, it is well documented across countries that MNEs pay higher wages for the same (type of) worker.[2] This wage premium has been well-documented in both developed and developing countries, though the magnitude and drivers of the premium can vary. In developed countries, such as the United States and those in the European Union, studies have shown that MNEs offer higher wages due to their higher productivity levels, advanced technology, and the need to attract and retain skilled labor (see Heyman, Sjöholm, and Tingvall (2007), Görg and Görlich (2011)). In lower income countries, wage premiums of MNEs are often linked to the need to comply with international standards and corporate

---

[2]See Martins (2004) and Girma and Görg (2007) for an overview of the literature on MNE wage premia.

social responsibility practices. These studies include Aitken, Harrison, and Lipsey (1996) for a comparative study in Mexico and Venzuela, Poole (2013) for positive wage premium in Brasil, and Hijzen et al. (2013) for a comparison of the wage premium across countries. The wage premium paid in MNEs presents an improvement in the outside options form the perspective of an incumbent worker in a domestic firm, an important channel for this study.

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 Alfaro-Urena, Manelici, and Vasquez (2019) for labour market effects in Costa Rica and Setzler and Tintelnot (2021) in the US respectively. However, it is yet not clear what channel drives the impact of MNEs on wage in domestic firms. In this study, I firstly establish that MNEs have a positive impact on wages in domestic firms in the Netherlands. Moreover, I investigate how MNEs' access to the foreign labour market drives this effect. Thirdly, 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 enables MNEs to recruit workers from all location of their subsidiaries and potentially re-allocate the workforce to places in order to increase efficiency.

The channels in this paper relate to a large literature on the economic impact of migration, in the sense of international labour mobility. This literature has explored the impact of migrants on the wage distribution of natives (Card (2001), Ottaviano and Peri (2012) among others), firm performance and regional economic performance (Bernstein et al. (2022), Ottaviano and Peri (2013)). Furthermore, studies find that employing migrants can boost R&D activity (Khanna, Lee, et al. (2018)) and product level innovation (Hiller (2013)). In terms of international connections, recent literature has found that migrants in a firm induce import and export activity (Erbahar and Gençosmanoğlu (2023), Hiller (2013)). Most studies suggest that immigration enhances global connectedness and thereby reduces barriers to trade and facilitates knowledge spillovers. I will return to more literature about migrants and firms when describing descriptive statistics below.

The rest of this paper is organized as follows. Section 2 illustrates how the presence of large, productive (multinational) firms affect wages in domestic firms using an on-the-job search model. Section 3 gives an overview of the data on MNEs in the Netherlands and provides descriptive statistics. Section 4 explains the approach of using a shift-share instrument to estimate indirect wage effects. Section 5 presents results for indirect wage effects of MNE exposure in local labour markets. Lastly, Section 6 concludes.

# 2 Framework: On the job search model

I illustrate how the presence of MNEs affects wages and employment in domestic firms using an on-the-job search model developed by Balsvik, Fitzgerald, and Haller (2023) who build on Cahuc, Postel-Vinay, and Robin (2006). This framework captures the role of outside options for workers, which are critical in understanding wage-setting behaviour and job mobility. Unlike traditional search models, an on-the-job search model accounts for the fact that workers continuously seek better employment opportunities while employed, which allows for endogenous wage competition among firms. In the context of this study, the model illustrates how the presence of large, productive MNEs changes the outside options available to workers in domestic firms. Specifically, when MNEs enter a local labour market, they increase competition for talent, potentially driving up wages and influencing the bargaining power of workers who may threaten to switch employers. By capturing these dynamics, the model helps to explain how MNEs' demand for labour can indirectly affect wage structures, profit an vacancy posting in domestic firms.

In the following, I describe the main features of the model. The goal is to illustrate how MNEs affect the wage distribution, vacancy posting behaviour and profits of domestic firms. Derivations and extensions can be found in Balsvik, Fitzgerald, and Haller (2023).

**Workers**:
Time is discrete. Workers are homogeneous, have linear utility and discount future utility with a discount factor $\beta$. If employed, workers supply one unit of labour for wage $w$, which is a result of bargaining with the employer over the match value and worker's outside options. When employed, workers search for a job with search intensity $s \leq 1$ in every period. If a worker is unemployed, they receive utility $b$ in every period, which can include unemployment benefits and the value of leisure. They search for a job with search intensity 1 as long as being unemployed.

**Firms**:
Firms are heterogeneous in productivity, but produce the same final good with a linear production function. There are two types of firms, domestic and foreign, denoted by subscript $i \in \{D, F\}$. Productivity of a firm $p$ corresponds to the level of output per worker at that firm. A firm starts without workers. It decides how many vacancies $v$ to post and pays a per-period convex cost $c(v)$ with $c(0) = 0$, $c'(v) > 0$ and $c''(v) > 0$. The firm's objective is to maximise the value of the firm's vacancies and their productivity, by posting an optimal number of vacancies $v(p)$. Firms pay entry costs to draw a productivity from a

distribution with cumulative density function $\tilde{\Gamma}_i(p)$ and probability density function $\tilde{\gamma}_i(p)$. By assumption, foreign firms draw their productivity from a distribution with a fatter right tail. This implies that they are in expectation more productive, reflecting evidence from an extensive literature about the productivity advantages of (foreign) MNEs (see above).

The free entry condition that costs equal the expected productivity draw implies that there is a productivity cut-off $\underline{p}$ below which no firm operates as they cannot attract workers. This lower bound is implicitly defined by the utility from unemployment, such that unemployed workers are indifferent between taking an offer from a firm with productivity at the lower bound or remaining unemployed. Given this cutoff $\underline{p}$, the measure of actual entrants of type $i$ is

$$m_i = \frac{\tilde{m}_i}{1 - \tilde{\Gamma}_i(\underline{p})} \tag{1}$$

Firms die with exogenous probability $\delta_f$. In stationary equilibrium, the mass of entrants of type $i$ ($m_i$) equals the firms that exit, $\delta_f M_i$, where $M_i$ is the number of active firms of type $i$. The total number of active firms is $M = M_D + M_F$. From this, it is possible to write out the productivity distribution of all active firms $\gamma(p)$

$$\gamma(p) = \frac{M_D}{M_D + M_F} \left( \frac{\tilde{\gamma}_D(p)}{1 - \tilde{\Gamma}_D(\underline{p})} \right) + \frac{M_F}{M_D + M_F} \left( \frac{\tilde{\gamma}_F(p)}{1 - \tilde{\Gamma}_F(\underline{p})} \right) \tag{2}$$

**Matching:**

Workers and firms meet randomly and workers accept a job if the offer improves the worker's utility (see below). A match is broken in two scenarios: a firm dies with exogenous probability $\delta_f$ or a match between a firm and a worker is broken with exogenous probability $\delta_m$. This yields a separation probability of $\delta = \delta_m + \delta_f - \delta_m \delta_f$. After a match is broken, a worker becomes unemployed for one period and continues to search for a job after.

Given the total number of active firms $M$, the relation between firm level productivity and vacancies $v(p)$ and the productivity distribution of active firms $\delta(p)$, the total number of vacancies is

$$V = M \int_{\underline{p}}^{\bar{p}} v(p)\gamma(p)dp \tag{3}$$

The total number of searching workers is given by the number of unemployed $u$ and the number of employed workers that search on the job,

$$S = u + s(1 - \delta)(1 - u) \tag{4}$$

7

The number of searching workers and the number of vacancies serve as inputs to a constant returns to scale matching function $\mu(S,V)$. This yields the probability that a vacancy matches with a workers $\chi$ and the probability that an unemployed workers meets a vacancy $\lambda$. The probability that an employed workers meets a vacancy is weighted by the search intensity: $\lambda s$

$$\chi = \frac{\mu(S,V)}{V} \tag{5}$$

$$\lambda = \frac{\mu(S,V)}{S} \tag{6}$$

**Bargaining**:

Once a firm and a worker match, they bargain over the wage, following standard Nash bargaining. The worker receives the value of their outside option plus a fraction $\phi$ of the match surplus, which is the value of production minus the value of the worker's outside option. The following illustrates how meeting another firm influences the worker's value function and their own wage. Denote $W(w,p)$ the value to a workers of working for wage $w$ and a firm of productivity $p$. The wage $w(q,p)$ depends on the current firm's productivity $p$ and the productivity of an outside option $q$. For unemployed workers, the wage of working at a firm with productivity $p$ is $w_0(p)$ and $U$ is the value of unemployment. An unemployed worker accepts an offer from firm with productivity $p$ such that[3]

$$W(w_0(p),p) = U + \phi(W(p,p) - U) \tag{7}$$

For employed workers at a firm with productivity $p$ and outside option $q$, there are three possible scenarios upon meeting a firm of productivity $p'$.

First, if the 'new' firm is less productive than the incumbent firm and the productivity is lower than the worker's outside option (i.e. $p' \leq q \leq p$), meeting that firm with productivity $p'$ does not improve the worker's outside option. Hence the worker does not accept the match but does also not bargain.

Second, if the productivity of the 'new' firm is greater than the worker's outside option, but below the productivity of the incumbent firm (i.e. $q < p' \leq p$), the worker stays at the current firm, but receives a new (bargained) wage $w(p',p)$ such that the value is

$$W(w(p',p),p) = W(p',p') + \phi\left(W(p,p) - W(p',p')\right) \tag{8}$$

---

[3]Note that by definition of the productivity cut-off $\underline{p}$, firms always offer acceptable values to unemployed workers and workers always accept job offers.

8

Third, if the productivity of the new firm is larger than the productivity of the incumbent firm ($p < p'$), the worker moves to the new firm and receives a wage corresponding to the new firm's productivity and the updated outside option corresponding to the incumbent firm's productivity

$$W(w(p, p'), p') = W(p, p) + \phi\left(W(p', p') - W(p, p)\right) \tag{9}$$

**Predictions**:

In the following, I briefly describe the intuition of the main results from this model. The focus is on how MNEs affect wage in domestic firms. Further extensions and derivations can be found in Balsvik, Fitzgerald, and Haller (2023). The key difference between domestic and foreign firms is that, by assumption, foreign (multinational) firms are in expectation more productive. This assumption of the productivity advantage of MNEs is in line with substantial evidence discussed above.

When the number of foreign (multinational) firms, $m_F$ increases, the productivity distribution of active firms $\gamma(p)$ shifts to the right. This can be seen from Equation 2, which shows that the productivity distribution of active firms is a mixture of the productivity distribution of domestic firms and of foreign firms, weighted by the share of firms form each type. A right shift in the productivity distribution also increases the total number of vacancies in Equation 3.

