

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

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Abstract

This paper examines the impact of multinational enterprises (MNEs) on wages and employment in domestic firms, using comprehensive administrative data from the Netherlands. To address the endogeneity of firm location choice, I develop a shift-share instrumental variable based on the local labour market composition by sector. I find that an increase in the employment share of MNEs in a region leads to higher wages for workers in domestic firms, while firm size and profits decline. I explore how MNE's access to the foreign labour market influences local wage dynamics. Using the proportion of migrants hired by MNEs as a proxy for their access to the foreign labour market, the results reveal a stronger impact in regions where MNEs rely more on local labour and conversely import less immigrant labour. This suggests that the observed wage increase is partly driven by heightened demand for local labour.

Keywords: Multinational enterprises, labour 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 has been increasing worldwide since the early 2000s (OECD, 2018). MNEs are typically distinct from domestic firms on several levels: There is substantial evidence in the economic literature that MNEs are more productive, larger and pay higher wages for the same worker, than domestic firms.¹ Some policy makers seek to attract MNEs with the intention of inducing positive spillovers to the local economy (OECD, 2022). Conversely, MNEs paying a wage premium may intensify competition for talent with domestic firms. With the increasing prominence of MNEs in the global economy, it is important to investigate how MNEs affect wages and employment in domestic firms. MNEs may affect local workers through different channels, directly and indirectly. A direct effect refers to the result that the same individual receives a higher compensation in an MNE compared to a domestic firm, for example through a wage premium or other amenities. An indirect wage effect is defined as the effect of MNEs on workers in domestic firms even if these workers stay at the domestic firm. Studies on the effect of MNEs on domestic firms include Setzler and Tintelnot (2021) for the US, Alfaro-Urena, Manelici, and Vasquez (2019) for Costa Rica and Balsvik, Fitzgerald, and Haller (2023) for Norway. While these find positive indirect effects of MNE presence on wages of domestic workers, it is still unclear which factors drive the impact of MNEs on domestic firms.

In this paper, I investigate how MNEs influence wages, employment, and productivity in domestic firms, and to what extent access to foreign labour markets shapes these effects. 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). The economic structure of the country reflects this. Around 1% of registered firms are foreign-owned, yet account for an employment share of 16% and around 30% of value added (CBS, 2022).

A key difference between domestic and foreign firms is the ability to hire internationally. By definition, MNEs operate across multiple locations, giving them direct access to international labour pools. Indeed, I document supporting descriptive evidence that the share of migrants in employment is around 40% larger in MNEs compared to domestic firms.

Whether MNEs hire migrants from abroad or locally relates an an important channel through which MNEs affect domestic firms, which is demand for local labour. An expansion of MNE activity in a host region, potentially due to a global demand shock or other factors

¹For 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).

related to global activity, creates excess demand for local workers and hence drives up wages. This is mediated by MNEs' access to the foreign labour market. If MNEs hire more migrants, they exert a lower demand for domestic workers. Here, I first estimate the overall impact of MNEs on local workers in the Netherlands and then investigate how this effect differs by MNEs' access to the foreign labour market. To address the endogeneity of firm location choice, 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 labour 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 on average more productive and likely to pay a wage premium, they may improve outside options for domestic workers. As incumbent workers observe vacancies in MNEs, they may bargain up wages in their current position or change employers altogether. 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 MNEs. 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 compensation.

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 can arise in the form of lower search and screening costs when MNEs hire from a subsidiary's location. The share of foreign workers in a local labour market affects the strength of the labour demand channel. The more workers MNEs hire from abroad, the less additional local labour demand they exert. At the same time, the possibility to hire internationally reduces 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 the endogeneity of MNE location choice, I use a shift-share instrumental 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. This is analogous

to the approach in Setzler and Tintelnot (2021) and Alfaro-Urena, Manelici, and Vasquez (2019). I estimate the effects of MNEs on outcomes at the local labour market level and the firm level. Next, I use the share of migrants hired in MNEs as a proxy for MNEs' access to the foreign labour market, to investigate whether the effect of MNEs on domestic firms differs.

At the local labour market level, I find that a 1% increase in the MNE employment share increases wages in domestic firms by 0.04%, suggesting that the presence of MNEs indeed drives up wages. At the same time, employment and value added in domestic firms decline by 0.5% and 1.4% respectively with an increase in MNE employment share in the same local labour market. This is in line with workers bargaining up their wages at domestic firms, although they may not become more productive. The latter results in a decline in value added in domestic firms. The decrease in aggregate employment in domestic firms may arise 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: for example, wages increase by 0.18% with a 1% increase in the MNE employment share in local labour markets where MNEs rely more on local labour. In local labour markets where MNEs rely more on foreign labour, the estimated effect on wages in domestic firms is not statistically different from zero. 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 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. First, only the most productive firms expand internationally (Helpman, Melitz, and Yeaple (2004), Bernard et al. (2018)), hence, we expect MNEs to be on average more productive. In this paper, 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,

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

though the magnitude and drivers of the premium can vary. In developed countries, such as the US and those in the European Union (EU), studies have shown that MNEs offer higher wages due to their higher productivity levels, advanced technology, and the need to attract and retain skilled labour (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 social responsibility practices. These studies include Aitken, Harrison, and Lipsey (1996) for a comparative study in Mexico and Venezuela, Poole (2013) for positive wage premium in Brazil, 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 still unclear what channel drives the impact of MNEs on wages in domestic firms. In this study, I first 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 locations of their subsidiaries and potentially reallocate the workforce to places to increase efficiency.

