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Careers in Multinational Enterprises

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Abstract

Do workers in multinational enterprises (MNEs) build stronger CVs? We track the careers of all workers entering the Dutch labor market over the years 2006-2021 and find large and portable wage premia of MNE employment experience. Workers with experience at MNEs instead of domestic firms earn up to 14% higher wages within the MNE, and up to 11% higher wages after moving to another firm. Consistent with a model of MNEs that leverage the value of their employment experience, we find that MNEs hire more juniors, pay lower starting wages, and are more selective towards senior workers than domestic firms.

Keywords: multinationals, experience wage premia, firm organization, AKM, knowledge spillovers, Netherlands
JEL Codes: F23, F66, J24, J31

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1 Introduction

For many workers, multinational enterprises (MNEs) are more attractive employers than domestic firms. An extensive literature documents that MNEs pay higher wages, are more productive, and attract better workers (Girma and Görg, 2007; Fons-Rosen et al., 2021; Setzler and Tintelnot, 2021; Roesch et al., 2022). However, the impact of MNE employment on workers' careers is less clear. Experience at an MNE may improve workers' CVs, raising their future earnings potential, as MNEs provide more on-the-job training, use advanced technologies, and foster network effects of productive employees (Poole, 2013; Balsvik, 2011; Koch and Smolka, 2019). MNEs may also screen their workers more strictly than other firms. Hence, MNE employment could allow workers to build human capital or signal quality, leading to higher future wage.

This paper shows that employment experience in an MNE increases workers' future wages, both within the MNE and at other firms. We embed such wage premia from MNE employment experience in a standard model of international firms with hiring and promotion strategies, and we show that the firms' predicted organizational choices are consistent with stylized facts in the data.

We employ the universal matched employer-employee data of the Netherlands over the years 2006-2021 to investigate the wage effects of MNE employment over the careers of workers. Our dataset combines detailed worker- and firm-level information with data on firm nationality and international trading activities. Focusing on cohorts of graduates, we track the wage impacts of MNE employment for up to 16 years after the worker enters the labor market. The Netherlands provides an appropriate setting to study the impact of MNE employment on workers' wages. In addition to the availability of highly-detailed data, the country is open to international trade and investment, and MNEs hire around one third of the workers who enter the labor market.

To identify the impact of MNE employment, we use a Mincer regression that explains wages based on previous employment experience (Abowd et al., 1999, AKM henceforth). Our regression controls for the fixed effects of a worker's current firm, to avoid conflating the impacts of earlier employment experience with the current employer's quality. It also controls for worker-level fixed effects to distinguish experience effects from unobserved skills and from the sorting of high-skilled workers into multinationals. In addition, we control for industry-year shocks, various dimensions of worker mobility, and direct observables of workers and firms. We also verify our results in settings of mass layoffs and company closures that generate exogenous variation in workers' CVs, and in multiple variations of the AKM regression.

Our results show significant wage premia of a worker's earlier employment in MNEs. As experience accumulates, a worker's wage increases by about 1 to 14% faster over 10 years when the worker is employed at an MNE, instead of a domestic firm. The wage premia following MNE employment also persist when the worker moves to another firm. At later employers, a worker with past MNE employment earns 2 to 11% higher wage than a worker with similar domestic employment spells, and the premium increases in the years of earlier experience in an MNE. Our point estimates reflect a total value of employment experience in MNEs of about 6% of labor income in the Netherlands in the cross-section of 2021, compared to when that experience had been accumulated in domestic firms.

In addition, we present several empirical results that suggest MNEs leverage the career prospects of employ-

ment at their firm. We set up a stylized model of international firms with hires and promotions, in which the firm recognizes its value for its workers' future wage. We document descriptive results that are consistent with the model's main predictions. First, MNEs pay relatively low wages to junior (inexperienced) workers. The intuition is that juniors accept lower wages as they are compensated with experience that pays off once they are seniors. In our estimates of career wage paths (conditional on worker fixed effects), workers with MNE experience earn higher wages over the course of their careers as they earn high wages in late career stages. At the career onset, MNEs pay lower wages than domestic firms, conditional on worker and firm characteristics. Second, MNEs employ higher ratios of junior to senior workers. As juniors have low wages relative to their marginal product, the MNE employs relatively few seniors. Consequently, the promotion probabilities to senior positions are low within MNEs. Consistent with such stricter selection, the average worker fixed effect in MNEs increases strongly with seniority, compared to domestic firms.

Our paper relates most closely to the studies by Pesola (2011) and Mion et al. (2022). Pesola (2011) shows that workers who leave a foreign-owned firm (instead of a domestic firm) earn higher wages at the next employer, conditional on worker fixed effects. The estimates of wage premia are about half the size of ours and suggest that early-career workers do not forego wage in exchange for experience. Whereas Pesola (2011) uses a sample of Finnish workers, we use the universe of cohorts of Dutch workers entering the labor market, allowing us to condition on the workers' full experience profile since labor market entry. Additionally, we focus on multinationals rather than foreign-owned firms, and we control directly for firm-level fixed effects, thus excluding worker sorting into productive firms as an explanation for the wage premia of previous employment experience.

Mion et al. (2022) show for a sample of managers in Portugal that employment in internationally active firms generates wage premia relative to employment in domestic firms. Their estimates of the magnitude of the premia are similar to ours. Mion et al. (2022) also find lower employment premia for blue-collar workers, which ties in with the lower premia of MNE employment that we find for workers with lower ability estimates (i.e. lower fixed effects in the Mincer regressions). Our paper additionally distinguishes between MNEs and other internationally active firms, highlighting a dominant role of MNEs in the rewards to experience. Moreover, we find that worker experience, and not the average level of workers' fixed effects, is crucial in understanding why productive workers are employed in MNEs. We are able to dissect sorting (on fixed effects) from experience effects, because we directly estimate worker and firm fixed effects. Our paper exploits the universe of worker-employer relations instead of a sample, which is essential to identify the fixed effects in an network setting (Jochmans and Weidner, 2019). Lastly, the completeness of our data allows us to shed light on the consequences of the value of MNE experience for the wage setting and organization of MNEs. Our descriptive results indicate that MNEs adapt their hiring strategy to the value of their workers' experience, consistent with the predictions of our theoretical framework.

Our results additionally add to a large literature that examines why MNEs pay high wages in local labor markets. MNEs may have a higher level of productivity, driven by technology, management or connectivity (Girma and Görg, 2007; Bircan, 2019; Koch and Smolka, 2019; Andersson et al., 2022), but the higher wage could also be driven by the MNE's selection of workers, as they select workers of higher ability (Hijzen et al., 2013; Setzler and Tintelnot, 2021; Roesch et al., 2022). Relative to this literature, we propose that careers play

a central role in explaining the wage premia of multinationals. We find that MNEs have a substantial impact on local wages, as the workers who have worked for MNEs receive higher wages later on. Compared to this employment experience value, the immediate wage benefits of current employment at a multinational are minor. Our results also shed light on the sorting process: Where earlier literature suggests that workers select into MNE employment on time-invariant abilities (e.g., Heyman et al., 2007; Hijzen et al., 2013), we show that the past employment experience of workers, instead of their time-invariant ability, explains most of the premia that they earn at multinationals. Consistent with sorting on experience rather than on innate ability, we find that MNE premia are absent for junior workers, and only materialize later in the career. Additionally, we present evidence of selection within the MNE over time: Out of a cohort of workers entering an MNE, those with higher innate ability are more likely stay with the MNE over time. Similar results have been obtained for domestic firms of different productivity types (Stoyanov and Zubanov, 2012; Serafinelli, 2019; Adda and Dustmann, 2023). In contrast to these results, we focus on the distinction between multinationals and domestic firms as two discrete and directly observed firm types.

Related work also studies the spillovers that multinationals cause towards other firms. Most studies rely on firm-level data (e.g., Javorcik, 2004; Keller and Yeaple, 2009; Haskel et al., 2007) but a few worker-level studies suggest that firms hiring workers with previous MNE experience become more productive (Balsvik, 2011; Poole, 2013). Balsvik (2011) shows that, within domestic firms, workers with previous MNE experience earn a wage premium over continuing domestic workers. Similarly, Poole (2013) shows that when ex-MNE workers join a domestic firm, the wages of continuing workers rise. Our approach does not identify spillovers directly, but establishes that experience in multinationals increases workers' future wage, and that the value of MNE employment experience is highly portable between firms.

The rest of the paper is organised as follows. In Section 2, we present an off-the-shelve model of international firms, in which we introduce hires and promotions. The model motivates that firms with higher experience value of their employment are likely to be multinationals. More importantly, it generates several predictions on how firms adapt their hiring and promotion strategies if they operate as multinationals. In Section 3, we introduce the dataset. Section 4 shows the main empirical results on the value of MNE experience and its implications for the interpretation of the AKM fixed effects. Section 5 explores our theoretical model's implications for the labor market strategies of multinationals. Finally, Section 6 presents several robustness checks and Section 7 concludes.

2 Theoretical motivation

We employ an off-the-shelve trade model to examine the consequences of valuable on-the-job experience for the organization of international firms. The setting is a monopolistic industry in which firms employ junior and senior workers. All workers produce the same product, but at potentially different productivity levels. Workers offer two periods of labor: one period as a junior, and one period as a senior. Junior workers can use their experience to earn higher wages in the senior stage of their career. If a worker moves between firms after the junior period of employment, the value of his or her experience is discounted relative to a worker who becomes a senior in the original firm.

Within this setting, we examine how the value of employment experience within a firm (i.e. the senior wage benefits associated with junior employment in that firm) affect the organization of the firm. In line with theories of international trade, firms may have different levels of overall productivity. In addition, its workers have a match-specific productivity, that is only observed after a period of employment. We focus on a static interpretation in which workers offer one junior and one senior unit of labor.

2.1 Output market

We consider a symmetric two-country economy in which consumers (indexed i) have CES preferences over products from different firms (indexed j), and there is an elasticity of substitution between products of $1-1/\sigma$. On the home output market, firms take the demand function as given $d_j = p_{d,j}^{-\sigma} B$, where $p_{d,j}$ is the delivered price of firm j. The term $B = (\int_i l(i)w(i))di)/(\int_j p_{d,j}^{1-\sigma} dj)$ reflects the market size, consisting of the labor income $w(i)$ aggregated over all workers, divided by the (delivered) price index $\int_j p_{d,j}^{1-\sigma} dj$. It is symmetric across the countries. Firms face iceberg transport costs τ to supply the other country. Firms charge a markup over marginal costs, charging $p_j = \sigma/(\sigma-1)mc_j$ in the home market, and τp_j in the foreign market. The operating profits in the symmetric economy are proportional to $(\sigma/(\sigma-1)mc_j)^{1-\sigma}B/\sigma$ in the home market and to $\tau^{1-\sigma}(\sigma/(\sigma-1)mc_j)^{1-\sigma}B/\sigma$ in the foreign market, so that operating profits strictly decrease in the marginal cost level of the firm.

Firms face fixed costs of operating in different markets. The fixed costs are a production volume f required to operate: f_d for domestic operations, f_x for exports to foreign market, and f_m to operate a plant in the foreign market as a multinational. We assume that $f_x < f_m$. The framework thus far closely follows Helpman et al. (2004) and produces the same ordering of international strategies the marginal cost level of the firms. Firms have a maximal marginal cost to operate domestically, mc_d, a maximal marginal cost to export, mc_x and a maximal marginal cost to operate as a multinational, mc_m, where $mc_m < mx_x < mc_d$. Hence, the firms with the lowest marginal costs become multinationals.

The marginal costs of the firm are determined by the level productivity of the firm, b_j, the productivity shifters of the specific workers employed by the firm, the value of experience of the workers in the firm, and the wage levels of those workers, which we detail below.

2.2 Labor supply

Workers have a junior stage and a senior stage in their career. They offer one unit of labor in either stage to one firm. The productivity of the worker has a component that is specific to the firm-worker match: $a(\theta_{i,j})$, where i indexes the worker and a increases in θ. The productivity shifter of worker i in firm j is only known after a period of employment and is equal in the junior and senior stage of the career. The density of the productivity distribution over the workforce $l(\theta_{i,j})$ is known and constant across all firms, and the expected value of the productivity shifter over the population is a.

In the junior stage, workers build up experience at their employer j, which increases their productivity in the senior period. If the worker remains with firm j, the worker's productivity in the senior stage is higher by a factor e_j. If the worker moves to another firm than j, the productivity is discounted by a factor $\delta \leq 1$, such

that the productivity shifter from employment experience is $\delta e_j \geq 1$. This assumption reflects that the value of earlier employment experience may be imperfectly portable, for instance because some part of the worker's human capital is firm-specific, the worker is held back by intellectual property provisions, or the worker's tasks change between firms. The worker's match-specific productivity level $a(\theta_{i,j})$ is independent of the worker's match-specific productivity level in another firm $a(\theta_{i,j'})$.

Workers in the senior stage have no later employment opportunity and have full collective bargaining over their surplus, securing their marginal product of labor as wage.

2.3 Labor demand

The labor market decisions of firms determine the production process. Firms optimize three choices. First, firms choose how many juniors to promote to senior workers. Second, firms choose how many external workers to hire (who spent their junior stage in a different firm). Third, firms select how much output to produce.

The number of junior workers in the firm is L_j^J, the total number of internally promoted senior workers is L_j^S, and the number of externally hired senior workers is L_j^X. The terms s_j and x_j are the ratio of internal and external senior workers, such that $s_j L_j^J = L_j^S$ and $x_j L_j^J = L_j^X$.

The productivity by worker type is as follows. The firm has a general productivity shifter b_j. Junior workers have an average match-specific productivity shifter a as the match-specific productivity is unobserved at the junior stage. Hence, the average junior worker productivity is ab_j. After a period of employment, the firm observes workers' match specific productivities. It selects a minimum required productivity threshold for promotion $\theta(j)$, letting workers below the threshold go. Omitting the firm-specific subscript for brevity, the expected productivity shifter for the promoted workers is $a(\theta_j^*) = \int_{\theta_j^*}^{\infty} a(\theta) l(\theta) d\theta$, and the expected productivity of internally promoted workers is $b_j a(\theta_j^*) e_j$. As the firm promotes its workers by order of productivity, the match-specific shifter $a(\theta_j^*)$ declines in the rate of promotion s_j. The match-specific productivity distribution is not bound so $a(\theta_j^*)$ tends to infinity as s_j tends to 0, and $a(\theta_j^*)$ tends to a as s_j tends to 1 (and $s_j \leq 1$ as the firm can only promote its own junior workers). As θ_j^* depends exclusively and inversely on s_j^*, this implies that $a(s_j)$ tends to infinity as s_j tends to 0 and $a(s_j)$ tends to a as s_j tends to 1. Finally, the firm can hire workers who left other firms on a market for senior workers. Outside workers require integration into the company, which we assume has convex costs such that the productivity of outside workers declines in the their ratio to internal junior workers, captured in a productivity shifter $z(x)$ with $dz/dx < 0$. The productivity of a worker in firm j who was previously employed at firm j' is $ae_{j'}\delta z(x)$. As workers on the external senior market are randomly matched to firms, the expected value of employment experience when hiring an external worker is the expected employment experience value over the population of workers who were not promoted at their initial firm $e = \int (1 - s_j) L_j^J e_j dj / \int (1 - s_j) L_j^J dj$.

Collecting the productivities of the three types of workers, the production function of the firm is

$$Q_j = b_j (a L_j^J + a(\theta_j^*) e_j L_j^S + a e_j' \delta z(x) L_j^X), \tag{1}$$

and the corresponding total cost function is

$$TC_j = L_j^J w_j^J + L_j^S w_j^S + L_j^X w_j^X. \tag{2}$$

2.4 Wage setting, promotion and hiring

In the senior stage in their career, workers secure their marginal product as wage. The respective wages for workers who have been promoted inside their firm (S), who were hired from an outside firm (X), or who leave j and enter a next firm j' (O), are

$$w_j^S = p_j b_j a(s_j) e_j, \tag{3}$$

$$w_j^X = p_j b_j a e \delta, \tag{4}$$

$$w_j^O = p_j^o b_j^o a e_j \delta. \tag{5}$$

To employ a junior worker, firm j needs to offer a wage that is consistent with a lifetime income at least as large as the equilibrium lifetime income Y. This incentive implies that $Y = w_j^J + s_j w_j^S + (1 - s_j) w_j^O$, or the required junior wage is

$$w_j^J = Y - s_j w_j^S - (1 - s_j) w_j^O. \tag{6}$$

Note that from the senior wages w^S and w^O in (3), a higher employment experience e_j increases the expected senior wage of any worker who enters firm j.

Cost minimization for a given level of output implies the first-order conditions

$$w_j^S / w_j^J = a(s_j) / a e_j (1 + \varepsilon_s), \tag{7}$$

and

$$w_j^X / w_j^J = e_j' \delta z(x) (1 + \varepsilon_x), \tag{8}$$

where $\varepsilon_s = da(s_j)/ds_j * s_j/(a(s_j)$ and $\varepsilon_x = dz/dx * x/z$, which we assume to be sufficiently close to zero for internal solutions to x and s to exist (the intuition is that the distribution of match-specific productivity is smooth enough, so that promoting a marginal worker only has marginal impact on the average match-specific productivity of seniors). The first-order conditions equate the wages of either type of senior worker relative to the junior wage to the productivity of the senior worker relative to the junior worker. The marginal products are constant in the employment ratios of the different types of workers, so the cost-minimizing ratios of senior to junior workers s and external seniors to juniors x are independent of the production quantity decision of the firm.