The increase in foreign (multinational) firms and the right shift in the productivity distribution improve outside options of incumbent workers. A more attractive outside option, measured by a higher $q$, will put upward pressure on wages as it improves the workers bargaining position within the incumbent firm. With a higher presence of foreign (multinational) firms, workers are more likely to meet high-wage, high-productivity vacancies.

Beyond the wage effect, the right shift in the productivity distribution stemming form the number of foreign (multinational) firms increases the productivity cut off $\underline{p}$. This implies that the least productive firms may cease to operate, as they cannot offer acceptable wages to (unemployed) workers. This will be observed as a decrease in the number of domestic firms. Aggregate employment in domestic firms declines for two reasons: some domestic firms close and some workers from domestic firms may move to foreign (multinational) firms.

This framework is useful to understand how the presence of more productive firms can affect wage setting in domestic firms through outside options. In the following, I will examine how MNEs affect wages and employment in domestic firms in the Netherlands. Furthermore, I will assess how these dynamics are mediated by access to the foreign labour

market, measured by the share of migrants hired by MNEs.

# 3 Data

This paper studies the effect of MNEs on outcomes in domestic firms. This requires data on firm outcomes, as well as individual level data of employees, to be able to track how wages move over time.

I create matched employer-employee data from Statistics Netherlands covering the universe of firms and workers in the Netherlands from 2008 to 2020. Firm level data is derived from the Dutch firm registry (Algemeene Bedrijven Register (ABR)) linked with data on foreign affiliate statistics (FATS). It covers firm structure, location, ownership status, sector and number of employees per firm as well as some balance sheet variables such as value added and turnover on an annual basis. The ownership status indicates if a firm is (by majority) domestic or foreign owned.[4] The firm registry additionally includes the firm type classification that allows to distinguish MNEs. I define a foreign multinational firm as a foreign owned firm that has at least 10 employees at any point in time in the Netherlands. This definition is similar to Antràs and Yeaple (2014) and Caves (2007), defining a multinational enterprise as an enterprise operating establishments in at least two countries. In the analysis, I focus on foreign owned multinationals as opposed to Dutch multinationals and non-multinational firms. The data covers all activity inside the Netherlands, but provides no information regarding activities in other countries.

The employer-employee data is on the monthly level and contains all employment spells of the population, derived from tax information. I select employees aged 18 to 60 that are employed for at least one week within a year. I assign employees to a primary employer by their highest income with an employer in a given year. The main outcome of interest is hourly wage, derived from an employee's taxable income and realized working hours.

Additionally, I match demographic characteristics for the entire population and migration movements for all immigrants in the Netherlands. The migration data include the exact date of registration in the Netherlands as well as the country of previous residence.[5] In this context, I define a migrant as an individual that moves to the Netherlands from abroad during their first employment spell in the Netherlands. Once such an individ-

---

[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".

[5]Individuals that stay at least 4 months in the Netherlands need to register with the municipality upon arrival. This is necessary for access to employment, health care and social services.

|  | Domestic firms | Foreign firms | Employees |
|---|---|---|---|
| Matched data | 684,692 | 23,821 | 12,404,415 |
| Market sectors | 454,593 | 23,713 | 11,863,040 |
| Observed for $\geq 2$ years | 439,460 | 22,879 | 11,839,439 |
| $\geq 10$ employees | 109,537 | 13,344 | 11,409,309 |
| Value added / worker | 109,535 | 13,342 | 11,408,174 |

Table 1: Sample construction for firms

*Note:* The table shows the number of firms by ownership and the total employment (irrespective of the firm type) for the years 2008-2020. Note that "Number of firms" refers to the total number of firm identifiers and "Number of employees" captures the total number of individuals registered as working in those type of firms. Explanation by lines: (1) all matched data, (2) firms classified as sectors in "Manufacturing", "Services", "Wholesale and Retail Trade" as defined in Table **??**, (3) firm identifier is observed for at least 2 years, (4) firm is registered with at least 10 employees in any year, (5) Value added per worker does not exceed the 99.9 percentile of the annual distribution for more than half of the firm's duration.

ual changes jobs within the labour market in the Netherlands, it will be counted in the group 'workers in domestic firms'. This definition, as opposed to defining migrants with a time-invariant term 'foreign born', highlights the flow concept of firms hiring locally versus internationally. Relatedly, I refer to 'domestic workers' or 'workers in domestic firms' as individuals that have been present in the (local) labour market - either by past settlement (native Dutch) or past employment spells (former migrants).

Table 1 shows the steps to select the sample for analysis from the matched employer employee data. I construct a sample consisting of privately owned firms (excluding self employed workers). Moreover, I focus on market-oriented firms in the industries manufacturing, wholesale and services. Furthermore, I only consider firms that are observed for at least two years as the main outcome will be changes in employment and wages. I restrict the sample to active firms with at least 10 employees at any point in time, as I'm interested in medium to large (domestic) firms. While the number of firm identifiers drops substantially by this requirement, the total number of employees declines relatively little. To avoid 'postbox' firms, that register in the Netherlands for tax reasons, I take two steps: Firstly, the employment requirement to capture only active firms. Secondly, I exclude firms with implausibly high value added per worker (> 99.9th percentile) for the majority of operating years. The resulting sample consists of 109,535 domestic firms and 13,342 foreign firms with a combined stock of 11,408,174 employees.

I analyse the impact of multinational firms on two levels: the local labour market and the firm level. Conceptually, a local labour market is a region where most workers work and live, forming a localized economy (see Moretti (2010)). I define local labour markets by a broad sector and an area between municipality and province.[6] I show descriptive

---

[6]Specifically, I use the COROP area defined by Statistics Netherlands. COROP stands for

statistics for the 40 regions in the Netherlands below. I document limited commuting for the chosen regional level, which strengthens the point that the local labour market captures a local economy. Secondly, I can trace employment, wages and productivity measures on the firm level. For multi-establishment firms, the datasets do not contain establishment-specific information, but totals for the oldest (or main) establishment. This is of limited concern, as 70% of firms have one establishment in the Netherlands, such that firm and establishment level largely correspond. Note that the capital income tax, value added tax and personal income tax are set on the national level, hence they do not influence firm or establishment location choice within the Netherlands.

## 3.1   Descriptive statistics

**Firm characteristics**

The sample covers the years 2008 to 2020, and it is unbalanced. On average it contains 6,534 foreign-owned firms and 56,990 domestic firms per year. Figure 1 shows the national distribution of shares by firm ownership for the entire sample period 2008-2020. First, on the national level, both types of firms operate in all sectors. Foreign firms are slightly overrepresented in the overall largest sectors "Wholesale and Retail Trade" and "Manufacturing", as well as "Information, Communication and Technology" (ICT). These are typically sectors that are exposed to international trade or produce tradable goods. Domestic firms constitute a larger share in typically non-tradable sectors such as "Administrative Services", "Professional and Scientific Services" and "Hospitality" (Accommodation and Food Service Activities). These sectors tend to hinge on local knowledge or language requirements, for example in industries like "Legal Services" or "Accounting" that form part of "Professional and Scientific Services".

Over the sample period, 2008 - 2020, 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 2. The top 3 owners of foreign firms are US, Germany and France.

I document main differences between foreign-owned and domestic firms in Table 2: , foreign-owned firms in this sample are more productive in terms of value added per worker. While average value added per worker is 45€ in domestic firms, it is 101€ in foreign owned

---

*Coördinatiecommissie Regionaal Onderzoeksprogramma* (Coordination Commission Regional Research Programme). The COROP area is defined by Statistics Netherlands and is an area between municipality and province level (equivalent to NUTS3). I define 'broad sector' as Manufacturing, Wholesale & Retail trade and Services. This distinction is to broadly limit spillovers between broad sectors within labour markets.
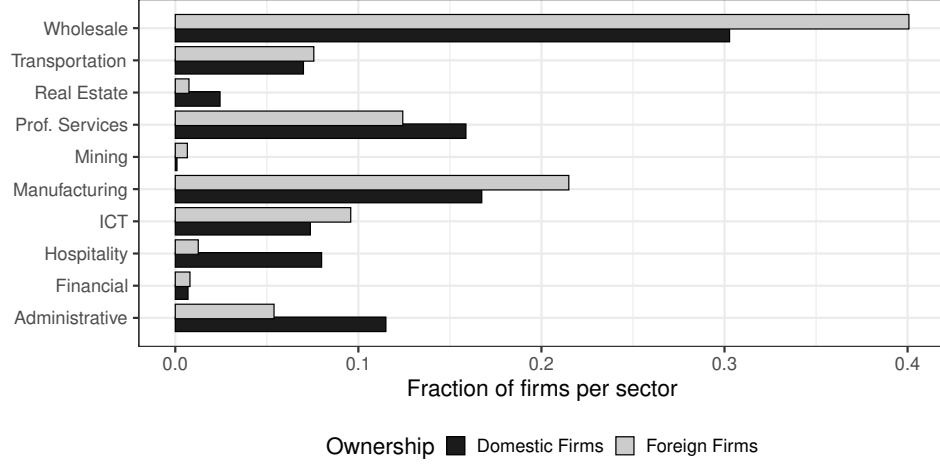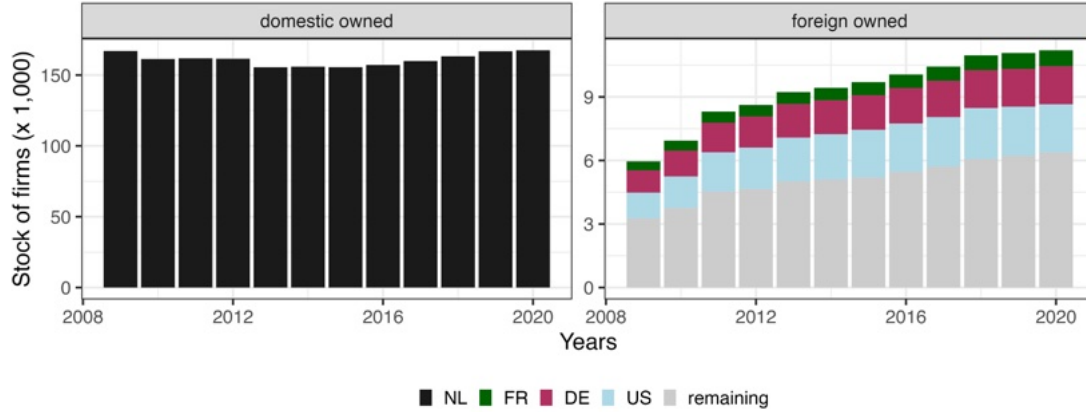
Figure 1: Firm shares by ownership and sector

Figure 2: Stock of firms by ownership status

firms. The difference remains large and significant even after controlling for sector and firm age.