The channels I investigate 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 thereby reducing trade barriers and facilitating knowledge spillovers. I review additional 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 affects wages in domestic firms using an on-the-job

search model. Section 3 summarises 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 and 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

Workers are homogeneous, have linear utility and discount future utility with a discount factor β . Time is discrete. If employed, workers supply one unit of labour for wage w , which is the result of bargaining with the employer over the match value and the worker's outside options. When employed, workers search for a job with search intensity $s \leq 1$. If a worker is unemployed, they receive utility b , which can include unemployment benefits and the value of leisure. They search for a job with search intensity 1 as long as long they are 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 of posting vacancies $c(v)$ 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 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 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 of 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} and the mass of potential entrants \tilde{m}_i , the measure of actual entrants of type i is

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

Firms die with exogenous probability δ_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 $\gamma(p)$

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

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 δ_f or a match between a firm and a worker is broken with exogenous probability δ_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

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

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,

$$S = u + s(1 - \delta)(1 - u) \quad (4)$$

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 worker χ and the probability that an unemployed worker meets a vacancy λ . The probability that an employed worker meets a vacancy is weighted by the search intensity: λs

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

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

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 ϕ 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 wage. Denote $W(w, p)$ the value to a worker 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 a firm with productivity p such that³

$$W(w_0(p), p) = U + \phi(W(p, p) - U) \quad (7)$$

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

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

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

$$W(w(p', p), p) = W(p', p') + \phi(W(p, p) - W(p', p')) \quad (8)$$

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

$$W(w(p, p'), p') = W(p, p) + \phi(W(p', p') - W(p, p)) \quad (9)$$

Predictions

In the following, I outline the intuition behind the main results from this model. Further extensions and derivations of the model can be found in Balsvik, Fitzgerald, and Haller (2023). A key distinction between domestic and foreign firms is the assumed productivity advantage of foreign (multinational) firms, consistent with substantial evidence discussed above.

This illustration focuses on how an increase in MNEs affects wages in domestic firms. Growth in MNE activity within a country can stem from multiple sources. Globally, such expansion may reflect broader trends in globalisation, as documented by OECD (2018). At the national level, reductions in trade barriers or subsidies for foreign direct investment can also incentivise MNEs. I discuss and document that global trends are likely the primary drivers of MNE activity in the Netherlands, as discussed in the empirical strategy section.

When the number of potential entrants foreign (multinational) firms, \tilde{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 foreign firms, weighted by the share of firms from 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 corresponding right shift in the productivity distribution improves outside options for incumbent workers. A more attractive outside option, measured by a higher q , will put upward pressure on wages as it improves the worker's 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 from 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 for understanding how the presence of more productive firms can affect wage setting in domestic firms through outside options. In the following, I examine how MNEs affect wages and employment in domestic firms in the Netherlands. Furthermore, I 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 examines the impact of MNEs on domestic firm outcomes in local labour markets. To do so, I construct a panel of detailed matched employer-employee data for the Netherlands, enabling an analysis of wage dynamics over time. First, I describe the creation of this dataset, followed by a review of descriptive statistics on firm characteristics.

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

⁴The definition of ownership status and Ultimate Controlling Unit (UCI) is harmonized with Eurostat Foreign Affiliate Statistics manual ([Link](#)). 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. The country of UCI is defined as "the country of residence of the UCI".

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 at the monthly level and contains all employment spells of the population, derived from tax information. I select employees aged 18 to 60 who 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 the 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 who moves to the Netherlands from abroad during their first employment spell in the Netherlands. Once such an individual 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 of 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 am interested the wage and employment dynamics in medium to large (domestic) firms as these are more likely to experience turnover in their labour force. 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 ($> 99.9^{\text{th}}$ percentile) for the majority of operating years. The resulting sample for 2008-2020 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

⁵Individuals who 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	Domestic workers	Migrant workers
Total matched IDs	684,692	23,821	10,084,425	2,319,990
Active in Industry, Services, Wholesale	454,593	23,713	9,651,381	2,211,659
Observed for \geq 2 years	439,460	22,879	9,635,044	2,204,395
\geq 10 employees	109,537	13,344	9,284,727	2,124,582
Value added / worker	109,535	13,342	9,284,727	2,124,580

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 types 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 C.1, (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.

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 as the interaction between a broad sector and an area between municipality and province.⁶ I show descriptive 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 at the firm level. For multi-establishment firms, the datasets do not contain establishment-specific information, but aggregate information 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 levels largely correspond. Note that the capital income tax, value added tax and personal income tax are set at the national level, hence they do not influence firm or establishment location choice within the Netherlands.

Descriptive statistics

Firm characteristics

I outline some characteristics of domestic firms and MNEs for the sample described above. Over the sample period 2008 - 2020 both the total number of foreign-owned firms increased substantially at the national level, while the number of domestic-owned firms stayed on similar levels, see Figure 1. The top 3 owners of foreign firms are the US, Germany and France.

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

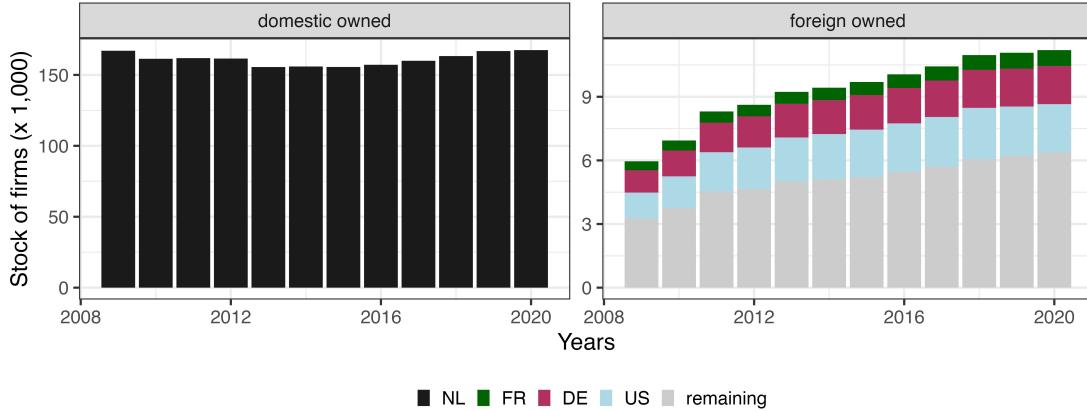


Figure 1: Stock of firms by ownership status

Note: Number of firms in the Netherlands in all sectors, 2008-2020. Colours for countries with the following abbreviations: "NL" for The Netherlands, "FR" for France, "DE" for Germany and "US" for United States. Sample as defined in Table 1.

Figure 2 shows the national distribution of industry shares by firm ownership for the entire sample period 2008-2020. First, at 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'.