2.5 Marginal costs and internationalization strategy

Given the ratios of seniors to juniors, the firm maximizes profits by selecting the quantity of production, which is proportional to the quantity of junior hires. Facing the imperfectly competitive market, the quantity is determined by price, which in turn is a markup over marginal costs.

To see the marginal cost structure, we use the optimized promotion and external hiring rates in the cost and production functions to get

$$TC_j = L_j^J(Y - (1-s_j)w_j^O + x_j w_j^X), \tag{9}$$

$$Q_j = b_j a L_j^J (1 + a(\theta_j^*)e_j s + e_j' \delta z(x) x). \tag{10}$$

As a consequence, the marginal cost function for the firm is

$$mc_j = \frac{dTC/dL_j}{dQ/dL_j} = \frac{Y - (1-s_j)w_j^O + x w_j^X}{b_j(1 + a(\theta_j^*)/a e_j s + a e_j' \delta z(x) x} \tag{11}$$

$$= \frac{1}{b_j} \frac{Y - (1-s_j)p_j^o a e_j \delta + x w_j^X}{1 + a(\theta_j^*)/a e_j s + a e_j^x \delta z(x) x}. \tag{12}$$

The marginal costs of the firm are inversely proportional to the productivity of the firm, b_j, as in most theories of monopolistic firms. However, they additionally depend on, among others, on the output prices p_j^o of the firms that hire firm j's exiting workers, and the value of experience that incoming senior workers accumulated at other firms.

Comparing the level of marginal costs across firms, the marginal costs of firm j are low if i) the experience value of its employment e_j is high, ii) if the transferability of the experience δ to other firms is high, and iii) if the level productivity b_j of the firm is high. Note that the numerator decreases and the denominator increases both in e_j and δ. Moreover, by the envelope condition $dmc_j/ds_j = dmc_j/dx_j = 0$, and that due to randomized matching of exiting workers to senior positions in other firms, p_j^o is constant across firms, as is Y.

The intuition is as follows. A firm with higher employment value e_j can offer junior workers a lower wage. The low wage balances with compensations later in the worker's career. If the worker is promoted, the firm pays the senior worker a higher wage in tandem with their productivity. However, a leaving worker will earn more at a next firm, but the original firm does not pay for that higher wage, thus allowing the firm to internalize its workers' value of employment experience.

Hence, in our stylized framework, following eq. (11), conditional on the firm's productivity level (b_j), a multinational strategy arises if the firm has a sufficiently high employment experience value for its juniors (e_j).

2.6 Testable results

If multinationals have higher employment experience values, our results bear three central implications on wages (following eq. (7)). First, workers who remain with a multinational experience higher wages, because they accumulate valuable experience. This is in addition to the possibility that multinationals i) generally pay their workers higher wages and ii) multinationals may be more selective in the worker types they attract. Second, workers who move away from a multinational earn higher wages at their next employer. Third, and related, the

rise in pay over the course of the career rises faster in a multinational, with the possibility that multinationals pay junior workers a lower wage than domestic firms.

The presence of an experience value also translates into the organizational hierarchy of multinationals. First, a firm with higher employment value e_j promotes fewer workers, so that it has relatively many juniors. To see this, note that the right-hand side of the first-order condition for promotion in eq. (7) rises in the post-promotion productivity $(a(s_j)/a)$, so it falls in the rate of promotion s_j. The right-hand side of eq. (7) is proportional to e_j while the wage ratio on the left-hand side rises more than proportionally in e_j, as witnessed from combining w^S and w^J from eq. (3). Second, MNEs will offer relatively low entry wages. Following eq. (6), the entry wages of multinationals may be below those of domestic firms. The intuition is that while a higher employment experience value raises the productivity and wages of senior workers proportionally, it also reduces the equilibrium junior wage. Junior workers accept a payment in employment experience, and so the relative marginal cost of seniors to juniors is higher, which requires the firm to select only highly productive senior workers.[1]

3 Data

We construct a yearly employer-employee matched dataset for the period 2006-2021 using different administrative sources of Statistics Netherlands. Our data follows workers in the Netherlands up from labor market entry, combined with the MNE (foreign and domestic), international or domestic status of their employers.

Leveraging the consistent identifiers across sources, we combine ownership, trade and employment databases that add up to universal coverage. At the employer-level, we extract information on ownership structures and broad NACE industry from the General Business Register and enrich the data with information on imports and exports from the official trade statistics. In a first step, we aggregate the employer-level information to the yearly company group level for those employers that are part of a company group. Hence, our empirical analysis treats company groups as a single firm and employer.[2] Subsequently, we identify three distinct types of firms. We classify a firm as an MNE if its ultimate owner, which controls strategic decisions, is non-Dutch, or if the domestic firm reports affiliates abroad. In total, around 19k of the 207k firms in our dataset are MNEs. We classify the remaining firms as either domestic, or international (importing and/or exporting but no multi-country establishments) if the yearly-average sum of imports and exports exceeds 10k Euro.

We can closely follow career choices, as our employee-level data is based on information that employers send to the Dutch national employment agency (Uitvoeringsinstituut Werknemersverzekeringen). Serving to identify pension and labor market insurance claims, the data contain the exact start and end dates of an employer-employee relation. At the worker-level, the data provides information on workers' demographics, regular- and overtime-pay, any additional allowances and the associated hours worked. It also allows us to identify full-time equivalents and internships. For the analysis, we remove internships from the dataset and aggregate the remaining

[1] By the same logic, the relative wage of externally hired seniors to juniors is high, and the relative productivity of external seniors is elevated by having a lower proportion of external hires through $z(x)$.

[2] On average around 1.8% (sd = 2.2) of the firms in a given year are company groups.

observations to the yearly worker-firm level. We focus on workers in full-time positions ($\geq$ 0.7 fte) and remove all workers who ever hold more than one full-time position at the same time (about 5% of workers). For all remaining worker-firm matches in the data, we calculate hourly wages as total income over total hours worked to measure earnings.

To follow workers' careers up from labor market entry, we connect the graduations from Dutch middle- and higher-level educational institutions across the years 2004 to 2021 to the data.[3] We select workers aged 18 and above who start working within three years after graduation from a full-time study and who are not enrolled in another educational program after labor market entry. By using the start and end dates of their employment relations, we construct four measures of experience. Within firms, we allow the number of days spent at the current employer to accumulate over time. Across firms, we leverage worker mobility to separately identify the number of days a worker spent in MNEs, international and domestic firms prior to entering a new employer.

The final dataset follows the lifetime career developments of over one million workers for up to 16 years. Tables A1 and A2 in Online Appendix A provide an overview of the dataset. Workers are around 24 years old when entering the labor market and hold two different jobs throughout the observation period. Although MNEs make up less than 10% of the firms, about 30% of workers start their career at an MNE. On average, workers in MNEs earn 9% higher wages than workers in domestic firms, while workers with past employment in an MNE earn 8% higher wages at their current employer than workers with past domestic firm employment.

4 The value of MNE employment experience

To identify the expected change in a worker's wage for a year of employment experience in an MNE, we use a Mincer regression with firm and worker fixed effects (Abowd et al., 1999). The regression explains a worker's log wage from time spent at the current employer, measuring experience within his or her own firm, and from earlier employment experience in other firms. Specifically, the regression equation is

$$\log(w_{ijt}) = \psi_j + \alpha_i + \gamma_t + \sum_{c \in C} \lambda_c h_{it}^c + \sum_{c \in C} \beta_c t_{ijt}^c + \mathbf{x}_{ijt}' \nu + \epsilon_{ijt}, \tag{13}$$

where $\log(w_{ijt})$ is the natural logarithm of the hourly wage of a worker indexed i, at a firm j, in year t. The variable t_{ijt}^c captures the years of experience within the worker's current firm. Similarly, h_{it}^c captures the years of experience at employers before the current firm. We differentiate the years of experience in a firm by the type of the firm, c: multinational, international (importing and/or exporting but no multi-country establishments), or domestic. We use the domestic firm type as the reference group.

The coefficients of interest are λ and β. The coefficient λ_{MNE} measures the log contribution to a worker's current wage of a year of experience at a previous employer that is an MNE, as compared to when that year of experience was with a domestic firm. The coefficient β_{MNE} measures the log wage contribution of a year of employment within the worker's current multinational firm, relative to when that firm would have been domestic.

[3]Specifically, we include Dutch universities (wo), universities of applied sciences (hbo) and the theoretical track of the Dutch secondary vocational education institutions (mbo-bol).

To allow the wage contributions to vary flexibly with years of employment experience, we estimate the impact using a set of indicator variables by year of (cumulative) experience.

We condition the estimates of the value of employment experience on a set of other explanations, following the literature on matched employer-employee data. Workers with valuable experience may sort into firms that are highly productive or pay high wages for other reasons. To exclude this interpretation, we introduce a firm-level fixed effect ψ_j in the specification. Similarly, we difference out worker-specific level difference in pay with a worker fixed effect, α_i. Exploiting within-worker variation, we identify the impact of experience from worker-specific changes in experience levels over time, accounting for the possibility that high-ability workers both earn more and accumulate multinational-specific experience more often. In addition, we difference out year-specific industry fixed effects γ_t to prevent industry shocks, such as technology or demand, that generate employment as well as wage differences from explaining the association between experience and wage.[4] Finally, vector $\mathbf{x}_{ijt}$ contains observed characteristics. We use the log of employment size of the firm to control directly for any size-related explanations of wage. To control for the mobility of workers, we also include dummies for the number of jobs a worker has held up to time t and their interaction with tenure inside the firm. The term ϵ_{ijt} is an error term.

To account for serial correlation of the errors within workers, we cluster the standard errors at the worker level. Later we will study estimates of the firm- and worker-level fixed effects. As usual in the literature studying the mobility of workers between firms, we estimate our fixed effects model on the largest set of firms that are connected by worker mobility (Abowd et al., 1999, 2002). In Section 6, we offer several robustness checks pertaining to the specification of our empirical model and the mobility of workers (Bonhomme et al., 2019).

Figure 1 summarizes the main estimates of eq. (13), based on the full results reported Table F1 in Online Appendix F. Panel (a) of Figure 1 shows the coefficient estimates for λ_{MNE}, the expected wage premium for an additional year of MNE experience instead of domestic firm experience in an earlier firm. The results show an immediate and statistically significant premium of around 2% with the first year of experience in an MNE relative to a domestic firm. With more years of experience in a previous MNE employer, the expected premium rises monotonically, up to around 11% with seven years of experience. At that point, the coefficient curve is flatter, pointing to a smaller marginal contribution of an additional year of experience.

Panel (b) of Figure 1 summarizes the estimates of β_{MNE}, the wage premium of a year of multinational experience inside the same firm. The wage premia drawn from experience external to the firm (Panel (a)) and internal to the firm (Panel (b)) are every similar, although the internal premia are slightly higher.

For comparison, Figure 1 shows the wage premia for experience in an international firm relative to a domestic firm. The premia on experience in an international firm are significantly below those of the multinational firm, but positive over domestic firm experience.

Section 6 shows a set of robustness checks with our main result. It covers among others, checks on definitions, size effects of firms, variation in the transferability of the wage premia, mobility decisions of workers, and the overall worker mobility across employers.

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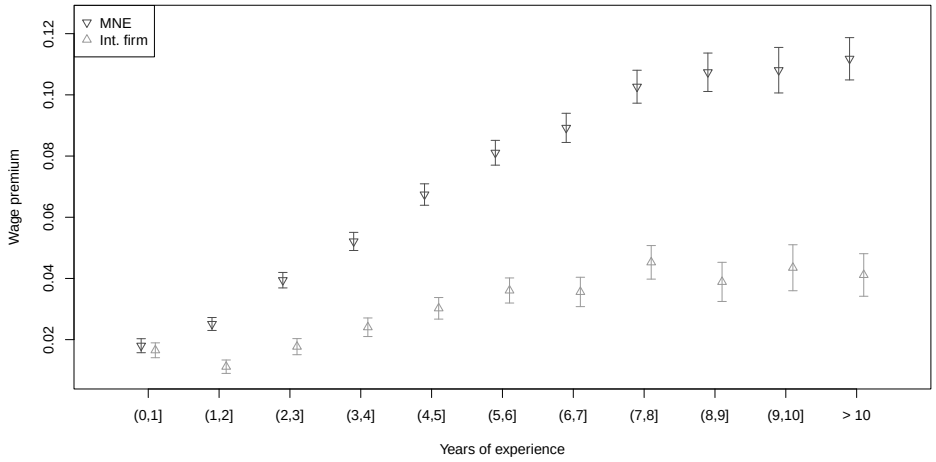
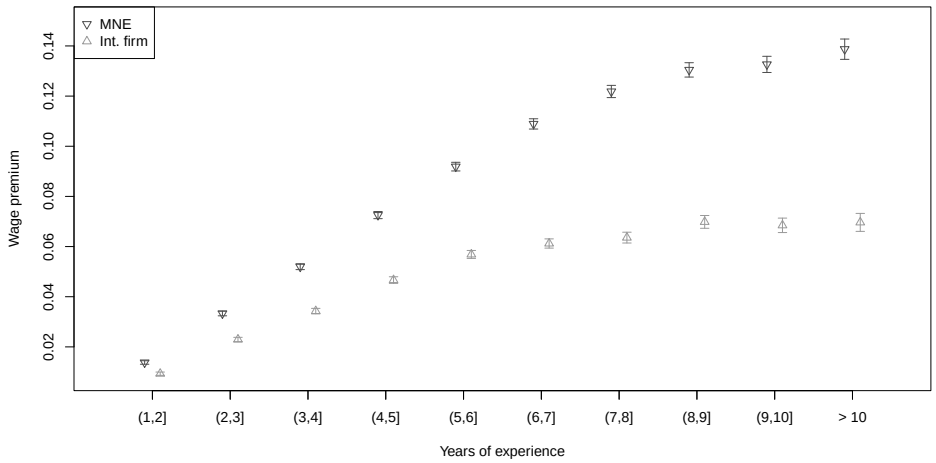
[4]In practice, we first demean log hourly wages by γ_t on a dataset that includes the wages of all workers in the Netherlands. Then we use the residuals to estimate the other parameters in the sample of labor market entrants.

Figure 1: The wage premia of MNE experience.



(a) Across-firm



(b) Within-firm

Notes: The plots depict calculated wage premia and their 95%-confidence intervals (see eq. (13) and the discussion in Section 4). The full regression results are in Table F1 in Online Appendix F. Wage premia are calculated as the coefficients for MNE/international firm experience minus the respective coefficients for domestic firm experience. Experience within and across firms are based on actual days worked and cut in yearly splines. MNEs comprise foreign firms (ultimate owner located abroad) and domestic firms with foreign subsidiaries. International firms are defined as (non-multinational) firms with an average yearly sum of imports and exports that exceeds 10k EUR. Standard errors are clustered at the worker level.

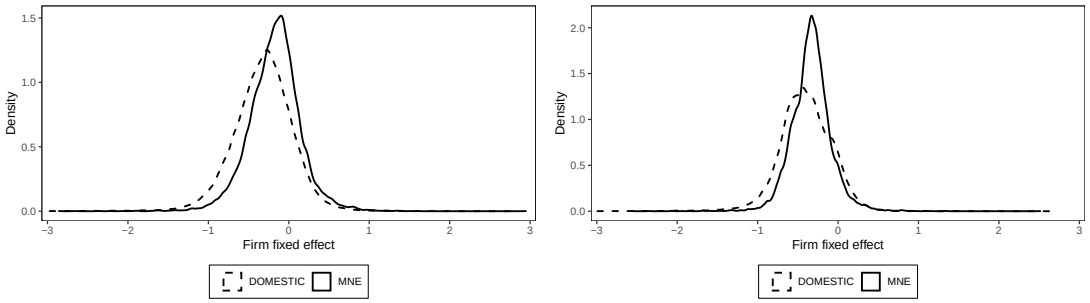
4.1 The value of experience and firm fixed effects

The firm fixed effects in the AKM wage model (13) reflect static differences across firms in pay premia, conditional on their workers' fixed effects. They are commonly used to measure static pay premia of MNEs (e.g. Andrews et al., 2009; Setzler and Tintelnot, 2021) and more broadly interpreted as measures of firm-level productivity as they correlate with the marginal product of labor in competitive labor markets. Firm internationalization models argue that high productivity selects firms into the MNE status (Helpman et al., 2004), as does our framework (for firms with high static productivity b_j). Plausibly, a firm's static productivity estimate correlates with the accumulated employment experience in the firm. Hence, in this section, we disentangle the wage contribution of the static firm fixed effect from the contribution of the employment experience of the firm's workforce.

To understand how workers' experience affects the estimate of firm fixed effects, we compare the distributions of firm fixed effect estimates with and without controlling for workers' experience. Figure 2 displays distributions of firm-level fixed effects of domestic firms (dashed line) versus those of MNEs (solid line). Panel (a) shows the distribution derived from a static AKM decomposition, which attributes wages to firm fixed effects, worker fixed effects, and industry-year fixed effects only. In the static model, MNEs have around 8% higher fixed effects than domestic firms.[5] Panel (b) shows AKM fixed effects estimates conditional on workers' for experience in different types (domestic, international, MNE) of previous employers. Once controlling for such experience, the average fixed effects of MNEs are 6% lower than that of domestic firms (see Table B2 in Online Appendix B). Panel (c) shows fixed effects conditional on worker experience as well as a size control, resulting in fixed effects of MNEs that are about 1% lower than those of domestic firms. These results suggests that the full ex-ante wage premium of MNEs is explained by the employment experience of their workers.