Secondly, foreign owned firms employ on average almost triple the workforce of domestic firms. On average, domestic firms employ 34 workers per year, while the stock of employees is 117 at MNEs. This difference remains when controlling for sector and age of a firm. The largest firms are owned in France, Great Britain and Switzerland, closely followed by the US and Germany. Figure 3 shows the average employment stock by firm ownership. While

|                           | Domestic | Foreign | Difference | N       |
|---------------------------|----------|---------|------------|---------|
| Value added / worker      | 45.2     | 101.4   | 56.3***    | 769,478 |
| Annual stock of employees | 34       | 117     | 83***      | 785,477 |
| Annual number of migrants | 1        | 9       | 8***       | 785,477 |
| Median hourly wages       | 17.5     | 24.6    | 7.1***     | 785,477 |

Table 2: Descriptive statistics for foreign owned MNEs and domestic firms

*Note:* Averages over firms by ownership status, 2008- 2020. Migrants are defined as non-Dutch employees with previous residence abroad. Average wages are not adjusted for employee composition in a firm. Difference is based on a t-test, in a regression of a foreign ownership dummy, controlling for year and firm age. Sample as described in Section 3.

there is some heterogeneity in average firm level outcomes, foreign firms from any country of ownership are larger and more productive than domestic firms.

Thirdly, foreign-owned firms hire more migrants than domestic firms. On average, domestic firms employ 1 migrants, while foreign owned firms employ on average 9. The number of migrants per firm is particularly high in firms owned in the US and France. Conditional on hiring migrants, there seems to be a 'home bias': the firm's country of ownership predicts where a migrant is hired from, i.e. French workers are more likely to be employed in a French owned firm. This home bias in high-skilled migrants in multinational firms is documented for the US by Morales (2023). He incorporates the home bias in a quantitative model by arguing that workers from different countries may have a comparative advantage in a firm if this firm operates with source-country specific technology. This increases migrant's productivity in some firms and also provides an incentive for firms to hire (high-skilled) migrants from the same source country.

Lastly, average hourly wages in foreign owned firms are 40% higher than in domestic firms. While this does not control for employee composition, it is nonetheless an indicator that foreign-owned firms may pay higher wages than domestic owned firms, even after conditioning on firm size, firm age and sector. This is in line with previous theoretical and empirical findings across countries (see for example Navaretti et al. (2004) for an overview).

Why would any firm hire migrants in the first place? In summary, there are four main reasons why firms would choose to hire migrants: Firstly, because foreign workers may possess skills that may not be found (or are in low supply) in the local labour market and may even improve native worker's productivity. A large literature points towards a positive effect of (high-skilled) migration on native's productivity. For example, Peri, Shih, and Sparber (2015) find that an inflow of STEM workers increases native worker's productivity in US cities, and Mitaritonna, Orefice, and Peri (2017) find similarly positive effects on native's productivity in firms and regions in France. In terms of R&D activity, Bernstein
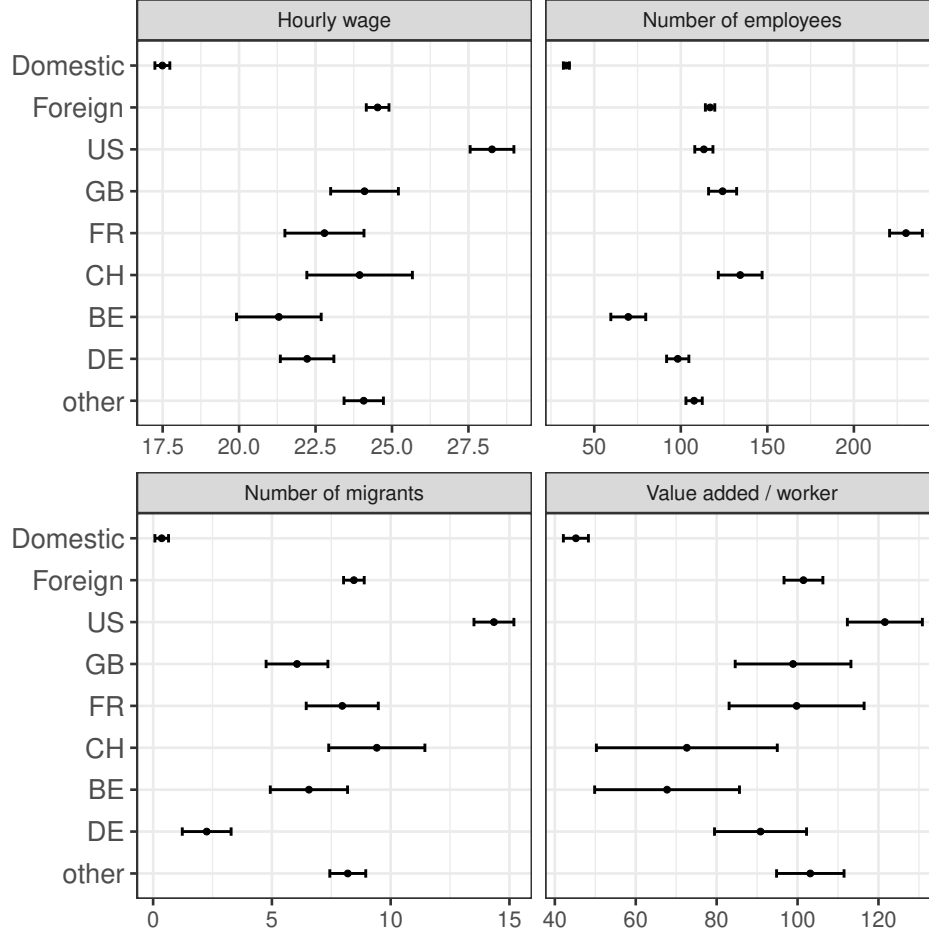
Figure 3: Average firm level outcomes by firm ownership

et al. (2022) shows that (high-skilled) migrants contribute positively both directly and indirectly through (knowledge) spillovers to native workers. For product level innovation, Khanna, Lee, et al. (2018) find a positive effect from high skilled migrants. Similar as in the literature on immigrant's wage effect on natives, it is crucial whether or not migrants are complements or substitutes to native workers (Card (2001), Peri and Sparber (2011)).

Secondly, firms may want to hire migrants for reasons related to intangible connections to foreign product markets and customer bases. On the firm level, some literature indicates that the workforce composition matters for firm activities beyond productivity. For trade, Erbahar and Gençosmanoğlu (2023) finds that firms that hire migrants from a high-income country are also more likely to import from that country, highlighting the role of information

frictions. In Denmark, Hiller (2013) show that both foreign employment and regional immigration is positively related to firm's export activity. In a similar argument, although not directly related to immigration, Patault and Lenoir (2024) show that customer relations may move with managers across firms.

Thirdly, in some cases migrants may be cheaper than the local workforce. In the Netherlands, some high skilled migrants are eligible for a temporary tax reduction. This rule creates an opportunity for the employer to attract high skilled migrants, but may also reduce social security contributions on the employer side. Another reason why some migrants may accept a lower salary compared to natives is that low(er) skilled migrants may have worse outside options than natives, resulting that these migrants are willing to accept a lower wage.

Lastly, while the above mentioned reasons hold for domestic firms and MNEs alike, in particular MNEs may prefer hiring migrants from their source country due to migrant networks and lower screening costs in the country of their subsidiaries. A small strand of literature examines firms hiring behaviour, where the main limitation is data on firm's decision making in hiring. Using a survey on Danish firms, Bertheau, Larsen, and Zhao (2023) show that search and training frictions matter as much as labour costs in hiring decisions, but those friction are heterogeneous by firm size and productivity and more salient for smaller firms. For the US, Raux (2019) conducts a study using Visa applications and finds that longer job posting duration increases employer's probability to search for foreign workers, particularly for STEM workers.

However, some factors may also inhibit firm's willingness to hire migrants. These include screening and searching costs, which likely to be salient when a firm has no previous experience in hiring migrants. This includes verifying diplomas and understanding what (foreign) education entails and how an individual's work experience abroad may bring added value to the firm. Another factor why a firm may not be willing to hire migrants may be a language barrier. This is likely to occur either for firms that sell products or services that are very localized (non-tradable) and geared towards a language specific market or audience - for example providing legal services in a particular language.

Why are MNEs more prone to hire migrants? Both search and screening costs of recruiting (from abroad) are lower if a firm has an establishment in another country and has hired from that county before (see Larch and Lechthaler (2011)). Furthermore, Larch and Lechthaler (2011) argue that MNEs can improve match quality of workers and vacancies by moving workers across establishments (and potentially countries). This argument is closely related to the literature finding better employer-employee matching in large labour markets (for example Moretti and Yi (2024), Harmon (2013)).

In the following I briefly review some institutional context related to hiring migrants. In the European Union (EU), EU nationals can move freely without a need for residence or work permits. Non-EU nationals need a residence and work permit, where different types of Visa exist. The existence of two specific visa categories suggests that labour mobility is an important factor in the Netherlands: Firstly, high-skilled immigrants can both apply for a improved Visa (*Kennismigrantenvisa*) and a tax incentive[7]. Secondly, for non-EU nationals exists a visa category for 'Intra-corporate transferee' targeting non-EU nationals employed in companies outside of the EU and being transferred to a branch in the Netherlands. Both visa categories suggest that MNEs have an advantage of hiring non-EU nationals: firstly, they are more likely to (be able to) pay higher wages, which reduces the 'bite' of the income threshold for high-skilled migrants. Secondly, they can leverage on 'inter-company' rotation to bring foreign nationals from their workforce.

**Location choice of firms**

The location choice of firms is potentially influenced by local labour market conditions, but also firm or industry specific requirements such as access to a transportation network or to a customer base. Another factor for firm location choice are agglomeration effects where firms may benefit from positive spillovers by co-locating with other firms in a similar sector.