I document the main differences between foreign-owned and domestic firms in Table 2. First, 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 firms. The difference remains large and significant even after controlling for the 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, in terms of number of employees, are owned in France, Great Britain and Switzerland, closely followed by the US and Germany. Figure 3 shows the average employment stock, average hourly wages, number of migrants and value added per worker by country of ownership. When comparing average firm-level outcomes between domestic

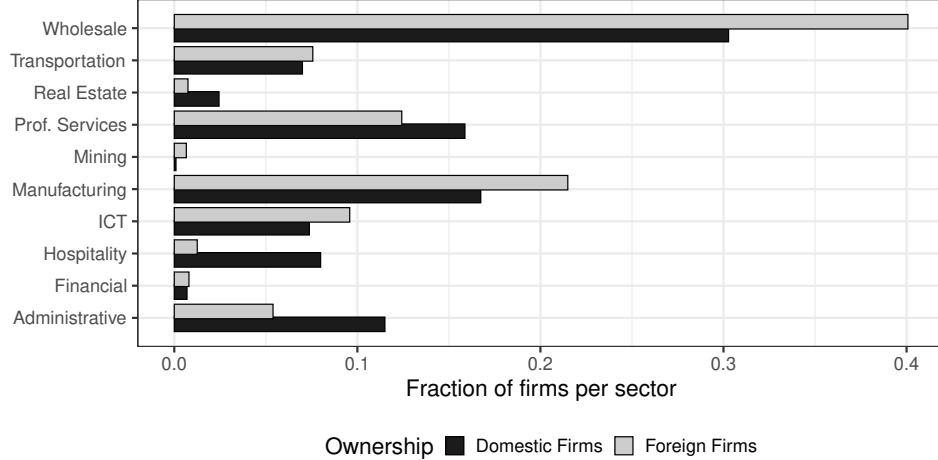


Figure 2: Firm shares by ownership and sector

Note: The table shows the average share of sectors across 2008-2020. ‘ICT’ stands for ‘Information, Communication, Technology’, ‘Hospitality’ stands for ‘Accommodation and Food Services’, ‘Prof. Services’ stands for ‘Professional and Scientific Services’. Sample as defined in Table 1. Sectors are defined in Table ??.

and foreign-owned firms, it is clear that foreign firms from any country of ownership are larger and more productive than domestic firms. Splitting foreign-owned firms by country of ownership reveals some heterogeneity. While US owned firms pay on average the highest hourly wage and produce the highest value added per worker, French firms lead in the count of employees.

Thirdly, foreign-owned firms hire more migrants than domestic firms. On average, domestic firms employ 1 migrant, 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 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

	Domestic firms	Foreign firms	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.

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 natives’ productivity in firms and regions in France. In terms of R&D activity, Bernstein et al. (2022) show 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 to the literature on immigrant wage effect on natives, it is crucial whether or not migrants are complements or substitutes for native workers (Card (2001), Peri and Sparber (2011)).

Secondly, firms may want to hire migrants due to their intangible connections with foreign product markets and customer bases. At the firm level, some literature indicates that workforce composition matters for firm activities beyond productivity. For trade, Erbahar and Gençosmanoğlu (2023) find 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) shows that both foreign employment and regional immigration are positively related to a 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

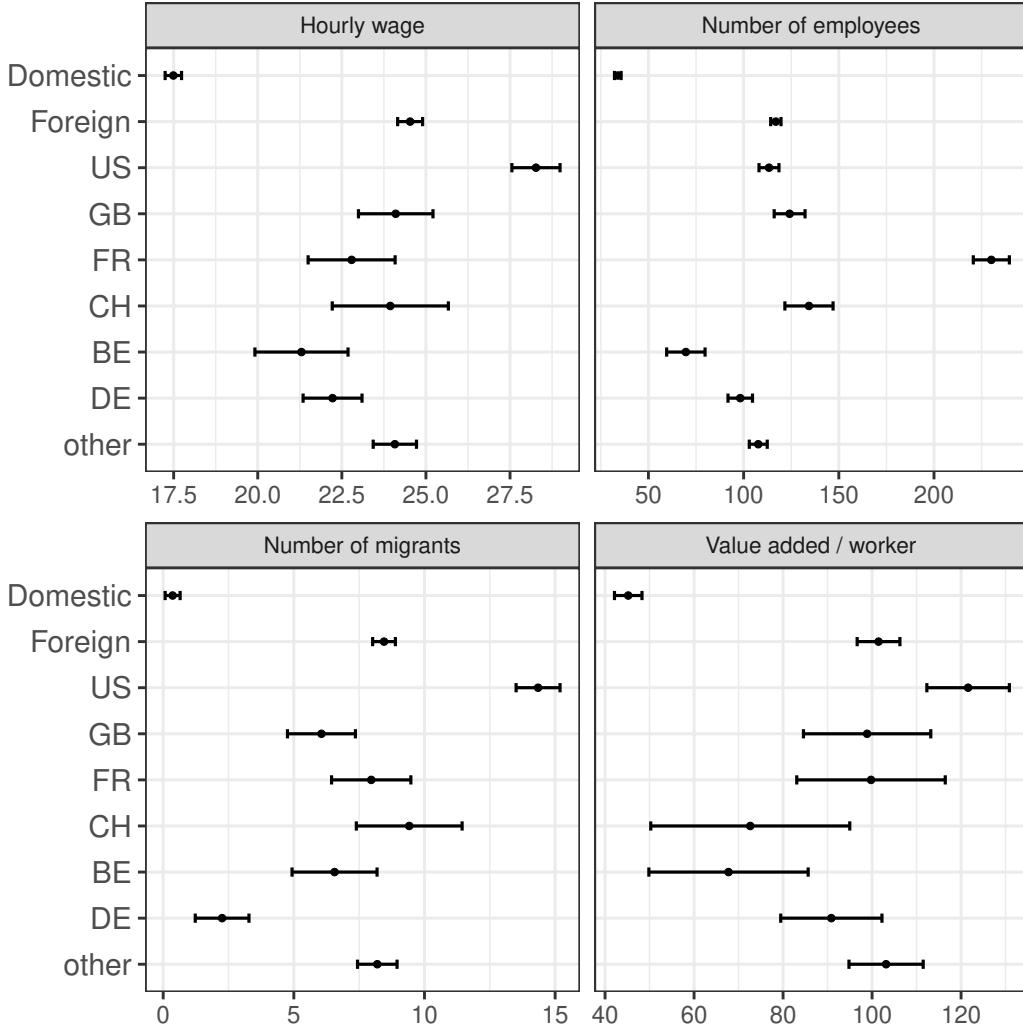


Figure 3: Average firm level outcomes by firm ownership country

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. Sample as defined in Table 1.

