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Volatile multinationals? Evidence from the labor demand of German firms

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Abstract

Does more FDI make the world a riskier place for workers? We analyze whether an increase in multinational firms' activities is associated with an increase in firm-level employment volatility. We use a firm-level dataset for Germany which allows us to distinguish between purely domestic firms, domestic multinationals, their foreign affiliates, and foreign firms that are active in Germany. We decompose the volatility of firms into their reaction and their exposure to aggregate developments. Generally, we find no above-average wage and output elasticities for multinational firms.

Keywords: Employment volatility, labor demand, multinational firms

JEL classification: F23, J23

Non technical summary

This paper analyzes the question whether firms' multinational activities make the world a riskier place for workers. Our short answer to this question is: No. More specifically, we address this question using a firm-level dataset on German firms. In contrast to earlier work, we distinguish between different types of multinational firms and study their exposure to foreign and domestic economic activity.

Our main results, based on estimates of firm-level labor demand functions, can be summarized as follows. First, employment in German firms is relatively persistent, it increases in response to firm-level sales, and it falls if wages increase. Second, multinational firms do not respond systemically more to wages and output than firms that are active only on the domestic market. Also, the persistence of employment is very similar across the different types of firms. These results are relatively robust across different industries.

Overall, our results do not lend support to the hypothesis that an increasing integration into international markets generally increases the elasticity of labor demand and thus labor market uncertainty. In view of the large degree of heterogeneity across different types of multinationals, across different industries, and across firms of different sizes, it will be difficult to devise policy measures directly geared towards the reduction in employment risk in specific types of firms or industries. Instead, policies should aim at increasing the flexibility of firms and workers to adjust to changes in the external environment.

Nichttechnische Zusammenfassung

Dieses Papier geht der Frage nach, ob grenzüberschreitende Aktivitäten deutscher Unternehmen Auswirkungen auf die Sicherheit der Arbeitsplätze haben. Unsere kurze Antwort auf diese Frage lautet ‚Nein'. Wir untersuchen diese Fragestellung anhand von Firmendaten und können im Vergleich zu früheren Arbeiten unterschiedliche Typen von multinationalen Unternehmen identifizieren sowie bestimmen, in welchem Ausmaß diese Unternehmen Veränderungen der heimischen und ausländischen Wirtschaftsentwicklung ausgesetzt sind.

Unsere Hauptergebnisse lassen sich wie folgt zusammenfassen. Erstens ist die Beschäftigung in deutschen Unternehmen verhältnismäßig dauerhaft. Sie steigt mit den Umsätzen der Unternehmen und sinkt bei Lohnerhöhungen. Zweitens reagieren multinationale Unternehmen nicht systematisch anders auf Löhne und Umsätze als Firmen, die nur im heimischen Markt tätig sind. Ferner ist die Dauerhaftigkeit der Beschäftigung für alle identifizierten Unternehmenstypen ähnlich hoch und die Ergebnisse der Studie sind über alle Wirtschaftszweige hinweg relativ robust.

Insgesamt zeigen die Ergebnisse, dass durch eine stärkere internationale Integration von Unternehmen deren Reaktion der Arbeitsnachfrage auf Änderungen der Löhne und Umsätze nicht generell größer wird. Angesicht der großen Vielfalt auf der Unternehmensebene hinsichtlich der multinationalen Aktivität sowie der Unternehmensgröße ist es schwierig, allgemeine Politikempfehlungen mit dem Ziel einer Verringerung von Beschäftigungsrisiken auszusprechen. Stattdessen sollte die Politik darauf abzielen, die Flexibilität der Unternehmen und Arbeitskräfte hinsichtlich der Anpassung an Veränderungen des betrieblichen Umfelds zu stärken.

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1 Introduction

Does more FDI make the world a riskier place for workers? Survey evidence suggests that a greater presence of multinational firms in an industry increases workers' perceived insecurity (Scheve and Slaughter 2004). There are also good theoretical reasons to believe that labor market volatility increases as firms become more active across borders. Firms in comparative advantage industries are likely to experience higher job turnover rates than firms in industries without comparative advantages (Bernard et al. 2007), outsourcing affects the volatility of employment at home and abroad (Bergin et al. 2006), firms could move volatile production to locations where labor markets are flexible (Cunat and Melitz 2007), and greater familiarity with foreign countries may increase the elasticity of labor demand (Rauch and Trindade 2003).

In this paper, we empirically study the link between FDI and the volatility of employment. We depart from the hypothesis that multinational firms have higher elasticities of labor demand and thus react more to a given shock than domestic firms (Rodrik 1997). Since macroeconomic volatility has declined over the past few decades in industrialized countries, changes in the reaction to aggregate developments could be a factor behind a – potential – increase in the volatility of employment at the firm level. Our focus is thus on the impact of internationalization on the *response* of firms to changes in wages and output. We test whether the responses differ across firms that operate domestically and multinational firms, and we distinguish the responses to domestic from those to foreign value added.

Using firm-level data on German firms, we follow earlier literature by estimating labor demand elasticities at the firm level. We go beyond earlier literature in three main regards.

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First, we distinguish between the exposure and the reaction of firms to industry-level aggregates. Second, we use a finer distinction of different groups of firms by distinguishing between different types of MNEs as well as between exporters and non-exporters. Third, we compute the determinants of firm-level dispersion as a measure of uncertainty. One advantage of this measure of uncertainty over standard volatility measures is that it can be computed even for firms with short strings of time series observations.

Our data come from two sources. The first is the firm-level Microdatabase Direct Investment (*MiDi*) on the foreign direct investment (FDI) of German firms abroad and on foreign firms' FDI in Germany provided by the Deutsche Bundesbank. We use these data to obtain information on the importance of multinational firms across industries and the exposure of German multinationals to foreign industry-level value added. The second source is the firm-level database *Dafne*, provided by Bureau van Dijk, which has information on the balance sheets and income statements of firms that are active in Germany. This database also contains information on the ownership structure of firms.