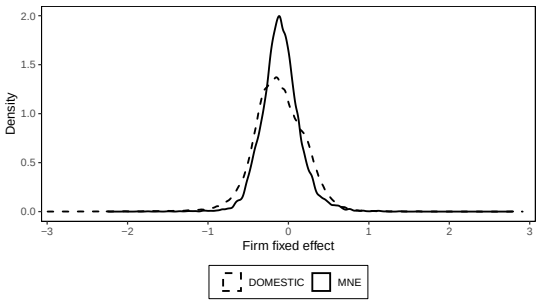
[5] A formal comparison of these distributions can be found in Online Appendix B (Combes et al., 2012; De la Roca and Puga, 2017).

Figure 2: Comparison of firm fixed effects, MNE vs. domestic firm.



(a) Static model

(b) Dynamic model w/o size control



(c) Dynamic model

Notes: The plots show the distributions of firm fixed effect estimates derived from different models. The estimates include the fixed effects of MNEs and domestic firms that do not change status. The firm fixed effects are derived from (a) a static model with only worker fixed effects, firm fixed effects and industry-year fixed effects; (b) a dynamic model with MNE, international and domestic firm experience included (see eq. (13)) but excluding the log firm size control; (c) our main dynamic model with MNE, international and domestic firm experience included (see eq. (13)). A formal comparison of the distributions is in Table B2 in Online Appendix B.

4.2 The value of experience and estimates of worker sorting

In related literature, the sorting of workers with high fixed effects into MNEs explains most of the wage premia that MNEs pay (Setzler and Tintelnot, 2021). However, in an AKM regression, omitting workers' previous employment experiences may lead to an overestimation of the workers' static abilities in their time-invariant fixed effect. Consequently, if MNEs employ workers with valuable employment experiences, the value of experience might be wrongfully interpreted as sorting on time-invariant skill in a static AKM estimation. To examine this possibility, we compare distributions of the worker fixed effect estimates, with and without controlling for experience patters.

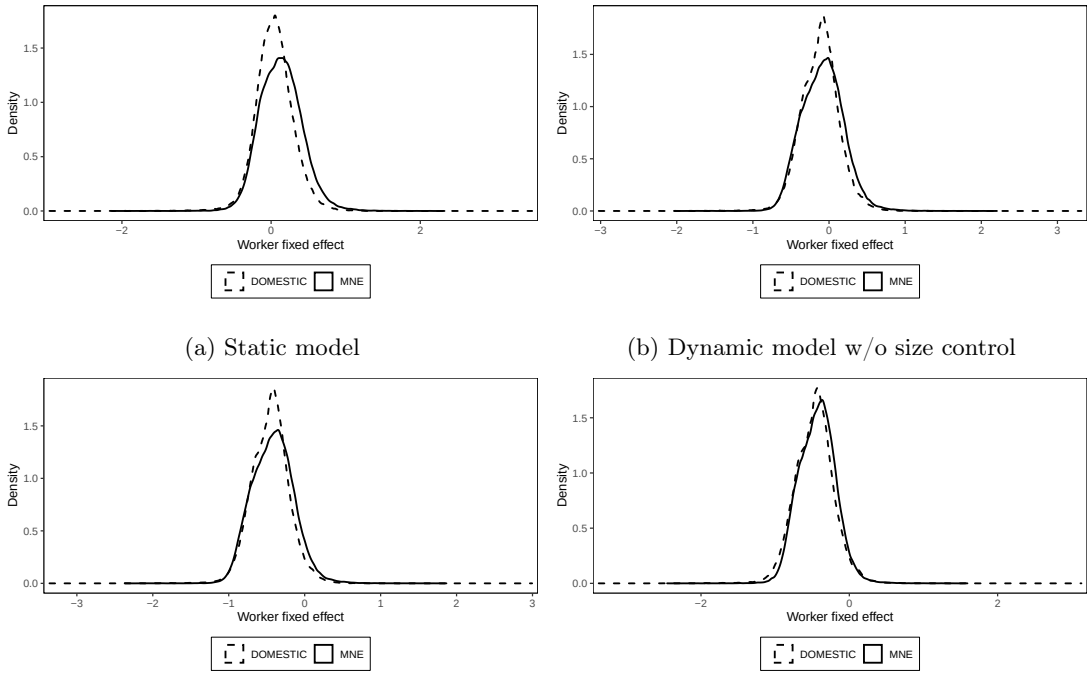
Figure 3 displays the distributions of the worker-level fixed effects for workers in domestic firms (dashed line) and MNEs (solid line). As workers move between MNEs and domestic firms, we avoid observing workers multiple times by focusing on the fixed assignment of workers in 2014, roughly the middle of the data's time span.[6] When estimated from a static AKM model with worker-level, firm-level and industry-year fixed effects only, the mean worker fixed effect is approximately 8% higher in MNEs than in domestic firms.[7] This statistic would suggest that MNEs tend to hire workers with greater time-invariant earning abilities. Panels (b) and (c) exhibit the worker-level fixed effects from the dynamic AKM model with experience included (see eq. (13)), with a firm size control excluded (panel b) or included (panel c). Once accounting for workers' experience, the average difference in worker fixed effects between MNEs and domestic firms reduces to roughly 4 to 6%. This indicates that neglecting the value of prior employment experience (as in Panel (a)) overstates the role of innate worker ability in wage determination.

If workers with higher time-invariant ability also have higher returns from MNE experience, the fixed effects in Panels (b) and (c) could overestimate ability at the top of the distribution and underestimate it at the bottom. We estimate a dynamic AKM model that permits heterogeneity in the value of employment experience according to a linear interaction with the worker fixed effect (De la Roca and Puga, 2017). We detail and discuss the implications of such heterogeneity in the wage returns to MNE experience in Section 4.3. Panel (d) of Figure 3 depicts distributions in the time-invariant worker fixed effects, accounting for variation in the returns to MNE employment experience. Allowing for such heterogeneity in the estimation, the distributions of time-invariant skill of workers largely coincide between MNEs and domestic firms (there is no significant difference - see Online Appendix B). Hence, difference in the value of MNE experience, and the higher returns to MNE experience for workers with high fixed effects, explain the orignal result that workers of high fixed effects sort into MNEs.

[6] The results are qualitatively similar when using a different year to fix worker assignment.

[7] See Online Appendix B for a formal comparison (Combes et al., 2012; De la Roca and Puga, 2017).

Figure 3: Comparison of worker fixed effects, MNE vs. domestic firm.



(a) Static model

(b) Dynamic model w/o size control

(c) Dynamic model

(d) Dynamic model with worker fe interactions

Notes: The plots show the distributions of worker fixed effect estimates derived from different models. The estimates are based on a snapshot of the data in 2014, and include the fixed effects of workers in MNEs and domestic firms that do not change status. The worker fixed effects are derived from (a) a static model with only worker fixed effects, firm fixed effects and industry-year fixed effects; (b) a dynamic model with MNE, international and domestic firm experience included (see eq. (13)) but excluding the log firm size control; (c) our main dynamic model with MNE, international and domestic firm experience included (see eq. (13)); (d) a dynamic model with MNE, international and domestic firm experience, and their interactions with the worker fixed effects included (see eq. (14)). A formal comparison of the distributions is in Table B1 in Online Appendix B.

4.3 The value of MNE experience by workers' innate ability

It is plausible that workers with high fixed effects benefit more from MNE employment in the long run. For instance, workers with higher skill might learn faster, or learn more skills that complement their own skill set at an MNE. Alternatively, the MNE might be a more precise signalling device for higher skilled workers. The correlation between the workers' fixed effects and their returns to MNE employment is relevant for at least two reasons. First, it can lead to the false attribution of high returns from past employment experiences to high inherent ability in a classical omitted variable problem. Neglecting to account for experience might cause workers with valuable past employment experiences to be classified as high-ability workers. Second, the correlation between earnings ability and learning ability might have important implications for assortative matching on the labor market.

To allow worker fixed effects to associate systematically with wage returns from MNE employment, we augment our original wage model with the interaction between the two. Formally, the interaction is between the worker's level fixed effect α_i, and the external and internal employment experience terms h_{it}^c and t_{ijt}^c. The coefficients for the interactions are λ_c^α and β_c^α. We also account for a full set of interactions between within-firm experience, the number of jobs a worker has held, and the worker fixed effects. The resulting equation is

$$\log(w_{ijt}) = \psi_j + \alpha_i + \gamma_t + \sum_{c \in C}(\lambda_c + \lambda_c^\alpha \alpha_i)h_{it}^c + \sum_{c \in C}(\beta_c + \beta_c^\alpha \alpha_i)t_{ijt}^c + \mathbf{k}'_{ijt}\nu + \eta_{ijt}, \tag{14}$$

where the definitions of eq. (13) apply, vector $\mathbf{k}_{ijt}$ contains the control variables, adjusted for interactions with α_i, and η_{ijt} is an error term. Positive coefficient estimates for λ_c^α and β_c^α indicate that workers with higher level fixed effects (α_i) reap larger returns from employment in firms of type c compared to workers with lower level fixed effects.

It is unfeasible to estimate the equation with worker fixed effect interactions (eq. (14)) directly. We follow De la Roca and Puga (2017) by employing an iterative method where the worker fixed effects from eq. (13) provide the initial estimate for α_i. These estimates are then updated in eq. (14) until convergence is reached to an error margin of 10^{-4}.

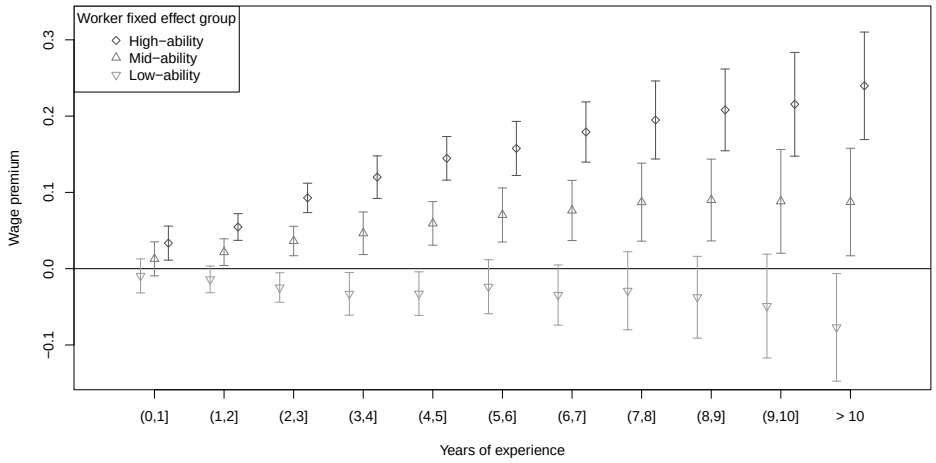
To visualize the regression results, Figure 4 illustrates the wage premia of MNE (over domestic) experience for typical workers of high, medium and low ability, classified as the 75th, 50th, and 25th percentile of the fixed effects distribution.[8] Panel (a) displays wage returns to MNE experience for workers who moved to a different firm. High-ability workers gain the highest returns on previous MNE experience, reaching a wage premium of up to 26% over domestic firm experience. Medium-ability workers also receive a wage premium when changing employers, but this premium is smaller and increases less with experience. For low-ability workers, there is no significant advantage from MNE experience over domestic firm experience when changing employers. The patterns for intra-firm experience are similar. However, low-ability workers earn a significant negative wage

[8]Figure C1 in Online Appendix C illustrates the estimates for other international (non-multinational) firms. Notably, that group of firms shows no heterogeneity in returns.

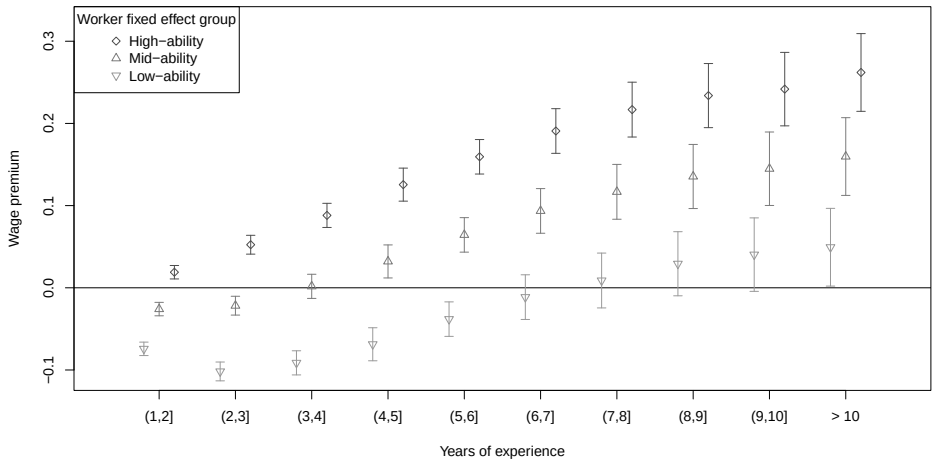
premium during their first six years at an MNE.

We report the complete set of coefficient estimates in Table F2 in Online Appendix F. The interaction between worker fixed effect and multinational experience is positive and significant across all time frames, for both experience internal and external to the firm. The coefficient estimates increase invariably with the years of experience. Hence, workers with higher fixed effects realize higher wage returns from a year of experience in a multinational, compared to a year in a domestic firm, as illustrated in Figure 4.

Figure 4: Wage premia of MNE experience by worker ability.



(a) Across-firm



(b) Within-firm

Notes: The plots depict calculated wage premia per worker fixed effect group and their 95%-confidence intervals, as estimated by a wage regression with interactions between MNE/international firm/domestic firm experience and the worker fixed effects (see eq. (14)). The full regression results are in Table F2 in Online Appendix F.2. Wage premia are calculated as the coefficients for MNE experience minus the respective coefficients for domestic firm experience. Experience within and across firms are based on actual days worked and cut in yearly splines. High-ability workers are in the 75th percentile and low-ability workers in the 25th percentile of the worker fixed effects distribution. Standard errors are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).

4.4 Evidence from mass layoffs

A concern with the main result may be that workers' mobility towards MNEs may be endogenous. Our estimating equations (13) and (14) account for the sorting of workers on their own fixed effects, the firm fixed effects, and their past experience at different types of firms, thus limiting the scope for endogeneity arising from worker sorting. However, there may be unobserved time-varying factors that drive worker mobility. Workers might self-select into moving up the job ladder towards higher wage establishment over time, for example as workers' learn about new outside job opportunities (Woodcock, 2008); respond to idiosyncratic labor demand shocks (Helwege, 1992); or learn about their ability or match quality (Gibbons et al., 2005; Menzio and Shi, 2011). To assess the potential impact of such endogenous mobility on our estimates, we follow the literature and exploit a sample of workers that is involved in firm closures and mass layoffs. Such layoffs generate more exogenous variation in worker mobility, if displaced workers accept any job offer that is preferable to unemployment (see e.g., Huttunen et al., 2018; Dauth et al., 2021; Di Addario et al., 2023).

We focus our analysis on workers that were involved in a mass layoff of a firm with at least 10 employees. We identify a mass layoff when 80% or more of workers exit the firm in a given year, or the firm ceases to exist. We additionally require that less than 30% of the exiting workers enter the same new firm, to avoid classifying changes in the identifier of the same firm as mass layoffs (Benedetto et al., 2007). Then we focus on the observations of workers in their first job after the mass layoff, when worker-firm mobility is caused by the plausibly exogenous layoff event, rather than self-selection of workers into mobility. Table D1 in Online Appendix D shows that around 2800 (4600) MNE (international firm) workers in the data are displaced by a mass layoff, while around 6000 workers are involved in a mass layoff of a domestic firm. As this is a small group of workers compared to the around 1 million workers in our sample, we estimate eq. (13) and eq. (14) with experience profiles that are linear over time. We follow Mion et al. (2022) in adding linear profiles for the respective estimated firm and worker fixed effects, in order to control for their effect on forming wage at the next employer after a mass layoff.

Figure D1 in Online Appendix D shows the distribution of worker fixed effects in mass layoffs. Panel (a) compares the distribution of displaced workers (in all firms) against those of all other workers that are not involved in a mass layoff. The comparison shows that displayed workers exhibit around 6% lower fixed effects on average than non-displaced workers, suggesting that the two groups only differ slightly in their time-invariant ability to earn high wages. Panels (b) and (c) split the distribution of displaced workers up by the multinational status of the origin and destination firm. We find no diverging fixed effects between employees of MNEs and domestic firms in both the group of exiting workers and the group of workers that are hired after a mass layoff.

The results in the sample of workers involved in layoffs are summarised in Table 1.[9] Column 1 shows the within- and across-firm returns to experience across all worker classes, as in eq. (13). Column 2 allows for heterogeneity across the worker fixed effects. The results are similar to those in Figures 1 and 4, which use the full set of workers and allow for dynamic rather than linear wage profiles. The estimates in Column 1 suggest that for each year of previous MNE experience, a worker accumulates about 0.74% ($= exp(0.0469 - 0.0395)$; $t(12192) = 8.79$, $p < 0.001$) more wage than when that experience had been acquired in a domestic firm. Within

[9]The full regression results are in Table D2 in Online Appendix D.

the next employers, wage growth is higher by 0.74% per year spent in an MNE, relative to a domestic firm. The estimates in Column 2 of Table 1 show that the wage benefits of MNE experience are higher for workers with higher fixed effects, consistent with the result in Section 4.3.