rule creates an opportunity for the employer to attract high-skilled migrants at potentially lower gross salaries, but may also reduce social security contributions on the employer side (see Timm, Giuliodori, and Muller ([forthcoming](#))). 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 in these migrants being 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 firms' decision making in hiring. Using a survey of Danish firms, Bertheau, Larsen, and Zhao (2023) show that search and training frictions matter as much as labour costs in hiring decisions, but those frictions 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 employers' probability of searching for foreign workers, particularly for STEM workers.

However, some factors may also inhibit a firm's willingness to hire migrants. These include screening and searching costs, which are 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 country 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. 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 simplified Visa procedure (*Kennismigrantenvisa*) and a tax reduction.⁷ Secondly, for non-EU nationals a visa category for 'Intra-corporate transferee' exists, 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 in hiring non-EU nationals. Firstly,

⁷Non-EU applicants can apply for a work visa or 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 incentive 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 (forthcoming) show that this is an effective measure to attract migrants with mid-level earnings.

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 is 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 are located 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 be located in different areas (see Figure 5). 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 a 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 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 the 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.

Local labour markets

I define a local labour market by region and broad sector, 'Manufacturing', 'Services' and 'Wholesale / Retail Trade'. 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 with a total of 11,043 and 2,859 employees respectively. As outlined

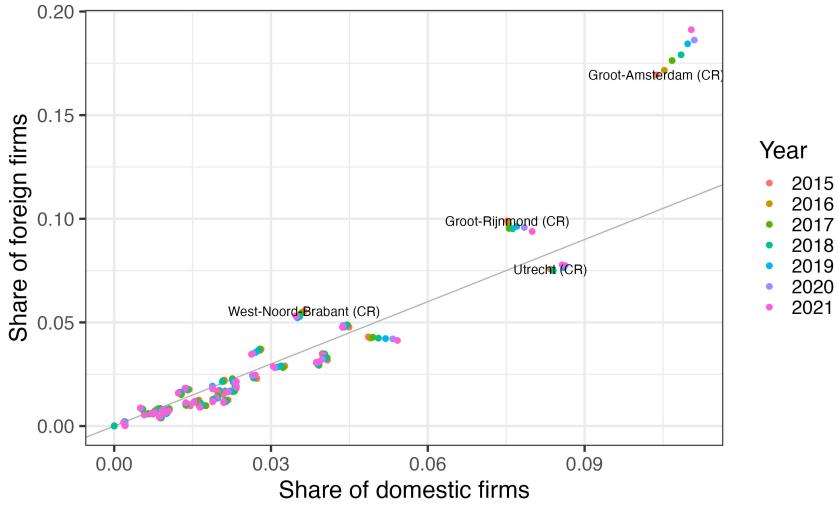


Figure 4: Share of domestic and foreign firms by region and year

Note: The chart shows the fraction of the stock of firms per region, relative to all firms in NL, by type of ownership. The correlation between foreign and domestic firm shares is 0.95. Figure A.1 in the Appendix shows the scatterplot by sectors. *Source:* CBS Statline

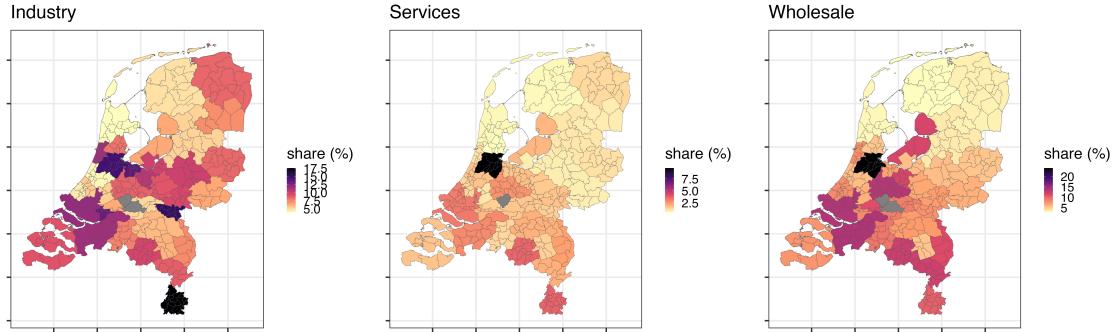


Figure 5: Fraction of foreign firms per labour market region and broad sector

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.

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 for the distribution of hourly wages at MNEs.

While both the number of firms and employment per local labour market vary substan-

	25th Percentile	Mean	Median	75th Percentile	N
Total firms	180	529	351	608	1,440
Domestic firms	166	475	330	546	1,440
Foreign firms	11	55	23	58	1,440
Stock of employees	6,741	24,837	14,390	28,043	1,440
.. in domestic firms	5,303	18,212	11,043	21,067	1,440
.. in foreign firms	868	6,703	2,859	6,706	1,440
Avg. hourly wage domestic firms	16.45	19.02	18.22	20.15	1,440
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.

tially across local labour markets, the ranking of local labour markets in terms of size has been roughly constant over the 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 Figure B.6 in the Appendix). 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 in Section 5.

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 labour market level and the firm level. Then I describe how I estimate heterogeneous effects to investigate the impact of MNE's access to the 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 the 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 at the firm level. If a change in MNE intensity in a local labour market r in time t affects the change in the outcome, this is captured by the coefficient β in the following specification

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

where $x_{r,t}^{MNE}$ stands for MNE employment in local labour market r and year t . The fraction then captures the change in the MNE employment share relative to total employment (x^{all}). $\mathbf{X}_{r,t}$ represents potentially time-varying controls. θ_t and θ_r stand for year and local labour market fixed effects respectively. I weigh the regression by the number of workers in the local labour market level to take into account the size differences of local labour markets. Finally, I cluster standard errors at the firm 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 of productivity. A change in value added per worker in domestic firms reveals the short-run impact of MNE exposure on productivity in domestic firms.