Our research is related to three strands of empirical literature:

A first strand of literature is concerned with the estimation of labor demand elasticities and with differences between domestic and foreign firms. Using industry-level data, Slaughter (2001) finds no significant impact of openness on labor demand elasticities. Barba Navaretti et al. (2003) estimate firm-level labor demand functions for a panel of European firms taken from the *Amadeus* database. They include a dummy variable which indicates whether a firm is owned by a foreign MNE and test whether domestic and multinational firms have different elasticities of labor demand. Their empirical specification also includes a lagged term which allows partial adjustment processes to be modeled and the persistence of labor demand to be estimated. They find that MNEs adjust their labor demand faster than national firms. However, long-run wage and output elasticities of labor demand are higher for national firms than for multinationals. There are no systematic differences with regard to the short-run elasticities. Results for Germany are similar to those for the other countries in the sample. Using data for UK firms, Fabbri, Haskel, and Slaughter (2003) find somewhat different results. They show that the elasticity of labor demand is higher for multinational than for national firms. Görg et al. (2006) use Irish data and find that multinational have higher labor demand elasticities than domestic firms. However, the labor demand of multinationals becomes less elastic if these firms have backward linkages with the local economy.

A second strand of literature studies patterns in firm-level volatility. To date, the literature remains somewhat inconclusive with regard to the evolution of firm-level volatility over time.

Comin and Philippon (2005) document diverging patterns in firm-level and aggregated output volatility for the US. While firm-level output volatility has increased, aggregated output volatility has decreased. Comin et al. (2006) support these general patterns and show that output and employment volatility display similar trends. Empirical evidence for France also supports an upward trend in firm-level volatility (Thesmar and Thoenig 2004). For Germany, however, it is difficult to detect a clear trend in firm-level volatility. Patterns are similar to those found in aggregated data, and there is little evidence of an increase in volatility (Buch et al. 2006). Davis et al. (2006) show that, for the US, too, the finding of an increase in firm-level volatility depends on the sample of firms chosen. According to their results, the increase in firm-level volatility documented by Comin and Phillipon (2005) is a feature of large, publicly traded firms. Using information on privately-owned firms as well, Davis et al. (2006) find a downward trend in firm-level volatility for the US. The impact of openness on firm-level volatility has hardly been studied. Bergin et al. (2006) find that outsourcing industries in the US and Mexico have higher volatilities than the industry average, but their data are at industry level. Buch et al. (2006) find that export openness of German firms and output volatility are negatively correlated.

A third strand of literature studies the impact of openness on employment security in Germany, but the set-up of their empirical models differs from ours. Becker and Mündler (2006) use a linked employer-employee dataset to show that expanding multinational enterprises retain more domestic jobs than competitors without foreign expansions. A foreign expansion is the dominant explanatory factor for reduced worker separation rates. Results obtained by Geishecker (2006) suggest that greater openness increases insecurity instead. He uses data from the German Socio-Economic Panel and finds that international outsourcing at industry level significantly lowers individual workers' employment security.

In the following Second Part, we decompose the effect of openness on employment volatility into the exposure and the reaction to shocks. We describe our empirical approach to estimating the elasticity of labor demand and measuring employment volatility and dispersion. In Part Three, we describe our data and present descriptive statistics. Part Four contains the regression results and robustness tests, and Part Five summarizes our findings. Generally, we find no evidence for above-average wage and output elasticities of multinational firms.

2 Decomposing Employment Volatility

The volatility of employment can differ between domestic and multinational firms for two main reasons: firms can have different exposures to shocks, and firms can react differently to these shocks. To set the stage for our empirical analysis below, the following section shows the link between labor demand and the volatility of employment. We then describe how we measure the exposure and the reaction of firms to firm- and industry-level developments.

2.1 Labor Demand and the Volatility of Employment

Understanding how internationalization affects the elasticity of labor demand requires that this elasticity be decomposed into its components. Hamermesh (1992) shows that a firm's own-price labor-demand elasticity (η_{LL}) depends on the labor share in total revenues, the elasticity of substitution between labor and capital (σ_{LK}), and the product-demand elasticity facing firm i in the output market (η): $\eta_{LL} = -(1-s)\,\sigma_{LK} - s\eta < 0$ where $s = wL/Y$ is the labor share. In assessing the impact of increased multinational activity on factor demand, three effects can be distinguished:

- Substitution effect: How much, for a given level of output, does the firm substitute labor away from other factors of production? Multinational enterprises (MNEs) with different locations for production might, for instance, be able to shift production across affiliates more easily than purely domestic firms.
- Scale effect: How much of the change in labor demand is due to a change in the level of output? As output markets become more integrated, consumers may find it easier to substitute between different varieties. A higher elasticity of product demand may thus increase the elasticity in the demand for labor.
- Scope effect: To what extent does the firm change the composition of its output? Firms may, for instance, become more specialized in R&D or management as they become MNEs (Hanson et al. 2003).

Our data are not sufficiently detailed to allow a separation of the scope effect as we do not have information about the products of firms. However, the substitution and the scale effect can be distinguished by estimating the constant-output demand for labor. Using a CES production function, labor demand can be expressed as a function of wages, interest rates, and output using the following linear model (Hamermesh 1992):

$$l_{it}^{d} = c_1 + \eta'_{LL}\, w_{it} + \eta'_{LK}\, r_{it} + \eta y_{it} + \varepsilon_{it} \qquad (1)$$

where η'_{LL} and η'_{LK} denote the constant-output labor demand elasticities with regard to wages and interest rates, w_{it} denotes firm-level wages, r_{it} denotes firm-level interest rates, and y_{it} is a firm-specific output vector. Including firm-specific output allows us to estimate the elasticity of labor demand for a given scale of activities. Hence, this specification accounts for the fact that multinational firms can gain market shares by relocating production to low-cost countries. This may increase their demand for domestic labor. In our empirical model below, we will also allow the respective elasticities to differ across different types of firms.

Using equation (1), we can write the volatility of employment as a function of the volatility of the determinants of labor demand:

$$\sigma^2\left(l_{it}^d\right) = c_2 + \eta'^2_{LL}\,\sigma^2\left(w_{it}\right) + \eta'^2_{LK}\,\sigma^2\left(r_{it}\right) + \eta^2\sigma^2\left(y_{it}\right) + \text{Cov} + \eta_{it} \qquad (2)$$

where σ^2 denotes the volatility of wages, interest rates, and output, and Cov is the covariance between the variables. Equation 2 shows that there are three factors affecting the volatility of employment:

First, domestic and multinational firms might *react* differently to exogenous shocks because their elasticities of labor demand and supply differ. Comparing equations (1) and (2) shows that the elasticities of labor demand affect the volatility of employment and that, ceteris paribus, firms with higher elasticities of labor demand have more volatility of employment. Below, we will mainly estimate equation (1) but we will also estimate a variant of equation (2) based on a measure of employment dispersion. This will allow us to test the cross-equations restrictions implied in the above equations.