Table 1: Evidence from mass layoffs (short table).

	log(hourly wage) (detrended)	
	(1)	(2)
Domestic firm experience	0.0395***	0.0523***
	(0.0007)	(0.0033)
International firm experience	0.0445***	0.0602***
	(0.0007)	(0.0032)
MNE experience	0.0469***	0.0825***
	(0.0007)	(0.0027)
Years in firm	0.0496***	0.0477***
	(0.0010)	(0.0053)
Years in firm × International firm	0.0021*	0.0082
	(0.0010)	(0.0051)
Years in firm × MNE	0.0074***	0.0285***
	(0.0010)	(0.0055)
Worker fe interactions		
Domestic firm experience × Worker fe		0.0389***
		(0.0057)
International firm experience × Worker fe		0.0438***
		(0.0056)
MNE experience × Worker fe		0.0858***
		(0.0046)
Years in firm × Worker fe		0.0151
		(0.0102)
Years in firm × International firm × Worker fe		0.0042
		(0.0097)
Years in firm × MNE × Worker fe		0.0393***
		(0.0102)
Other variables		
Controls	✓	✓
Worker fe	✓	✓
Firm fe	✓	✓
Observations	42,558	42,558
R^2	0.8067	0.8192

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. The full estimation results are in Table D2 in Online Appendix D. The dependent variable is a workers' log hourly wage, detrended by industry-year fixed effects on the full firm-worker network. The estimations focus on the observations of workers at their first employer, after the worker was involved in a mass layoff; see Section 4.4. 'Years in firm' refers to experience accumulated while a worker is employed at the current employer of type MNE, international firm and domestic firm (reference category). MNE/international firm/domestic firm experience refers to experience accumulated before entering the current employer. Experience is calculated based on actual days worked. Column 1 adds the worker and firm fixed effects of an estimation of eq. (13) as linear regressors. Column 2 adds those of eq. (14). Standard errors in Column 1 are clustered at the worker level. Standard errors in Column 2 are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).

5 Firm strategy and the labor market

In this section, we present stylised facts on the impact of MNE experience on labor market outcomes, guided by the predictions of the theoretical framework in Section 2. First, we leverage our empirical wage model from Section 4 to predict the typical wage trajectory of a worker starting his or her career in an MNE as opposed to a domestic firm. Second, we estimate a worker's probability to be employed at an MNE as the worker gains experience on the labor market. Third, we provide additional empirical findings that distinguish between the hiring of workers by MNEs based on earlier work experiences and the hiring based on innate abilities.

5.1 Career profiles

Workers with different employment experience earn different wages as their career progresses. We interpret our estimates by constructing the model's predicted wage over different career paths. We compare typical workers that switch firms at different career stages, using average MNE and average domestic firm characteristics.

Figure 5 illustrates the predictions, with the y-axis showing the predicted log hourly wage as experience accumulates over a ten-year period from the point of entry into the labor market. The wage paths are net of industry-year fixed effects, firm size, and worker fixed effects. The solid gray line indicates that a career in a domestic firm starts with a higher wage than a career that starts in an MNE (solid black line). However, as experience years accumulate, the wage level in the MNE rises faster, and in three years, the wage of a worker in an MNE surpasses the wage of a similar worker in a domestic firm.

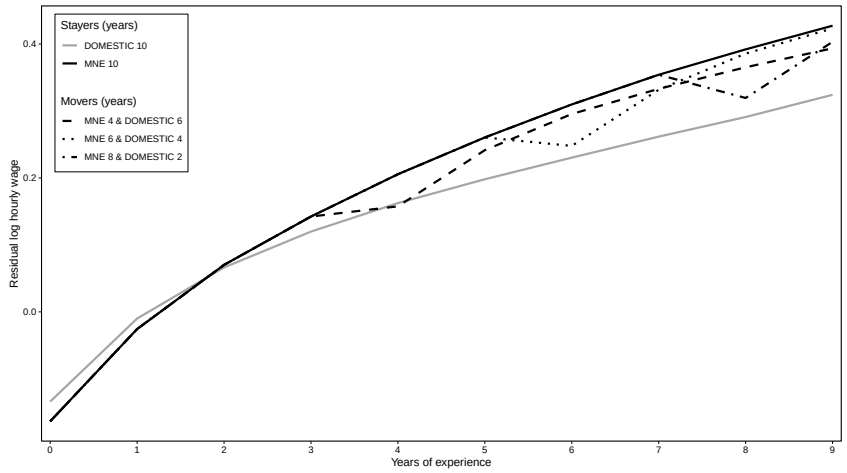
The Figure shows that experience is portable between domestic firms and MNEs. In careers that start in an MNE but switch to a domestic firm (dotted lines), workers generally experience a drop in wage after the move. The drop may reduce the wage of a worker with MNE experience below that of a worker with experience in the domestic firm at the time of the move (for MNE 4, domestic 6 years), but the MNE experience leads to higher wages over the domestic experience in the subsequent years. An earlier move to a domestic firm leads to lower wages in the final years, as relatively more experience is domestic (and the first years of experience in a domestic firm lead to stronger increases in wage than later years of experience in the domestic firm).

The career profiles show that for workers with no experience, the domestic wages are above multinational wages. This is consistent with the theoretical framework in Section 2, in which multinationals effectively pay junior workers in deferred pay later in their career.

We test whether initial wages are significanly lower in MNEs more formally. We employ a least squares regression weighted by the employment size fo the firm, to explain firm fixed effect estimates from MNE status. As the estimated firm fixed effect is conditional on experience values of the workers and their fixed effects, it reflects the expected wage for a worker who enters the firm with no experience. As the firm fixed effects are time-invariant, we focus on MNEs and domestic firms that do not change status throughout the sample period.

The results are reported in Table A3 of Online Appendix A. The fixed wage premium of MNE careers net of experience is around 3% below that of domestic careers. The difference is statistically significant under standard errors that are block-bootstrapped at the worker level. This holds both for the weighted fixed effects of our main dynamic model (see eq. (13)) and the model with worker ability interactions (see eq. (14)).

Figure 5: Wage developments of different career paths.



Notes: The figure shows the predicted wage paths of a worker up from labor market entry and for different career paths. Predictions are based on eq. (13), while differencing out the effect of firm size and the worker fixed effect on log hourly wages. The average fixed effects of MNE and domestic firms are worker-population averages, see the estimates in Table A3 in Online Appendix A.

5.2 Selection within the multinational

In our theoretical framework in Section 2, the value of experience in MNEs forms an incentive to hire relatively more junior workers. As junior workers accept lower wages in exchange for higher later wages, they are cheap relative to their productivity, and the MNE hires more of them.

To examine whether junior workers are more likely to be employed by MNEs than senior workers, we explain the employment in an MNE ($MNE_{ijt} = 1$) from the worker's time since labor market entry. The regression equation is

$$MNE_{ijt} = \sigma_i + \psi_j + \gamma_t + \mu l_{it} + \mathbf{q}'_{ijt}\nu + u_{ijt}, \tag{15}$$

where again i, j, j index workers, firms and years; σ_i is a worker fixed effect; ψ_j is a firm fixed effect; γ_t is an industry-year fixed effect; vector $\mathbf{q}_{ijt}$ includes the controls log firm size and number of jobs; and u_{ijt} is an error term. Importantly, l_{it} is a set of dummies that reflect the number of years since labor market entry, with the year of entry as the reference category.

The coefficients for l_{it}, μ, capture the likelihood of observing a worker employed in an MNE at each year of their career conditional on the worker, firm and industry-year fixed effects. As such they measure how workers sort into MNE employment as they gain experience (high l_{it}), relative to their likelihood of MNE employment at the start of their career.

Panel (a) of Figure 6 plots the estimates for worker sorting into MNE employment.[10] The y-axis counts years since labor market entry and the x-axis shows the difference in the probability of a worker to be employed at an

[10]The full regression results are in Table F3 in Online Appendix F.

MNE relative to the entry year. MNEs employ relatively more inexperienced workers than experienced workers. The top coefficient implies that more than ten years after entry, workers are about 0.7 percentage points less likely to be employed at an MNE than right at labor market entry. As 31.2% of entrants start at an MNE, the coefficient suggests that the odds of MNE employment decrease by about 3.2%, reflecting a small sorting effect of workers out of MNE employment as they gain experience. The remaining coefficients show that sorting out of MNE employment is particularly relevant after six years of labor market experience when a trend break is visible. A Wald test confirms a statistically significant difference between the coefficients for seven and more years and less than seven years on the labor market ($\chi^2(1) = 5.2$, $p < 0.05$).

In our framework, MNEs are particularly selective in senior positions. Accordingly, we test whether workers with lower time-invariant abilities are less likely to be employed at later stages of their career than workers with higher time-invariant abilities. We augment the linear probability model in eq. (15) with interactions between ability (the worker fixed effect estimate of a wage equation) and years since labor market entry,

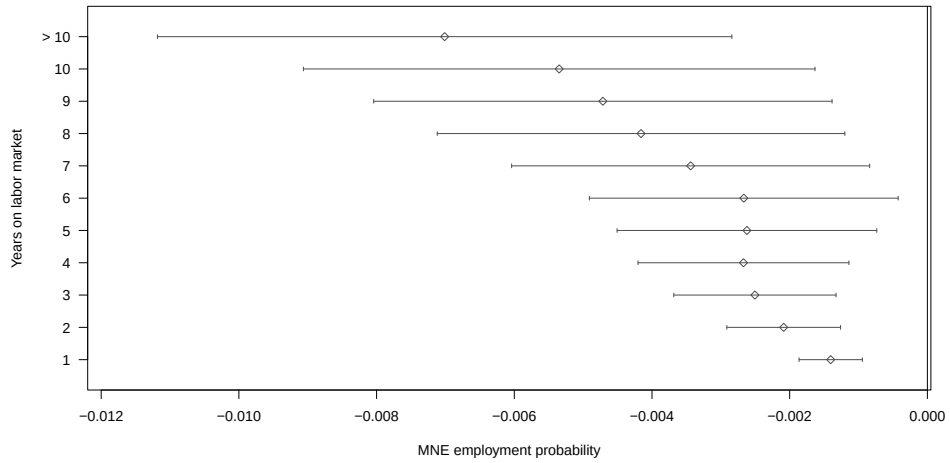
$$MNE_{ijt} = \sigma_i + \psi_j + \gamma_t + (\mu + \mu^{\alpha}\alpha_i)l_{it} + \mathbf{x_{ijt}}\nu + v_{ijt}. \tag{16}$$

where $\mu^{\alpha} \neq 0$ allows the impact of work experience l_{it} on MNE employment to vary with the worker's fixed effect estimate α_i (measured by the worker fixed effects in eq. (14)), and v_{ijt} is the error term.

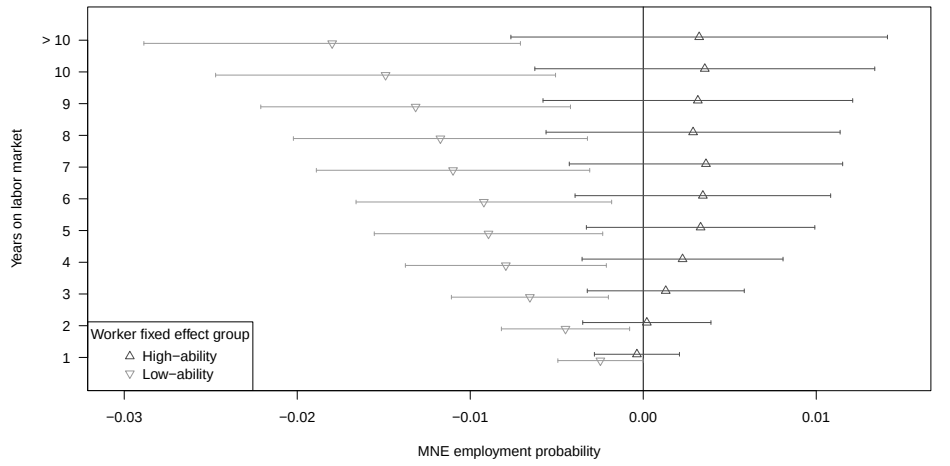
In panel (b) of Figure 6, we show the impact of career progression on MNE employment for two distinct groups of worker ability. Downward facing triangles depict the sorting of low-ability workers (in the 25th percentile of the worker fixed effect distribution) and upward facing triangles those of high-ability workers (in the 75th percentile). The estimates for high-ability workers are mostly positive but not significantly different, suggesting they do not develop different likelihoods of working for an MNE over their career. By contrast, the estimates for low-ability workers are significantly negative and they decrease as the worker's labor market experience grows. Hence, low-ability workers are increasingly less likely to work for a multinational as their career progresses. As 28.5% of low-ability workers start their career in an MNE, the odds that a low-ability worker is in MNE employment ten or more years after labor market entry are about 7.8% lower than at labor market entry. Together, this indicates the reduction in the number of senior workers in MNEs is explained by the lower employment by MNEs of low-ability workers at later career stages.

The full set of estimates for equation (16) is in Table F4 in Online Appendix F.3. They show positive and statistically significant interaction effects between worker ability and labor market experience for all career stages. Moreover, the estimates increase with labor market experience.

Figure 6: Sorting of experienced and inexperienced workers to MNEs.



(a) Overall



(b) By worker ability

Notes: The plots depict point estimates and their 95%-confidence intervals of labor market sorting relative to the year of labor market entry. Estimates in Panel (a) are based on a linear probability model with an MNE employment dummy as the dependent variable and are conditional on number of jobs, log firm size; and worker, firm and industry-year fixed effects (see eq. (15)). Panel (b) splits the estimates up by the worker fixed effects of a wage regression (see eq. (16) and the discussion in Section 5.2). High-ability workers are in the 75th percentile and low-ability workers in the 25th percentile of the worker fixed effects distribution. The full regression results are in Online Appendix F.3. Standard errors in Panel (a) are clustered at the worker level. Standard errors in Panel (b) are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).

5.3 Experience and hiring by multinationals

Our results suggest that the productivity advantages of MNEs derive from the employment histories of their workforce. Intuitively, MNEs may be more likely to hire a worker with valuable experience, over and above the innate ability of that worker. To examine this possibility, we analyze the moving workers in our data, and explain whether the move is to an MNE from the worker's earlier experience and the worker's fixed effect estimate. We control for industry-year fixed effects, to prevent an omitted variables bias from within-industry moves in industries with many multinationals.

Table 2 shows the regression results for observations of moving workers. The experience variables capture the years of experience in multinational, international and domestic firms prior to the move. For comparability of the estimates, Column 3 uses standardized measures of experience and ability (standardized to mean zero and variance one).

Column 3 of Table 2 shows that a one standard deviation increase in a worker's previous experience in an MNE increases the probability of moving to an MNE by 2.75%-points. This represents a considerable effect with a 12.6% increase in the odds of observing a (senior) job mover entering an MNE, relative to the mean of 35% of entries to MNEs. Previous experience in international and domestic firms have a negative effect. A one standard deviation increase in ability increases the probability by only 1.52%-points, or the odds by 6.8%. The standardized effect of a year of MNE employment is considerably larger than that of the worker fixed effect, which suggest that earlier MNE experience matters most in explaining mobility towards MNEs. The results are not explained by the industry and size composition of MNEs as the specification includes an industry-year fixed effect and controls for log firm size.

Table 2: Sorting of experienced workers to MNE entry positions.

	Entry to MNE		
	(1)	(2)	(3)
			standardized
MNE exp.	0.0232***	0.0178***	0.0275***
	(0.0003)	(0.0003)	(0.0004)
Int. firm exp.	-0.0112***	-0.0099***	-0.0143***
	(0.0003)	(0.0002)	(0.0004)
Dom. firm exp.	-0.0191***	-0.0063***	-0.0091***
	(0.0003)	(0.0003)	(0.0004)
Worker ability (standardized)	0.0334***	0.0152***	0.0152***
	(0.0006)	(0.0005)	(0.0005)
log(firm size)		0.0884***	0.0884***
		(0.0002)	(0.0002)
Fixed-effects			
Industry-year (324)	✓	✓	✓
Observations	1,271,658	1,271,658	1,271,658
R^2	0.2378	0.4306	0.4306

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Estimated on a sample of entry observations at new employers after the first employer. The dependent variable is a binary indicator that identifies a worker's entry into an MNE. MNE/international firm/domestic firm experience capture the years of experience a worker collected before entering the current employer. 'Worker ability' refers to the worker fixed effects of an estimation of eq. (14). MNE/international firm/domestic firm experience (Column 3) and worker ability (all columns) are standardized to mean zero and variance 1. Standard errors are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).

6 Robustness checks

We estimate several variations of eq. (13) to explore the sensitivity of our main result to alternative explanations and our modeling choice. We report the results of the checks in Figures 7 and 8. Different model specifications provide varying estimates of the returns to MNE experience, yet a consistent trend emerges: MNE employment experience yields wage premia over domestic firm experience, both when workers continue at the MNE and when workers switch firms, including to non-MNEs.

1. **Base Salary.** We focus only on the hourly wage rate that follows from a workers' base income, excluding the impact of overtime and bonus payments. This approach arises from the understanding that MNEs may compensate overtime differently than domestic firms and provide substantial bonuses to certain employees (Vahter and Masso, 2019). Likewise, a worker's past MNE experience could be rewarded with bonus payments when joining a new employer. As our theoretical framework abstracts from such explanations, we verify that our results also hold for a worker's base hourly wage.

