

## The Multinational Wage Premium and Wage Dynamics

Gianluca Orefice, Nicholas Sly & Farid Toubal

### Highlights

- Document a distinct U-shaped pattern in worker-level wages surrounding the time their employer is acquired by a foreign firm.
- Use detailed administrative data linking French firms and workers over the years 2002-2007.
- Present a model of fair wage considerations among workers and endogenous cross-border acquisition activity that predicts this U-shaped pattern, and characterizes the selection of domestic targets for acquisition by an MNE.
- Show that the dip in earnings is evident in both wages and in-kind payments given to workers.
- Our findings stands in contrast to prior work suggesting MNEs have no significant relationship with wages paid to employees.



## Abstract

Using detailed administrative data linking French firms and workers over the years 2002-2007, we document a distinct U-shaped pattern in worker-level wages surrounding the time their employer is acquired by a foreign firm, with a dip in earnings observed in years just before domestic firms switch to MNE status. The dip in earnings is evident in both wages and in-kind payments given to workers. To guide our empirical approach, we present a simple model with fair wage considerations among workers and endogenous cross-border acquisition activity that predicts this U-shaped pattern, and characterizes the selection of domestic targets for acquisition by an MNE.

## Keywords

Multinational Enterprises, Wage premium, In-kind payments, Fair wages.

## JEL

F66, F14, F23.

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RESEARCH AND EXPERTISE  
ON THE WORLD ECONOMY



## The Multinational Wage Premium and Wage Dynamics<sup>1</sup>

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### 1. Introduction

For many countries, multinational enterprises (MNEs) account for a substantial share of total domestic employment. For example, in France, MNEs account for upwards of 25% of total hours worked and total national employment. Slaughter (2009) reports similarly large volumes of labor usage by MNEs within the US. An important implication of this concentration of hiring activity is that the expansion of MNEs in the global economy can substantially impact nations' aggregate wage distributions. Nocke & Yeaple (2007), Head & Ries (2008), and UNCTAD (2000) document that the dominant mode of expansion MNEs use to enter foreign economies is cross-border merger & acquisitions (M&A). Hence, a key mechanism by which globalization impacts local incomes is through changes in wages for workers whose domestic employers are acquired by an MNE.

In this paper we examine the wage dynamics of workers employed at firms that transition from being domestic enterprises to being part of an MNE through cross-border acquisition. Our analysis investigates both pre- and post-acquisition changes in worker-level earnings, and shows that wages exhibit a distinct U-shaped pattern surrounding in the incidence of cross-border M&A activity. We find similar patterns in other compensation using unique information about benefits in-kind given to workers, which includes bonuses and various forms of non-monetary remuneration. The estimated U-shaped pattern in earnings dynamics is substantial in magnitude and robust to a variety of empirical specifications.

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To guide our empirical approach, the first component of our analysis introduces a simple model of cross-border acquisition activity with endogenous wage differences among similar workers employed at heterogeneous firms. The model integrates the fair wage mechanism of Akerlof & Yellen (1990) into the model of cross-border M&A activity from Blonigen et al. (2014). When deciding how much effort to put forth, workers consider the wages offered by their employer relative to the overall performance of the firm. To maximize effort of the workforce firms optimally pay a wage commensurate with their total earnings. Consistent with our approach, Budd et al. (2009) provide evidence that rent-sharing among workers reflects the total global earnings of a multinational employer. Hence, multinational firms may have to pay higher wages to induce effort. As discussed in Egger & Kreckemeier (2009, 2013), the fair wage mechanism generates rent-sharing with workers, and thus captures their incentives to sort into employment at globally oriented firms.

Following Blonigen et al. (2014), we assume that firm performance fluctuates over time due to the realization of persistent productivity shocks, and that domestic firms can sell their productive assets to foreign MNEs via cross-border M&A. Upon acquisition, a foreign acquirer may substitute its technological capabilities for that of the domestic target firm after paying a fixed integration cost. We show that firms that possess productive assets, but realize negative productivity shocks, are more likely to receive successful takeover bids at any point in time. Intuitively, when target firm productivity suffers, a larger share of potential acquirers can profitably substitute their own technology and make relatively better use of the target's assets.

Considering the fair wage constraint of workers that links remuneration to firm performance, the dip in productivity that precipitates acquisition leads to a coincident dip work worker-level earnings. Then, upon acquisition, an acquiring MNE integrates its technology and provides access to global markets. This increase in global firm performance raises workers' consideration of fair wages, which firms pay to induce optimal effort. Thus, the model predicts a distinct U-shaped pattern in wages surrounding the time that domestic firms are acquired by a foreign MNE.

The second component of our analysis exploits detailed administrative data linking French workers and firms over time to estimates change in worker-level earnings as their employer transitions to being part of an MNE via cross-border acquisition activity. Our starting point is the standard propensity score matching difference-in-difference estimator (PSM DID); e.g., See Heyman et al. (2007), Hijzen et al. (2013), and Huttunen (2007) for PSM DID studies of MNE wages in Sweden, Brazil, Germany, Indonesia, Portugal, UK, and Finland. This approach estimates the

difference between average wages across years prior to acquisition and post acquisition periods, relative to wage gains at observationally equivalent firms as indicated by the propensity score. Consistent with findings from this approach applied to other countries, we find that average wages earned by French workers pre- and post- acquisition do not appear to differ significantly. We then generalize the PSM DID approach and estimate year-to-year changes in worker-level earnings before and after foreign acquisition. This PSM event-study approach is common in the program evaluation literature, and relaxes the assumption that wages are constant within the pre- and post- acquisition periods. Our empirical strategy follows Couch & Placzek (2010), and estimates a differenced average treatment effect on the treated (DATT) among a set of matched firms indicated by the propensity score.<sup>2</sup>

Our results show that several years prior to acquisition worker-level earnings do not differ from their earnings observed in the year their employer joins a multinational firm. But, as shown in Blonigen et al. (2014), domestic firms that are targeted by foreign multinationals experience several years of declines in productivity prior to acquisition. Consistent with the predictions of the model, we estimate a dip in worker-level earnings coincident with the drop in firm productivity in the years just before acquisition. The estimated pre-acquisition earnings dip is robust to a variety of specifications of fixed effects and the inclusion of detailed information about worker and firm characteristics.

After a firm joins an MNE we find that wages begin to rise. After the initial increase in earnings observed in year after acquisition, we find an additional small and marginally significant increase in wages. By the second year after joining and MNE worker-level wages are significantly greater than observed in the year that the firm was first acquired, indicating continued increases in worker-level earnings. Our model confirms that wages may increase beyond the level of the pre-acquisition dip if integration costs of M&A activity are sufficiently high. With high integration costs, only the most productive foreign acquirers can make successful takeover bids. Subsequently, the improvements to target firm profitability upon acquisition by a high productivity acquirer are relatively larger, leading to greater wage gains for workers. Importantly, the estimated wage increases and coincident improvements in target firm productivity following acquisition are consistent with the evidence that MNEs invest substantially in the production capacities of target firms, thereby raising workers' marginal products; see Arnold & Javorcik (2009) and Guadalupe et al. (2012).

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<sup>2</sup>The techniques for estimating DATT in matching contexts are developed in Heckman et al. (1997), Heckman et al. (1998), and Dehejia & Wahba (2002), and elsewhere.

We observe a panel of French workers and firms, with information about earnings that offer several advantages for our purposes. First, wages are recorded net of employee and employer payroll tax contributions. In this sense, our measurement of wages best captures retained worker earnings rather than firm-level labor costs. Second, we are able to distinguish worker-level earnings in the form of benefits in-kind, in addition to their net wages. Benefits-in-kind include, for example, the private use of a company car, free or subsidized accommodation and preferential loans, allowances for lunch or travel, communication tools such as phones, computers or internet, etc. This feature allows us to explore not only how the *level* of worker earnings changes as domestic firms transition to becoming MNEs, but also how the *composition* of earnings changes. Finally, we are able to merge worker-level information with detailed data about their employer. The matched employee-employer dataset allows us to examine relative wages paid by MNEs over time controlling for a rich set of worker, firm, and occupation characteristics. The time period of our sample, 2002-2007, is also advantageous in that we observe a full oscillation of a merger wave, from flow to ebb and return to flow.