Across sectors, foreign and domestic firms locate in similar regions (see Figure 4). Figure 4 also captures the size of regions. The share of foreign and domestic firms per region is highly correlated (0.95). However, firms in different sectors tend to locate in different areas (see Figure 5 in the Appendix). For example, firms in the services sector settle mainly in the urban centres, and foreign MNEs tend to be slightly overrepresented in the Amsterdam region. Firms active in the manufacturing or wholesale sector are more dispersed across regions. It seems that this spatial allocation is roughly stable across years. Considering the 5 year change in the stock of firms, there does not seem to be systematic relation between the change of domestic and foreign firms (see Figure 4 and Figure A.2 in the Appendix). I will return to these settlement patterns when discussing the identification strategy using a shift-share instrumental variable based on sector shares.

The finding that firms co-locate across regions is in line with the concept of a localized

---

[7]Non-EU applicants can apply for a work visa or for a 'high-skilled visa'. To qualify for a 'high skilled' visa, a migrant needs to fulfil an income threshold. 'High-skilled' migrants fulfilling an income threshold can also apply for a tax incentives where 30% of their taxable income is exempt from the income tax for up to 5 years. This rule creates an opportunity for the employer to attract high skilled migrants, but may also reduce social security contributions on the employer side. Timm, Giuliodori, and Muller (n.d.) show that this is an effective measure to attract migrants with mid-level earnings.

economy in a local labour market. If firms hire locally, and domestic and foreign firms from the same sector co-locate, they are likely to compete for the same workers within the same region. From the worker's perspective, incumbent workers can find vacancies within their labour market without a friction of moving to another labour market (or commuting). As outlined above, this is an important channel of how the presence of MNEs affects wages in domestic firms.
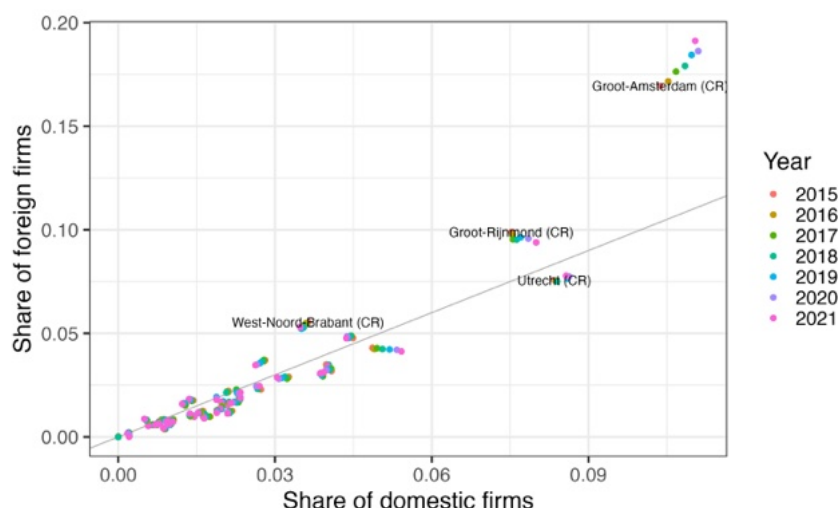


Figure 4: Share of domestic and foreign firms by region and year

*Note:* The chart shows the fraction of the stock of firms per COROP region, relative to all firms in NL, by type of ownership. Correlation between foreign and domestic firm shares is 0.95.
*Source:* CBS Statline
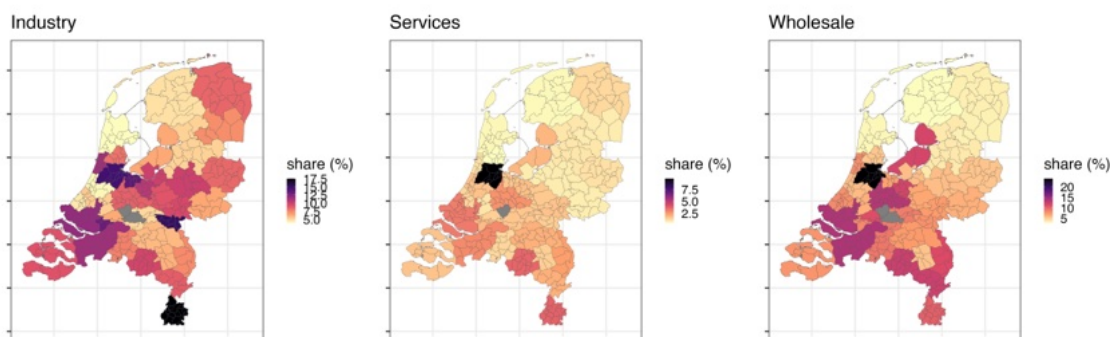


Figure 5: Fraction of foreign firms per labour market region and broad sector

*Note:* The chart shows the fraction of foreign firms relative to all firms by region in the Netherlands in 2022. Left to right: Manufacturing, Services and Wholesale and Retail Trade. For each of the 40 regions, I calculate the total number of foreign firms and divide by the total number of firms in a given year.

| Variable | 25th Percentile | Mean | Median | 75th Percentile | N |
|---|---|---|---|---|---|
| Total firms | 180 | 529 | 351 | 608 | 1440 |
| Domestic firms | 166 | 475 | 330 | 546 | 1440 |
| Foreign firms | 11 | 55 | 23 | 58 | 1440 |
| Stock of employees | 6741 | 24837 | 14390 | 28043 | 1440 |
| .. in domestic firms | 5303 | 18212 | 11043 | 21067 | 1440 |
| .. in foreign firms | 868 | 6703 | 2859 | 6706 | 1440 |
| Avg. hourly wage domestic firms | 16,45 | 19,02 | 18,22 | 20,15 | 1440 |
| Avg. hourly wage foreign firms | 21,34 | 25,13 | 24,34 | 27,36 | 1440 |

Table 3: Descriptive statistics for local labour markets

*Note:* Averages over local labour markets, 2008- 2020. A local labour market is defined by region (n = 40) and broad sector ('Manufacturing', 'Services' and 'Wholesale'). Average wages are not adjusted for employee composition in a firm. Sample as described in Section 3.

**Local labour markets**

Each local labour market contains between 20 and 33 sectors, defined as 3-digit industry classifications (see Table C.1 in the appendix for a breakdown of industries and sectors). With 40 regions and 3 broad sectors, this yields up to 120 local labour markets per year.

Table 3 shows descriptive statistics for local labour markets across the years 2008 to 2020. The median local labour market contains 330 domestic and 23 foreign owned MNE firm establishments and with a total of 11,043 and 2,859 employees respectively. As outlined when describing firms above, MNEs are larger in terms of employment. This is also reflected at the local labour market level: around 10% of firms in this sample are MNEs, but they employ on average 27% of workers in a local labour market. Looking at wages at the local labour market level reveals two differences between domestic and foreign firms: Firstly, average hourly wages at domestic firms are lower across the distribution. Secondly, the interquartile range for average hourly wages is larger for MNEs than for domestic firms, suggesting a fatter right tail the distribution of hourly wages at MNEs.

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 over years. This can be interpreted as a sign that local labour markets have similar levels of amenities or unobserved characteristics over time.

Local labour markets are typically characterized by the fact that workers work and live in the same region (Moretti (2010)). Across regions, a median of 60% of workers stay within the same region to work. Additionally, the regions roughly correspond with 'Functional Urban Areas' as defined by the OECD (see Appendix B.6). This underscores that the

regions chosen for local labour markets correspond to commuting zones. Additionally, I replicate my main analyses using a larger area to show that the results do not depend on the definition of local labour market.

# 4   Empirical strategy

I estimate the effect of MNE exposure on outcomes in domestic firms in local labour markets by relating the change in MNE employment share to the change in outcomes in local labour markets. I estimate MNE exposure effects at both the local labour market level and at the firm level.

I argue that the expansion of MNE employment in local labour markets can put upward pressure on wages in domestic firms through excess labour demand and wage competition. This effect is expected to be dampened if MNEs hire (part of) their workforce from abroad. I first describe the estimation strategy for the effects of MNE exposure on outcomes at the local lavour market level and the firm level. Then I describe how I estimate heterogeneous effects to investigate the impact of MNE's access to teh foreign labour market.

As firm location choice is 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.[8] Conceptually, the shift share instrument distributes national level industry shocks through the shares to local industry structure.[9]  For example, if the financial industry constitutes a larger share of employment in Amsterdam than in Rotterdam, a national shock in foreign employment in the financial sector will affect Amsterdam more strongly than Rotterdam. I will provide further details about the instrument and its identifying assumptions below, after describing the regression model.

**Local labour market level**

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

---

[8]Shift-share instruments are also commonly used in other strands of literature, for example immigration (Card (2001)) or trade (Autor et al. (2014))

[9]For an extensive review of the shift-share instrument, see Goldsmith-Pinkham, Sorkin, and Swift (2020) and Bartik (1991)

$$\log(y_{r,t}) - \log(y_{r,t-1}) = \beta \left( \frac{x^{MNE}_{r,t} - x^{MNE}_{r,t-1}}{x^{all}_{r,t-1}} \right) + \delta \mathbf{X}_{r,t} + \theta_t + \theta_r + \varepsilon_{r,t} \qquad (10)$$

where $x^{MNE}_{r,t}$ stands for MNE employment in local labour market $r$ and year $t$. The fraction then captures the change of the MNE employment share relative to total employment $(x^{all})$. $\mathbf{X}_{r,t}$ represents potentially time-varying controls. $\theta_t$ and $\theta_r$ stand for year and local labour market fixed effects respectively. I weight the regression by the number of workers at the local labour market level to take into account the size differences of local labour markets. I cluster standard errors on the local labour market level.

I consider a range of outcomes $y_{r,t}$ for local labour market $r$ and time $t$. First, the average wage and average employment for workers in domestic firms. Second, value added per worker in domestic firms. The estimated coefficients will capture a short run effect of a change in MNE exposure. As outlined in the theoretical framework in Section 2, a change in average wages and employment will be influenced by wage bargaining and potential worker mobility as workers discover improved outside options in MNEs. Secondly, value added per worker can be interpreted as a measure for productivity. A change in value added per worker in domestic firms reveals short-run impact of MNE exposure on productivity in domestic firms.