2. **Excluding acquisitions.** A concern could be that international acquirors 'cherry pick' targets with high wage growth for acquisition (Almeida, 2007). Then, wage effects might reflect target selection rather than the value of employment experience. We re-classify MNEs as "always an MNE" if it is observed as an MNE for at least three quarters of its years in the panel (even for the years in which the firm is not an MNE). MNEs that do not fulfill this requirement are consistently identified as either international or domestic firms. With this classification, acquisitions should have little to no impact on the wage equation.

3. **Large firms.** Since MNEs are generally larger than domestic firms, our estimates could capture wage premia due to firm size (Bloom et al., 2018), rather than the multinational status of firms, potentially bypassing our firm-size control variable. We restrict our focus to a subsample of large firms with at least 250 employees in a given year.

4. **Discounting.** Our estimates do not distinguish between the age of the experience on a worker's CV, while the value of experience may depreciate. Hence, the diminishing returns in Figure 1 could be an outcome of this modeling choice. To examine this possibility, we introduce a worker-year-specific discount factor to eq. (13), which restricts experience gained T+1 years ago to contribute less to identifying the estimate, compared to experience obtained T years ago. We identify the best fit for the discount factor by estimating our model under different discount factors and selecting the one that results in the lowest root mean squared error. We find that a discount rate of around 1% per year fits the data slightly better than no discount rate. Adjusting our wage equation for this discount factor leads to very little change to our baseline results.

5. **MNE vs. industry experience.** Previous research has underscored the critical role of industry-specific human capital as a determinant of wage (e.g., Sullivan, 2010). If this industry-specific human capital proves to be integral in explaining worker mobility and wage structure, its omission could lead us to conflate wage accumulation within MNEs (and other firms) with wage growth due to industry-specific experience. In addition, MNEs are more present in some industries than in others (see e.g., Roesch et al., 2022). If MNEs are concentrated in industries with high values of experience generally, i.e. regardless of whether industry

experience is gained in an MNE or a domestic firm, we could confuse a workers' past MNE experience with experience gained in those industries.

To address these two possibilities, we verify that our results are robust to including two types of controls. First, we add a variable that captures a workers' past experience within the same 2-digit NACE industry as the current employer. Second, we add an additional variable that captures the employment-weighted share of MNEs in the 2-digit NACE industries that a worker has worked for in the past. Neither impacts our main result.

6. **Bargaining.** While our approach accounts for wage growth based on the internationalisation status of a workers' current and previous firms, internationalisation may correlate with other factors that determine a workers' bargaining position, such as the size of the previous employer and the wage that the worker earned there. We control for a workers' lagged (log) wage and lagged (log) employer size, following the argumentation in Mion et al. (2022). Bonhomme et al. (2019) propose that a worker's previous wage and the identity of his or her previous employer capture complex wage negotiation structures, suggesting that lower past wage determines higher wage growth. Similarly, on-the-job search models like that of Postel-Vinay and Robin (2002), highlight the importance of both the present and potential employers in determining worker mobility and wages. In these models, the more productive a worker's firm is, the higher is the worker's wage growth, irrespective of whether the worker changes firms. In contrast, Di Addario et al. (2023) find that empirically the identity of a worker's previous employer is unimportant in determining wage at the next employer for a sample of Italian firms.
7. **Firm-year fixed effects.** We substitute the firm fixed effects with firm-year fixed effects to capture changes in a firm's wage policy over time, such as productivity shocks that are both firm-specific and time-varying, potentially driving the selection of firms into MNE status (Roesch et al., 2022; Engbom et al., 2023). With the inclusion of firm-year fixed effects, the coefficients on the within- and across-returns to MNE experience are identified by the variation in wage among workers with different experience levels within the same firm in the same year. In addition, they are identified by within-worker variation of employment experience and wage.
8. **Across-firm returns by firm type.** We examine the interaction between across-firm returns to experience and the firm type of a worker's current employer. Our empirical framework suggests that workers accrue benefits from past experience at an MNE as compared to experience at a domestic firm, irrespective of their subsequent post-MNE employment choices. However, it could be that only other MNEs value MNE experience, implying that workers transitioning from an MNE to a domestic firm might not realize any wage premium. To comprehensively assess whether workers generally benefit from MNE experience, we split the effect of the MNE experience premia accumulated at past employers up based on the firm type of the workers' current employer. The estimates show positive wage premia regardless of the MNE status of the worker's current employer.
9. **Spell fixed effects.** Selection into senior positions may be a function of the match quality between the firm and the worker. A concern could be that the match-specific quality also accounts for wage differences between domestic firms and MNEs, in which case within-firm experience might conflate with

match quality. To examine this, we introduce firm-worker-spell fixed effects to examine wage variation within the employment duration of each contract. This leads to very minor shifts in the estimates of MNE premia in the within-firm returns to experience. As the spell fixed effects fully control for the worker's external employment history, the experience value across firms cannot be identified with spell fixed effects.

6.1 Limited mobility bias

If few workers move between firms, the firm fixed effects in our data are identified from few worker movements, and a "limited mobility bias" might arise. While the level estimates of the fixed effects are generally unbiased under limited mobility, the "plug-in" estimator of their variance may yield biased estimates (see e.g., Andrews et al., 2008; Jochmans and Weidner, 2019; Bonhomme et al., 2023). This means that the OLS estimates of our wage profiles are unaffected by limited mobility concerns, as are the level estimates of the firm fixed effects that we use in computing the MNE wage premium in Section 4.1.[11] However, when comparing the distributions of firm fixed effects, we rely on the variance of the fixed effects which may be biased. In this subsection, we investigate whether limited mobility bias affects our conclusion that the value of employment experience drives the MNE wage premium.

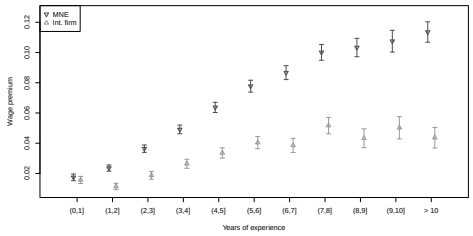
To assess the influence of limited mobility, we employ a clustering approach to the firm fixed effects (Bonhomme et al., 2019). Specifically, we employ a K-means clustering algorithm to identify $K = 10, 20, 50$ clusters of firms, using percentile cutoffs of the within-firm wage distribution after demeaning log hourly wages by industry-year fixed effects. Same as in Section 4.1, we re-estimate eq. (13) with and without experience profiles included, but with cluster-level instead of firm-level fixed effects. Clustering addresses the limited mobility bias, since many movers identify a single cluster-level fixed effect (Bonhomme et al., 2019). Column 2 of Table 3 presents Jochmans and Weidner (2019)'s network connectivity measure, which indicates how susceptible the network is to limited mobility. The network with firm-level fixed effects features low connectivity, while cluster-level networks exhibit up to 133 times higher connectivity. This suggests that clustering effectively counteracts any biases stemming from limited mobility.

We extract the cluster-level fixed effect estimates to compute the MNE wage premium in both the static (without experience) and dynamic (with experience) model. To determine the MNE wage premium, we follow Setzler and Tintelnot (2021) in calculating the difference in the average cluster-level fixed effect experienced by MNE and domestic workers. A limitation of the clustering method is that it precludes the direct computation of standard errors and p-values for the MNE wage premium. To estimate the standard error, we apply a block-bootstrap approach over 100 iterations, which involves randomly sampling workers' entire employment histories with replacement and re-estimating all components, including the MNE wage premium.

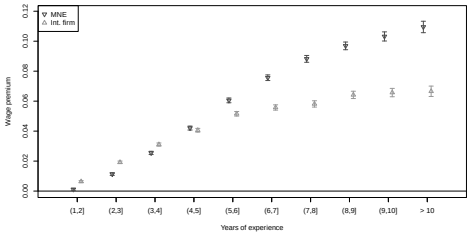
Table 3 compiles the derived MNE wage premia under various clustering strategies. For reference, the table's bottom panel also provides the MNE wage premium calculated using firm-level fixed effects without clustering.

[11] Online Appendix E includes Figure E1, which depicts our estimates for the wage returns to MNE experience when using $K = 10, 20, 50$ clusters for the firm fixed effects (Bonhomme et al., 2019). These estimates align with our main results in Figure 1, implying that limited mobility does not influence our findings on the wage premia of MNE experience.

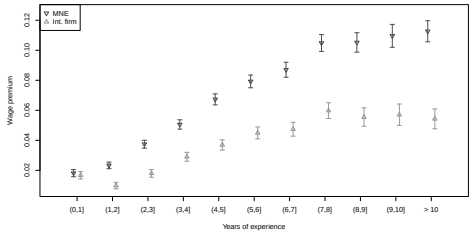
Figure 7: The wage premia of MNE experience under different regression specifications (1).



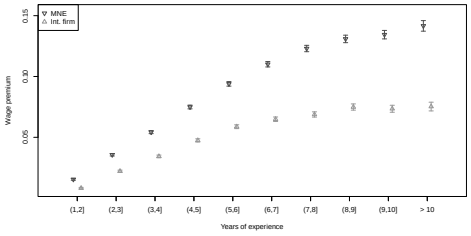
(a) Base salary: across-firm



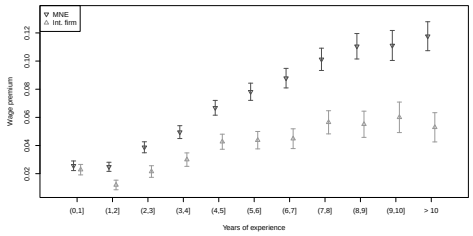
(b) Base salary: within-firm



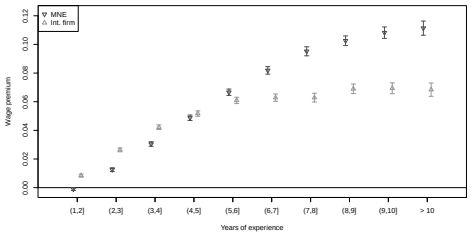
(c) Excluding acquisitions: across-firm



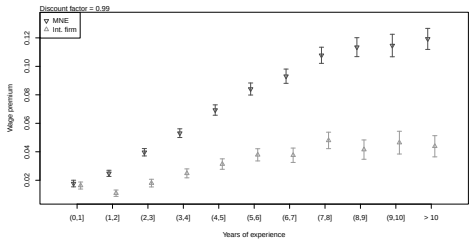
(d) Excluding acquisitions: within-firm



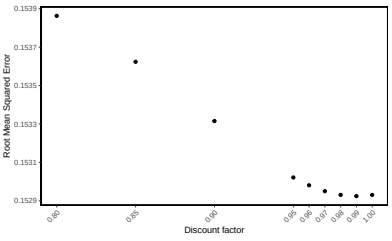
(e) Large firms ($\geq$ 250 workers): across-firm



(f) Large firms ($\geq$ 250 workers): within-firm



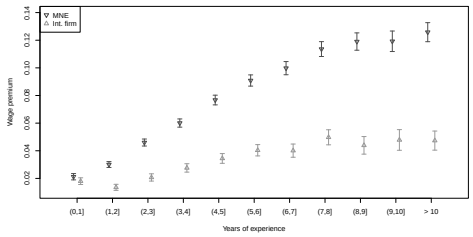
(g) Discounting experience: across-firm



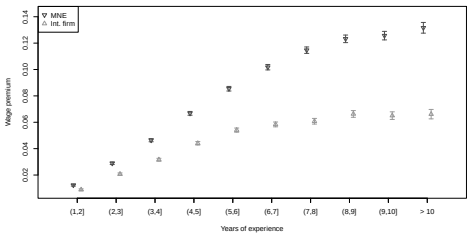
(h) Discounting experience: RMSE

Notes: The figure shows the estimated wage return to MNE experience under different variations of eq. (13); see Section 6 for details. The returns are split up by within-firm (continuing workers) and across-firm (moving workers) returns. Panel (h) shows the Root Mean Squared Error (RMSE) derived when applying different discount factor to the across-firm returns. Panel (g) shows the corresponding model with the lowest RMSE.

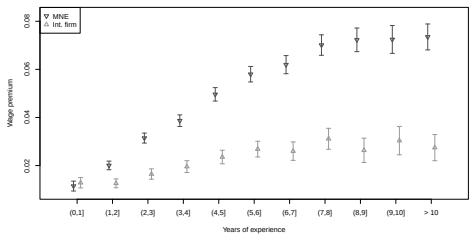
Figure 8: The wage premia of MNE experience under different regression specifications (2).



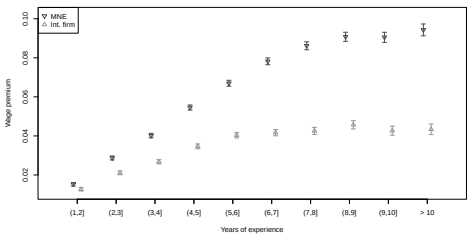
(a) Industry experience control: across-firm



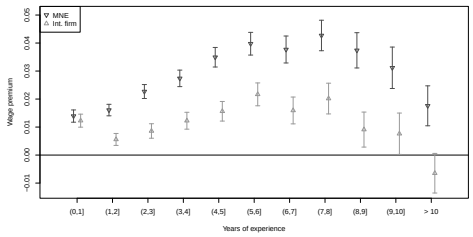
(b) Industry experience control: within-firm



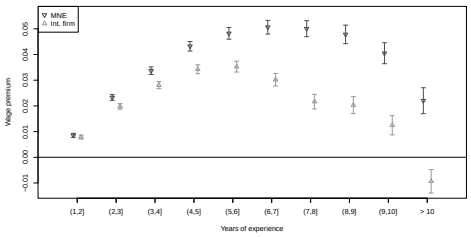
(c) Bargaining power controls: across-firm



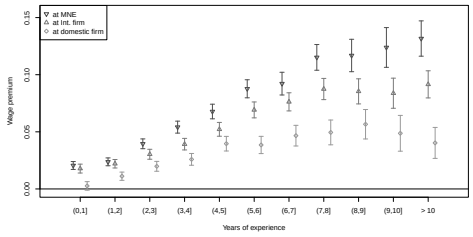
(d) Bargaining power controls: within-firm



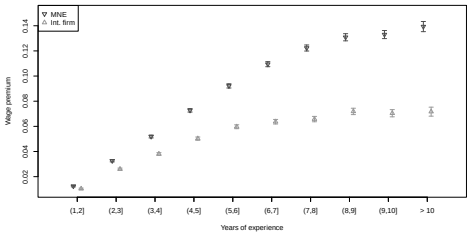
(e) Firm-year fixed effects: across-firm



(f) Firm-year fixed effects: within-firm



(g) By firm type: across-firm



(h) Spell fixed effects: within-firm

Notes: The figure shows the estimated wage return to MNE experience under different variations of eq. (13); see Section 6 for details. The returns are split up by within-firm (continuing workers) and across-firm (moving workers) returns.

The estimates fluctuate with the number of clusters and between the static and dynamic models. However, across all configurations, the static estimate is positive with smaller standard errors, whereas the MNE wage premium in the dynamic specification is near-zero with broad standard errors. This confirms our conclusion that considering the dynamic wage benefits of MNE experience diminishes the MNE wage premium, even after correcting for the limited mobility of workers.

Table 3: T-tests on MNE wage premium under different k-means clustering approaches.

Clusters	Network Connectivity	Specification	MNE premium	s.e. (bootstrapped)	p-value
10	0.6978	Static model	0.0662	0.0017	0.0160
10	0.6978	Dynamic model	0.0111	0.0021	0.1214
20	0.8083	Static model	0.0801	0.0081	0.0639
20	0.8083	Dynamic model	0.0232	0.0099	0.2561
50	0.8640	Static model	0.1007	0.0076	0.0478
50	0.8640	Dynamic model	0.0426	0.0103	0.1507
max	0.0065	Static model	0.0709	0.0010	0.0089
max	0.0065	Dynamic model	-0.0378	0.0017	0.0285

Notes: The table shows t-tests on the (weighted) average difference in fixed effects of MNEs and domestic firms. The fixed effects derive from an estimation of eq. (13) with $K = 10, 20, 50$ clusters of firm fixed effects. Firm fixed effect clusters are found using a K-means clustering algorithm on the within-firm distribution of (detrended) hourly wages (Bonhomme et al., 2019), and by picking 20 random initial assignments. 'Clusters = max' refers to the firm fixed effects of a model without clustering. 'Network connectivity' refers to Jochmans and Weidner (2019)'s limited mobility indicator. 'MNE premium' shows the weighted average difference in (cluster) firm fixed effect between MNEs domestic firms, with weights according to observed worker-firm matches in the data. 's.e. bootstrapped' shows block-bootstrapped standard errors (worker-level) of the MNE premium. The bootstrap randomly samples with replacement the full employment histories of workers across 100 iterations.

7 Conclusion

We examine how employment in a multinational adds value to workers' CVs. While multinationals are known to be more productive and pay higher wages than domestic firms, little is known about the impact of MNE employment on workers' future wages. We show that the future wage returns to MNE experience represent a large share of the returns to working in an MNE.