As mentioned above, much of the evidence using information about worker characteristics suggests that the observed multinational wage premium may be almost entirely due to the sorting of different workers across firms. The seminal work in Heyman et al. (2007) concludes that foreign ownership does not increase wages of Swedish workers, with some evidence that MNEs may even pay lower wages. Hijzen et al. (2013) incorporates administrative data from several countries (Brazil, Germany, Indonesia, Portugal, & UK) and finds little evidence that MNEs increase wages to otherwise identical workers. Huttunen (2007) does find some evidence in Finland of a small wage premium ( $< 2\% - 3\%$ ), but only for high skill workers, and not until several years after their employer becomes an MNE. As an alternative strategy, Martins (2011) examines changes in wages due to labor mobility and finds that they are similar for Portuguese workers that transition from employment at a domestic to a foreign firm, or from one foreign firm to another, suggesting there is a negligible impact of MNEs on worker earnings. Our analysis differs from these in that we focus on year-to-year changes in worker-level wages observed at MNE and non-MNE firms, rather than average differences across pre- and post- treatment periods. In this sense, our analysis relaxes several assumptions imposed in previous empirical studies. Moreover, we contribute to this literature by deriving the propensity score that characterizes the likelihood of foreign acquisition from first principles. In doing so, we theoretically ground the conditional independence assumption that underlies identification when implementing PSM techniques.

In the next section we develop a simple model of cross-border acquisition activity by MNE with endogenous wage differences among workers employed at heterogeneous firm. In section 3 we use the model to derive predictions about year-to-year wage changes for workers as their employer enters MNE status. Section 4 characterizes our preferred empirical strategy to estimate wage dynamics of workers. The data sources for both worker and firm characteristics, as well as variable construction, are described in Section 5. The following section presents the results from our preferred empirical specifications, while the final section concludes.

## 2. Model

Our purpose is to empirically examine year-to-year changes in earnings for workers as their employer transitions to being part of a multinational enterprise, independent of other worker and firm characteristics. To inform our empirical approach we present a simple model of endogenous cross-border acquisition activity, with endogenous wage differences among similar workers employed at heterogeneous firms. Specifically, the simple model integrates the fair wage mechanism of Akerlof & Yellen (1990) into the cross-border M&A model in Blonigen et al. (2014). As discussed in Egger & Kreckemeier (2009, 2013), the fair wage mechanism generates rent sharing between firms and workers, and thus captures the incentives of workers to sort into employment at large and highly productive firms at any point in time, while the framework in Blonigen et al. (2014) captures the likelihood of cross-border acquisition activity across time.

We use the theoretical framework (i) to derive from first principles the propensity of domestic firms to be acquired by a foreign multinational, which guides our empirical approach, (ii) to derive novel predictions about the changes in worker-level earnings prior to their employer being acquired by a foreign multinational, and (iii) to derive predictions about post-acquisition gains in earnings for workers.

### 2.1. Wages and Firm Heterogeneity

Consumers in the home country are workers who derive utility in each period  $t$  by aggregating consumption,  $x_t(j)$ , of individual varieties,  $j$ , according to  $X_t = [\int_{j \in J} x_t(j)^{(\epsilon-1)/\epsilon} dj]^{\frac{\epsilon}{\epsilon-1}}$ , where  $\epsilon > 1$  is the constant elasticity of substitution across varieties. Letting  $E_t$  denote the home expenditure (or income), it follows that demand for each variety is  $x_t(j) = \beta E_t P_t^X (p_t(j)^{-\epsilon} / P_t^X)^{1-\epsilon}$ , where  $p_t(j)$  is the price of the individual variety  $j$ , and  $P_t$  is the ideal price index across all varieties, defined as  $P_t^X = [\int_{j \in J} p_t(j)^{1-\epsilon} dj]^{1/(1-\epsilon)}$ .

Following Akerlof & Yellen (1990), we assume that workers have a preference for fairness and consequently they condition their effort,  $e_t$ , on the wage they are paid,  $\omega_t$  relative to the wage they consider to be fair,  $\hat{\omega}_t$ . Employers cannot write binding contracts that condition output on effort, and reductions in effort correspond to reductions in the supply of effective units of labor by workers. Total output of a firm depends linearly on its productivity parameter,  $\phi_{jt}$ , draw from distribution  $\Phi$ , and the mass  $l_t(\phi_{jt})$  of labor that puts forth effort,  $e_t$ , so that

$$x_t(\phi_{jt}) = \phi_{jt} \frac{l(\phi_{jt})}{e_t} . \quad (1)$$

If firms pay at least the fair wage, workers provide the normal level of effort which is set to unity. However worker effort decreases proportionally as the wage falls below  $\hat{\omega}_t$ . Formally, we write

$$e_t = \min \left\{ \frac{\omega_t}{\hat{\omega}_t}, 1 \right\} . \quad (2)$$

From (2) it is clear that firms have no incentive to pay more than the fair wage, as workers put forth no more than a unit level of effort. Moreover, firms have no incentive to pay less than the fair wage; with elastic demand ( $\epsilon > 1$ ) revenue decreases more than proportionally with output, and hence firms are incentivized to maximize the output of each employed worker. Thus, firms optimally set wages such that  $\omega_t = \hat{\omega}_t$ .

As in Egger & Kreckemeier (2013), workers determine fair wages according to (i) the economic success of the firm it in which they are employed and (ii) the available employment opportunities outside their current employer. Specifically, workers determine fair wages according to a weighted average between the global operating profits,  $\Pi(\cdot)$ , earned by their employer having productivity  $\phi_{jt}$ , and the average wage of all employers within their sector,  $\bar{\omega}_t$ :

$$\hat{\omega}_t(\phi_{jt}) = \Pi(\phi_{jt})^\theta \bar{\omega}_t^{1-\theta} . \quad (3)$$

The fair wage constraint in (3) is consistent with evidence in Budd et al. (2009) that rent sharing among workers reflects the global earnings of a multinational employer, rather than just local earnings. Yet, as discussed in Egger & Kreckemeier (2013), the fair wage constraint in (3) also nests the possibility that multinational firms do not pay a wage premium. If  $\theta = 0$ , then all firms pay identical wages for each efficiency unit of labor. If  $\theta > 0$ , then employers must pay a wage commensurate with their operating profits worldwide. A final thing to notice is that the fair wage determined by workers, and paid by employer  $j$ , can fluctuate year-to-year as shocks



to productivity,  $\phi_{jt}$ , lead to variation in operating profits over time.<sup>3</sup>

Given optimal firm behavior to set  $\omega_t = \hat{\omega}_t$  and workers optimal response to supply a full unit of effective labor,  $e_t = 1$ , operating profit in period  $t$  for firm producing variety  $j$  that realizes productivity level  $\phi_{jt}$  are given by

$$\Pi(\phi_{jt}) = A \left( \frac{\hat{\omega}_t(\phi_{jt})}{\phi_{jt}} \right)^{1-\epsilon}, \quad (4)$$

where the constant  $A$  is a function of aggregate parameters. The expression in (4) captures not only the operating profits of a firm in a given period, but also the option that a firm retains if it is confronted by a takeover bid from a potential acquirer; a target firm can continue to operate independently rather than be acquired by a foreign multinational. This outside option is important in determining which takeover bids are accepted by target firms on M&A markets, and hence the timing of cross-border acquisition activity.

## 2.2. Cross-Border M&A Activity

Target firms can sell their productive assets to foreign acquirers on domestic M&A markets. Upon acquisition, a foreign multinational can substitute its technological capabilities for producing its variety  $a$ , given by  $\phi_{at}$ , for that of the target domestic firm,  $\phi_{jt}$ , after paying cost  $l$  to integrate the new technology. See Arnold & Javorcik (2009) and Guadalupe et al. (2012) for evidence that MNEs invest substantially to improve the production capacities of target firms. In addition to the new technology, there is a potential cost synergy  $n \geq 1$  in producing the varieties  $a$  and  $j$ , so that the merged firm produces  $n$  additional units of output given their productivities.<sup>4</sup>

<sup>3</sup>The fair wage constraint provides a straight forward mechanism that ties firm-level profitability to worker-level wages, and receives empirical support in a global context in Budd et al. (2009). However, there are alternative mechanisms that also generate a link between wages and firm productivity. For example, Postel-Vinay & Turon (2010) argue that even transitory productivity shocks can give firms a credible threat to terminate the workers' employment, which allows the firm to renegotiate wages downward, thereby generating a persistent wage shock. Similarly, Lise et al. (2013) show how persistent firm-level productivity shocks induce renegotiation of long-term contracts, and thus generate persistent wage dynamics. We adopt the fair wage mechanism for its ease of exposition, but note that these more sophisticated mechanisms are also consistent with our approach.