Second, for multinational firms, the output vector y_{it} comprises domestic and foreign demand effects. Hence, multinational firms are *exposed* to domestic and foreign demand developments. Domestic firms, by contrast, are directly exposed only to changes in domestic demand.

Third, the covariance term (Cov) captures potential diversification effects. The correlation between domestic and foreign demand shocks, for instance, affects the exposure to shocks and, thus, the volatility of employment. If shocks are imperfectly correlated across countries, multinational firms benefit from a *diversification* effect, which dampens the volatility of employment.

In sum, openness affects firm-level volatility through the reaction and the exposure of firms to aggregated developments. We analyze this reaction by estimating the wage and output elasticities of different types of firms. We also distinguish the reaction of firms to changes in their own output from changes in (domestic and foreign) output – capturing their exposure to

domestic and foreign market conditions – at industry level. Next, we describe how we measure the reaction and the exposure of firms to shocks as well as firm-level volatilities.

2.2 Exposure to Industry-Level Value Added

In contrast to earlier empirical work studying the elasticities of labor demand, we disentangle the reaction and the exposure of firms to aggregate developments. We also distinguish the response of firms to idiosyncratic developments at the firm level from those to changes in output at the industry level.

For all firms in the sample, we include German industry-level value added in constant prices as a regressor. For domestic multinationals, we additionally include a measure of industry-level value added abroad. To construct this measure of the exposure of German multinationals to foreign aggregate developments, we use the firm-level database on foreign direct investment (*MiDi*) provided by the *Deutsche Bundesbank*. From this database, we calculate the employment (*emp*) and sales weights ω_{ij} of each partner country *j* in total foreign activities for each German MNE *i*:

$$\omega_{ij} = \frac{emp_{ij}}{\sum_{j=1}^{n} emp_{ij}} \text{ or } \omega_{ij} = \frac{sales_{ij}}{\sum_{j=1}^{n} sales_{ij}}$$

Results using the different weighting schemes differ very little. These weights are then used to calculate a firm-specific foreign value-added aggregate at the industry level. Firms are classified by the industry of the German parent.[1]

2.3 Volatility and Dispersion

Ideally, we would compute firm-level volatilities to test our model. It has become relatively standard in the literature to compute growth volatility as the variance in growth rates over a moving 5-year window. (See, e.g., Comin et al. (2006) for a study using data for the US.) However, for many firms in our sample, we lack sufficient time series information to calculate this volatility measure. Therefore, our volatilities are based on industry-level data. Figure 1 shows the standard deviation of percentage changes γ in employment in industry *i* over a rolling five-year period. We use this volatility measure to provide descriptive statistics.

[1] In principle, we could use the same methodology to construct measures of the exposure of foreign multinationals in Germany to foreign industry-level value added. However, we lack information on further host countries for foreign multinationals and their activities there.

To obtain a firm-level measure of the variability of business outcomes, which we can also use for a regression analysis, we follow Davis et al. (2006) and compute a dispersion measure – the cross-sectional standard deviation of firms' growth rates. Let firm *i*'s growth rate be given by: $\gamma_{it} = (x_{it} - x_{it-1})/x_{it-1}$. Then, the cross-sectional dispersion of growth rates is given by: $d_{it} = (\gamma_{it} - \overline{\gamma}_t)^2$ where $\overline{\gamma}_t$ is the period-average growth rate of all firms in the sample. This dispersion measure reflects the year-to-year variation in growth rates *between* firms, whereas volatility measures reflect the year-to-year *within*-firm variations in growth rates. Although these measures capture different aspects of the variation in growth rates over time and across firms, Davis et al. (2006) show, for the US, that dispersion and volatility measures have co-moved over recent years.

3 Data and Descriptive Statistics

3.1 The Data

Our data come from two sources. (See the Appendix for details on the data definitions and sources.) The main data source is *Dafne*, a commercial database providing financial information for about 60,000 German companies. We use this database since it provides information on a large panel of firms that are active in Germany. The second data source is the firm-level database on multinational firms *MiDi* provided by the *Deutsche Bundesbank* (Lipponer 2006). From this database, we obtain information on the countries in which firms are active and the volume of their activities abroad.

To eliminate outliers and to clean the sample, we start from the full *Dafne* dataset and drop firms with less than 10 employees and with negative values for sales. Data for very small firms are often patchy and unreliable, and negative sales might be an indication of misreporting. Imposing the additional restriction that firms should have entries for at least three consecutive years for employment, sales, and wages further reduces the sample. Since we do not have information on mergers among the firms in the sample, we correct for possible merger-induced outliers by dropping observations with large changes in sales, employment, and wages.[2] This outlier correction results in a further reduction of observations. The final dataset used for the regressions contains some 8,600 firm-year observations. These represent

[2] More specifically, we drop firms that report more than doubling or halving sales, wages or employment on a year-on-year basis, and that report wages exceeding three times the mean.

data from about 2,500 firms in 8 years, of which 2,000 are domestic enterprises (NEs), and 500 are multinationals (MNEs).

To be more precise, we can distinguish German firms which hold more than 10% of the equity capital in foreign firms from foreign firms which hold more than 10% of the equity capital in German firms and from firms which simultaneously own foreign affiliates and are owned by foreigners. Moreover, we can distinguish German firms that export from those that do not. We thus create five groups of firms:

- Purely domestic German firms, i.e. firms which are not owned by a foreign parent and which do not hold affiliates abroad ('Domestic Firms') (1,696 firms),
- Domestic firms that export ('Domestic Exporters') (288 firms),
- German firms with foreign affiliates ('German MNEs') (309 firms),
- Foreign firms that are active in Germany ('Foreign Firms') (50 firms), and
- Foreign firms in Germany which are owned by foreign firms *and* which own affiliates abroad ('Two-Way MNEs') (139 firms).

Since we have no time-varying ownership and export information in *Dafne*, we generally use information for the most recent year. Where available, dynamic ownership information has been implemented using *MiDi* data.