Tracking workers' careers from labor market entry in the universal matched employer-employee data of the Netherlands for 2006-2021, we show that workers accumulate substantial wage premia in an MNE. Specifically, workers employed in MNEs, as opposed to domestic firms, accrue 1 to 14% higher wage growth if they remain in the MNE, with the premium rising in the time spent within the firm. These wage premia are portable both to other MNEs and to non-MNEs. When moving between firms, workers with MNE employment experience earn on average 2 to 11% more, increasing in the previous time spent in an MNE. Our estimation strategy excludes worker sorting, variation in the overall pay level across firms, and industry-level shocks from explaining the wage premia. Several checks show that the estimates are robust to wage explanations driven by firm size, industry-

specific experience and various incentives to worker mobility. Additionally, we find that the premia persist in a context where variation in employment experience among workers is driven by mass layoffs. The estimates imply a substantial aggregate value of MNE employment: We estimate that the total accumulated value of experience in MNEs in 2021 amounts to around 6% of the total labor income in the Netherlands, relative to a counterfactual situation in which this experience had been accumulated in domestic firms.

Employment experience explains most of the wage premia that multinationals pay. Once we control for experience, the estimates of the level fixed effects for workers, often interpreted as innate ability or skill, are very similar between MNEs and domestic firms. Similarly, the level fixed effects of MNEs are no different from domestic firms, once we account for the experience of the workforce. Hence, our analysis implies that employment experience is a key driver in explaining the higher skill level and wage of the MNE workforce. This finding extends earlier literature, which, lacking workers' full employment histories, predominantly traces the wage premia of multinationals to worker sorting on innate ability rather than experience (e.g., Hijzen et al., 2013; Setzler and Tintelnot, 2021).

We present stylized facts suggesting that MNEs leverage the experience premia that their workers' accumulate. A standard international trade model, augmented with hiring and promotion decisions, suggests that a firm with higher experience value is likely to internationalize as it has low marginal costs. Such an MNE pays junior workers relatively low wages, as workers get compensated in higher wages later on. Accordingly, the MNE hires relatively many junior workers. Learning its junior workers' productivities, the MNE also promotes fewer but more productive junior workers to senior ranks, compared to a domestic firm. Consistent with these predictions, we estimate a 3% wage penalty at career onset for the average multinational career. We also find that MNEs employ relatively few seniors per junior worker. This is explained by the exit of workers with lower innate abilities (as proxied by worker fixed effects) from MNE employment over time, suggesting stronger selection in MNEs.

The stylized facts have more broad implications for theories of firm selection into international trade. These theories predict that firms with high levels of (ex-ante) productivity operate at lower marginal costs and are more likely to overcome obstacles to internationalize (Helpman et al., 2004, 2010; Felbermayr et al., 2011). In our formalization, multinationals with high experience values for junior workers push down marginal costs by capitalizing on the later wage premia of their workforce, thus opening up opportunities for scale-intensive multinational investment. For the universe of Dutch firms, we find that level productivity estimates, as measured by firm-level fixed effects in Mincer wage equations, are not higher for MNEs than for other firms when we control for the experience of the firm's workforce. Hence, our results suggest that in addition to ex-ante productivity advantages, the careers of the MNE's workers explain the firm's internationalization strategy.

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Online Appendix

A Supporting tables and figures

Table A1: Overview of the matched employer-employee dataset.

Firm type	Firms	Workers	Observations
MNE	19,020	517,870	2,721,956
International	61,618	580,370	2,831,073
Domestic	133,357	517,872	2,501,994
	207,074	1,059,991	8,055,023

Notes: The table shows the number of firms, workers and observations split up by three firm types: MNE, international and domestic firms. MNEs comprise foreign firms (ultimate owner located abroad) and domestic firms with foreign subsidiaries. International firms are defined as (non-multinational) firms with an average yearly sum of imports and exports that exceeds 10k EUR. Domestic firms are all remaining firms.

Table A2: Summary statistics.

	All workers		2006 cohort	
	Mean	SD	Mean	SD
Workers	1,059,991		37,496	
Age at labor market entry	23.84	3.11	23.31	3.12
Number of different employers	2.26	1.34	3.33	1.80
First job at				
MNE (probability)	0.31	0.46	0.28	0.45
International firm (probability)	0.34	0.47	0.34	0.47
Domestic firm (probability)	0.35	0.48	0.38	0.49
Years in firm				
MNE (years)	1.73	2.65	3.30	4.28
International firm (years)	1.92	2.73	3.44	4.17
Domestic firm (years)	1.56	2.45	2.65	3.62
MNE (hourly wage)	21.42	10.35	23.98	13.55
International firm (hourly wage)	21.07	8.26	22.12	12.24
Domestic firm (hourly wage)	19.64	8.42	20.02	9.27
Past experience from				
MNE (years)	0.94	2.00	2.24	3.51
International firm (years)	0.88	1.89	2.04	3.14
Domestic firm (years)	0.87	1.88	2.00	3.15
MNE (hourly wage)	24.80	12.37	28.11	13.86
International firm (hourly wage)	24.74	10.64	27.18	16.41
Domestic firm (hourly wage)	22.92	9.23	24.68	12.65

Notes: The table provides summary statistics for two groups of workers: all workers in the sample and workers who entered the labor market in 2006. 'Years in firm' shows the average maximum number of years that workers have been with their current employer. Past experience shows the average maximum number of years of prior employment experience of workers before joining their current employer. Hourly wages are averages of total reported earnings divided by total reported hours worked. MNEs comprise foreign firms (ultimate owner located abroad) and domestic firms with foreign subsidiaries. International firms are defined as (non-multinational) firms with an average yearly sum of imports and exports that exceeds 10k EUR. Domestic firms are all remaining firms.

Table A3: The static wage premium of careers in MNEs.

	Firm fixed effect	
	(1)	(2)
Intercept	-0.1339***	-0.1193***
	(0.0038)	(0.0032)
MNE-career	-0.0295***	-0.0322***
	(0.0019)	(0.0019)
Observations	144,396	144,396
R^2	0.0038	0.0047

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Weighted Least Squares regressions with weights according to average employment size. The dependent variables are the respective firm fixed effects of two different specifications: (1) including MNE/international firm/domestic firm employment experience (see eq. (13)); (2) including full interactions between employment experience and the worker fixed effects (see eq. (14)). Bootstrapped standard errors in parentheses (re-estimating firm fixed effects until convergence in all 100 iterations).

B Comparing the fixed effects distributions

In this section we develop a formal decomposition of the difference in the (worker and firm) fixed effects distributions between MNEs and domestic firms to complement the discussion in Sections 4.1 and 4.2. Specifically, we decompose the difference in the firm and worker fixed effects distributions of MNEs and domestic firms into differences in mean and dilation, using the quantile approach of Combes et al. (2012). The approach minimizes the mean quantile difference between the observed fixed effects distribution in MNEs and an approximated distribution, where the approximation is formed by shifting and dilating the observed distribution in domestic firms. For the worker fixed effects and in order to avoid counting workers that move between MNEs and domestic firms more than once, we use a snapshot of the data in 2014 when applying the Combes et al. (2012) method. For the firm fixed effects, we focus on firms that never change status throughout our sample period.[12]

Table B1: Comparison of worker fixed effect distributions, MNE vs domestic firm.

	(1)	(2)	(3)	(4)
Shift	0.0842***	0.0418***	0.0591***	-0.00854
	(0.00152)	(0.00197)	(0.00573)	(0.00489)
Dilation	1.069***	1.053***	1.053***	0.900***
	(0.0119)	(0.0121)	(0.0121)	(0.00989)
Observations	241566	241566	241566	241566
R^2	0.776	0.404	0.396	0.599

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Estimates of shift and dilation in the Combes et al. (2012) method applied to the distribution of worker fixed effects. The estimates are based on a snapshot of the data in 2014, and include the fixed effects of workers in MNEs and domestic firms that do not change status. The columns refer to different worker fixed effect estimates described by (1) a static model with only worker fixed effects, firm fixed effects and industry-year fixed effects; (2) a dynamic model with MNE, international and domestic firm experience included (see eq. (13)) but excluding the log firm size control; (3) our main dynamic model with MNE, international and domestic firm experience included (see eq. (13)); (4) a dynamic model with MNE, international and domestic firm experience, and their interactions with the worker fixed effects included (see eq. (14)). Standard errors (in parentheses) are block-bootstrapped at the worker level (re-estimating the fixed effects until convergence in all 100 iterations).

Table B1 reports estimates of shift and dilation for the worker fixed effects in different specifications. In Column 1, we first consider the worker fixed effects of a static estimation that ignores the benefits of MNE experience, and includes only industry-year fixed effects, worker fixed effects and firm fixed effects. The shift parameter is 0.08 and the dilation parameter is greater than one, implying that in this specification worker ability is more dispersed in MNEs than in domestic firms. The statistically significant shift parameter reflects the exclusion of the time-varying benefits of experience. Ignoring them causes the worker fixed effect estimates to not only pick up time-invariant characteristics of workers but also time-variant differences in the accumulation of experience. Columns 2 and 3 adjust the estimates for experience but restricts its returns to be homogeneous across worker ability (as in eq. (13)), with the difference being the inclusion of a firm size control. The shift parameter

[12]The results are qualitatively similar when using a different snapshot or including firms that change status.

in Column 3 falls to 0.06, while the dilation parameter remains almost unchanged. As discussed in Section 4.3, the returns to MNE experience are heterogeneous across workers, whereby the fixed effects underlying Column 3 overestimate ability at the top of the distribution and underestimate ability at the bottom of the distribution. Column 4 addresses these issues and adjusts for heterogeneous time-varying differences in the wage accumulation with experience across different levels of the worker fixed effects (as in eq. (14)). The dispersion parameter is just below one, suggesting that worker ability varies less in MNEs. The mean difference estimate is negative, close to zero and statistically insignificant. In summary, the change in shift parameter across Columns 1 to 4 suggests that the worker-level disparities between MNEs and domestic firms arise from faster wage growth with MNE experience and heterogeneous returns to experience for workers of different ability, not from innate ability differences among workers.

Table B2 shows the estimates of shift and dilation for the firm fixed effects in the same set of modules. For the firm fixed effects of the static model in Column 1, the shift parameter is 0.08, implying that MNEs have higher average fixed effects than domestic firms. Column 2 adds experience to the estimation but ignores the effect of firm size on wages. The shift parameter turns negative to -0.06, implying that the fixed effects of MNEs are lower than those of domestic firms. Column 3 additionally adds a control for firm size and Column 4 allows the effect of experience on wage to vary by the worker fixed effects. In both cases, the shift parameter is negative. The estimates for the dilation parameters are consistently smaller than one, implying that the fixed effects of MNEs vary less than those of domestic firms. All estimates are statistically significant. Taken together, the change in shift estimate implies that the ex-ante wage premium of MNEs (Column 1) is fully explained by the accumulation of experience in the workforce of MNEs (Columns 2 to 4).

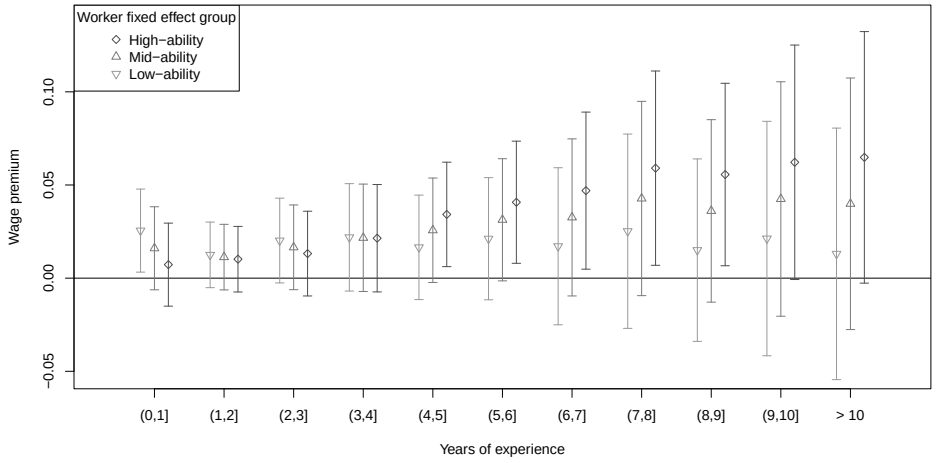
Table B2: Comparison of firm fixed effect distributions, MNE vs domestic firm.

	(1)	(2)	(3)	(4)
Shift	0.0829***	-0.0630***	-0.0160***	-0.0134***
	(0.00473)	(0.00540)	(0.00193)	(0.00234)
Dilation	0.792***	0.673***	0.684***	0.674***
	(0.0159)	(0.0141)	(0.0145)	(0.0151)
Observations	144396	144396	144396	144396
R^2	0.775	0.722	0.636	0.642

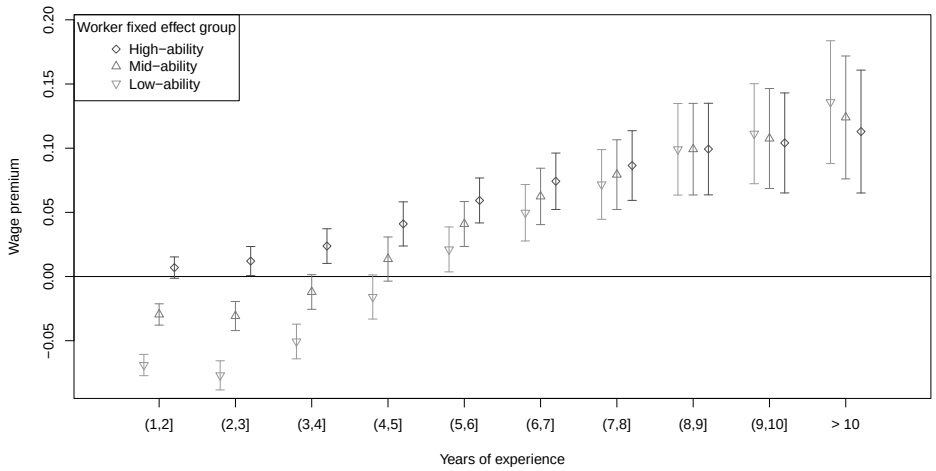
Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Estimates of shift and dilation in the Combes et al. (2012) method applied to the distribution of firm fixed effects. The estimates include the fixed effects of MNEs and domestic firms that do not change status. The firm fixed effects are derived from (1) a static model with only worker fixed effects, firm fixed effects and industry-year fixed effects; (2) a dynamic model with MNE, international and domestic firm experience included (see eq. (13)) but excluding the log firm size control; (3) our main dynamic model with MNE, international and domestic firm experience included (see eq. (13)); (4) a dynamic model with MNE, international and domestic firm experience, and their interactions with the worker fixed effects included (see eq. (14)). Standard errors (in parentheses) are block-bootstrapped at the worker level (re-estimating the fixed effects until convergence in all 100 iterations).

C Additional results on other international (non-multinational) firms

Figure C1: Wage premia of international firm experience by worker ability.



(a) Across-firm



(b) Within-firm

Notes: The plots depict calculated wage premia per worker ability group and their 95%-confidence intervals, as estimated by a wage regression with interactions between MNE/international firm/domestic firm experience and the worker fixed effects (see eq. (14)). The full regression results are in Table F2 in Online Appendix F.2. Wage premia are calculated as the coefficients for international firm experience minus the respective coefficients for domestic firm experience. Experience within and across firms are based on actual days worked and cut in yearly splines. High-ability workers are in the 75th percentile and low-ability workers in the 25th percentile of the worker fixed effects distribution. Standard errors are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).

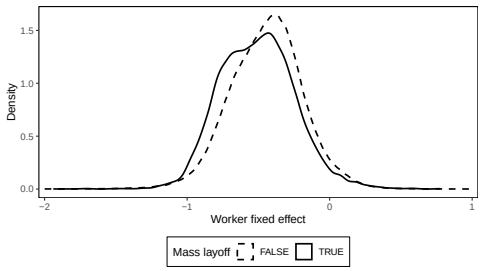
D Evidence from mass layoffs

Table D1: Mass layoffs.

Firm type	Firms	Workers
MNE	386	2,813
International	979	4,602
Domestic	1,521	5,956

Notes: The table shows the number of firms and workers involved in mass layoffs, split up by three firm types: MNE, international and domestic firms. MNEs comprise foreign firms (ultimate owner located abroad) and domestic firms with foreign subsidiaries. International firms are defined as firms with an average yearly sum of imports and exports that exceeds 10k EUR. A Mass layoff event identifies a firm with at least 10 employees that ceases to exist or lays off more than 80% of its workers in a given year, with less than 30% of the exiting workers entering the same new firm.

Figure D1: Worker fixed effects in mass layoffs.



(a) Workers in mass layoffs vs. other workers

(b) At old firm

(c) At new firm

Notes: The plots show different distributions of worker fixed effects derived from a wage regression (see eq. (14)). Panel (a) splits the distribution up by workers involved in a mass layoff event. A mass layoff event identifies a firm with at least 10 employees that ceases to exist or lays off more than 80% of its workers in a given year, with less than 30% of the exiting workers entering the same new firm. Panel (b) splits the distribution up by the MNE/domestic firm status of the origin firm where the mass layoff occurs. Panel (c) splits the distribution up by the destination firm where workers are observed following a mass layoff.

Table D2: Evidence from mass layoffs (full table).