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

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

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 at 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:

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

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 at the firm and the local labour market level respectively. θ_t and $\theta_{r(j)}$ stand for year and local labour market effects respectively. At the firm level, I control for firm size and the 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 weigh the regression by the number of workers at the local labour market level to consider differences in market sizes. I cluster standard errors at the firm 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

I now turn to the heterogeneity by MNEs' impact on domestic firms by access to the foreign labour market. I use the share of migrants in newly hired workers at MNEs as a proxy for MNEs' access to the foreign labour market. For all MNEs in all labour markets, I compute the fraction of migrants relative to 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

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

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

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

$$\begin{aligned} \log(y_{j,r(j),t}) - \log(y_{j,r(j),t-1}) &= \sum_m \beta_m \left(\frac{x_{r(j),t}^{MNE} - x_{r(j),t-1}^{MNE}}{x_{r(j),t-1}^{all}} \right) \times \mathbf{I}_{r(j)}(\text{tercile}) + \\ &\quad \delta_1 \mathbf{X}_{jt} + \delta_2 \mathbf{Q}_{r(j),t} + \theta_t + \theta_{r(j)} + \varepsilon_{j,r(j),t} \end{aligned} \quad (13)$$

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

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 ($-r$).

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

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 the 3-digit industry employment shares in the

local labour market ('shares'). In this application, the 3-digit industry employment shares capture the relative importance of each the 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 the number of enterprises and the number of employees of MNEs for the sector "Services". Outward activity of MNEs is defined as the activity of an MNE outside its source country, where the headquarter is located. Figure A.4 shows worldwide employment and the number of enterprises in the manufacturing sectors. For both sectors, employment and the number of enterprises have been increasing gradually across all source countries, indicating an increase in MNE activity worldwide.

Additionally, the World Bank enterprise survey from 2020 suggests that the Netherlands is highly connected to international trade relations: The percentage of firms exporting

directly (31.8%) as well as the 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 this section, I present results on the impact of MNE expansion on average wages and aggregate employment in domestic firms at the local labour market level. I then examine how a change in MNE employment share affects firm-level productivity measures. For each outcome, I report findings for the full sample as well as for subsamples split by the proportion of migrants hired by MNEs in a given year.

First Stage of the Shift Share Instrumental Variable

For both local labour market level and firm level, I predict the change of MNE employment using sectoral shares and national level shifts (see Section 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). I show the coefficients for the first stage in Table 4. The coefficient for the constructed SSIV measure is positive and significantly different from zero, suggesting that the constructed instrument predicts the change in the MNE employment share well. The F-statistic for the first stage is 22.3, 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 (β from 10) using SSIV, for average wages, aggregate employment and aggregate value added in domestic firms at the local labour 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)

Outcome: Δ MNE employment share_{r,t}

$t_0 = 2008-09$

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.

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 positive direction of this effect is in line with the theoretical framework: A 1% increase in the MNE employment share is associated with a 0.039% increase in wages at average firms. When interacting the change in MNE employment with the share of new migrant employees, this effect turns statistically different from 0 and positive for local labour markets where MNEs hire few migrants and relatively many local workers ($\beta = 0.185$). For local labour markets where MNEs tend to hire from the local labour force, a 1% increase in the MNE employment share increase wages by 0.185%. In the average labour market, MNE employment increases by 2.4% per year, resulting in a 4.4% increase of wages in domestic firms, which is substantially above the national level wage growth of just under 2% year-on-year. For the opposite - local labour markets where MNEs hire relatively more migrants and fewer local labour force, the point estimate is negative and not significantly different 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 (columns 3-6 in Table 6). For both outcomes, the overall effect is close negative and statistically significant: a 1% increase in the MNE employment share in a local labour market decreases aggregate employment and value added in domestic firms by 0.52% and 1.4% respectively. There is substantial heterogeneity by the share of migrants in MNEs as well: both aggregate employment and

	Δ for domestic firms:					
	Avg. wages		Agg. employment		Agg. value added	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ MNE	0.039 (0.053)		-0.517*** (0.051)		-1.441*** (0.224)	
Δ MNE x low migration		0.185** (0.084)		-0.968*** (0.079)		-2.436*** (0.353)
Δ MNE x mid migration		-0.089 (0.094)		-0.239*** (0.088)		-1.176*** (0.396)
Δ MNE x high migration		-0.030 (0.108)		-0.143 (0.101)		-0.126 (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 at the local labour market level

Note: The table reports the coefficient β 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 at the firm 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.

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 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 at the firm level to complement the findings from above with more detailed information on productivity. These results capture the average change in firm level outcome relative to the change in the MNE employment share at the local labour market level.

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

Table 6 shows the results (coefficient β from Equation 11) at the firm level. Across all firms, the average impact of a change in local labour market MNE employment share is small and not significantly different from zero for 'Production value' (Column 1) and 'Turnover per worker' (Column 3). However, stratifying firms by the local labour market level of the share of migrants hired by MNEs reveals some heterogeneity: Both production value and turnover per worker increase by 0.16% and 0.074% respectively, upon a 1% increase in the MNE employment share in local labour markets where MNEs tend to rely more on local labour and less on migrant labour. Conversely, in local labour markets where MNEs tend to rely more on foreign labour, a 1% increase in the MNE employment share decreases production value by 0.99% and turnover per worker by 0.145%. While production value and turnover capture firm activity, value added reflects the a firm's contribution to the value of the final good, and is typically used as a proxy for firm productivity. In this sample, a 1% increase in the local labour market level share of MNE employment increases value added per worker by 0.034%. Stratifying by the local labour market level share of migrants in MNEs reveals some heterogeneity, in line with the aggregate results at the local labour market level: While firm-level value added per worker decreases by 0.19% upon a 1% increase in the MNE employment share in local labour markets where MNEs expand and rely mainly on local labour.