**Firm level**

I conduct the same exercise at the firm level. Here, I regress the change in outcome $y$ for firm $j$ on the change in MNE exposure in the local labour market where firm $j$ is located. Estimating the effect of MNE exposure on the firm level allows for richer firm level outcomes, but also allows to control for firm size and sector. For outcome $y_{j,r(j),t}$ of firm $j$ located in local labour market $r(j)$ and year $t$, I estimate the following:

$$\log(y_{j,t}) - \log(y_{j,t-1}) = \beta \left( \frac{x^{MNE}_{r(j),t} - x^{MNE}_{r(j),t-1}}{x^{all}_{r(j),t-1}} \right) + \delta_1 \mathbf{X}_{jt} + \delta_2 \mathbf{Q}_{r(j),t} + \theta_t + \theta_{r(j)} + \varepsilon_{j,r(j),t} \quad (11)$$

where the change in MNE exposure is defined as above. The vectors $\mathbf{X}_{j,t}$ and $\mathbf{Q}_{r(j),t}$ contain potentially time-varying controls on the firm and on the local labour market level respectively. $\theta_t$ and $\theta_{r(j)}$ stand for year and local labour market effects respectively. At the firm level, I control for firm size and 3-digit sector of the firm. All regressions include year and local labour market fixed effects allowing for differential rates of changes per year and local labour market. I weight the regression by the number of workers at the local labour

market level to consider differences in market sizes. I cluster standard errors on the local labour market level.

At the firm level, I consider a range of outcomes related to firm level productivity. This allows to infer whether there are short-run changes in productivity upon the entry of MNEs. While knowledge spillovers may occur in the long-run, the short-run effects of MNE exposure on may reveal some insight about worker productivity and selective mobility: the theoretical framework from section 2 predicts that workers bargain up wages or move to more productive firms (MNEs) when there are more productive firms (MNEs) in the economy.

**Heterogeneous effects by foreign labour market access**

Having described how I estimate the average effect of MNE exposure on a range of outcomes, I now turn to the heterogeneity by MNEs' access to the foreign labour market. I use the share of migrants in newly hired workers at MNEs across local labour markets as a proxy for MNEs' access to the foreign labour market. For all MNEs in all labour markets, I compute the fraction of migrants of workers starting employment at an MNE. At the local labour market level, this will capture the variation across labour markets of hiring migrants and provide a proxy for the demand for local labour by MNEs. I stratify local labour markets by the tercile of migrants hired in foreign owned firms in a given year, which I will refer to as "low", "medium" and "high" migrant share when describing the results. I interact an indicator for the terciles with the variable for MNE exposure.

At the local labour market level the regression equation (Eq. 10) then becomes

$$
\log(y_{r,t}) - \log(y_{r,t-1}) = \beta \left( \frac{x_{r,t}^{MNE} - x_{r,t-1}^{MNE}}{x_{r,t-1}^{all}} \right) \times \mathbf{I}_r(tercile) + \delta \mathbf{X}_{r,t} + \theta_t + \theta_r + \varepsilon_{r,t} \quad (12)
$$

where all variables are as defined above, and $\mathbf{I}_r(tercile)$ is an indicator for (labour market level) tercile of the annual distribution of the share of migrants hired at MNEs.

At the firm level, the regression equation (Eq. 11) is augmented to

$$
\log(y_{j,r(j),t}) - \log(y_{j,r(j),t-1}) = \beta \left( \frac{x_{r(j),t}^{MNE} - x_{r(j),t-1}^{MNE}}{x_{r(j),t-1}^{all}} \right) \times \mathbf{I}_{r(j)}(tercile) + \delta_1 \mathbf{X}_{jt} + \delta_2 \mathbf{Q}_{r(j),t} + \theta_t + \theta_{r(j)} + \varepsilon_{j,r(j),t}
$$

$$(13)$$

If labour demand is a relevant factor for the change of local wages, I expect heterogeneous effects in local labour markets by the share of migrants hired.

22

**Shift-share Instrumental variable**

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 instrumental variable (SSIV) with the employment shares for industry $k$ and national level growth rates of the foreign employment share $(g_{k,t,-r} = \frac{x_{k,t}^{MNE} - x_{k,t-1}^{MNE}}{x_{t-1}^{all}})$. I compute the national level growth rate as a leave-one-out and calculate national growth for all regions except the region of interest $(-r)$.

$$\widehat{B}_{r,t} = \sum_k \left( \underbrace{\frac{x_{r,k,t_0}^{all}}{x_{r,t_0}^{all}}}_{\text{lagged share}} \times \underbrace{g_{k,t,-r}}_{\text{shift}} \right) \tag{14}$$

where $x_{r,k,t_0}^{all}$ stands for total employment (in all firms) in local labour market $r$, 3-digit industry $k$ and year $t_0$. The shares capture the relative importance of an industry $k$ in a local labour market $r$, measured in the period $t_0$, 2008-2009.

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 3-digit industry employment shares in the local labour market ('shares'). In this application, 3-digit industry employment shares capture the relative importance of each 3-digit industry in the local labour market. The national level industry shift is then the change in foreign employment share in an 3-digit industry but across all regions.

**Identifying 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 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. Identification can come from either exogeneity of the shares (Goldsmith-Pinkham, Sorkin, and Swift (2020) or from quasi-random assignment of shocks, where exposure shares are allowed to be endogenous (Borusyak, Hull, and Jaravel (2018)). Here, I take the stance that the shocks - an expansion of the multinational employment share by 3-digit industry - is quasi-randomly assigned. This is motivated by the notion that the shocks consist of employment in MNEs' subsidiaries, and hence business and employment are influenced by factors outside of the local labour

markets in the Netherlands.

These shifts include global demand for the products on an MNE, affecting production in subsidiaries, including in the Netherlands. Another source of an MNE wide shock may arise via changes in productivity in the MNE, which affects subsidiaries as well. Beyond firm-specific shocks, also shocks in the location of the headquarter may affect subsidiaries in the Netherlands. For a more detailed discussion of these firm relations, see Alfaro-Urena, Manelici, and Vasquez (2019) for multinational supply chains and Desai, Foley, and Hines Jr (2004) for financial shocks. Indeed, I show that the worldwide activity of multinational firms has been increasing across source countries in both total activity and services. Figure A.3 shows the outward activity in both number of enterprises and number of employees of MNEs for the sector "Services". Outward activity of MNEs is defined as the activity of an MNE outside it's source country, where the headquarter is located. Figure A.4 shows worldwide employment and number of enterprises in the manufacturing sectors. For both sectors, employment and number of enterprises have been increasing gradually across all source countries, indicating and increase in MNE activity worldwide.

Additionally, the World Bank enterprise survey from 2020 suggests that the Netherlands is highly connected in international trade relations: The percentage of firms exporting directly (31.8%) as well as percentage of firms using material inputs and/or supplies of foreign origin (88.7%) lies above the averages in Europe and Central Asia (18.4% and 69.4% respectively).

Both of these stylized facts underscore that MNE activity in the Netherlands is likely to be influenced by global factors rather than local circumstances. This contributes to the argument that the industry-level shifts in MNE activity are plausibly exogenous from local labour market conditions.

# 5 Results

In the following, I report results for average wages and aggregate employment in domestic firms, first on the local labour market level (Table 5) and then on the firm level (Table 6). For each outcome, I show results for the entire sample and results for the sample split by the fraction of migrants hired in multinational firms in a given year.

I show the coefficients for the first stage in Table 4. The first stage predicts the change in MNE employment share at the local labour market level, using the constructed 3-digit industry shares and national shifts (Equation 14). The coefficient for the constructed SSIV measure is positive and significantly different from zero, suggesting that the constructed

*Outcome: Δ MNE employment share$_{r,t}$*
$t_0 = 2008\text{-}09$

| | |
|---|---|
| Intercept | 0.001 |
| | (0,001) |
| SSIV | 0.079*** |
| | (0.017) |
| Year FE | x |
| LLM FE | x |
| N | 1 320 |
| R$^2$ | 0.44 |
| F Statistic | 22.3 |

Table 4: First stage for shift-share instrument

*Note:* The Table shows the first stage for the shift-share instrumental variable as in Equation 14 in Section 4.

instrument predicts the change in the MNE employment share well. The F-statistic for the first stage is 22, indicating that the instrument is sufficiently correlated with the endogenous outcome in the first stage.

## Results: Local labour market level

In Table 5, I show the estimated coefficients ($\beta$) using SSIV, for average wages, aggregate employment and aggregate value added in domestic firms at the local lbaour market level. The theoretical framework of on-the-job search (Section 2) suggests that an increase in MNE exposure increases wages in domestic firms through improved outside options. At the same time, the framework suggests that some employees may move from domestic firms to MNEs, while it can also happen that the least productive (domestic) firms cease to produce as they cannot attract workers. The change in aggregate value added depends on how 'surviving' domestic firms adjust their production, and may also depend on which workers leave, which is ultimately an empirical question.

The effect of an increase in the MNE employment share on wages in domestic firms is positive although not statistically different from zero (see column 1). The direction of this effect is in line with the theoretical framework. When interacting with of the share of new migrant employees however, this positive effect seems to be driven by local labour markets where MNEs hire few migrants ($\beta = 0.185$) and relatively many local workers. For the opposite - local labour markets where MNEs hire relatively more migrants and fewer local labour force, the point estimate is negative although not significantly different

|  | Avg. wages | | Agg. employment | | Agg. value added | |
|---|---|---|---|---|---|---|
| $\Delta$ *in domestic firms*: | | | | | | |
| $\Delta$ MNE | 0.039 | | $-0.517^{***}$ | | $-1.441^{***}$ | |
|  | (0.053) | | (0.051) | | (0.224) | |
| $\Delta$ MNE | | 0.185** | | $-0.968^{***}$ | | $-2.436^{***}$ |
| x low migration | | (0.084) | | (0.079) | | (0.353) |
| $\Delta$ MNE | | -0.089 | | $-0.239^{***}$ | | $-1.176^{***}$ |
| x mid migration | | (0.094) | | (0.088) | | (0.396) |
| $\Delta$ MNE | | -0.030 | | $-0.143$ | | $-0.126$ |
| x high migration | | (0.108) | | (0.101) | | (0.455) |
| N | 1320 | 1300 | 1320 | 1300 | 1313 | 1293 |
| $R^2$ | 0.19 | 0.20 | 0.35 | 0.38 | 0.23 | 0.24 |

Table 5: Results on the local labour market level

*Note:* The table reports the coefficient $\beta$ from Equation 10. "low", "mid" and "high" migration refers to the annual terciles of the distribution of migrant shares in newly hired work force across local labour markets. Results on the local labour market level (region by broad sector), for the years 2010 - 2020. All regressions include year and local labour market fixed effects, and controls for the total size (number of firms and number of employees) of the local labour market. The regression is weighted by the number of employees in the local labour market. The unit of observation is the local labour market. This contains on average 518 firms and 24 404 workers per year. Standard errors in parenthesis, clustered on local labour market level.

from zero ($\beta = -0.030$). Secondly, I estimate the effect of a change in the MNE share on aggregate employment and aggregate value added in domestic firms. For both outcomes, the overall effect is negative and statistically significant. There is substantial heterogeneity by the share of migrants in MNEs as well: both aggregate employment and value added seems to decrease more in local labour markets where MNEs hire relatively more local workers. The negative effect on aggregate employment in domestic firms is in line with the prediction from the theoretical framework, suggesting that an increase in MNE exposure decreases employment in domestic firms as workers move to higher-paying MNEs and the least productive firms cease to exist. The negative effect on aggregate value added per worker may be driven by the MNEs 'poaching' more productive workers from domestic firms, especially since the decrease in value added is stronger in local labour markets where MNEs hire more local workforce.