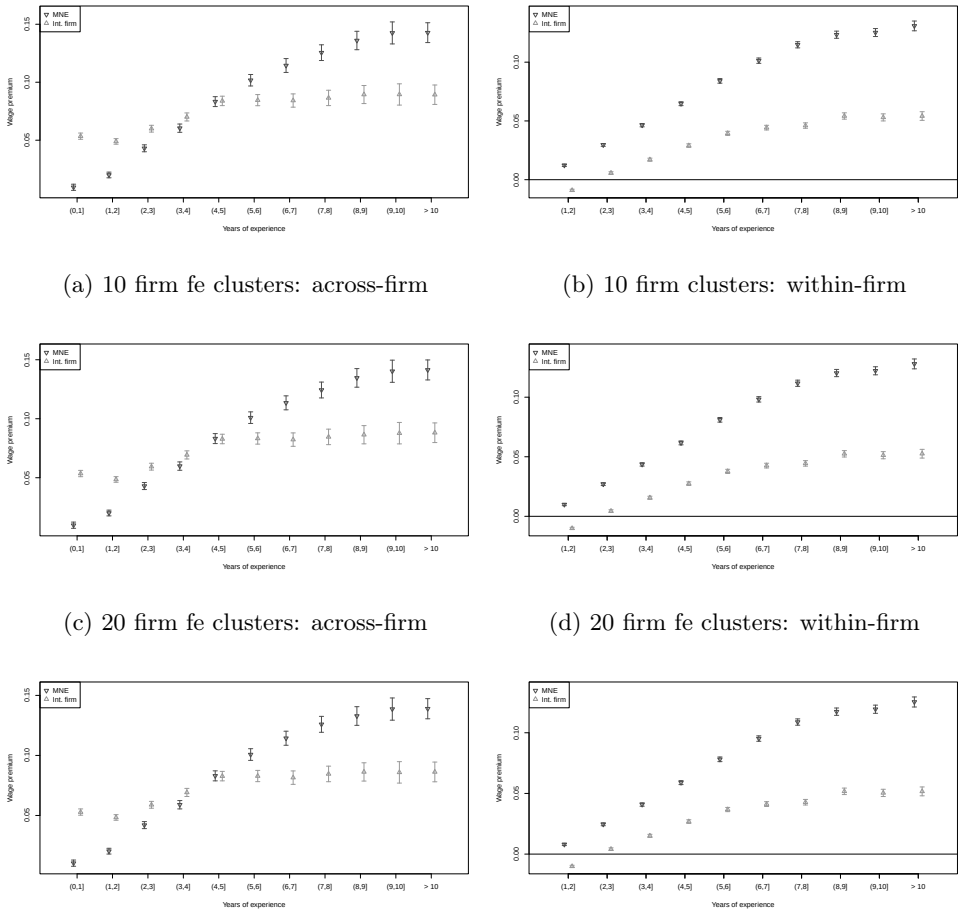
	log(hourly wage) (detrended)	
	(1)	(2)
Domestic firm experience	0.0395***	0.0523***
	(0.0007)	(0.0033)
International firm experience	0.0445***	0.0602***
	(0.0007)	(0.0032)
MNE experience	0.0469***	0.0825***
	(0.0007)	(0.0027)
Years in firm	0.0496***	0.0477***
	(0.0010)	(0.0053)
Years in firm × International firm	0.0021*	0.0082
	(0.0010)	(0.0051)
Years in firm × MNE	0.0074***	0.0285***
	(0.0010)	(0.0055)
log(firm size)	0.0363***	0.0297***
	(0.0004)	(0.0006)
Employer number = 3	0.0569***	0.0247·
	(0.0037)	(0.0131)
Employer number = 4	0.0538***	-0.0011
	(0.0047)	(0.0206)
Years in firm × Employer number = 3	-0.0089***	-0.0057
	(0.0012)	(0.0039)
Years in firm × Employer number = 4	-0.0098***	-0.0101·
	(0.0016)	(0.0059)
Worker fe	0.9239***	0.7476***
	(0.0042)	(0.0092)
Firm fe	0.9354***	0.9728***
	(0.0051)	(0.0112)
Domestic firm experience × Worker fe		0.0389***
		(0.0057)
International firm experience × Worker fe		0.0438***
		(0.0056)
MNE experience × Worker fe		0.0858***
		(0.0046)
Years in firm × Worker fe		0.0151
		(0.0102)
Worker fe × Employer number = 3		-0.0181
		(0.0237)
Worker fe × Employer number = 4		-0.0983**
		(0.0344)
Worker fe × years in firm × Employer number = 3		-0.0069

		(0.0080)
Worker fe × years in firm × Employer number = 4		-0.0135
		(0.0103)
Years in firm × Worker fe × International firm		0.0042
		(0.0097)
Years in firm × Worker fe × MNE		0.0393***
		(0.0102)
Observations	42,558	42,558
R^2	0.8067	0.8192

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. The dependent variable is a workers' log hourly wage, detrended by industry-year fixed effects on the full firm-worker network. The estimations focus on the observations of workers at their first employer, after the worker was involved in a firm closure or mass layoff; see Section 4.4. 'Years in firm' refers to experience accumulated while a worker is employed at the current employer of type MNE, international firm and domestic firm (reference category). MNE/international firm/domestic firm experience refers to experience accumulated before entering the current employer. Experience is calculated based on actual days worked. Employer number refer to the cumulative number of distinct firms that a worker has been observed at, with two being the reference category. log(firm size) is the natural logarithm of the total number of (full-time) employees observed in a firm in a given year. Column 1 adds the fixed effects of an estimation of eq. (13) as linear regressors. Column 2 adds those of eq. (14). Standard errors in Column 1 are clustered at the worker level. Standard errors in Column 2 are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).

E Limited mobility bias

Figure E1: The wage premia of MNE experience with K = 10, 20, 50 clusters in the firm fixed effects.



(a) 10 firm fe clusters: across-firm

(b) 10 firm clusters: within-firm

(c) 20 firm fe clusters: across-firm

(d) 20 firm fe clusters: within-firm

(e) 50 firm fe clusters: across-firm

(f) 50 firm fe clusters: within-firm

Notes: The plots depict calculated wage premia and their 95%-confidence intervals (see eq. (13) and the discussion in Sections 4 and 6.1) for $K = 10, 20, 50$ clusters in the firm fixed effects. Wage premia are calculated as the coefficients for MNE/international firm experience minus the respective coefficients for domestic firm experience. Experience within and across firms are based on actual days worked and cut in yearly splines. Firm fixed effect clusters are found using a K-means clustering algorithm on the within-firm distribution of (detrended) log hourly wages (Bonhomme et al., 2019), and by picking 20 random initital assignments. Standard errors are clustered at the worker level.

F Full regression tables for the main estimates

F.1 The value of MNE experience

Table F1: Wage profile estimates.

	log(hourly wage) (detrended)
	(1)
Years in firm = (1,2]	0.1240***
	(0.0003)
Years in firm = (2,3]	0.2003***
	(0.0004)
Years in firm = (3,4]	0.2538***
	(0.0005)
Years in firm = (4,5]	0.2964***
	(0.0006)
Years in firm = (5,6]	0.3319***
	(0.0007)
Years in firm = (6,7]	0.3642***
	(0.0008)
Years in firm = (7,8]	0.3956***
	(0.0009)
Years in firm = (8,9]	0.4249***
	(0.0010)
Years in firm = (9,10]	0.4580***
	(0.0012)
Years in firm = (10,Inf]	0.5189***
	(0.0014)
International firm × years in firm = (1,2]	0.0093***
	(0.0003)
International firm × years in firm = (2,3]	0.0229***
	(0.0004)
International firm × years in firm = (3,4]	0.0343***
	(0.0006)
International firm × years in firm = (4,5]	0.0466***
	(0.0007)
International firm × years in firm = (5,6]	0.0569***
	(0.0008)
International firm × years in firm = (6,7]	0.0612***
	(0.0009)
International firm × years in firm = (7,8]	0.0636***
	(0.0011)
International firm × years in firm = (8,9]	0.0698***

	(0.0013)
International firm × years in firm = (9,10]	0.0685***
	(0.0015)
International firm × years in firm = (10,Inf]	0.0696***
	(0.0018)
MNE × years in firm = (1,2]	0.0138***
	(0.0004)
MNE × years in firm = (2,3]	0.0333***
	(0.0005)
MNE × years in firm = (3,4]	0.0520***
	(0.0006)
MNE × years in firm = (4,5]	0.0726***
	(0.0007)
MNE × years in firm = (5,6]	0.0919***
	(0.0009)
MNE × years in firm = (6,7]	0.1089***
	(0.0010)
MNE × years in firm = (7,8]	0.1218***
	(0.0012)
MNE × years in firm = (8,9]	0.1304***
	(0.0015)
MNE × years in firm = (9,10]	0.1326***
	(0.0016)
MNE × years in firm = (10,Inf]	0.1387***
	(0.0021)
Years in firm = (1,2] × Employer number = 2	-0.0401***
	(0.0003)
Years in firm = (1,2] × Employer number = 3	-0.0506***
	(0.0004)
Years in firm = (1,2] × Employer number = 4	-0.0578***
	(0.0004)
Years in firm = (2,3] × Employer number = 2	-0.0624***
	(0.0004)
Years in firm = (2,3] × Employer number = 3	-0.0830***
	(0.0005)
Years in firm = (2,3] × Employer number = 4	-0.0991***
	(0.0006)
Years in firm = (3,4] × Employer number = 2	-0.0784***
	(0.0005)
Years in firm = (3,4] × Employer number = 3	-0.1061***
	(0.0007)
Years in firm = (3,4] × Employer number = 4	-0.1292***
	(0.0008)
Years in firm = (4,5] × Employer number = 2	-0.0888***

	(0.0006)
Years in firm = (4,5] × Employer number = 3	-0.1232***
	(0.0008)
Years in firm = (4,5] × Employer number = 4	-0.1502***
	(0.0010)
Years in firm = (5,6] × Employer number = 2	-0.0960***
	(0.0008)
Years in firm = (5,6] × Employer number = 3	-0.1349***
	(0.0010)
Years in firm = (5,6] × Employer number = 4	-0.1648***
	(0.0013)
Years in firm = (6,7] × Employer number = 2	-0.1004***
	(0.0009)
Years in firm = (6,7] × Employer number = 3	-0.1437***
	(0.0013)
Years in firm = (6,7] × Employer number = 4	-0.1763***
	(0.0017)
Years in firm = (7,8] × Employer number = 2	-0.1060***
	(0.0011)
Years in firm = (7,8] × Employer number = 3	-0.1499***
	(0.0016)
Years in firm = (7,8] × Employer number = 4	-0.1867***
	(0.0024)
Years in firm = (8,9] × Employer number = 2	-0.1040***
	(0.0014)
Years in firm = (8,9] × Employer number = 3	-0.1552***
	(0.0019)
Years in firm = (8,9] × Employer number = 4	-0.1934***
	(0.0031)
Years in firm = (9,10] × Employer number = 2	-0.1083***
	(0.0015)
Years in firm = (9,10] × Employer number = 3	-0.1664***
	(0.0023)
Years in firm = (9,10] × Employer number = 4	-0.2082***
	(0.0038)
Years in firm = (10,Inf] × Employer number = 2	-0.1244***
	(0.0019)
Years in firm = (10,Inf] × Employer number = 3	-0.1872***
	(0.0031)
Years in firm = (10,Inf] × Employer number = 4	-0.2383***
	(0.0057)
MNE experience = (0,1]	0.0362***
	(0.0009)
MNE experience = (1,2]	0.0759***

	(0.0009)
MNE experience = (2,3]	0.1296***
	(0.0010)
MNE experience = (3,4]	0.1792***
	(0.0012)
MNE experience = (4,5]	0.2281***
	(0.0014)
MNE experience = (5,6]	0.2694***
	(0.0016)
MNE experience = (6,7]	0.3071***
	(0.0019)
MNE experience = (7,8]	0.3409***
	(0.0021)
MNE experience = (8,9]	0.3753***
	(0.0024)
MNE experience = (9,10]	0.4003***
	(0.0029)
MNE experience = (10,Inf]	0.4515***
	(0.0027)
International firm experience = (0,1]	0.0347***
	(0.0010)
International firm experience = (1,2]	0.0619***
	(0.0009)
International firm experience = (2,3]	0.1078***
	(0.0011)
International firm experience = (3,4]	0.1511***
	(0.0012)
International firm experience = (4,5]	0.1909***
	(0.0014)
International firm experience = (5,6]	0.2244***
	(0.0016)
International firm experience = (6,7]	0.2535***
	(0.0019)
International firm experience = (7,8]	0.2835***
	(0.0021)
International firm experience = (8,9]	0.3068***
	(0.0025)
International firm experience = (9,10]	0.3357***
	(0.0030)
International firm experience = (10,Inf]	0.3809***
	(0.0027)
Domestic firm experience = (0,1]	0.0182***
	(0.0010)
Domestic firm experience = (1,2]	0.0508***

	(0.0009)
Domestic firm experience = (2,3]	0.0901***
	(0.0011)
Domestic firm experience = (3,4]	0.1271***
	(0.0013)
Domestic firm experience = (4,5]	0.1607***
	(0.0015)
Domestic firm experience = (5,6]	0.1883***
	(0.0016)
Domestic firm experience = (6,7]	0.2179***
	(0.0019)
Domestic firm experience = (7,8]	0.2382***
	(0.0021)
Domestic firm experience = (8,9]	0.2679***
	(0.0024)
Domestic firm experience = (9,10]	0.2923***
	(0.0027)
Domestic firm experience = (10,Inf]	0.3397***
	(0.0025)
log(firm size)	0.0294***
	(0.0005)
Employer number = 2	0.1124***
	(0.0007)
Employer number = 3	0.1487***
	(0.0011)
Employer number = 4	0.1570***
	(0.0015)
Fixed-effects	
Worker (1,059,991)	✓
Firm (207,074)	✓
Observations	8,055,023
R^2	0.8288

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Estimates of eq. (13) based on the full sample of workers that are observed up from labor market entry. The dependent variable is the natural logarithm of hourly wage (total wage over total hours worked), detrended by industry-year fixed effects on the full sample of all workers in a first step. 'Years in firm' refers to experience accumulated while a worker is employed at the current employer of type MNE, international firm and domestic firm (reference category). MNE/international firm/domestic firm experience refers to experience accumulated before entering the current employer. Experience is calculated based on actual days worked and cut in yearly splines. Employer number refer to the cumulative number of distinct firms that a worker has been observed at, with one being the reference category. log(firm size) is the natural logarithm of the total number of (full-time) employees observed in a firm in a given year. Standard errors clustered at the worker level in parentheses.

F.2 The value of MNE experience by workers' innate ability

Table F2: Wage profile estimates (worker fixed effects interactions).

	log(hourly wage) (detrended)
	(1)
Years in firm = (1,2]	0.0817***
	(0.0008)
Years in firm = (2,3]	0.1434***
	(0.0013)
Years in firm = (3,4]	0.2045***
	(0.0015)
Years in firm = (4,5]	0.2605***
	(0.0018)
Years in firm = (5,6]	0.3126***
	(0.0019)
Years in firm = (6,7]	0.3609***
	(0.0025)
Years in firm = (7,8]	0.4058***
	(0.0028)
Years in firm = (8,9]	0.4478***
	(0.0035)
Years in firm = (9,10]	0.4899***
	(0.0039)
Years in firm = (10,Inf]	0.5650***
	(0.0046)
Worker fe × years in firm = (1,2]	-0.0938***
	(0.0016)
Worker fe × years in firm = (2,3]	-0.1285***
	(0.0023)
Worker fe × years in firm = (3,4]	-0.1112***
	(0.0029)
Worker fe × years in firm = (4,5]	-0.0794***
	(0.0036)
Worker fe × years in firm = (5,6]	-0.0402***
	(0.0038)
Worker fe × years in firm = (6,7]	-0.0021
	(0.0047)
Worker fe × years in firm = (7,8]	0.0301***
	(0.0056)
Worker fe × years in firm = (8,9]	0.0602***
	(0.0068)
Worker fe × years in firm = (9,10]	0.0814***
	(0.0075)

Worker fe × years in firm = (10,Inf]	0.1149***
	(0.0091)
International firm × years in firm = (1,2]	0.0217***
	(0.0010)
International firm × years in firm = (2,3]	0.0293***
	(0.0013)
International firm × years in firm = (3,4]	0.0381***
	(0.0016)
International firm × years in firm = (4,5]	0.0520***
	(0.0020)
International firm × years in firm = (5,6]	0.0667***
	(0.0022)
International firm × years in firm = (6,7]	0.0790***
	(0.0027)
International firm × years in firm = (7,8]	0.0893***
	(0.0031)
International firm × years in firm = (8,9]	0.0993***
	(0.0043)
International firm × years in firm = (9,10]	0.1027***
	(0.0047)
International firm × years in firm = (10,Inf]	0.1085***
	(0.0056)
MNE × years in firm = (1,2]	0.0370***
	(0.0010)
MNE × years in firm = (2,3]	0.0823***
	(0.0015)
MNE × years in firm = (3,4]	0.1228***
	(0.0021)
MNE × years in firm = (4,5]	0.1631***
	(0.0028)
MNE × years in firm = (5,6]	0.1976***
	(0.0032)
MNE × years in firm = (6,7]	0.2299***
	(0.0041)
MNE × years in firm = (7,8]	0.2571***
	(0.0049)
MNE × years in firm = (8,9]	0.2735***
	(0.0054)
MNE × years in firm = (9,10]	0.2807***
	(0.0061)
MNE × years in firm = (10,Inf]	0.3032***
	(0.0062)
Years in firm = (1,2] × Employer number = 2	-0.0077***
	(0.0009)