The results for all three productivity measures suggest that domestic firms produce more volume, but not necessarily more value, in regional labour markets where MNEs expand and hire mainly from the local labour force. 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 upon the expansion of a competitor or upstream consumer of intermediate goods. 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, while the majority of value added is created in more productive MNEs.

I additionally show the impact of MNE exposure on the total personnel costs (wage bill)

	Δ in domestic firms							
	Production value		Turnover / worker		Value added / worker		Personnel costs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ MNE	0.021 (0.020)		-0.007 (0.017)		-0.619*** (0.019)		0.098*** (0.021)	
Δ MNE		0.160** (0.032)		0.074*** (0.029)		-0.190*** (0.032)		0.233*** (0.035)
x low migration								
Δ MNE		-0.038 (0.033)		0.010 (0.010)		-0.122*** (0.033)		0.0131*** (0.036)
x mid migration								
Δ MNE		-0.099*** (0.038)		-0.145*** (0.034)		-0.307 (0.038)		-0.143*** (0.041)
N	496 634	495 298	479 095	484 195	480 364	480 364	495 306	493 976
R ²	0.09	0.09	0.04	0.06	0.05	0.05	0.06	0.06

Table 6: Results at 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.

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 immediately. 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.

Robustness to choice of region

In this section, I demonstrate that the results are qualitatively robust to the choice of regional unit used to define local labour markets. Specifically, I replicate the analysis using provinces rather than the smaller regional units applied in the main analysis. Choosing the regional definition for a local labour market involves a trade-off: smaller regions offer a more localized economy, with workers largely remaining within the area, but may introduce noise if workers commute to other regions. Conversely, larger regions may dilute the concept of a local labour market, as individuals may be less affected by events occurring far from their immediate area, potentially smoothing out the effects over the entire region.

Using provinces as the definition of local labour markets, fewer units are available per

year: 11 provinces and 3 broad sectors yield up to 33 local labour markets, compared to 120 in the main specification. Nonetheless, the total number of firms and workers remains constant. Tables D.2 and D.3 in the Appendix show the estimated coefficients for the local labour market definition using provinces.

Overall, the results align closely with those from the main analysis using smaller regions. In some cases, coefficients are larger with the provincial definition: for instance, a 1% increase in MNE employment share leads to a 0.8% (0.52%) decrease in aggregate employment and a 2.5% (1.4%) decrease in aggregate value added in domestic firms using provinces (smaller regions). Notably, the MNE employment share is also calculated at the provincial level, resulting in larger absolute changes. At the firm level, the results for production value, and turnover per workers are mostly aligned between the definitions of local labour markets based on provinces or regions. The estimated effects for value added across all local labour markets turn direction from a -0.619% to a positive 0.001% increase upon a 1% increase in the MNE employment share when using provinces versus regions as local labour markets. This seems to be mainly driven by the local labour markets where MNEs rely more on local labour. It may be an indication that the larger provinces mask some heterogeneity that arises when using a more detailed level of regions

In summary, this robustness check indicates that results are broadly consistent across different regional definitions. Due to the greater detail and limited commuting observed within smaller regions, I retain the smaller regions as the primary definition for local labour markets in the main analysis.

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. At 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.

This paper adds to the existing literature around globalised firms and their impact on domestic firms and regional labour markets. I examine closely the labour market effects of MNEs and I contribute to the literature by examining the channel of foreign labour market access, a distinctive feature of MNEs.

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A Additional descriptive charts