## Results: Firm level

I provide additional estimates on the firm level in Table 6 and I relate the change in MNE exposure on the local labour market level to changes in firm outcomes to complement the findings from above with more detailed information on productivity.

I use three measures of firm productivity: production value, value added and turnover

are measures of firm performance and describe distinct but related aspects of production. Production value captures the value of the entire firm's production (or provision of services) in a given year, irrespective of when the product is sold. This can be understood as the total production activity of the firm. Turnover captures the revenue from goods sold in the year of the sale. This measure is also influenced when the produced goods are sold and may be influenced by product market competition. Lastly, value added captures revenue from sold goods net of input costs. This highlights the firm's contribution to the value of the (final) product.

While total production value (column 1-2) and turnover per worker (column 5-6) show similar effects at the firm level, value added seems to be affected differently. Both total production value and turnover per worker exhibit a small and statistically significant positive effect in local labour markets where MNE exposure increases while MNEs hire relatively more local labour. In local labour markets where MNEs hire relatively more migrants, this effect turns around to be negative however.

It is not straightforward to conclude which forces drive the negative effect in productivity at the firm level, as product level information is not available. Some may come from product level competition between firms or from a re-orientation of domestic firms towards a different set of products. Both the change in value added and in production and turnover may be mediated by the relative position in the supply chain (see a discussion by Alfaro-Urena, Manelici, and Vasquez (2019)). If domestic firms tend to be suppliers of multinationals, an increasing presence of multinationals may increase production and turnover or low-value added inputs.

I additionally show the impact of MNE exposure on the total personnel costs (wage bill) of the firm. This measure is influenced by two factors: the total amount of workers and the salary per worker. The theoretical framework predicts that wages in domestic firms may increase, but some workers may move from domestic firms to MNEs. An increase in wages per workers increases total personnel costs, while a decline in work force decreases total personnel costs, unless a worker is replaced inmediately. The change in personnel costs (total wage bill of a firm) is in line with the observed change in wages: overall, on average, the firm's wage bill increases with an increase in the MNE exposure in the corresponding local labour market. This effect is stronger in local labour markets where MNEs hire more migrants, which is consistent with the prediction that wages in local labour markets increase stronger with an increase in MNE exposure.

|  | Δ in domestic firms | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | Production value | | Value added / worker | | Turnover / worker | | Personnel costs | |
| Δ MNE | 0.021 | | 0.034* | | −0.007 | | 0.098*** | |
|  | (0.020) | | (0.019) | | (0.017) | | (0.021) | |
| Δ MNE | | 0.160** | | −0.190*** | | 0.074*** | | 0.233*** |
| x low migration | | (0.032) | | (0.032) | | (0.029) | | (0.035) |
| Δ MNE | | −0.038 | | −0.122*** | | 0.010 | | 0.0131*** |
| x mid migration | | (0.033) | | (0.033) | | (0.010) | | (0.036) |
| Δ MNE | | −0.099*** | | −0.307 | | −0.145*** | | −0.143*** |
| x high migration | | (0.038) | | (0.038) | | (0.034) | | (0.041) |
| N | 496 634 | 495 298 | 480 364 | 480 364 | 479 095 | 484 195 | 495 306 | 493 976 |
| $R^2$ | 0.09 | 0.09 | 0.05 | 0.05 | 0.04 | 0.06 | 0.06 | 0.06 |

Table 6: Results on the firm level

*Note:* The unit of observation is a firm. Time period is 2010-2020. All regression include year and local labour market fixed effects, and controls for the total firm size and 2-digit sector of the firm. The regression is weighted by the number of workers per firm. Standard errors are clustered on local labour market level.

# 6 Conclusion

This paper examines how multinational enterprises (MNE) affect wages and employment of workers in domestic firms in the Netherlands. An important channel through which MNEs affect domestic firms is the demand for local labour. An expansion of MNE activity in a host region, potentially driven by global activity, creates additional demand for local workers exerting upward pressure on wages. There is substantial evidence that MNEs are typically more productive than domestic firms, and I also document this for the Netherlands. This gives way for wage competition between domestic firms and MNEs, which amplifies the increase of wages.

Using the framework of an on-the-job-search model, I show that the presence of large, productive (multinational) firms improves the outside options of incumbent workers, encouraging wage bargaining or even job mobility of incumbent workers from domestic firms to MNEs. Furthermore, I argue that a distinctive feature of MNEs is their ability to hire from abroad. I document that MNEs indeed employ more migrants than domestic firms. This may moderate MNEs' effect in local labour markets: when MNEs hire more migrants, they exert relatively lower demand for domestic workers

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. 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. On the local labour market level, I find that domestic firms tend to shrink in size and produce less value added in local labour markets where MNEs expand. This effect is stronger (more negative) in local labour markets, where MNEs hire few migrants and more domestic workers. This finding suggests that MNEs may poach workers from domestic firms which ultimately produces a negative contemporaneous impact on employment and value added.

The results shown in this paper suggest a contemporaneous increase in worker compensation together with a decrease in domestic firm size and value added. This is consistent with a labour market competition for (skilled) workers: some workers may be taken over by MNEs, while domestic firms raise wages to retain their workforce. While this benefits the workers through a higher wage, some less productive firms may cease to exist in the presence of more productive MNEs. Interacting the change in the MNE employment share with the migrant share of newly hired workers, I show that these wage effects are stronger in local labour markets where MNEs hire a fewer migrants and hence exert relatively larger demand for local workers.

# References

Aitken, Brian, Ann Harrison, and Robert E Lipsey (1996). "Wages and foreign ownership A comparative study of Mexico, Venezuela, and the United States". In: *Journal of international Economics* 40.3-4 (1996), pp. 345–371.

Alfaro-Urena, Alonso, Isabela Manelici, and Jose P Vasquez (2019). "The effects of multinationals on workers: evidence from Costa Rica". In: *IRLE Working Paper 112-19* (2019).

Antràs, Pol and Stephen R Yeaple (2014). "Multinational firms and the structure of international trade". In: *Handbook of international economics* 4 (2014), pp. 55–130.

Autor, David H, David Dorn, Gordon H Hanson, and Jae Song (2014). "Trade adjustment: Worker-level evidence". In: *The Quarterly Journal of Economics* 129.4 (2014), pp. 1799–1860.

Balsvik, Ragnhild, Doireann Fitzgerald, and Stefanie Haller (2023). "The Impact of Multinationals Along the Job Ladder". In: (2023).

Bartik, Timothy J (1991). *Who benefits from state and local economic development policies? Kalamazoo, MI: WE Upjohn Institute for Employment Research.* 1991.

Bernard, Andrew B, J Bradford Jensen, Stephen J Redding, and Peter K Schott (2018). "Global firms". In: *Journal of Economic Literature* 56.2 (2018), pp. 565–619.

Bernstein, Shai, Rebecca Diamond, Abhisit Jiranaphawiboon, Timothy McQuade, and Beatriz Pousada (2022). *The contribution of high-skilled immigrants to innovation in the United States.* Tech. rep. National Bureau of Economic Research, 2022.

Bertheau, Antoine, Birthe Larsen, and Zeyu Zhao (2023). "What Makes Hiring Difficult? Evidence from Linked Survery-Administrative Data". In: *NHH Dept. of Economics Discussion Paper* 20 (2023).

Borusyak, Kirill, Peter Hull, and Xavier Jaravel (2018). *Quasi-experimental shift-share research designs (No. w24997).* 2018.

Cahuc, Pierre, Fabien Postel-Vinay, and Jean-Marc Robin (2006). "Wage bargaining with on-the-job search: Theory and evidence". In: *Econometrica* 74.2 (2006), pp. 323–364.

Card, David (2001). "Immigrant inflows, native outflows, and the local labor market impacts of higher immigration". In: *Journal of Labor Economics* 19.1 (2001), pp. 22–64.

Caves, Richard E (2007). *Multinational enterprise and economic analysis.* Cambridge university press, 2007.

CBS (2022). *Buitenlandse zeggenschap bedrijven in Nederland; kerncijfers, bedrijfstak.* 2022. URL: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81358ned/table?dl=142A6.

Desai, Mihir A, C Fritz Foley, and James R Hines Jr (2004). "A multinational perspective on capital structure choice and internal capital markets". In: *The Journal of finance* 59.6 (2004), pp. 2451–2487.

Erbahar, Aksel and Ömer Tarık Gençosmanoğlu (2023). "Migrants and imports: Evidence from Dutch firms". In: *Economica* 90.360 (2023), pp. 1204–1228.

Girma, Sourafel and Holger Görg (2007). "Evaluating the foreign ownership wage premium using a difference-in-differences matching approach". In: *Journal of International Economics* 72.1 (2007), pp. 97–112.

Goldsmith-Pinkham, Paul, Isaac Sorkin, and Henry Swift (2020). "Bartik instruments: What, when, why, and how". In: *American Economic Review* 110.8 (2020), pp. 2586–2624.

Gorg, Holger and Eric Strobl (2001). "Multinational companies and productivity spillovers: A meta-analysis". In: *The economic journal* 111.475 (2001), pp. 723–739.

Görg, Holger and Dennis Görlich (2011). *Trade and labour market outcomes in Germany.* 125. OECD Publishing, 2011.

Harmon, Nikolaj A (2013). "Are Workers Better Matched in Large Labor Markets?" In: *Job market paper, Princeton University* (2013).

Helpman, Elhanan, Marc J Melitz, and Stephen R Yeaple (2004). "Export versus FDI with heterogeneous firms". In: *American Economic Review* 94.1 (2004), pp. 300–316.