To check whether the reduced sample is roughly representative for German industry as a whole, Table 1a compares the final structure of our sample in terms of sales, employment, and number of firms to aggregate data for Germany. The biggest discrepancies are for manufacturing, which is over-weighted in our sample (49% of sales) compared to the German aggregate (36% of sales). Our sample under-weights the wholesale and retail trade industries (12% versus 32% of sales). The shares of the remaining industries are, by and large, similar to those in the aggregated data. We address the potential selection bias by including industry-time fixed effects in all regressions and by estimating our main regressions separately for firms of different sizes and from different industries.

Table 1b shows the allocation of employment by industry and ownership type for the data used in the regressions. Overall, 40% of the employment in our sample is in Domestic Firms. The second largest group are the Two-Way MNEs (26%), followed by German MNEs (22%), Domestic Exporters (10%), and Foreign Firms. Across industries, however, the allocation of employment differs. Two-Way MNEs, for instance, are particularly important in agriculture, manufacturing, construction, hotels and restaurants, and transport and communication.

Domestic Firms, in contrast, prevail in industries such as mining and quarrying, electricity, financial intermediation, public administration, education as well as health and social work.

In *Dafne*, company reports typically include balance sheet information and profit and loss information. We can, therefore, compute a firm-level measure of wages by dividing the total wage bill by the number of employees. Comparing the average wage bill per worker in our data to industry-level data shows that the average wage bill of the *Dafne* firms is about 160% of the average wage bill in the respective industry. This reflects the fact that *Dafne* contains data on firms' total personnel expenditure, including social security contributions, rather than just workers' gross wages.

From the Bundesbank's *MiDi* database, we obtain information on the names and the number of countries in which firms are active. This information is used to construct weights for foreign industry level aggregates as described above (Section 2.2.2) as well as a count variable indicating the number of countries in which firms are active. This variable will be used as a regressor in our labor demand equations below, and it is intended to capture the diversification effect of multinational activity (Section 2.1). We also use data on stocks of FDI taken from *MiDi* as a measure of industry-level openness.

3.2 Descriptive Statistics: Volatility and Dispersion

Figure 1 shows scatter plots for volatilities and the share of FDI relative to the total capital stock (i.e. gross fixed capital formation) by industry. We plot the volatility of employment, wages, and output. We also distinguish inward from outward FDI.

Eye-balling Figure 1 does not suggest strong links between our volatility measure and FDI. If anything, there is a slight negative correlation between FDI and employment and wage volatilities and a positive correlation between FDI and output volatility. At the same time, there is also a large degree of heterogeneity across industries. Manufacturing has a high share of outward FDI relative to its domestic capital stock; the retail and wholesale trade industries have a high share of inward FDI. Both industries have low to medium volatility. Agriculture, fishing, and mining are the most volatile industries. These industries, in turn, have a very low degree of internationalization. We have also checked whether there are any systematic correlations between volatility and industry-level FDI. However, in unreported regressions, we find no significant linkages between FDI and employment volatility at the industry-level. The only significant effect we find is a positive impact of inward and outward FDI on output volatility.

Next, we turn from industry-based volatilities to our firm-level dispersion measures. Comparing these dispersion measures across different types of firms, we find no clear differences. For the full sample, the dispersion of employment growth over the cross-section of firms is 1.8% (standard deviation of 6.1%). These values are very similar for Domestic Exporters, German MNEs, and the Two-Way MNEs. The employment dispersion measure is higher for the Foreign Firms (3.3%) but the standard deviation across these – relatively few – firms is also large (12.6%). Hence, prima facie, there are no strong indications that the volatility or the dispersion of employment growth differs significantly according to firms' MNE status.

4 Regression Results: Firm-Level Labor Demand Elasticities

One reason for differences in the employment volatilities across industries could be that the relative importance of multinational firms differs and that, in addition, multinational firms react differently to changes in wages and in output. Next, we thus estimate output and wage elasticities for different firms that are active on the German market.

4.1 The Model

Our baseline model for labor demand elasticities is based on Hamermesh (1992) and is specified similarly to Barba Navaretti et al. (2003):[3]

$$\begin{aligned} l_{ijt} = {} & \alpha_o + \beta_1 l_{ijt-1} + \beta_2 D_{MNE} l_{ijt-1} + \beta_3 y_{ijt} + \beta_4 D_{MNE} y_{ijt} \\ & + \beta_5 w_{ijt} + \beta_6 D_{MNE} w_{ijt} + \beta_7 y_{jt} + \beta_8 y^*_{jt} + D_{jt} + \varepsilon_{jit} \end{aligned} \tag{5}$$

where l_{ijt} is employment in firm i in industry j at time t, D_{MNE} is a vector of dummies for Domestic Exporters, German MNEs, Foreign Firms, and Two-Way MNEs, y_{ijt} denotes total firm-level sales, y_{jt} (y^*_{jt}) is domestic (weighted foreign) industry-level value added, w_{ijt} denotes firms' average wages, D_{jt} represents time-industry fixed effects, and ε_{ijt} is the error term. We include lagged employment to account for the fact that hiring and firing costs may cause employment persistence. All variables are specified in logs, and we can therefore interpret the coefficients as elasticities.

We follow Slaughter (2001) in assuming that the labor supply faced by the individual firm is perfectly elastic. In this case, changes in the labor supply schedule allow changes in labor

[3] Descriptive statistics for the variables used in the regressions are given in Table 1d.

demand to be observed, and we can interpret our coefficient estimates as labor demand elasticities.

Since we lack industry-level price data for some industries, in particular services industries, we use nominal values. The time-industry fixed effects capture price changes and other developments at the industry level such as the cost of capital, for which we do not have reliable firm-level estimates. They also address the possible selection bias caused by differences in the structure of our sample compared to the German economy (see Table 1a).

We go beyond earlier work in three main regards. First, we include not only a firm's own output but also domestic and foreign output at the industry level. Hence, we distinguish how firms react to changes in domestic and foreign industry-level value added. The reaction of labor demand to a firm's own output captures the response to changes in the relative demand for its product. Second, as regards the ownership dummy D_{MNE}, Barba Navaretti et al. (2003) distinguish between domestic firms and affiliates of multinational firms. We can additionally distinguish between German MNEs, Foreign Firms, and Two-Way MNEs as well as Domestic Exporters. Third, we use a system GMM instead of a difference GMM estimator to model the dynamics of firms' labor demand.