<sup>4</sup>Blonigen et al. (2014) endogenizes the source of synergies during acquisition as the savings in trade costs that arise as merging firms exploit sunk investments in export capacity. Besides the ability to better access foreign markets, other potential sources of synergies may include eased credit constraints within a multinational firm, general returns to scope in producing the two unique varieties, or use of other idle assets for which sunk investments have already been made. The presence of cost synergies is typical of the I/O literature on M&A activity and does not play a role in generating the time variation in wages that we study here. We include potential cost synergies to be consistent with previous literature.

Hence, upon acquisition, the multinational earns combined profits of

$$S_{a,j}(\phi_{at}, \phi_{jt}) = n^{\epsilon-1}[\Pi^a(\phi_{at}) + \Pi^j(\phi_{at})] \quad . \quad (5)$$

Successful mergers occur between firms for which there is a non-negative surplus generated by acquisition, such that the combined operating profits in (5), net integration costs and the outside option of each firm to remain independent, are non-negative. Specifically, for a given target firm producing variety  $j$ , that meets a potential foreign acquirer,  $a$ , with probability  $\mu$ , and receives a takeover bid with strike price  $Q_{a,j}$ , the likelihood it is acquired in period  $t$  is given by

$$Y_{jt}(\phi_{jt}) = Pr \left[ S_{a,j} - Q_{a,j} - I - \Pi(\phi_{at}) > Q_{a,j} - \Pi(\phi_{jt}) \mid \mu, n \right] \quad . \quad (6)$$

In order to characterize the propensity of a firm to be acquired by a foreign multinational in (6), we define the productivity of the marginal acquirer  $\bar{\phi}(\phi_{jt}, n)$  that is indifferent to acquisition of a target firm with productivity  $\phi_{jt}$ , conditional on  $n$ . From (5), note that the surplus from acquisition is strictly increasing in the productivity of the acquirer. Hence,  $\bar{\phi}(\phi_{jt}, n)$  uniquely satisfies

$$n^{\epsilon-1}[\Pi^m(\bar{\phi}) + \Pi^a(\bar{\phi})] \equiv \Pi^m(\phi_{jt}) + \Pi^a(\bar{\phi}) + I \quad . \quad (7)$$

It follows that for any target firm with productivity  $\phi_{jt}$  the probability that it is acquired is

$$Y_{jt}(\phi_{jt}) = \mu \int_{\bar{\phi}(\phi_{jt}, n)}^{\infty} d\Phi'(h) \quad . \quad (8)$$

Intuitively, the integral captures the proportion of foreign acquirers from distribution  $\Phi'$  that have productivity sufficient to generate a non-negative surplus by acquiring a domestic firm characterized by  $\phi_{jt}$ . The expressions in (7) and (8) explicitly characterize the propensity of firms to be acquired by foreign multinationals at any point in time conditional on its own observable characteristics. From (7), variation in firm-level productivities (summarized by  $\phi_{jt}$ ) or available complementary assets between firms (summarized by  $n$ ) influence the requisite productivity of the marginal acquiring firm ( $\bar{\phi}$ ), and (8) then calculates the likelihood that a domestic target meets a foreign acquirer with productivity at least as great as the marginal acquirer.

### 3. Wage Dynamics and Cross-Border Acquisition Activity

Combined with wages characterized in (3), we can use the properties of (8) to derive predictions about changes in wages of workers who are employed at firms that are acquired by foreign multinational firms. We begin by characterizing the selection of domestic firms into acquisition by a foreign acquirer. As in Blonigen et al. (2014), the realization of productivity shocks to target firms affects the likelihood that they will meet an acquirer that can make a successful takeover bid.

**Lemma 1** *All else equal, firms that realize a persistent negative productivity shock in period  $t - 1$  are more likely to be acquired by a foreign multinational in period  $t$ .*

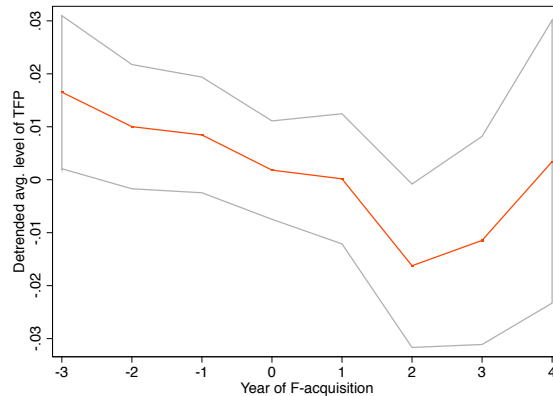
This result follows directly from implicit differentiation of (7) with respect to the target firm's productivity to obtain  $\partial \bar{\phi}(\phi_{jt}, n)/\partial \phi_{jt}$ , and then differentiation of (8) to obtain  $\partial Y(\phi_{jt})/\partial \phi_{jt} < 0$ .

Figure 1 takes advantage of detailed administrative data from French firms to illustrate systematic changes in firm characteristics as they transition from domestic to multinational status. Specifically, we plot TFP for firms that are acquired by foreign owners relative to sector and year averages, from three years prior to the acquisition through four years after the firm is acquired.<sup>5</sup> The middle line shows the relative detrended TFP for the average French firm acquired by a foreign owner, whereas the lines above and below show the relative detrended TFP for the 95th and 5th percentiles, respectively. Figure 1 demonstrates that target firms are, on average, 1.5% above the mean in three years prior to their of acquisition, and significantly above the typical firm in their same sector each year before acquisition. Even the targets of acquisition with the lowest relative productivity levels (say, at the 5th percentile) have greater than average productivity prior to acquisition.

As predicted by lemma 1, Figure 1 shows that prior to acquisition relative detrended TFP among target firms is falling significantly for any initial TFP level – from the 5th to 95th percentile in target firm productivity levels we see significant declines. Hence, Figure 1 provides non-parametric evidence that is consistent with lemma 1 across the entire distribution of firm productivities. (See also Blonigen et al. (2014).) The relative dip in productivity of domestic firms that become MNEs is realized for several years prior to acquisition.<sup>6</sup>

<sup>5</sup>The data sources used to estimate firm-level TFP and construct Figure 1 are described in section 5.

<sup>6</sup>We note that our results indicate that firm-level productivity and worker-level wages decline for several years prior to foreign acquisition, while Fich, Cai & Tran (2011) provides evidence from administrative filings by firms



**Figure 1 – Firm-level productivity prior to and after foreign acquisition**  
**Source: Blonigen et al. (2014)**

Relevant to our focus here, if workers consider firm performance in determining fair wages (i.e.,  $\theta > 0$ ), then equation (3) indicates that workers' earnings also respond to the realization of shocks to productivity and profitability among acquired firms evident in Figure 1.

**Lemma 2** *If  $\theta > 0$ , workers employed at firms that receive negative productivity shocks realize negative coincident shocks to their wages.*

This result follows directly from differentiating equilibrium wages in (3) with respect to firm level productivity  $\phi_{jt}$ . Rent sharing by employers leads to reductions in worker-level wages when firm earnings suffer. Combining lemmas 1 and 2, we obtain the following result:

**Proposition 3** *If  $\theta > 0$ , workers employed at firms that realize wage declines in period  $t - 1$  are more likely to be acquired by a foreign multinational in period  $t$ , all else equal.*

This result describes a pre-acquisition dip in worker-level earnings. Given the pattern in Figure 1 that the entire distribution of acquired firms realized negative productivity shocks, Proposition 1 suggests that nearly all workers employed at firms that are eventually acquired at a foreign multinational realized a dip in earnings, whereas few are likely to have constant pre-acquisition wages. Moreover, Figure 1 shows that firm experience dips in productivity for several years prior to acquisition. Applying the results of Proposition 1 suggests workers may experience several years of relative wage declines prior to being acquired by a foreign multinational firm.

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declaring their potential intent to merge that the length of M&A negotiations, from first contact, is approximately 120 days on average, and only 160 days at the upper quartile. Hence, it is highly unlikely that changes in wages two or three years prior to acquisition are related to the negotiation of a takeover by a foreign MNE.

We are also interested in the year-to-year changes in earnings after a domestic firm becomes part of an MNE. Upon acquisition, a foreign multinational may substitute its productivity for that of the target firm, as well as take advantage of potential synergies between complementary assets. The next result describes post-acquisition changes in wages following a merger with an MNE.