Heyman, Fredrik, Fredrik Sjöholm, and Patrik Gustavsson Tingvall (2007). "Is there really a foreign ownership wage premium? Evidence from matched employer–employee data". In: *Journal of International Economics* 73.2 (2007), pp. 355–376.

Hijzen, Alexander, Pedro S Martins, Thorsten Schank, and Richard Upward (2013). "Foreign-owned firms around the world: A comparative analysis of wages and employment at the micro-level". In: *European Economic Review* 60 (2013), pp. 170–188.

Hiller, Sanne (2013). "Does immigrant employment matter for export sales? Evidence from Denmark". In: *Review of World Economics* 149 (2013), pp. 369–394.

Khanna, Gaurav, Munseob Lee, et al. (2018). *High-skill immigration, innovation, and creative destruction.* Tech. rep. National Bureau of Economic Research, 2018.

Larch, Mario and Wolfgang Lechthaler (2011). "Multinational firms and labor market pooling". In: *Review of International Economics* 19.4 (2011), pp. 728–749.

Martins, Pedro S (2004). "Do foreign firms really pay higher wages? Evidence from different estimators". In: *Evidence from Different Estimators (November 2004)* (2004).

Mitaritonna, Cristina, Gianluca Orefice, and Giovanni Peri (2017). "Immigrants and firms' outcomes: Evidence from France". In: *European Economic Review* 96 (2017), pp. 62–82.

Morales, Nicolas (2023). "High-skill migration, multinational companies and the location of economic activity". In: *Review of Economics and Statistics* (2023), pp. 1–45.

Moretti, Enrico (2010). *Local labor markets*. Tech. rep. National Bureau of Economic Research, 2010.

Moretti, Enrico and Moises Yi (2024). *Size Matters: Matching Externalities and the Advantages of Large Labor Markets*. Tech. rep. National Bureau of Economic Research, 2024.

Navaretti, Giorgio Barba, Anthony J. Venables, Frank G. Barry, Karolina Ekholm, Anna M. Falzoni, Jan I. Haaland, Karen Helene Midelfart, and Alessandro Turrini (2004). *Multinational Firms in the World Economy*. Princeton University Press, 2004. ISBN: 9780691128030. URL: http://www.jstor.org/stable/j.ctv10crfcz (visited on 10/01/2024).

OECD (2018). *Multinational enterprises in the global economy*. 2018. URL: https://www.oecd.org/industry/ind/MNEs-in-the-global-economy-policy-note.pdf.

OECD (2024). *FDI main aggregates, BMD4*. 2024. URL: https://www.oecd.org/mena/competitiveness/35275189.pdf.

Ottaviano, Gianmarco and Giovanni Peri (2013). "New frontiers of immigration research: cities and firms". In: *Journal of Regional Science* 53.1 (2013), pp. 1–7.

Ottaviano, Gianmarco IP and Giovanni Peri (2012). "Rethinking the effect of immigration on wages". In: *Journal of the European economic association* 10.1 (2012), pp. 152–197.

Patault, Berengere and Clémence Lenoir (2024). "Customer capital spillovers: Evidence from sales managers in international markets". In: *American Economic Journal: Applied Economics* 16.4 (2024), pp. 404–443.

Peri, Giovanni, Kevin Shih, and Chad Sparber (2015). "STEM workers, H-1B visas, and productivity in US cities". In: *Journal of Labor Economics* 33.S1 (2015), S225–S255.

Peri, Giovanni and Chad Sparber (2011). "Highly educated immigrants and native occupational choice". In: *Industrial Relations: a journal of economy and society* 50.3 (2011), pp. 385–411.

Poole, Jennifer P (2013). "Knowledge transfers from multinational to domestic firms: Evidence from worker mobility". In: *Review of Economics and Statistics* 95.2 (2013), pp. 393–406.

Raux, Morgan (2019). "Looking for the" Best and Brightest": Hiring difficulties and high-skilled foreign workers". In: (2019).

Setzler, Bradley and Felix Tintelnot (2021). "The effects of foreign multinationals on workers and firms in the United States". In: *The Quarterly Journal of Economics* 136.3 (2021), pp. 1943–1991.

Timm, Lisa Marie, Massimo Giuliodori, and Paul Muller (n.d.). "Tax Incentives for Migrants With Mid-Level Earnings: Evidence From the Netherlands". In: *American Economic Journal: Applied Economics* ().

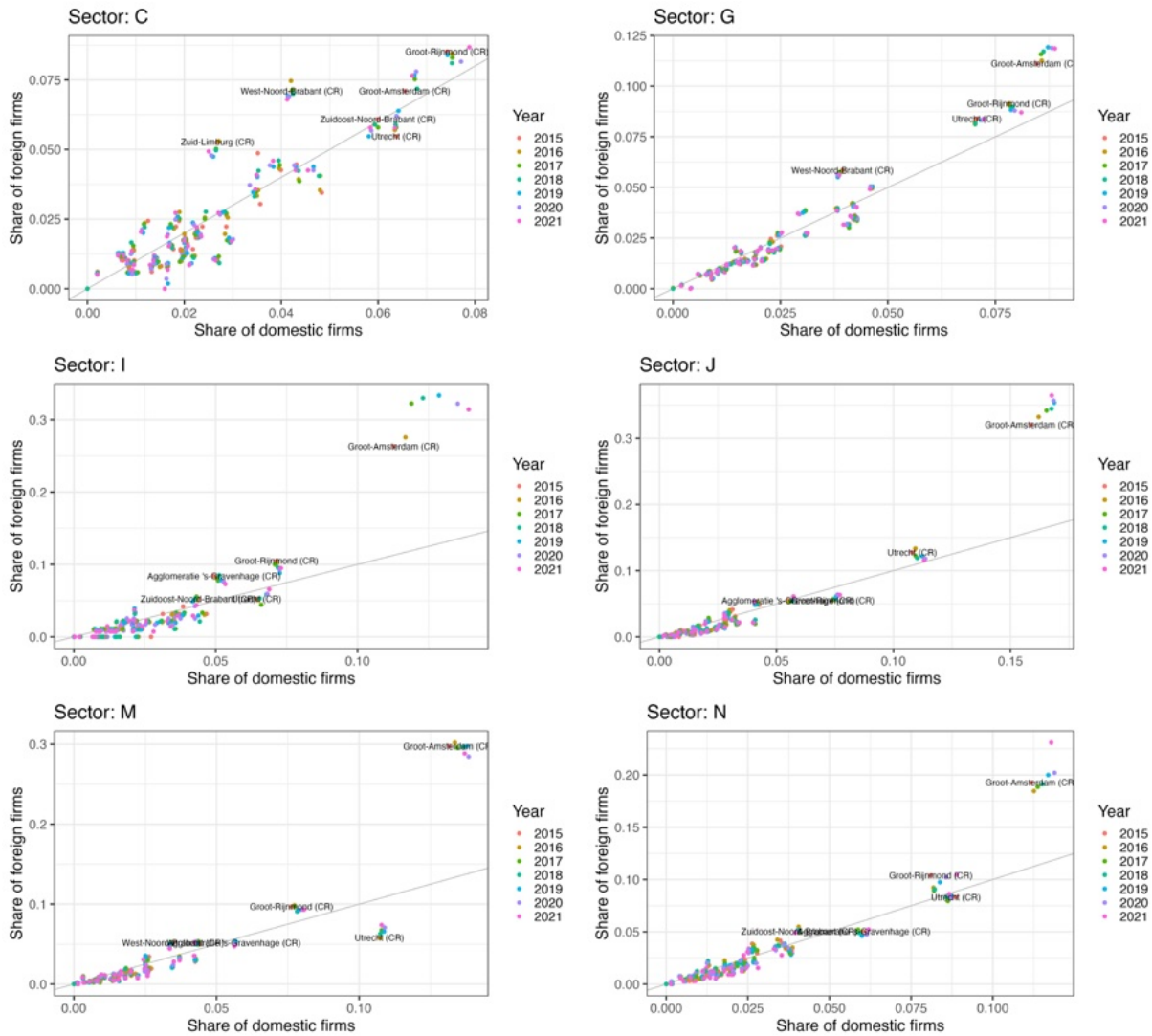# A    Additional descriptive charts



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 COROP region, relative to all firms in NL, by type of ownership. The charts refer to the following sectors: (1) Manufacturing (up left panel); (2) Wholesale and Retail Trade (up right); (3) Hospitality Services (mid left); (4) Information and Communication (mid right); (5) Professional and Scientific Services (low left); (6) Administrative Services (low right)
Correlation between foreign and domestic firm shares is 0.95.
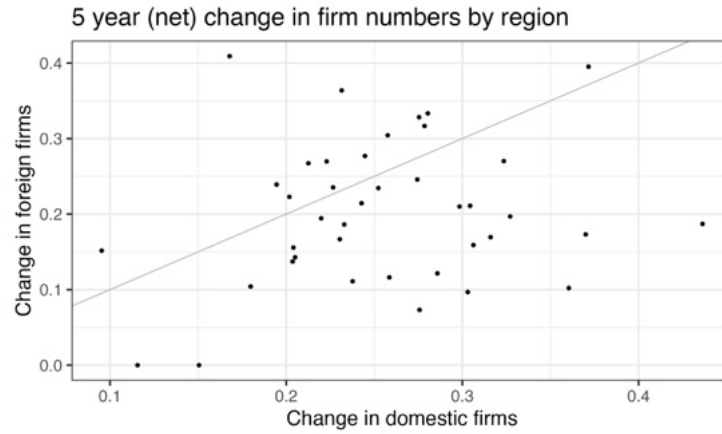*Source:* CBS Statline