Before turning to the specifics of the model, note that, using equation (5), we can assess how quickly firms adjust to changes in external conditions. This speed of adjustment is given by $(1-\beta_1)$ for domestic and $(1-\beta_1-\beta_2)$ for the different groups of multinational firms. We can also compute the short-run output elasticities for domestic firms (β_3) and multinational firms ($\beta_3+\beta_4$) as well as the long-run output elasticities for domestic firms $\beta_3/(1-\beta_1)$ and multinational firms $(\beta_3+\beta_4)/(1-\beta_1-\beta_2)$. Similarly, we can read off the short- and long-run wage elasticities of domestic and multinational firms.

Our main interest is the elasticity of labor demand with respect to output and wages. We expect a positive sign for output elasticity and a negative sign for wage elasticity. If multinational firms were *more* responsive to output and wages, β_4 should be positive and β_6 should be negative.

Equation (5) assumes that employment adjusts with a lag. In our empirical specifications reported below, the first lag of the endogenous variable is indeed highly significant. Since the residuals are correlated with the endogenous variables, fixed effects estimates would be biased. The difference GMM proposed by Arellano and Bond (1991) or the system GMM proposed by Blundell and Bond (1998) allow unbiased coefficients to be estimated in dynamic panel models. The main difference between the two is that system GMM adds the

level equations to the regression and augments the number of instruments by the order *T*. Adding the level equation to the regression in the system GMM gives more efficient estimates by increasing the number of instruments. As a general rule, the number of instruments used should be significantly smaller than the number of groups used for the regressions. This condition is met throughout, as the number of instruments does not exceed 10-20% of the number of groups. Hence, adding more instruments through system GMM should be smooth sailing.

The system GMM should be preferred over the difference GMM if the dependent variable (in our case: employment) is close to a random walk, i.e. if it is stationary.[4] In this case, the difference GMM performs poorly by using past levels as instruments which carry little information about future changes.

Due to the unbalanced nature of our panel and the short time series dimension, we cannot apply standard panel unit root tests to check whether employment is stationary. Note that our panel is of a standard "Large N, small T" type. The cross-section dimension (N = 2,482 firms) clearly dominates the time series dimension (maximum T = 8 years per cross-section) and thus drives the asymptotics. Hence, we use two indirect methods of assessing the appropriateness of choosing system over difference GMM.

First, we estimate equation (5) using a naïve OLS and a within-panel model. This gives a range for the lagged coefficient term to lie between 0.97 and 0.28 (Roodman 2006). All our estimates reported below give point estimates within this range. Estimating the model using the Arellano-Bond (1991) difference GMM gives a point estimate of 0.37 (standard error of 0.06) whereas the Blundell-Bond (1998) system GMM gives a point estimate of 0.85 (standard error of 0.02). (See columns (1) and (5) of Table 5.) Hence, the lagged employment in the system GMM lies more comfortably within the above range.

Second, finding a significant value for the Sargan test statistics would indicate a potential violation of the stationarity assumption. Since the Sargan test never turns out to be significant, this gives further support to making system GMM our preferred choice.

Moving from difference to system GMM has two main implications for our results. First, the point estimate on the lagged endogenous variable increases. This is not uncommon in

[4] Intuitively, stationarity implies that the economy is in the steady state and that fast-growing firms are not systematically closer to or further away from their steady state than slow-growing firms. During the convergence process, employment in smaller (larger) firms would tend to increase (decrease). Using lagged employment changes as instruments in a system GMM model would then be inappropriate since the instruments would be correlated with the fixed effects.

empirical applications similar to ours. (See, e.g., the labor demand functions estimated in Roodman (2006).). Second, the coefficient on wages becomes smaller. We interpret this as evidence for the endogeneity of firm-level wages. Endogeneity of wages implies that changes in firm-level wages are a mirror image of changes in firm-level employment. This effect is partly picked up by the lagged endogenous variable in the system GMM.

Following Roodman (2006), we make two further specification choices:

First, since the maximum string of firm-level observations is less than 10 years, we use the one-step instead of the – more data-intensive – two-step estimator. We invoke the *robust* option in *Stata* in all specifications. This yields an estimator for the one-step standard errors that is based on the estimation of the covariance matrix from the one-step residuals. It is robust to heteroskedasticity and to arbitrary patterns of autocorrelation within individuals. Moreover, a full set of time-industry fixed effects is included to account for contemporaneous correlation across the residuals.

Second, using firm-level and, to a lesser extent, industry-level explanatory variables as regressors creates endogeneity problems. At the same time, finding truly exogenous instruments is extremely difficult, and we essentially have to generate our instruments from within the dataset. The Blundell-Bond system GMM allows us to distinguish endogenous variables from predetermined and exogenous variables. We treat firm-level variables such as sales and wages as endogenous,[5] and we use lags two and earlier to instrument for these. German industry-level value added is treated as pre-determined. We use lags one and earlier of the instrument variable for the transformed equation. Only dummies and foreign industry-level variables are treated as exogenous and are included in the set of IV- rather than GMM-type instruments.

For each regression, we report the number of instruments[6] and groups. As a rule of thumb, the number of instruments used should be strictly smaller than the number of groups. This is indeed the case. Moreover, our estimation results are consistent if we use appropriate instruments for our lagged endogenous variable and if there is no second-order autocorrelation. Tests on first and second-order serial correlation and the Sargan-Hansen test

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[5] Treating wages as endogenous rather than exogenous or predetermined renders the interaction term between Domestic MNEs and sales and wages insignificant. Unreported regressions with exogenous or predetermined wages show significantly lower elasticities for the Domestic MNEs.

[6] More specifically, we report the degrees of freedom of the Sargan-Hansen tests, i.e. the number of instruments minus the number of regressors.

on overidentifying restrictions do not allow the validity of our specification and instruments to be rejected.

4.2 Regression Results

In our baseline estimations (Table 2a), we have a total of 6,099 firm-year observations. We present five specifications. Column (1) has the baseline specification, in which we regress employment on lagged employment, firm-level sales, wages, and industry-time fixed effects. In Column (2), we add interaction terms between all variables and the MNE-ownership dummies. In Column (3), we additionally include interaction terms between the explanatory variables and exporter dummies. In Column (4), we add proxies for domestic and foreign industry-level value added. As an alternative to the specification using interaction terms, we also run the baseline regression separately for each of the sub-samples of multinational firms and domestic exporters (Table 2b).