**Proposition 4** *If integration costs,  $I$ , are sufficiently large and  $\theta > 0$ , then workers employed at firms acquired by a foreign multinational firm in period  $t$  realize increases in wages in period  $t + 1$ , such that  $\omega_{t+1} > \omega_{t-1}$ . Regardless of the level of integration costs, average wages for workers employed at firms that by a foreign multinational are weakly greater in period  $t + 1$  than wages in period  $t$ , such that  $\omega_{t+1} \geq \omega_t$ .*

**Proof.** Applying the implicit function theorem to (7) shows that the productivity of the a marginal acquirer is strictly increasing the level of integration costs: i.e.,  $\partial\bar{\phi}/\partial I > 0$ . Because wages are increasing in firm-level productivity (equation 3), and the expected acquiring firm productivity is increasing in  $I$ , there must be a level of integration cost sufficiently large to increases in wages beyond any level observed pre-acquisition. The second part of the result follows from the fact that a domestic target always retains the outside option to remain independent. Hence, post-acquisition profitability  $S_{a,j}$ , and thus wages, will be at least as great as observed just prior to acquisition. ■

If the acquiring firm's technological capability is higher than that of the target firm, then lemma 2 implies that wages of workers employed at target firms will increase. Moreover, if the acquiring firm technology,  $\phi_{at}$ , is higher than the target firm's productivity before the negative shock that precipitated acquisition,  $\phi_{jt-1}$ , then lemma 2 implies that worker-level wages following acquisition will be even higher than both the period prior to acquisition, and than wages in periods several years prior to acquisition.

The integration cost of cross-border M&A activity,  $I$ , is unobserved, as is the parameter  $\theta$  that governs workers' fair wage considerations. It is then an empirical question if domestic wages will respond to multinational firms' acquisition activity (depending on  $\theta \geq 0$ ) and if so, how large the potential increase in wages will be (depending on  $I$ ). The results above predict that, if worker-level wages are influenced by multinational firm activity, then we expect a distinct U-shaped pattern in earnings as workers first experience a dip in wages followed by an increase in payments from their employer. We turn to the empirical analysis of these predictions immediately below.

#### 4. Empirical Strategy

In this section we describe our empirical strategy to estimate year-to-year wage differences among workers employed at firms that switch from domestic to MNE status via cross-border M&A activity. The simple model above indicates that worker-level wages depend on firm-level productivity  $\phi_{jt}$  that determines its profitability. In our empirical analysis we allow for several characteristics of firm  $j$  to influence its profitability and summarize the vector of its characteristics by  $X_{jt}$ . The predictions derived above described wages for each efficiency unit of labor. In the model we also assumed that workers were homogeneous, each having the same ability to supply efficiency units of labor. To account for heterogeneity of workers in their ability to produce we introduce a vector of characteristics for each worker  $i$  given by  $Z_{it}$ . Consistent with the entirety of the literature, we estimate a linear wage equation with the following form:

$$\ln \omega_{ijst} = \alpha + \sum_{k \neq 0} \delta^k D_{ijst}^k + X_{jt}\Gamma + Z_{it}\beta + \sigma_{st} + \epsilon_{ijst} \quad (9)$$

where  $\omega_{ijst}$  is the individual net wage – or alternatively earnings that includes net wage and benefits-in-kind – of individual  $i$  employed by firm  $j$  in sector  $s$  during year  $t$ . The indicator variables  $D_{ijst}^k$  equal unity if year  $t$  is the  $k^{\text{th}}$  year after acquisition by a foreign multinational. (If  $k < 0$  then  $D_{ijst}^k$  is an indicator for the  $k^{\text{th}}$  year prior to acquisition.) The term  $\sigma_{st}$  represent sector-by-year fixed effects, which capture *inter alia* the averages wage levels in a sector that influence workers fair wage considerations. Our key parameters of interest are the set of  $\delta^k$ , which indicate relative wage premium paid to workers in each year prior to and after acquisition activity. To operationalize (9) during estimation we omit the indicator for the year of acquisition. Hence, the interpretation of  $\delta^k$  is the difference in worker-level earnings in  $k^{\text{th}}$  year after acquisition relative to the year of acquisition.

A unique feature for our data is that, for a sub-sample of French workers (the October-birth cohort), we observe earnings in the form of benefits-in-kind, in addition to individuals' wages. We will also estimate (9) using total worker-level earnings as the dependent variable. The results for total earnings including benefits allows us to examine variation in outcomes that arise as employers alter the composition of remuneration, even if wages are not fully flexible.

The expression in (8) explicitly highlights the typical selection problem that plagues estimation of multinational wage premia via (9). From equation (8), the probability that a worker is employed at a firm that is acquired by a foreign multinational depends on  $\phi_{jt}$ . But, the fair wage constraint in (3) indicates that worker-level wages are also a function of  $\phi_{jt}$ , so that the selection of firms

into multinational status is tied to characteristics that also impact wages. Ramondo (2009), Arnold & Javorcik (2009), Criscuolo & Martin (2009), and Guadalupe et al. (2012) provide evidence from several countries confirming high wage and high productivity firms are more likely to be acquired by MNEs. However, (8) offers a potential solution. The probability a firm is acquired by a foreign multinational, conditional on  $\bar{\phi}(\phi_{jt}, n)$ , depends only on the latent variable  $\mu$ . Similar to previous studies of multinational wages, we can exploit wage variation at firms with similar observable characteristics, but different realizations of  $\mu$ , to identify the impact of multinational firm activity on worker-level wages.

Consistent with previous literature, we specify a propensity score,  $p(X_{jt})$  for each firm using equation (8), which captures the likelihood of acquisition conditional on target firm characteristics. Following Couch & Placzek (2010), we then use the set of matched firms indicated by  $p(X_{jt})$  to estimate each parameter  $\delta^k$  according to

$$\delta^k = \mathbf{E} \left\{ \mathbf{E} \left\{ \ln \omega_{ijsk} \mid \mathbf{D}_j = 1, p(X_{jt}) \right\} - \mathbf{E} \left\{ \ln \omega_{ijs0} \mid \mathbf{D}_j = 1, p(X_{jt}) \right\} \right. \\ \left. - \left[ \mathbf{E} \left\{ \ln \omega_{ijsk} \mid \mathbf{D}_j = 0, p(X_{jt}) \right\} - \mathbf{E} \left\{ \ln \omega_{ijs0} \mid \mathbf{D}_j = 0, p(X_{jt}) \right\} \right] \mid \mathbf{D}_j = 1 \right\}. \quad (10)$$

The estimator in (10) returns a differenced average treatment effect (DATTE). In this context, the DATTE compares the difference between wages in the  $k^{th}$  year after acquisition and the year of acquisition,  $k = 0$ , for a firm that is acquired during the sample period, indicated by  $\mathbf{D}_j = 1$ , to the difference in wages between year  $k$  and year 0 for a non-acquired firm, indicated by  $\mathbf{D}_j = 0$ , where year zero for a non-acquired firm indicates that year it was matched to a treated firm according to  $p(X_{jt})$ . The expected difference between the year-to-year difference in wages is estimated among the set of firms that are ever acquired; i.e., the expected difference in (10) is conditional on  $\mathbf{D}_j = 1$ .

Identification of average year-to-year differences in wages,  $\delta^k$ , rests on the standard conditional independence assumption, which requires that, conditional on observable characteristics, the difference in wages in year  $k$  between workers employed at acquired firms,  $\omega_k^a$ , and non-acquired firms,  $\omega_k^{na}$ , are independent to the likelihood of acquisition. The model above provides some guidance on the conditions under which this assumption is met. From equation (8), the likelihood that a domestic employer is targeted by a foreign multinational, conditional on its productivity, is simply the probability that it meets a potential acquirer,  $\mu$ . Hence, the conditional independence assumption requires that  $\omega_k^a, \omega_k^{na} \perp\!\!\!\perp \mu \mid X_{jt}, Z_{it}, \sigma_{st}$ . One is always concerned that unobservable

characteristics correlated with wages are also influencing the selection into acquisition by an MNE. Note, because we are estimating year-to-year differences in wages, the only concern here is unobservable characteristics that vary year-to-year and are correlated with both wages and the likelihood of acquisition. Our assumption about time-invariant characteristics being uncorrelated with year-specific indicators of treatment is much less restrictive than assuming that unobserved characteristics are uncorrelated with the likelihood that a firm is *ever* treated.

The control variables in  $Z_{it}$  and  $X_{jt}$  include a rich set of characteristics for both individuals and firms suggested by previous literature. The vector of worker characteristics  $Z_{it}$  includes gender, age (and its squared value) and a dummy indicating the skill level of each worker's occupation. We observe each worker's occupation within a particular job spell, which provides better information about the skill level employment than the fixed education level of the worker. The length of an individual job spell may also influence wage levels if there are standardized growth paths for employees. We include linear trend for each worker that begins in the first year a worker  $i$  enters a job within a new employer. The detailed information about the location of workers' employment allows us to also control for the spatial distribution of wages across regions within a country using regional fixed effects. The regional fixed effects control for unobservable local labor market conditions that might have influence wages.