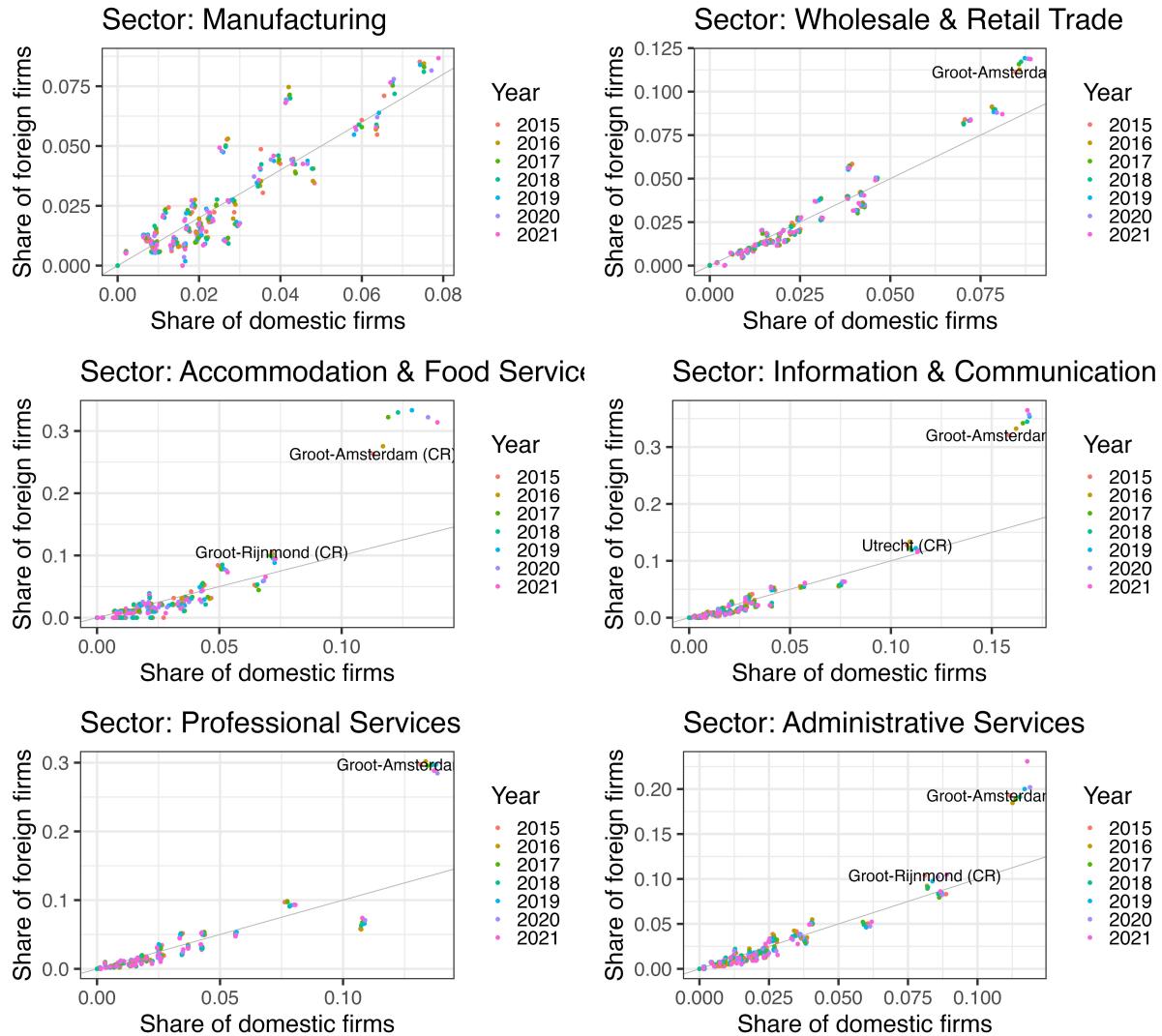


Figure A.1: Share of domestic and foreign firms by region and year

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

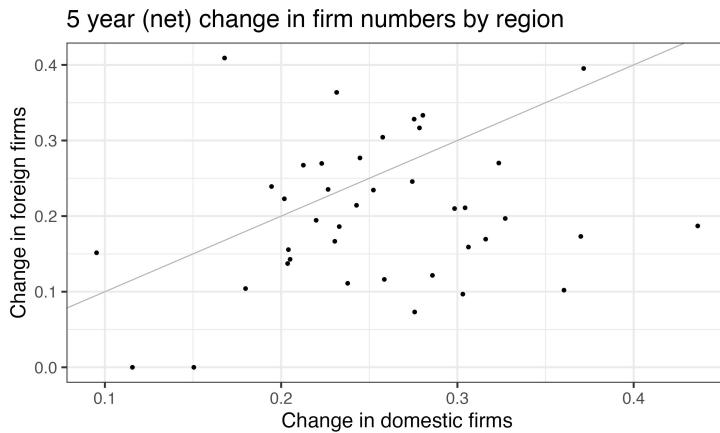


Figure A.2: 5 year change of the stock of firms.

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 firms of type i = foreign, domestic in year t). The correlation between the change rates is 0.2.
Source: CBS Statline

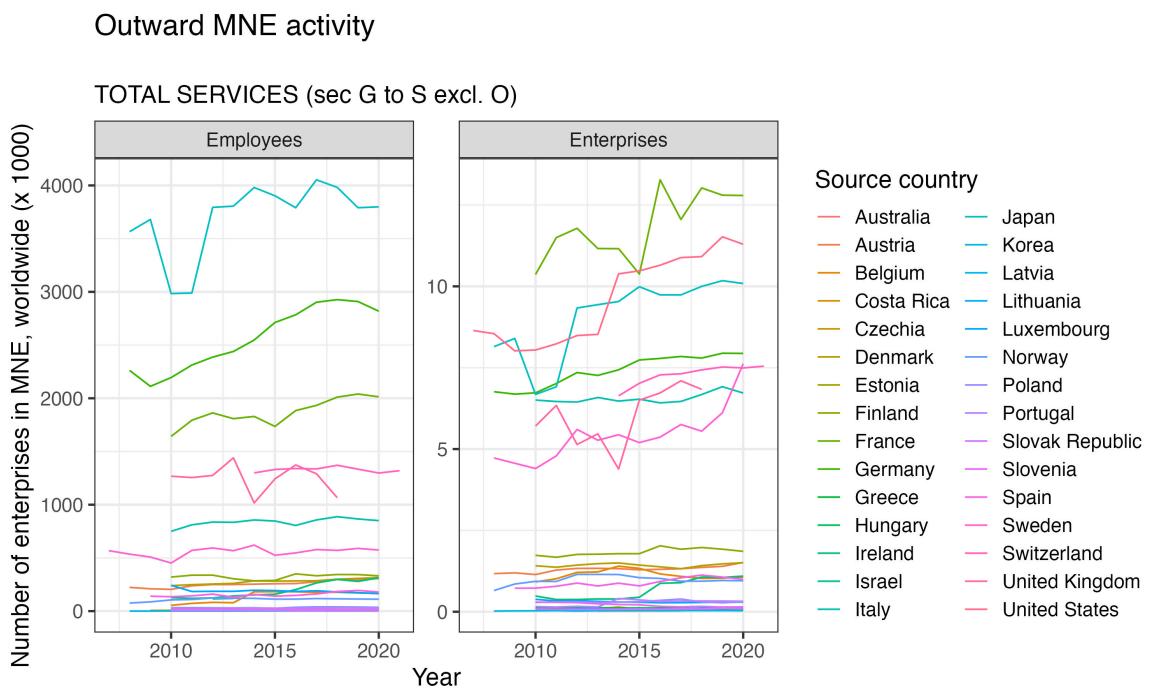


Figure A.3: Outward activity of multinational enterprises by source country

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>).