In the baseline specification, we find a positive and significant coefficient on the lagged dependent variable and on firm-level sales as well as a negative coefficient on firm-level wages. The wage elasticity is smaller than the one found in earlier studies (-0.24 versus -0.5). (See Barba Navaretti et al. (2003) or Slaughter 2001.) Our interpretation of this difference is that the system GMM estimator provides superior instruments to control for the endogeneity of wages.

Adding interaction terms hardly changes the baseline results. The coefficient estimates for the output elasticities are similar across specifications (around 0.12 and -0.24). Our estimates for the lagged endogenous variable (0.87) are a bit higher than earlier estimates (0.68) and suggest a greater persistence of employment.

Next, we turn to the key interest of this paper – the interaction terms between multinational status, on the one hand, and sales and wages, on the other. Generally, the interaction terms are insignificant. There are no significant differences between domestic and multinational firms with regard to their reaction to firm-level output and wages. In terms of the persistence of employment, there are no significant differences between firms as well.

Results presented in Table 2a do not allow the long-run elasticities as well as the total wage and output elasticities for the different types of firms to be read off. Table 3 thus shows the estimates and significance levels for these elasticities. From Table 2a we know that MNEs do not behave significantly differently from the rest of the sample. Table 3 partly confirms that result. The persistence of employment and the short- and long-run elasticities of output are quite similar for the different groups of firms. As for the wage elasticities, the point estimates

are still negative for all firms but smaller in absolute terms than for the control group of domestic firms. The total wage elasticities for German MNEs are not significantly different from zero in the specifications that do not include aggregate variables. Foreign MNEs do not react significantly to wages in the specifications that include aggregate developments. We take this as weak evidence in favor of the hypothesis that jobs in these MNEs are less risky than jobs in other firms.

Estimating the baseline model separately for the sub-groups of firms, as is done in Table 2b, gives qualitatively very similar results as the specifications using interaction terms. This supports the robustness of our results. Note that the point estimates reported in Table 2b and in Table 3 are not exactly comparable though as the regressions are run on different sub-samples of firms.

In sum, the results so far do not lend support to the hypothesis that multinational firms as a group have more volatile employment because of a higher wage or output elasticity of labor demand. MNEs do not differ significantly from domestic firms with regard to their output and wage elasticities. Our results are thus at odds with the conventional wisdom that employment with foreign firms exposes workers to higher risk than employment in domestically-owned firms.

4.3 Robustness Tests

Columns (3) and (4) of Table 2 and Tables 4 and 5 provide robustness tests for our baseline model. We account for the impact of trade, we split firms by size and by industry, and we change the specification of the model dynamics.[7] We run the robustness tests in Tables 4 and 5 on a specification which does not include the proxies for macroeconomic developments.

Impact of trade: So far, we have attributed the effects of international openness to the ownership of firms. We have not factored in the possibility of firms being exposed to foreign market developments because they export. In Column (3) of Table 2, we therefore present specifications including interaction terms between a 0/1 dummy indicating whether a domestic firm is an exporter, on the one hand, and firm-level sales and wages, on the other hand. Our main results are not affected, and the trade interaction terms are insignificant.

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[7] Testing the impact of the degree of unionization across firms might be interesting as well. However, we lack such information at the firm level, and the available industry-level information is too broad and has insufficient variability across industries to allow for a meaningful estimation and interpretation of the results.

Size effects: Datasets such as ours suffer from a selection bias resulting from incomplete reporting of employment, in particular for the smaller and domestic firms. Although our final sample has a higher share of small and mid-sized firms than the full *Dafne* dataset (see Table 1c), these firms are likely to have a below-average representation in our original database. We therefore reestimate our above model for the larger firms in the sample. Results are given in Column (4) of Table 4. Column (1) reports the results for the full sample again. In terms of the persistence of employment, the coefficient we obtain for the large firms is similar to that for the full sample. In contrast to estimates for the full sample, the coefficient on firm-level wages is now insignificant. One explanation could be that larger firms have a wider range of possibilities to adjust to changes in wages than smaller firms.

Heterogeneity across industries: Earlier research on the labor demand of multinational firms such as the work by Barba Navaretti et al. (2003) is based on data for manufacturing firms. To check whether differences between their findings and ours are due to the fact that we also have data on services firms, we rerun our baseline model for different subgroups of firms separately. We use firms in the manufacturing sector and in the real estate sector – as the largest services sector in terms of the number of firms – separately.[8] Results are reported in Columns (2)-(3) of Table 4.

In terms of persistence, results for the different groups of firms are very similar. Also, there are no significant interaction terms for the MNE dummies. The only interaction term which is significant is the wage elasticity for the domestic exporters in manufacturing sectors. This variable is negative and significant at the 10% level, suggesting that domestic exporters in manufacturing react more to changes in wages than the rest of the sample.

To check whether individual industries drive the main results, we also estimate the full model but exclude observations for each industry one by one. In unreported regressions, we find that dropping industries does not change the main qualitative results in most cases. There are two exceptions. First, the interaction terms between sales (wages) and Domestic Exporter status turn significantly positive (negative) when excluding industry K (real estate, renting, and business activities). Hence, without industry K, Domestic Exporters have higher wage and output elasticities than the rest of the firms. Second, the finding reported above that Domestic Exporters and German MNEs in services industries respond less to wages and output than other firms is a feature of the sample excluding industry D (manufacturing). In samples

[8] The remaining subgroups of firms are too small to estimate the model separately for these industries.

excluding sectors C and E (Mining and Electricity), German MNEs are less sensitive to changes in output and wages than other firms.

Model dynamics and estimation technique: Table 5 presents results for the same specification as in Table 4, but we now check the sensitivity of our results with regard to the choice of estimation technique and the model dynamics. Overall, the main results are unaffected, but there are also some differences across the specifications. In Column (1) of Table 5, we re-report Column (3) of Table 2 as a reference specification, i.e. using time-varying industry fixed effects. We have additionally included time and industry fixed effects separately (compare Column (1) of Table (5) with Column (2) and Column (3) respectively). We find that our results are not affected by the specification of the fixed effects.

Estimating the model using first differences of all variables, as is done in column (4), shows a weakly significant positive lagged dependent variable (0.1), a positive output elasticity, and a negative wage elasticity. The coefficient on sales is around 0.27 and the coefficient on wages is -0.63. However, estimating the model in first differences by construction creates problems of second-order autocorrelation, as indicated by the deterioration of the autocorrelation tests in comparison with Column (1). Column (5) reports the results of a difference GMM estimation.