On the firm side, it is well-known that high productivity firms pay higher wages, and the fair wage constraint in (3) shows this relationship explicitly. Thus, we include a measure of firm-level TFP in  $X_{jt}$ . Besides firm-level productivity we include observed capital intensity, and an export status dummy for each firm. Besides an individual's own skills and abilities, the skill composition of the workforce can also influence worker-level wages. To account for this we include a measure of overall skill intensity at a firm, in addition to the observed skill level of each worker's occupation. Firm-level wage growth may vary based on its age. To account for this possibility we also include a linear trend that begins in the first year firm  $j$  enters the sample period.

The final step in describing our empirical strategy is to specify the propensity score. Equation (8) indicates that the likelihood that a firm is acquired at any given point in time, conditional on the set of complementary assets  $n$ , is determined by its contemporaneous productivity level. For ease of exposition we assumed that the cost synergy realized during acquisition was constant across firms. Here we generalize this assumption and allow for a broad range of firm characteristics to influence the potential benefits of cross-border acquisition activity in addition to firm productivity. Consistent with previous literature, include indicators for export activity, firm skill intensity, firm capital intensity and firm-level productivity as determinants of the selection into acquisition.



We estimate probability that a firm with characteristics  $X_{jt}$  is acquired in period  $t$  using a logit model:  $p(X_{jt}) = \Lambda(X_{jt})$ . Consistent with prior approaches, we match firms within sector year by year using lagged covariates and implement the nearest-neighbor matching procedure without replacement. The results from the logit are in line with previous findings and can be found in the appendix.

## 5. Data

We built our sample matching three detailed micro-level datasets. The datasets have been merged using a unique and time-invariant identifier called SIREN that is attributed by the French statistical office (INSEE) to each firm.

Data regarding workers and wages come from the "DADS Panel" – Declaration Annuelle de Données Sociales – an employer/employee dataset collected by the INSEE (Institut National de la Statistique et des Etudes Economiques). As the information in the DADS dataset is used to compute the income tax of workers, the reporting is extremely reliable. The DADS dataset reports earning histories of all declared employees born in October. It has therefore a panel dimension that allows us to follow workers. It has information on the identification number of the establishment which can be easily matched to the SIREN of the firm. The data report moreover information on the number of hours worked, wages, in-kind payments, age, gender, occupation at two digit level, etc. The information in the data allow us to construct an indicator of worker experience as the number of active years on the labor market as well as the individual skill level using the Biscourp & Kramarz (2007) methodology.

The DADS panel dataset is merged with the "*Liaison Financière élargi*" (LIFI) that has information on the ownership and nationality of the parent company of firms located in France.<sup>7</sup> A foreign affiliate is defined as a firm that is located in France whose more than 50% of her share or voting rights are controls by a foreign group. We also use LIFI to identify the year of a takeover. We define a firm as having undergone a foreign M&A if the group owner in  $t$  is

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<sup>7</sup>The dataset combines two sources of information. A first survey on "large" firms gives detailed information on the ownership of groups, the link between affiliates (at home and abroad), and information on shareholders. Only firms with more than 500 employees, or having a yearly turnover greater than 20 million euros, or having more than 1.2 million euros of shares in other firms are subject to this survey. The survey is completed with a second database, DIANE, that reports financial linkages between firms. Firms with an annual turnover above one million euros are surveyed. Notice that relatively large firms are surveyed, but they indicate their financial links with all their affiliates (if any) irrespective of their size. Furthermore, the sample of firms that are surveyed (the ones with more than 500 employees or more than 1 million euros of turnover) represents half of the firms, but these firms account for 94 percent of total value added.

foreign, while the group owner in  $t - 1$  is French.

The data is merged to the EAE annual business survey dataset—Enquete Annuelle d'Entreprise, on firms' income statement and balance sheet. It also reports the location of firms in France and their 4-digit sector of principal activity (APE). The survey has information on firms with more than 25 employees and is exhaustive above this reporting threshold. It is thus not crucial as the M&A market concern operations on firms of large size. The EAE has information on capital, employment, etc. The firm's age and her skill intensity are computed using information from the DADS panel. In order to compute total factor productivity (TFP), we restrict the data to the manufacturing sectors. We compute firm-level TFP using the Olley and Pakes (1996) method. Accordingly, we control for the simultaneity bias that arises from the endogeneity of a firm's input selection.

After merging the dataset, there are 183,049 workers-year observations observed over the period 2002-2007. The unbalanced panel dataset has information on 4,362 firms. Given the fixed time frame of the sample period, and the fact that firms are acquired at different years in the sample period, one may be concerned about potential attrition of observations as we examine periods several years before or several years after acquisition. To mitigate concerns about attrition for outlying years we focus on our analysis on a narrow bandwidth surrounding acquisition. Specifically we focus our analysis of wage dynamics on coefficients  $\delta^k$  for years  $k = -2, -1, 1, 2$ , controlling for average relative wages in outlying years in all specifications, indicated by  $\delta^{\leq 3}$  and  $\delta^{\geq 3}$ .

## 6. Results

In this section we present our estimates of the wage dynamics for workers surrounding the time that employers switch from domestic to MNE status via cross-border M&A. Our starting point is the PSM DID specification often implemented when studying multinational wage premia. We then relax the assumption that worker-level wages are constant within pre- and post- acquisition periods, and estimate year-to-year changes in earnings as workers' employers are acquired by a foreign multinational using the PSM event study approach outlined in the previous section.

### 6.1. Propensity Score Matching Difference-in-Differences Approach

Several analyses using data from other countries have adopted a PSM DID strategy to study labor market outcomes at multinational firms. The evidence from Brazil, Finland, Germany,

Indonesia, Portugal, Sweden, and the UK suggest that average earnings of workers do not differ before and after their employer is acquired by a foreign multinational. In order to facilitate comparisons we replicate the typical DID estimation using our data on French workers and firms. Note that the DID approach is a specific case of our preferred strategy in (9), which imposes the assumptions that  $\delta^k = 0$  for all  $k < 0$  and that  $\delta^k = \delta^{k'}$  for all  $k, k' > 0$ .

We begin with a simple OLS estimation using our sample of French workers and firms. The results are reported in Table 2, with standard errors clustered at the firm-level reported in parentheses. Column (1) controls only for sector & year fixed effects and shows that on average the wage paid by multinational firms are approximately 13.4 percent higher than at non-multinational firms. Much of this observed difference in wages is attributable to the superior characteristics of MNEs; in Column (2) we introduce controls for observable firm-level characteristics and find that wages paid by MNEs are only 4.7 percent higher than paid by domestic firms. Finally, Column (3) introduces controls for worker-level characteristics to account for differences in the workforces of domestic firms and MNEs and the apparent difference in wages disappears. Columns (4)-(6) and (7)-(9) repeat this exercise allowing for trends in wages based on length of workforce experience among workers and the date firms enter the sample period. Consistent with prior evidence, the results in Table 2, as well as additional specifications available upon request, continue to find no apparent difference in wages of French workers employed at MNEs and non-MNEs.

Recognizing the selection of firms into multinational status, Table 3 reports estimates from PSM DID strategies often implemented in the literature. We continue to calculate standard errors clustered at the firm-level to account for repeated observations of workers within firms over time. Column (1) controls only for sector & year fixed effects and shows that on average the wage paid by acquired multinational firms do not differ significantly from wages paid by matched non-acquired firms indicated by the propensity score. In Column (2) we introduce controls for observable firm-level characteristics, while Column (3) introduces controls for worker-level characteristics to account for differences in the workforces of acquired firms and their observationally equivalent domestic counterparts. Consistent with previous studies, we find no apparent difference in worker-level wages at any reasonable degree of confidence. Columns (4)-(9) demonstrate the apparent null result once additional controls are included. These findings, and estimates from many other specifications available upon request, are consistent with the pervasive evidence from other countries.

## 6.2. Propensity Score Matching Year-to-Year Event Study Approach

The model above predicts that domestic firms who experience dips in relative earnings among their workforce are more likely to later be acquired by foreign multinationals. Upon acquisition, worker-level wages are then predicted to improve on average as workers' fair wage considerations increase commensurate with the global performance of the acquiring multinational enterprise. Rather than assume that wages are constant within pre- and post- acquisition periods, in this section we allow worker-level wages to differ in each year prior to and after acquisition.