Years in firm = (1,2] × Employer number = 3	-0.0165***
	(0.0011)
Years in firm = (1,2] × Employer number = 4	-0.0237***
	(0.0012)
Years in firm = (2,3] × Employer number = 2	-0.0119***
	(0.0013)
Years in firm = (2,3] × Employer number = 3	-0.0288***
	(0.0013)
Years in firm = (2,3] × Employer number = 4	-0.0489***
	(0.0016)
Years in firm = (3,4] × Employer number = 2	-0.0290***
	(0.0015)
Years in firm = (3,4] × Employer number = 3	-0.0534***
	(0.0017)
Years in firm = (3,4] × Employer number = 4	-0.0817***
	(0.0022)
Years in firm = (4,5] × Employer number = 2	-0.0422***
	(0.0018)
Years in firm = (4,5] × Employer number = 3	-0.0793***
	(0.0022)
Years in firm = (4,5] × Employer number = 4	-0.1078***
	(0.0030)
Years in firm = (5,6] × Employer number = 2	-0.0568***
	(0.0021)
Years in firm = (5,6] × Employer number = 3	-0.1013***
	(0.0030)
Years in firm = (5,6] × Employer number = 4	-0.1356***
	(0.0041)
Years in firm = (6,7] × Employer number = 2	-0.0669***
	(0.0027)
Years in firm = (6,7] × Employer number = 3	-0.1235***
	(0.0036)
Years in firm = (6,7] × Employer number = 4	-0.1582***
	(0.0048)
Years in firm = (7,8] × Employer number = 2	-0.0800***
	(0.0033)
Years in firm = (7,8] × Employer number = 3	-0.1375***
	(0.0047)
Years in firm = (7,8] × Employer number = 4	-0.1813***
	(0.0071)
Years in firm = (8,9] × Employer number = 2	-0.0816***
	(0.0046)
Years in firm = (8,9] × Employer number = 3	-0.1461***
	(0.0069)

Years in firm = (8,9] × Employer number = 4	-0.1868***
	(0.0086)
Years in firm = (9,10] × Employer number = 2	-0.0933***
	(0.0044)
Years in firm = (9,10] × Employer number = 3	-0.1695***
	(0.0069)
Years in firm = (9,10] × Employer number = 4	-0.2145***
	(0.0099)
Years in firm = (10,Inf] × Employer number = 2	-0.1223***
	(0.0060)
Years in firm = (10,Inf] × Employer number = 3	-0.1902***
	(0.0083)
Years in firm = (10,Inf] × Employer number = 4	-0.2569***
	(0.0158)
Worker fe × International firm × years in firm = (1,2]	0.0226***
	(0.0021)
Worker fe × International firm × years in firm = (2,3]	0.0081**
	(0.0027)
Worker fe × International firm × years in firm = (3,4]	0.0028
	(0.0032)
Worker fe × International firm × years in firm = (4,5]	0.0079·
	(0.0040)
Worker fe × International firm × years in firm = (5,6]	0.0183***
	(0.0041)
Worker fe × International firm × years in firm = (6,7]	0.0355***
	(0.0051)
Worker fe × International firm × years in firm = (7,8]	0.0527***
	(0.0063)
Worker fe × International firm × years in firm = (8,9]	0.0605***
	(0.0088)
Worker fe × International firm × years in firm = (9,10]	0.0704***
	(0.0094)
Worker fe × International firm × years in firm = (10,Inf]	0.0797***
	(0.0117)
Worker fe × MNE × years in firm = (1,2]	0.0492***
	(0.0022)
Worker fe × MNE × years in firm = (2,3]	0.1080***
	(0.0029)
Worker fe × MNE × years in firm = (3,4]	0.1640***
	(0.0036)
Worker fe × MNE × years in firm = (4,5]	0.2185***
	(0.0052)
Worker fe × MNE × years in firm = (5,6]	0.2627***
	(0.0057)

Worker fe × MNE × years in firm = (6,7]	0.3079***
	(0.0073)
Worker fe × MNE × years in firm = (7,8]	0.3490***
	(0.0093)
Worker fe × MNE × years in firm = (8,9]	0.3740***
	(0.0105)
Worker fe × MNE × years in firm = (9,10]	0.3902***
	(0.0116)
Worker fe × MNE × years in firm = (10,Inf]	0.4410***
	(0.0119)
Worker fe × years in firm = (1,2] × Employer number = 2	0.0749***
	(0.0020)
Worker fe × years in firm = (1,2] × Employer number = 3	0.0790***
	(0.0021)
Worker fe × years in firm = (1,2] × Employer number = 4	0.0788***
	(0.0023)
Worker fe × years in firm = (2,3] × Employer number = 2	0.1191***
	(0.0025)
Worker fe × years in firm = (2,3] × Employer number = 3	0.1274***
	(0.0026)
Worker fe × years in firm = (2,3] × Employer number = 4	0.1166***
	(0.0031)
Worker fe × years in firm = (3,4] × Employer number = 2	0.1162***
	(0.0031)
Worker fe × years in firm = (3,4] × Employer number = 3	0.1220***
	(0.0035)
Worker fe × years in firm = (3,4] × Employer number = 4	0.1065***
	(0.0039)
Worker fe × years in firm = (4,5] × Employer number = 2	0.1067***
	(0.0037)
Worker fe × years in firm = (4,5] × Employer number = 3	0.0971***
	(0.0042)
Worker fe × years in firm = (4,5] × Employer number = 4	0.0870***
	(0.0054)
Worker fe × years in firm = (5,6] × Employer number = 2	0.0863***
	(0.0043)
Worker fe × years in firm = (5,6] × Employer number = 3	0.0686***
	(0.0055)
Worker fe × years in firm = (5,6] × Employer number = 4	0.0500***
	(0.0078)
Worker fe × years in firm = (6,7] × Employer number = 2	0.0700***
	(0.0054)
Worker fe × years in firm = (6,7] × Employer number = 3	0.0326***
	(0.0069)

Worker fe × years in firm = (6,7] × Employer number = 4	0.0161·
	(0.0091)
Worker fe × years in firm = (7,8] × Employer number = 2	0.0494***
	(0.0070)
Worker fe × years in firm = (7,8] × Employer number = 3	0.0092
	(0.0087)
Worker fe × years in firm = (7,8] × Employer number = 4	-0.0192
	(0.0130)
Worker fe × years in firm = (8,9] × Employer number = 2	0.0379***
	(0.0097)
Worker fe × years in firm = (8,9] × Employer number = 3	-0.0045
	(0.0127)
Worker fe × years in firm = (8,9] × Employer number = 4	-0.0269·
	(0.0164)
Worker fe × years in firm = (9,10] × Employer number = 2	0.0197*
	(0.0092)
Worker fe × years in firm = (9,10] × Employer number = 3	-0.0356**
	(0.0120)
Worker fe × years in firm = (9,10] × Employer number = 4	-0.0596**
	(0.0188)
Worker fe × years in firm = (10,Inf] × Employer number = 2	-0.0148
	(0.0118)
Worker fe × years in firm = (10,Inf] × Employer number = 3	-0.0465**
	(0.0154)
Worker fe × years in firm = (10,Inf] × Employer number = 4	-0.0988***
	(0.0277)
Domestic firm experience = (0,1]	0.0171***
	(0.0029)
Domestic firm experience = (1,2]	0.0813***
	(0.0027)
Domestic firm experience = (2,3]	0.1413***
	(0.0033)
Domestic firm experience = (3,4]	0.1965***
	(0.0044)
Domestic firm experience = (4,5]	0.2423***
	(0.0043)
Domestic firm experience = (5,6]	0.2840***
	(0.0055)
Domestic firm experience = (6,7]	0.3199***
	(0.0055)
Domestic firm experience = (7,8]	0.3474***
	(0.0075)
Domestic firm experience = (8,9]	0.3829***
	(0.0072)

Domestic firm experience = (9,10]	0.4042***
	(0.0086)
Domestic firm experience = (10,Inf]	0.4640***
	(0.0096)
Worker fe × Domestic firm experience = (0,1]	-0.0052
	(0.0058)
Worker fe × Domestic firm experience = (1,2]	0.0599***
	(0.0056)
Worker fe × Domestic firm experience = (2,3]	0.1037***
	(0.0072)
Worker fe × Domestic firm experience = (3,4]	0.1436***
	(0.0092)
Worker fe × Domestic firm experience = (4,5]	0.1717***
	(0.0086)
Worker fe × Domestic firm experience = (5,6]	0.2034***
	(0.0107)
Worker fe × Domestic firm experience = (6,7]	0.2202***
	(0.0115)
Worker fe × Domestic firm experience = (7,8]	0.2367***
	(0.0149)
Worker fe × Domestic firm experience = (8,9]	0.2486***
	(0.0143)
Worker fe × Domestic firm experience = (9,10]	0.2441***
	(0.0170)
Worker fe × Domestic firm experience = (10,Inf]	0.2706***
	(0.0191)
International firm experience = (0,1]	0.0208***
	(0.0022)
International firm experience = (1,2]	0.0910***
	(0.0020)
International firm experience = (2,3]	0.1531***
	(0.0028)
International firm experience = (3,4]	0.2178***
	(0.0028)
International firm experience = (4,5]	0.2799***
	(0.0036)
International firm experience = (5,6]	0.3285***
	(0.0037)
International firm experience = (6,7]	0.3727***
	(0.0049)
International firm experience = (7,8]	0.4130***
	(0.0056)
International firm experience = (8,9]	0.4464***
	(0.0060)

International firm experience = (9,10]	0.4743***
	(0.0080)
International firm experience = (10,Inf]	0.5389***
	(0.0064)
Worker fe × International firm experience = (0,1]	-0.0333***
	(0.0047)
Worker fe × International firm experience = (1,2]	0.0563***
	(0.0037)
Worker fe × International firm experience = (2,3]	0.0929***
	(0.0055)
Worker fe × International firm experience = (3,4]	0.1429***
	(0.0060)
Worker fe × International firm experience = (4,5]	0.1988***
	(0.0071)
Worker fe × International firm experience = (5,6]	0.2334***
	(0.0083)
Worker fe × International firm experience = (6,7]	0.2660***
	(0.0112)
Worker fe × International firm experience = (7,8]	0.2886***
	(0.0114)
Worker fe × International firm experience = (8,9]	0.3108***
	(0.0123)
Worker fe × International firm experience = (9,10]	0.3069***
	(0.0155)
Worker fe × International firm experience = (10,Inf]	0.3500***
	(0.0118)
MNE experience = (0,1]	0.0589***
	(0.0025)
MNE experience = (1,2]	0.1493***
	(0.0022)
MNE experience = (2,3]	0.2568***
	(0.0027)
MNE experience = (3,4]	0.3461***
	(0.0035)
MNE experience = (4,5]	0.4212***
	(0.0043)
MNE experience = (5,6]	0.4768***
	(0.0048)
MNE experience = (6,7]	0.5404***
	(0.0059)
MNE experience = (7,8]	0.5857***
	(0.0061)
MNE experience = (8,9]	0.6386***
	(0.0073)

MNE experience = (9,10]	0.6709***
	(0.0087)
MNE experience = (10,Inf]	0.7650***
	(0.0080)
Worker fe × MNE experience = (0,1]	0.0607***
	(0.0051)
Worker fe × MNE experience = (1,2]	0.1652***
	(0.0044)
Worker fe × MNE experience = (2,3]	0.2838***
	(0.0053)
Worker fe × MNE experience = (3,4]	0.3782***
	(0.0063)
Worker fe × MNE experience = (4,5]	0.4437***
	(0.0075)
Worker fe × MNE experience = (5,6]	0.4815***
	(0.0100)
Worker fe × MNE experience = (6,7]	0.5479***
	(0.0110)
Worker fe × MNE experience = (7,8]	0.5800***
	(0.0113)
Worker fe × MNE experience = (8,9]	0.6252***
	(0.0130)
Worker fe × MNE experience = (9,10]	0.6497***
	(0.0178)
Worker fe × MNE experience = (10,Inf]	0.7562***
	(0.0153)
log(firm size)	0.0300***
	(0.0005)
Employer number = 2	0.0188***
	(0.0021)
Employer number = 3	0.0269***
	(0.0030)
Employer number = 4	0.0073*
	(0.0037)
Worker fe × Employer number = 2	-0.1958***
	(0.0042)
Worker fe × Employer number = 3	-0.2536***
	(0.0061)
Worker fe × Employer number = 4	-0.3241***
	(0.0075)
Fixed-effects	
Worker (1,059,991)	✓
Firm (207,074)	✓

Observations	8,055,023
R^2	0.8331

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Estimates of eq. (14) based on the full sample of workers that are observed up from labor market entry. Estimated using the iterative procedure of De la Roca and Puga (2017); see Section 4.3. The dependent variable is the natural logarithm of hourly wage (total wage over total hours worked), detrended by industry-year fixed effects on the full sample of all workers in a first step. 'Years in firm' refers to experience accumulated while a worker is employed at the current employer of type MNE, international firm and domestic firm (reference category). MNE/international firm/domestic firm experience refers to experience accumulated before entering the current employer. Experience is calculated based on actual days worked and cut in yearly splines. Employer number refer to the cumulative number of distinct firms that a worker has been observed at, with one being the reference category. log(firm size) is the natural logarithm of the total number of (full-time) employees observed in a firm in a given year. Standard errors in parentheses are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).

F.3 Selection within the multinational

Table F3: MNE employment probabilities.

	MNE
	(1)
Labor market experience = (0,1]	-0.0014***
	(0.0002)
Labor market experience = (1,2]	-0.0021***
	(0.0004)
Labor market experience = (2,3]	-0.0025***
	(0.0006)
Labor market experience = (3,4]	-0.0027***
	(0.0008)
Labor market experience = (4,5]	-0.0026**
	(0.0010)
Labor market experience = (5,6]	-0.0027*
	(0.0011)
Labor market experience = (6,7]	-0.0034**
	(0.0013)
Labor market experience = (7,8]	-0.0042**
	(0.0015)
Labor market experience = (8,9]	-0.0047**
	(0.0017)
Labor market experience = (9,10]	-0.0053**
	(0.0019)
Labor market experience = (10,Inf]	-0.0070***
	(0.0021)
log(firm size)	0.0474***

	(0.0005)
Employer number = 2	0.0032***
	(0.0003)
Employer number = 3	0.0040***
	(0.0004)
Employer number = 4	0.0062***
	(0.0006)
Fixed-effects	
Worker (1,059,991)	✓
Firm (207,074)	✓
Industry-year (332)	✓
Observations	8,055,023
R^2	0.9331

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Estimates of eq. (15) based on the full sample of workers that are observed up from labor market entry. The dependent variable is an indicator that identifies observations at MNEs. 'Labor market experience' refers to the number of years since a worker entered the labor market. Employer number refer to the cumulative number of distinct firms that a worker has been observed at, with one being the reference category. log(firm size) is the natural logarithm of the total number of (full-time) employees observed in a firm in a given year. Standard errors clustered at the worker level in parentheses.

Table F4: MNE employment probabilities (worker fixed effect interactions).

	MNE
	(1)
Labor market experience = (0,1]	0.0000
	(0.0005)
Labor market experience = (1,2]	0.0011
	(0.0008)
Labor market experience = (2,3]	0.0028*
	(0.0011)
Labor market experience = (3,4]	0.0042**
	(0.0015)
Labor market experience = (4,5]	0.0057**
	(0.0018)
Labor market experience = (5,6]	0.0059**
	(0.0021)
Labor market experience = (6,7]	0.0065**
	(0.0022)
Labor market experience = (7,8]	0.0057*
	(0.0024)
Labor market experience = (8,9]	0.0063*
	(0.0027)
Labor market experience = (9,10]	0.0071*

	(0.0031)
Labor market experience = (10,Inf]	0.0073*
	(0.0033)
Worker ability × Labor market experience = (0,1]	0.0032***
	(0.0008)
Worker ability × Labor market experience = (1,2]	0.0072***
	(0.0012)
Worker ability × Labor market experience = (2,3]	0.0120***
	(0.0014)
Worker ability × Labor market experience = (3,4]	0.0157***
	(0.0017)
Worker ability × Labor market experience = (4,5]	0.0188***
	(0.0019)
Worker ability × Labor market experience = (5,6]	0.0194***
	(0.0021)
Worker ability × Labor market experience = (6,7]	0.0224***
	(0.0024)
Worker ability × Labor market experience = (7,8]	0.0224***
	(0.0026)
Worker ability × Labor market experience = (8,9]	0.0250***
	(0.0025)
Worker ability × Labor market experience = (9,10]	0.0283***
	(0.0027)
Worker ability × Labor market experience = (10,Inf]	0.0325***
	(0.0032)
log(firm size)	0.0472***
	(0.0008)
Employer number = 2	0.0030***
	(0.0005)
Employer number = 3	0.0040***
	(0.0007)
Employer number = 4	0.0067***
	(0.0009)
Fixed-effects	
Worker (1,059,991)	✓
Firm (207,074)	✓
Industry-year (332)	✓
Observations	8,055,023
R^2	0.9332

Notes: ***Significant at the 0.1% level; **significant at the 1% level; *significant at the 5% level; .significant at the 10% level. Estimates of eq. (16) based on the full sample of workers that are observed up from labor market entry. The dependent variable is an indicator that identifies observations at MNEs. 'Worker ability' refers to the worker fixed effects of an estimation of eq. (14); see Section 5.2. 'Labor market experience' refers to the number of years since a worker entered the labor market. 'Employer

number' refers to the cumulative number of distinct firms that a worker has been observed at, with 1 being the reference category. log(firm size) is the natural logarithm of the total number of (full-time) employees observed in a firm in a given year. Standard errors in parentheses are block-bootstrapped at the worker level (re-estimating worker fixed effects until convergence in all 100 iterations).