Diversification effects: In unreported regressions, we have accounted for the fact that firms can reduce their exposure to changes in domestic conditions by diversifying activities across several host countries. We include a dummy variable which is set equal to one for German multinationals that are active in more than 10 host countries. It is insignificant. Since only 40 out of 300 firms are active in more than 10 countries, we also test the impact of diversification effects by including a continuous measure of "diversification", i.e. the number of countries in which German multinationals are active, which turns out to be insignificant, too. We also use interaction terms of the diversification dummy, dropping the interaction terms with the dummy for German multinationals at the same time. We find no indications that more diversified multinationals react differently to sales or wages than the remaining firms.

Production versus non-production affiliates: One final concern that we address in unreported regressions is that domestic multinationals with foreign production affiliates can shift production more easily than multinationals with foreign retail or wholesale affiliates. To check whether such different types of multinationals react differently to changes in wages and output, we thus split our dummy for German MNEs further. We distinguish MNEs with more than 50% of their foreign affiliates being active in retail and wholesale trade from those with less than 50% of affiliates in these sectors. In unreported results, we find our main findings to

be unaffected. The interaction terms remain insignificant, and the elasticities of the two sub-groups of German MNEs are not significantly different.

4.4 Determinants of Firm-Level Employment Dispersion

In a final step, we analyze whether differences in the response of firms to output and wages affect firm-level dispersion of employment. We use firm-level dispersion as a measure of uncertainty instead of firm-level volatility since the time-series dimension of our data is short for many firms (see Section 2.2.3).[9] Essentially, we estimate equation (2) above. We use the dispersion of employment as the dependent variable. The explanatory variables are the lagged dispersion of employment, the dispersion of sales, and the dispersion of wages. As a reference, we additionally report in Column (1) of Table 6 the results of Column (1) of Table 2, i.e. the baseline regression for the level of labor demand based on equation (2). In Columns (2) and (3), we estimate essentially the same equation but use the dispersion of employment as in equation (2) as the dependent variable. In one specification, we include covariance terms; in one specification, we do not. Finally, in Column (4), we show the results for the dispersion measure using interaction terms between the explanatory variables and the MNE dummies without including the covariance terms as they proved to be insignificant.

Based on our derivation of equation (2), we would expect the coefficient on, say, the dispersion of wages in the employment dispersion equation to be approximately the squared value of the coefficient on the level of wages in the labor demand equation. However, comparing columns (2) and (3) to column (1) shows that this is not the case. While we obtain a positive and significant impact of wage dispersion on employment dispersion, the coefficient estimates are too high ($0.36^2 = 0.13$ versus 0.29). The coefficients on sales are insignificant. Including or excluding the covariance terms does not materially affect this outcome, and the respective coefficients are insignificant. Note that the intra-equation restrictions for the coefficients of the dispersion and the covariance measures cannot be rejected.

In a sense though, the estimates including interaction terms confirm our earlier findings that multinational firms do not have more volatile employment than domestic firms. The only interaction term which is positive and significant is the wage coefficient for domestic

[9] Note that using the dispersion of employment as the dependent variable is not equivalent to estimating the regression in first differences. In the dispersion regressions, the dependent variable is the deviation of firm-level growth from the mean growth rates across all firms in a given year. In the regressions in first differences, the dependent variable is the deviation of firm-level growth from the mean growth of this particular firm.

exporters. This is driven by the manufacturing firms and hence corresponds perfectly with the results shown in Column (2) of Table 4.

In sum, Table 6 provides an alternative test of differences in employment uncertainty across multinational and domestic firms, which can be applied to firm-level datasets with a short time dimension. While the theoretically expected coefficient restrictions across equations are not supported by the data, the results still support our main findings based on estimates of labor demand elasticities.

5 Summary of Findings

Does multinational activity make the world a riskier place for workers? Our short answer to this question is: "No." We address this question by using a firm-level dataset on German firms. In contrast to earlier work, we distinguish between different types of multinational firms and study their exposure to industry-level value added. Hence, we disentangle whether differences in the volatility of employment across different types of firms are due to different reactions or to different exposures to industry-level developments.

Our main results are based on estimates of firm-level labor demand functions, which give the response of different types of firms active in Germany to firm-level and aggregated wage and output developments. The results can be summarized as follows:

- Employment in German firms is relatively persistent, it increases in response to firm-level sales, and it falls if wages increase.
- Multinational firms do not respond systematically more to wages and output than firms that are active only on the domestic market. Also, the persistence of employment is very similar across the different types of firms.
- The results are relatively robust across different industries. The main exception is that, for domestic exporters in manufacturing, we find a greater sensitivity to wages than for the remaining firms.
- We also use employment dispersion as a measure of firm-level uncertainty. Estimates of the determinants of employment dispersion, by and large, support the findings of our labor demand estimations.
- Accounting for differences in firms' exposures to industry-level developments has little impact on our results. Our data allow us to construct a firm-level measure of exposure to foreign aggregate output changes. This variable, though, is insignificant.

Differences in employment volatilities across firms have a large idiosyncratic component.

Overall, our results do not lend support to the hypothesis that growing integration in international markets generally increases the elasticity of labor demand. In view of the large degree of heterogeneity across different types of multinationals, across different industries, and across firms of different size, it would be difficult to devise policy measures directly geared towards reducing employment risk in specific types of firms or industries. Instead, policies should aim at increasing the flexibility of firms and workers to adjust to changes in the external environment.

6 References

Arellano, M., and S. Bond (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58: 277-97.

Barba Navaretti G., and T. Venables (2004). *Multinationals in the World Economy*. Princeton University Press. Oxford.

Barba Navaretti G., D. Checchi, and A. Turrini (2003). Adjusting Labour Demand: Multinational Versus National Firms – A Cross European Analysis. *Journal of the European Economic Association* 1(2-3): 708-719.

Becker, S.O., and M.-A. Muendler (2006). The Effect of FDI on Job Separation. University of Munich and UC San Diego. Mimeo.

Bergin, P.R., R.C. Feenstra, and G.H. Hanson (2006). Outsourcing and Volatility. University of California and NBER. Mimeo.

Bernard, A.B., S. Redding, and P.K. Schott (2007). Comparative Advantage and Heterogeneous Firms. *Review of Economic Studies* (2007) 74, 31–66

Blundell, R. and S. Bond (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics* 87: 115-143.