The results from our preferred specification in (9) are in Table 4. We continue to include the full set of both worker and firm controls and calculate standard errors clustered at the firm-level. Recall, to operationalize the estimation of (9) we omit the indicator for the year of acquisition so that the coefficients for each year around acquisition,  $\delta^k$ , reflect wages in year  $k$  relative to the year of acquisition. Evidence of a pre-acquisition dip and initial recovery in earnings for workers employed at firms that are acquired by a foreign multinational correspond to negative and significant coefficient on indicators for any pre-acquisition indicator variable.

The results in Column (1) of Table 4, confirm that workers experience a dip in wages in the year prior to their employer being acquired by a foreign multinational. Column (1) shows that worker-level wages two years prior to acquisition do not differ significantly from wages observed in the year of acquisition; the estimated coefficient on the indicator for  $k = -2$  is very small, -0.014, and not distinguishable from zero. However, the model predicts and Figure 1 confirms that foreign acquisition is preceded by negative productivity shocks among domestic firms, which may coincide with reductions in remuneration for workers. Consistent with the model, the estimated coefficient on the indicator for the year before acquisition,  $k = -1$ , in Column (1) is -0.126 which implies that relative wages of workers in the year before acquisition are approximately 11.8 percent lower than observed in the year of acquisition. This estimated dip in earnings is significant at high degrees of confidence.

In the years following acquisition activity there is some evidence that worker-level wages continue to improve. The point estimate in Column (1) indicates that wages are approximately 9.75 percent higher in the year following acquisition, but the coefficient is not significantly different from zero at reasonable degrees of confidence. In other words, wages in the year after foreign acquisition are not statistically different than wages initially observed in the year of acquisition. The positive coefficient estimate on the indicator for year  $k = +1$  is significantly different from the coefficient on  $k = -1$  ( $p$ -value < 0.001), indicating that the initial recovery from the pre-

acquisition earnings dip is stable. In the second year after acquisition we find that wages are significantly different than observed in the year of acquisition. Evidence in Arnold & Javorcik (2009) and Guadalupe et al. (2012) shows that foreign acquiring firms invest to improve the production technology and export capabilities of their domestic targets. The model above shows that such improvements in the productivity of the firms and their global engagement can lead to further increases in worker levels wages. The positive point estimate for the year following acquisition and the statistically significant increase in wages estimated in the second year after acquisition are consistent with this prediction.

Columns (2)-(5) of Table 4 sequentially introduce controls for the workforce experience of workers and the age of firms to account for different wage trends, as well as an alternative specifications with sector $\times$ year fixed effects, rather than simple year & sector fixed effects. In each specification we continue to find a statistically significant dip in wages in the year prior to acquisition with a increase in wages in the years following acquisition. Moreover, the quantitative magnitude of the pre-acquisition dip is invariant across specifications. In Column (2) we introduce only the control for years of workforce experience and no longer find statistically significant evidence of continued increases in wages following acquisition. However, once controls for firm age in the sample are introduced in Columns (3)-(5) we again find evidence that wages further increase beyond the initial recovery two years after acquisition at high degrees of confidence.

One may also be concerned that the changes in wages estimated in Table 4 do not fully capture dynamics in total worker compensation. In Table 5 we replicate the results of Table 4 using unique information about in-kind payments made to individual workers. Across each column we find the same U-shaped pattern in total earnings as observed for worker-level wages, with a pre-acquisition dip in the year before a worker's employer is acquired by a foreign multinational firm.

Figure 2 illustrates the estimated patterns in worker-level wages surrounding the time of acquisition by a foreign multinational. Panel A plots the estimated year-to-year wage variation for specifications that omit controls for workforce experience and firm age (Column (1) of Table 4), as well as specifications that include them with sector & year fixed effects (Column (4) of Table 4) and sector $\times$ year fixed effects (Column (5) of Table 4). Alternatively Panel B of Figure 2 plots estimates from analogous specifications using total worker compensation including in-kind benefits as the dependent variable. The error bars in each panel of Figure 2 represent one standard error, calculated by clustering at the firm-level. The U-shaped pattern in worker-level earnings is evident in each specification.

For the sake of illustration, Figure 2 also plots the results of an exercise in which we estimate (9) using only observations from our counterfactual set of matched firms, as indicated by the propensity score. For these matched firms, we index year  $k = 0$  as the year they are matched to an acquired firm. The results are illustrated by the fine dashed line in each panel. Across every year, wages do not differ significantly from the level observed in the year that the counterfactual firms were matched to acquired firms. In other words, even though these counterfactual firms are observationally equivalent at the time of acquisition to those that are taken over by a foreign multinational, they do not undergo the same year-to-year variation in earnings that we observe at firms that are acquired by an MNE.

## 7. Conclusion

Cross-border investment by MNEs is known to respond to several national and international policies; in fact, the key purpose many of globalization policies is to facilitate incoming investment by foreign multinationals. Most of the prior evidence has suggested individual workers do not necessarily benefit from increased MNE activity that result from these policies, as the greater entry for foreign firms appeared to have negligible impacts on worker-level wages. The results that we have presented here indicate that the worker-level wage dynamics before employers join an MNE may mask the potential benefits to labor earnings.

We have documented that the employees of MNEs face a distinct U-shaped pattern in earnings as their employer switches from domestic to MNE status, such that wages decline for in years just before being acquired by an MNE, and then increases following takeover. After worker-level wages recover from the pre-acquisition dip, we find some evidence that wages potentially increase for several years afterward. We have shown that remuneration in the form of benefits in-kind exhibits the same U-shaped pattern coincident with cross-border acquisition activity.