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 COROP region ( $\frac{N_t^i - N_{t-5}^i}{N_{t-5}^i}$ for $N$ number of firsm of type $i$ = foreign, domestic in year $t$). The correlation between the change rates is 0.2.
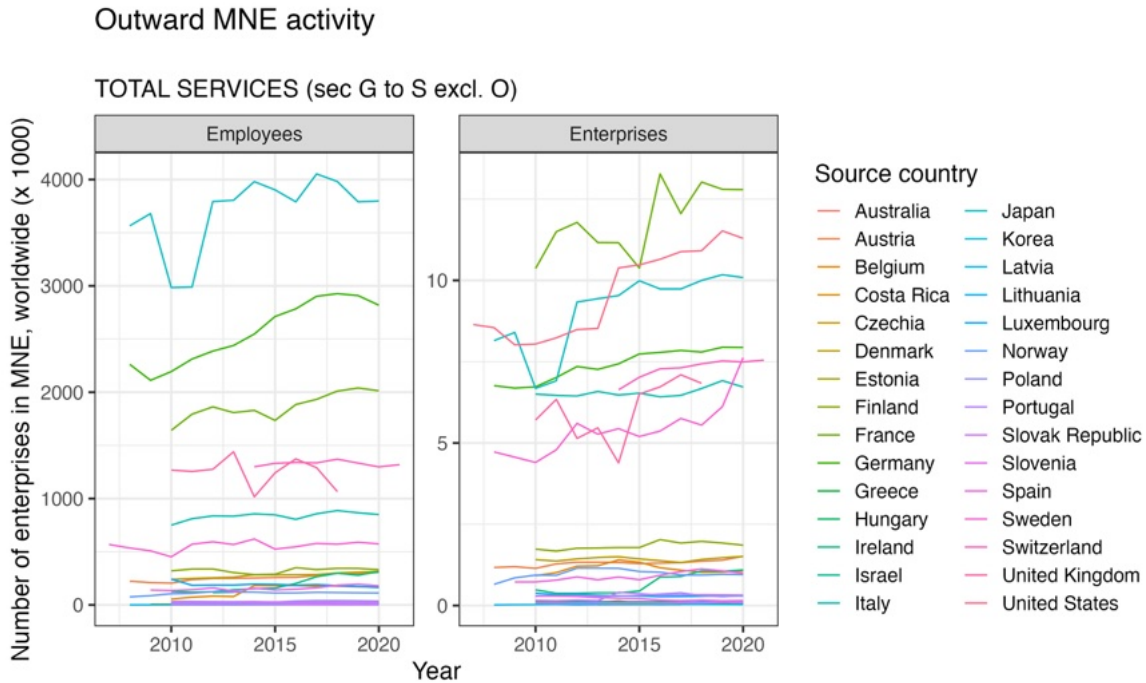*Source:* CBS Statline



Figure A.3: Outward activity of multinational enterprises by source country

*Note:* Outward activity of multinational firms by declaring country. Partner country: World total except for the declaring country. Employment (LHS) and number of enterprises (RHS). Sector: Total Services.
*Source:* OECD Statistics on measuring globalization (https://doi.org/10.1787/global-data-en).
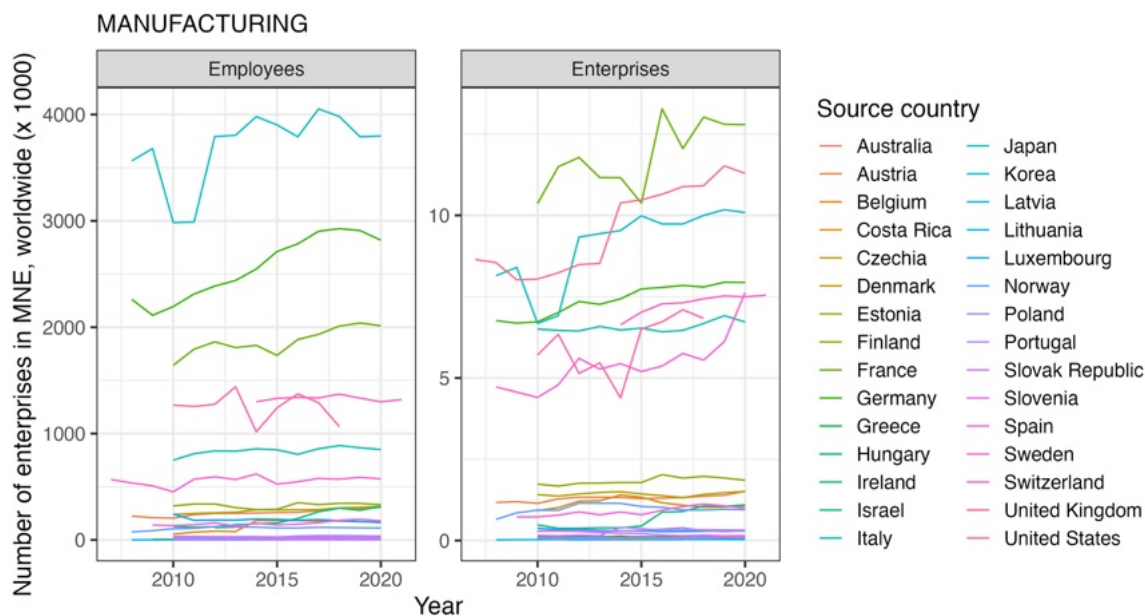
Figure A.4: Outward activity of multinational enterprises by source country

*Note:* Outward activity of multinational firms by declaring country. Partner country: World total except for the declaring country. Employment (LHS) and number of enterprises (RHS). Sector: Manufacturing.
*Source:* OECD Statistics on measuring globalization (https://doi.org/10.1787/global-data-en).

| Indicator | Netherlands | Europe & Central Asia | All Economies |
|---|---|---|---|
| Days to clear direct exports through customs* | 3.3 | 4.3 | 7.6 |
| Percent of firms exporting directly or indirectly (at least 10% of sales) | 38.3 | 23 | 16.2 |
| Percent of firms exporting directly (at least 10% of sales) | 31.9 | 18.4 | 11.9 |
| Proportion of total sales that are exported directly (%) | 15.8 | 9.1 | 5.9 |
| Days to clear imports from customs* | 6.6 | 5.9 | 11.5 |
| Percent of firms using material inputs and/or supplies of foreign origin* | 88.7 | 69.5 | 60.9 |
| Proportion of total inputs that are of foreign origin (%)* | 55.6 | 40.3 | 37.3 |
| Percent of firms identifying customs and trade regulations as a major constraint | 2.6 | 7.5 | 14.8 |

Figure A.5: World Bank enterprise survey 2020

*Note:* Business owners and top managers in 808 firms were interviewed from November, 2019 through February, 2021.
*Source:* World Bank Enterprise Survey: Netherlands 2020
(https://www.enterprisesurveys.org/en/data/exploreeconomies/2020/netherlands1).
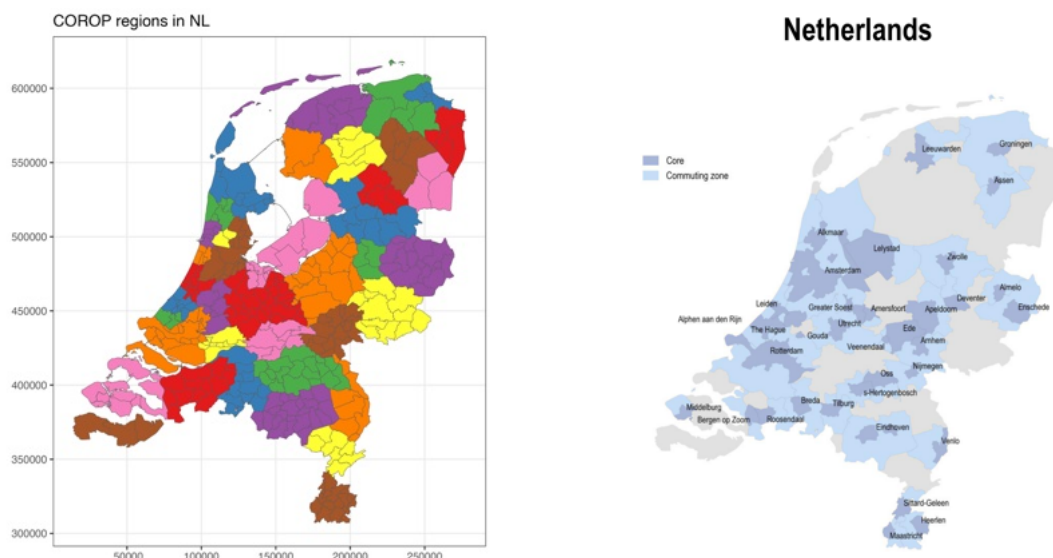
# B  Labour market regions in the Netherlands



Figure B.6: Labour market regions in the Netherlands (2022) and OECD Functional Urban Areas

*Note:* LHS: COROP regions in the Netherlands. These are defined by the *Coördinatiecommissie Regionaal Onderzoekspro-gramma* (Coordination Commission Regional Research Programme) 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

# C    Sectors & Industries

| Broad sector | NACE code (Industry) | | Num. 3 digit sectors |
|---|---|---|---|
| Industry | A | Agriculture, forestry and fishing | 3 |
| | B | Mining and quarrying | 3 |
| | C | Manufacturing | 24 |
| Wholesale and transportation | G | Wholesale and retail trade | 3 |
| | H | Transporting and storage | 5 |
| Services | I | Accommodation and Food Services | 2 |
| | J | Information and communication | 6 |
| | K | Financial and Insurance activities | 3 |
| | L | Real Estate | 1 |
| | M | Professional Scientific and Technical Activities | 7 |
| | N | Administrative and Support service activities | 6 |

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

*Note:* The table shows the correspondence of market sectors, NACE codes and 3 digit industry codes. NACE codes and description refer to the official classification (Source: European Commission).

# 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 (RINPERSOON). 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)*).[10] The firm registry as compiled from these sources is supposed to be complete, including establishments in the Netherlands from foreign firms.[11]

**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.

---

[10]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.

[11]Firms that are active in the Netherlands, but do not have an establishment, are not taken in to the registry.
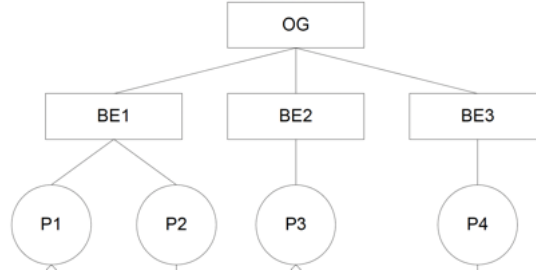
Figure D.7: Concept of firm statistical hierarchies

**Variables.**

| Statistical entity | Variables |
|---|---|
| OG | Date of commencement and discontinuation, OG sector classification |
| BE | Date of commencement and discontinuation, Sector of (main) activity, Number of employees, Legal status, Number of establishments, Location (municipality) |
| LBE | Date of commencement and discontinuation, Location (municipality) |

Table D.2: Variables per level of hierarchy

**Foreign Affiliates Statistics.**[12] 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

---

[12]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[13].

## 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.

---

[13]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.