Outward MNE activity

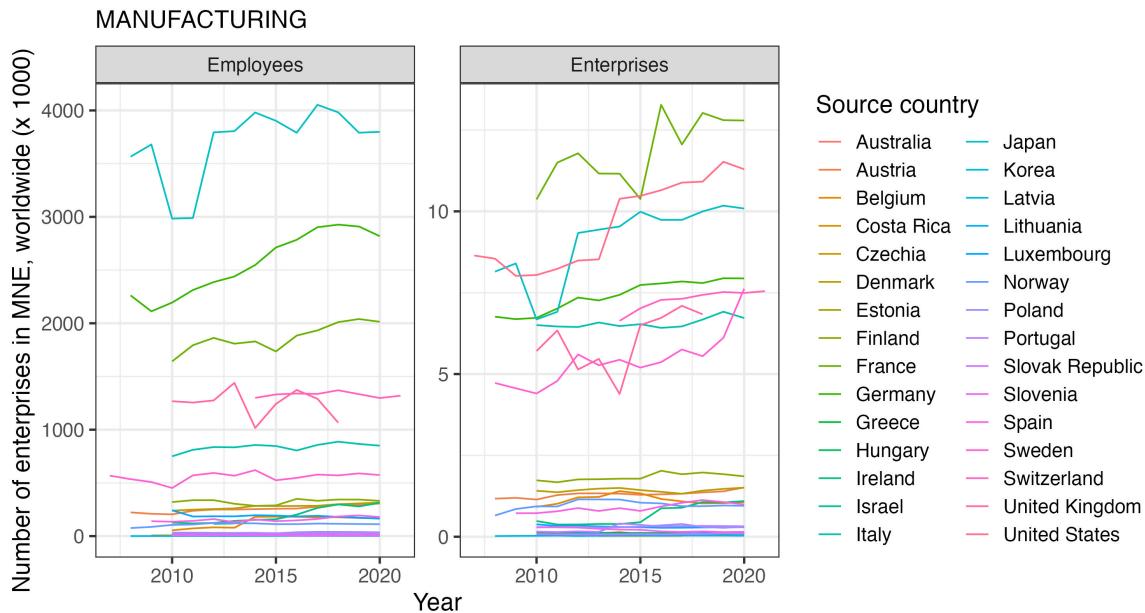


Figure A.4: Outward activity of multinational enterprises by source country

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

([World Bank Enterprise Survey](#)).

B Labour market regions in the Netherlands

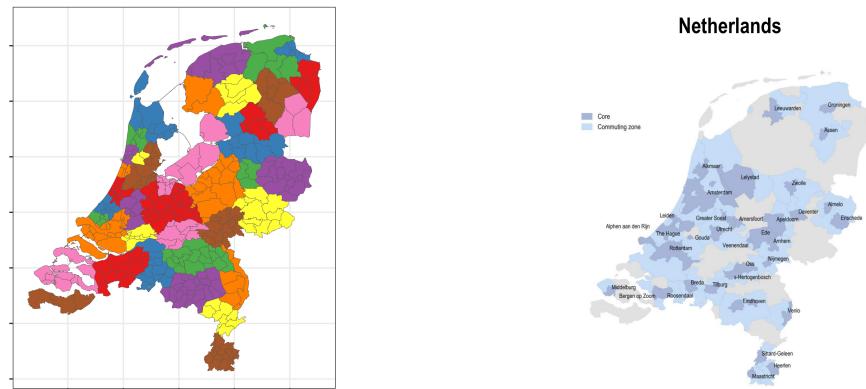


Figure B.6: Labour market regions in the Netherlands (2022) and OECD Functional Urban Areas

Note: LHS: COROP regions in the Netherlands. These are defined by the *Coördinatiecommissie Regionaal Onderzoeksprogramma* (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. digit sec- tors	3
Industry	A	Agriculture, forestry and fishing	6	
	B	Mining and quarrying	6	
	C	Manufacturing	24	
Wholesale and transportation	G	Wholesale and retail trade	21	
	H	Transporting and storage	15	
Services	I	Accommodation and Food Services	7	
	J	Information and communication	13	
	K	Financial and Insurance activities	9	
	L	Real Estate	3	
	M	Professional Scientific and Technical Activities	15	
	N	Administrative and Support service activities	19	

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 Additional Results

	Δ for domestic firms:					
	Avg. wages		Agg. employment		Agg. value added	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ MNE	-0.180 (0.123)		-0.813*** (0.098)		-2.521*** (0.386)	
Δ MNE		0.239 (1.149)		-1.098*** (0.116)		-3.318*** (0.456)
x low migration						
Δ MNE		-0.448 (0.320)		-0.397*** (0.25)		0.462 (1.00)
x mid migration						
Δ MNE		0.744** (0.35)		0.251 (0.273)		-0.839 (1.01)
x high migration						
N	396	396	396	396	396	396
R ²	0.24	0.25	0.45	0.48	0.48	0.5

Table D.2: Results at the local labour market level - using provinces as local labour markets

Note: The table reports the coefficient β from Equation 10, estimated on the sample described in Section 3, but with local labour markets defined as provinces. "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 at the firm 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, defined as province and broad sector. Standard errors in parenthesis, clustered on local labour market level.

	Δ in domestic firms							
	Production value		Turnover / worker		Value added / worker		Personnel costs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ MNE	0.005*** (0.025)		-0.102*** (0.025)		0.001* (0.032)		0.032*** (0.031)	
Δ MNE			0.118** (0.037)		-0.050 (0.033)		0.163*** (0.040)	
x low migration							(0.040) (0.040)	
Δ MNE			-0.081 (0.064)		-0.014 (0.057)		-0.082*** (0.070)	
x mid migration							(0.096) (0.096)	
Δ MNE			-0.166*** (0.064)		-0.355*** (0.057)		-0.595 (0.069)	
x high migration							-0.535*** (0.069)	
N	496 634	495 298	479 095	484 195	480 364	480 364	495 306	493 976
R ²	0.09	0.09	0.04	0.06	0.05	0.05		0.06
	0.06							

Table D.3: Results at the firm level - using provinces as local labour markets

Note: The table reports the coefficient β from Equation 10, estimated on the sample described in Section 3, but with local labour markets defined as provinces. "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 at the firm 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 firm. Standard errors in parenthesis, clustered on local labour market level.

E 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.

E.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 (*Belastingdienst*) 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.

¹⁰As 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.

¹¹Firms that are active in the Netherlands, but do not have an establishment, are not taken in to the registry.

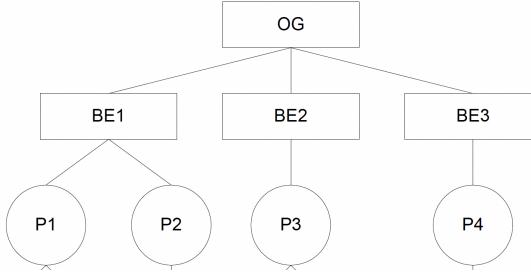


Figure E.7: Concept of firm statistical hierarchies

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 E.4: 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.

E.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

¹²coordinated 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 registry¹³.

E.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.

¹³Some 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.