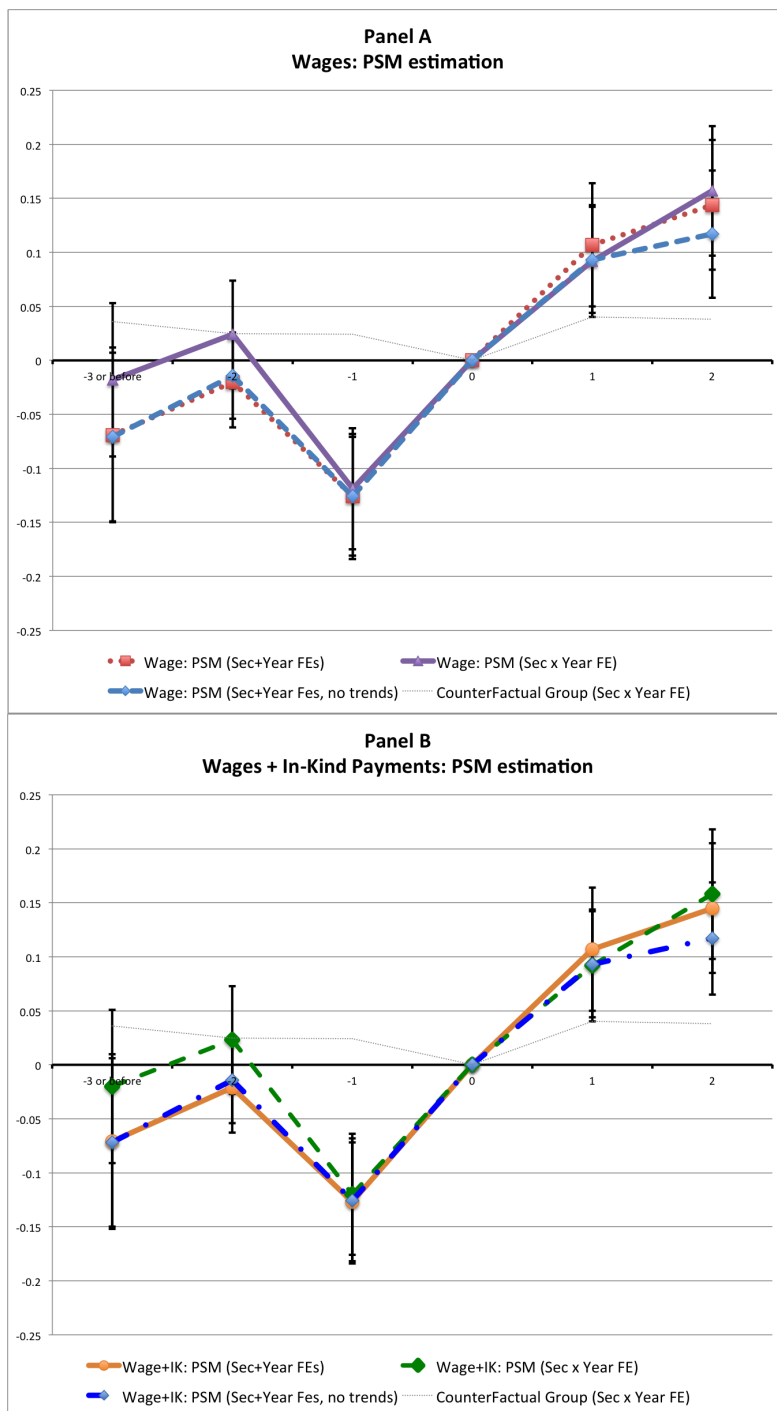
## References

- Akerlof, G. & Yellen, J. (1990). The fair wage-effort hypothesis and unemployment. *Quarterly Journal of Economics*, 105, 255–283.
- Arnold, J. & Javorcik, B. (2009). Gifted kids or pushy parents? foreign direct investment and plant productivity in indonesia. *Journal of International Economics*, 79(1), 42–53.
- Biscourp, P. & Kramarz, F. (2007). Employment, skill structure and international trade: Firm-level evidence for france. *Journal of International Economics*, 72(1), 22–51.
- Blonigen, B. A., Fontagne, L., Sly, N., & Toubal, F. (2014). Cherries for sale: the incidence of cross-border m&a. *Journal of International Economics*, 94(2), 341–57.
- Budd, J., Konings, J., & Slaughter, M. J. (2009). International profit sharing in multinational firms. *Review of Economics and Statistics*, 87, 73–84.
- Couch, K. A. & Placzek, D. W. (2010). Earnings losses of displaced workers revisited. *American Economic Review*, 100(1), 572–589.
- Criscuolo, C. & Martin, R. (2009). Multinationals and u.s. productivity leadership: Evidence from great britain. *Review of Economics and Statistics*, 91(2), 263–81.
- Dehejia, R. H. & Wahba, S. (2002). Propensity score-matching methods for non-experimental causal studies. *Review of Economics and Statistics*, 84(1), 151–61.
- Egger, H. & Kreickemeier, U. (2009). Firm heterogeneity and the labor market effects of trade liberalization. *International Economic Review*, 50(1), 187–216.
- Egger, H. & Kreickemeier, U. (2013). Why foreign ownership may be good for you. *International Economic Review*, 54(2), 693–716.
- Fich, E. M., Cai, J., & Tran, A. L. (2011). Stock option grants to target ceos during private merger negotiations. *Journal of Financial Economics*, 101, 413–30.
- Guadalupe, M., Kuzmina, O., & Thomas, C. (2012). Innovation and foreign ownership. *The American Economic Review*, 102(7), 3594–3627.
- Head, K. & Ries, J. (2008). Fdi as an outcome of the market for corporate control: theory and evidence. *Journal of International Economics*, 74(1), 2 – 20.
- Heckman, J. J., Ichimura, H., Smith, J., & Todd, P. (1998). Characterizing selection bias using experimental data. *Econometrica*, 66(5), 1017–98.
- Heckman, J. J., Ichimura, H., & Todd, P. (1997). Matching as an econometric evaluation estimator: evidence from evaluating a job training program. *Review of Economic Studies*,

64(4), 605–54.

- Heyman, F., Sjöholm, F., & Tinvall, P. G. (2007). Is there really a foreign ownership premium? evidence from matched employer-employee data. *Journal of International Economics*, 73(2).
- Hijzen, A., Martins, P. S., Schank, T., & Upward, R. (2013). Foreign-owned firms around the world: A comparative analysis of wages and employment at the micro-level. *European Economic Review*, 60(0), 170 – 188.
- Huttunen, K. (2007). The effect of foreign acquisition on employment and wages: Evidence from finnish establishments. *Review of Economics and Statistics*, 89(3), 497–509.
- Lise, J., Meghir, C., & Robin, J.-M. (2013). Mismatch, sorting and wage dynamics. NBER Working Paper No. 18719.
- Martins, P. S. (2011). Paying more to hire the best? foreign firms, wages, and worker mobility hire the best? foreign firms, wages, and worker mobility. *Economic Inquiry*, 49(2), 349–363.
- Nocke, V. & Yeaple, S. R. (2007). Cross-border mergers and acquisitions versus greenfield foreign direct investment: the role of firm heterogeneity. *Journal of International Economics*, 72(2), 336–365.
- Postel-Vinay, F. & Turon, H. (2010). On-the-job search, productivity shocks and the individual earnings process. *International Economic Review*, 51(3), 599–629.
- Ramondo, N. (2009). Foreign plants and industry productivity: Evidence from chile. *Scandinavian Journal of Economics*, 111(4), 789–809.
- Slaughter, M. J. (2009). How u.s. multinational companies strengthen the u.s. economy. Technical report, Business Roundtable and Business Roundtable and The United States Council Foundation.
- UNCTAD (2000). World investment report. Technical report, United Nations, New York, NY.





**Figure 2 – U-Shaped Pattern in Worker-Level Earnings Surrounding Cross-Border Acquisition**  
 Notes: Point estimates illustrated in Panel A correspond to results in Table 4 while those in Panel B correspond to results from Table 5. The plotted estimates for the counterfactual group in both panels are obtained by estimating the baseline specification in Column (1) of Tables 4 & 5 using only observations from our counterfactual set of matched firms, as indicated by the propensity score. For these matched firms, we index year  $k = 0$  as the year it was matched to an acquired firm.

**Table 1 – Descriptive Statistics (Obs. 183,049)**

	Mean	Standard Deviation
Log(wage)	9.61	0.96
MNE	0.25	0.43
TFP	3.97	1.29
Exporter	0.91	0.27
Capital Intensity	4.06	1.65
Skill Intensity	0.46	0.23
Male	0.71	0.45
Unskilled	0.14	0.35
Age	40.11	10.81
Age sq.	1726.4	869.4
Workforce Experience	2.67	1.68
Firm Age	3.15	1.72

**Table 2 – Average Differences in Worker-Level Wages Before/After Cross-Border Acquisition:  
OLS Specifications**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign	0.131*** (0.032)	0.043* (0.022)	0.026 (0.018)	0.097*** (0.028)	0.028 (0.021)	0.019 (0.018)	0.111*** (0.030)	0.040* (0.022)	0.025 (0.019)	0.030 (0.018)
TFP		0.080*** (0.011)	0.056*** (0.008)		0.050*** (0.010)	0.041*** (0.007)		0.055*** (0.011)	0.043*** (0.008)	0.044*** (0.008)
Exporter		0.107*** (0.033)	0.077*** (0.023)		0.075** (0.035)	0.064** (0.023)		0.089** (0.033)	0.072*** (0.023)	0.070*** (0.023)
Capital Intensity		0.031 (0.018)	0.019* (0.010)		0.038** (0.016)	0.024** (0.009)		0.037** (0.016)	0.024** (0.010)	0.021** (0.009)
Skill Intensity		0.299*** (0.058)	0.240*** (0.052)		0.335*** (0.054)	0.263*** (0.050)		0.339*** (0.053)	0.264*** (0.049)	0.263*** (0.048)
Male			0.236*** (0.011)			0.223*** (0.010)			0.222*** (0.010)	0.221*** (0.010)
Unskilled			-0.357*** (0.015)			-0.343*** (0.015)			-0.344*** (0.015)	-0.342*** (0.014)
Age			0.192*** (0.004)			0.171*** (0.005)			0.169*** (0.005)	0.168*** (0.005)
Age <sup>2</sup>			-0.002*** (0.000)			-0.002*** (0.000)			-0.002*** (0.000)	-0.002*** (0.000)
Workforce Experience				0.237*** (0.009)	0.233*** (0.009)	0.136*** (0.007)	0.261*** (0.011)	0.257*** (0.011)	0.151*** (0.009)	0.155*** (0.008)
Firm Age							-0.093*** (0.011)	-0.102*** (0.014)	-0.055*** (0.010)	-0.058*** (0.009)
Observations	183,049	183,049	183,049	183,049	183,049	183,049	183,049	183,049	183,049	183,049
R-squared	0.016	0.038	0.247	0.107	0.124	0.274	0.113	0.131	0.276	0.279
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Sector x Year	No	No	No	No	No	No	No	No	No	Yes

Standard errors clustered at firm-level reported in parentheses.

\*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ .

**Table 3 – Average Differences in Worker-Level Wages Before/After Cross-Border Acquisition:  
Propensity Score Diff-in-Diff Specifications**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign	0.052 (0.038)	0.050 (0.029)	0.037 (0.025)	0.059 (0.034)	0.061** (0.027)	0.044* (0.025)	0.059 (0.035)	0.061** (0.027)	0.044* (0.025)	0.045* (0.024)
TFP	0.050*** (0.014)	0.036*** (0.012)	0.036*** (0.012)	0.039*** (0.013)	0.032*** (0.011)	0.032*** (0.011)	0.039*** (0.014)	0.032*** (0.011)	0.032*** (0.011)	0.030*** (0.011)
Exporter	0.109 (0.066)	0.098* (0.050)	0.098* (0.050)	0.082 (0.058)	0.082 (0.049)	0.084* (0.047)	0.094 (0.056)	0.094 (0.056)	0.092* (0.047)	0.091* (0.049)
Capital Intensity	0.071** (0.028)	0.049** (0.020)	0.049** (0.020)	0.060** (0.022)	0.046** (0.018)	0.047** (0.018)	0.062** (0.023)	0.047** (0.023)	0.047** (0.018)	0.047** (0.018)
Skill Intensity	0.235* (0.118)	0.224* (0.112)	0.224* (0.112)	0.253*** (0.112)	0.352*** (0.113)	0.290** (0.109)	0.290** (0.109)	0.346*** (0.111)	0.286** (0.108)	0.280** (0.109)
Male	0.210*** (0.015)	0.210*** (0.015)	0.210*** (0.015)	0.253*** (0.023)	0.192*** (0.016)	0.192*** (0.016)	0.192*** (0.016)	0.192*** (0.016)	0.192*** (0.016)	0.192*** (0.015)
Unskilled	-0.317*** (0.023)	-0.317*** (0.023)	-0.317*** (0.023)	-0.298*** (0.021)	-0.298*** (0.021)	-0.298*** (0.021)	-0.298*** (0.021)	-0.301*** (0.021)	-0.301*** (0.021)	-0.301*** (0.021)
Worker Age	0.199*** (0.006)	0.199*** (0.006)	0.199*** (0.006)	0.166*** (0.006)	0.166*** (0.006)	0.166*** (0.006)	0.166*** (0.006)	0.165*** (0.006)	0.165*** (0.006)	0.165*** (0.006)
Worker Age <sup>2</sup>	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Workforce Experience	0.253*** (0.012)	0.253*** (0.012)	0.253*** (0.012)	0.253*** (0.012)	0.150*** (0.010)	0.150*** (0.010)	0.259*** (0.013)	0.259*** (0.012)	0.155*** (0.011)	0.155*** (0.011)
Firm Age	0.253*** (0.012)	0.253*** (0.012)	0.253*** (0.012)	0.253*** (0.012)	0.150*** (0.010)	0.150*** (0.010)	-0.071*** (0.017)	-0.074*** (0.021)	-0.051*** (0.016)	-0.052*** (0.015)
Observations	75,667	75,667	75,667	75,667	75,667	75,667	75,667	75,667	75,667	75,667
R-squared	0.008	0.024	0.228	0.132	0.146	0.264	0.134	0.149	0.265	0.266
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Sector x Year	No	No	No	No	No	No	No	No	No	Yes

Standard errors clustered at firm-level reported in parentheses.  
\*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ .

**Table 4 – Worker-Level Wages Surrounding Cross-Border Acquisition:  
Propensity Score Event-Study Specifications**

	(1)	(2)	(3)	(4)	(5)
Acquisition+2	0.117** (0.052)	0.097 (0.060)	0.125** (0.055)	0.144** (0.060)	0.157** (0.060)
Acquisition+1	0.093* (0.049)	0.090 (0.055)	0.096* (0.051)	0.107* (0.057)	0.092* (0.052)
Year of Acquisition	–	–	–	–	–
Acquisition–1	-0.126** (0.058)	-0.112* (0.055)	-0.128** (0.057)	-0.126** (0.055)	-0.119** (0.056)
Acquisition–2	-0.014 (0.040)	-0.009 (0.042)	-0.016 (0.041)	-0.020 (0.042)	0.024 (0.050)
Workforce Experience		0.111*** (0.012)		0.122*** (0.011)	0.123*** (0.011)
Firm Age			-0.014 (0.031)	-0.083* (0.042)	-0.091** (0.042)
TFP	0.018 (0.016)	0.028 (0.017)	0.016 (0.017)	0.016 (0.016)	0.018 (0.016)
Exporter	0.372** (0.135)	0.355** (0.145)	0.371** (0.133)	0.350** (0.136)	0.354** (0.134)
Capital Intensity	0.043* (0.021)	0.015 (0.028)	0.046** (0.022)	0.029 (0.024)	0.036 (0.023)
Skill Intensity	0.408*** (0.097)	0.447*** (0.113)	0.401*** (0.098)	0.408*** (0.106)	0.440*** (0.105)
Male	0.179*** (0.034)	0.144*** (0.035)	0.180*** (0.032)	0.148*** (0.032)	0.149*** (0.031)
Unskilled	-0.238*** (0.049)	-0.238*** (0.044)	-0.237*** (0.049)	-0.238*** (0.044)	-0.241*** (0.045)
Worker Age	0.209*** (0.018)	0.186*** (0.016)	0.209*** (0.018)	0.184*** (0.016)	0.183*** (0.016)
Worker Age <sup>2</sup>	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Acquisition ≥ 3	0.162** (0.064)	0.133* (0.076)	0.173** (0.068)	0.195** (0.072)	0.198*** (0.064)
Acquisition ≤ 3	-0.071 (0.078)	-0.051 (0.079)	-0.074 (0.079)	-0.069 (0.081)	-0.018 (0.071)
Observations	10,285	10,285	10,285	10,285	10,285
R-squared	0.278	0.296	0.278	0.298	0.300
Sector FE	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	No
Sector x Year	No	No	No	No	Yes

Standard errors clustered at firm-level reported in parentheses.

\*\*\*  $p < 0, 01$ ; \*\*  $p < 0, 05$ ; \*  $p < 0, 1$ .

**Table 5 – Total Worker-Level Earnings Surrounding Cross-Border Acquisition:  
Propensity Score Event-Study Specifications**

	(1)	(2)	(3)	(4)	(5)
Acquisition+2	0.117** (0.052)	0.097 (0.060)	0.126** (0.056)	0.145** (0.060)	0.158** (0.060)
Acquisition+1	0.093* (0.049)	0.090 (0.055)	0.096* (0.051)	0.107* (0.057)	0.092* (0.052)
Year of Acquisition	–	–	–	–	–
Acquisition–1	-0.126** (0.058)	-0.112* (0.055)	-0.129** (0.057)	-0.127** (0.055)	-0.120** (0.056)
Acquisition–2	-0.014 (0.040)	-0.010 (0.042)	-0.017 (0.041)	-0.021 (0.042)	0.023 (0.050)
Workforce Experience		0.110*** (0.012)		0.121*** (0.011)	0.122*** (0.011)
Firm Age			-0.015 (0.030)	-0.083* (0.042)	-0.092** (0.041)
TFP	0.018 (0.016)	0.027 (0.017)	0.015 (0.017)	0.015 (0.017)	0.018 (0.016)
Exporter	0.374** (0.136)	0.357** (0.145)	0.373** (0.134)	0.352** (0.137)	0.356** (0.134)
Capital Intensity	0.043* (0.021)	0.015 (0.028)	0.046** (0.022)	0.029 (0.024)	0.036 (0.023)
Skill Intensity	0.414*** (0.098)	0.453*** (0.113)	0.406*** (0.099)	0.413*** (0.106)	0.445*** (0.105)
Male	0.180*** (0.034)	0.145*** (0.035)	0.181*** (0.032)	0.149*** (0.032)	0.150*** (0.031)
Unskilled	-0.239*** (0.049)	-0.240*** (0.044)	-0.239*** (0.049)	-0.239*** (0.045)	-0.243*** (0.045)
Worker Age	0.209*** (0.018)	0.186*** (0.016)	0.209*** (0.018)	0.184*** (0.016)	0.184*** (0.016)
Worker Age <sup>2</sup>	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Acquisition ≥ 3	0.162** (0.064)	0.133* (0.076)	0.173** (0.069)	0.196** (0.073)	0.198*** (0.065)
Acquisition ≤ 3	-0.072 (0.078)	-0.053 (0.079)	-0.076 (0.079)	-0.071 (0.081)	-0.020 (0.071)
Observations	10,285	10,285	10,285	10,285	10,285
R-squared	0.278	0.295	0.278	0.298	0.300
Sector FE	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	No
Sector x Year	No	No	No	No	Yes

Standard errors clustered at firm-level reported in parentheses.

\*\*\*  $p < 0, 01$ ; \*\*  $p < 0, 05$ ; \*  $p < 0, 1$ .