Buch, C.M., J. Döpke, and H. Strotmann (2006). Does Export Openness Increase Firm-Level Volatility? Deutsche Bundesbank Discussion Paper 40/2006. Frankfurt a.M.

Comin, D., E.L. Groshen, B. Rabin (2006). Turbulent Firms, Turbulent Wages? National Bureau of Economic Research. NBER Working Paper 12032. Cambridge MA.

Cunat, A., and M. Melitz (2007). Volatility, Labor Market Flexibility, and the Pattern of Comparative Advantage. National Bureau of Economic Research. NBER Working Paper 13062. Cambridge MA.

Davis, S.J., J. Haltiwanger, R. Jarmin, and J. Miranda (2006). Volatility and Dispersion in Business Growth Rates: Public Traded versus Privately Held Firms. National Bureau of Economic Research. NBER Working Paper 12354. Cambridge MA.

Fabbri, F., J.E. Haskel, und M.J. Slaughter (2003). Does Nationality of Ownership Matter for Labor Demands? *Journal of the European Economic Association* 1(2 3): 698-707.

Geishecker, I. (2006). The Impact of International Outsourcing on Individual Employment Security: A Micro-Level Analysis. Free University of Berlin. Mimeo.

Görg, H., M. Henry, E. Strobl, and F. Walsh (2006). Multinational companies, backward linkages and labour demand elasticities. GEP, University of Nottingham, and CEPR. Mimeo.

Hamermesh, D.S. (1993). *Labor Demand*. Princeton: Princeton University Press.

Hanson, G.H., R.J. Mataloni Jr., and M.J. Slaughter (2003). Expansion Abroad and the Domestic Operations of U. S. Multinational Firms. University of California and NBER. Mimeo.

Lipponer, A., (2006). Microdatabase Direct Investment – MiDi A brief guide. Economic Research Centre, Deutsche Bundesbank. http://www.bundesbank.de/download/vfz/fdi/vfz_mikrodaten_guide.pdf .

Rauch, J.E., and V. Trindade (2003). Information and Globalization: Wage Co-Movements, Labor Demand Elasticity, and Conventional Trade Liberalization. *American Economic Review* 93: 775-791.

Roodman, D. (2006). How to Do xtabond2: An introduction to "Difference" and "System" GMM in Stata. Center for Global Development. Working Paper 103.

Rodrik, D. (1997). Has Globalization Gone Too Far?, The Institute for International Economics.

Scheve, K., and M.J. Slaughter (2004). Economic Insecurity and the Globalization of Production. *American Journal of Political Science* 48(4): 662-674.

Slaughter, M.J. (2001). International Trade and Labor-Demand Elasticities. *Journal of International Economics* 54(1): 27-56

Thesmar, D., and M. Thoenig (2004). Financial Market Development and the Rise in Firm Level Uncertainty. ENSAE-CREST, CERAS-CNRS, and CEPR. Mimeo.

Windmeijer, F. (2005). A Finite Sample Correction for the Variance of Linear Two-Step GMM Estimators. *Journal of Econometrics* 126: 25-51.

7 Data Appendix

Variable	Definition	Source
Firm-level data		
Employment	Number of employees	Bureau van Dijk (*Dafne*)
Sales	Turnover in €1,000	Bureau van Dijk (*Dafne*)
Wages	Personnel expenditure per employee in €1,000	Bureau van Dijk (*Dafne*)
Domestic Exporter	0/1 dummy for domestic exports as of 2006	Bureau van Dijk (*Dafne*)
German MNE	0/1 dummy for German firms with foreign affiliates as of 2006, dynamic ownership information from *MiDi*	Bureau van Dijk (*Dafne*), Deutsche Bundesbank (*MiDi*)
Foreign MNE	0/1 dummy for affiliates of foreign firms in Germany as of 2006	Bureau van Dijk (*Dafne*)
Two-Way MNE	0/1 dummy for affiliates of foreign firms in Germany which own affiliates abroad as of 2006	Bureau van Dijk (*Dafne*)
Employment- and sales-based weights for foreign value added	Employment (sales) per country over total employment (sales) abroad	Deutsche Bundesbank (*MiDi*)
Diversification dummy	0/1 dummy if a firm has affiliates in more than 10 countries	Deutsche Bundesbank (*MiDi*)
Industry-level data		
Germany		
Domestic employment	Number of employees, yearly average	Federal Statistical Office Series 18
Gross value added by industry	In current euro	Federal Statistical Office Series 18
Gross fixed capital formation	In current euro, at replacement costs	Federal Statistical Office Series 18
Inward and outward FDI	Primary direct investment stocks, in €1,000	Deutsche Bundesbank (*MiDi*)
Other countries		
Foreign value added	Value added by industry (OECD countries only) Index (2000 = 100).	OECD Annual National Accounts

8 Graphs and Tables

Table 1: Descriptive Statistics

(a) Industry Distribution of Sales and Employment (2004)

This Table compares the structure of the data used in the regression sample for the combined *Dafne*/*MiDi* data after search for consecutive chains and outlier analysis. Aggregated data for sales and employment come from the Federal Statistical Office; aggregated data for the number of firms come from the VAT statistics. All data are in %. The industry classification is based on WZ 2003. – = Industries are not included in the respective statistics.

Industry		Aggregated data (%)			Regression sample (%)			
		Sales	Employ-ment	Number of firms	Sales	Employ-ment	Number of firms	Number of firms (absolute)
A	Agriculture, hunting and forestry	0.6	2.2	2.51	0.04	0.06	0.50	10
B	Fishing	0.0	0.0	0.03	0.00	0.00	0.00	0
C	Mining and quarrying	0.6	0.2	0.09	0.52	0.81	0.79	16
D	Manufacturing	35.6	19.6	9.37	49.36	42.11	30.89	623
E	Electricity, gas, and water supply	4.4	0.8	0.47	7.40	3.75	9.72	196
F	Construction	3.7	5.8	10.42	0.46	0.65	2.03	41
G	Wholesale and retail trade, repairs	32.3	15.3	23.75	12.31	6.30	15.12	305
H	Hotels and restaurants	1.2	4.5	8.28	0.10	0.37	0.50	10
I	Transport, storage, and communication	5.7	5.4	4.25	11.62	19.40	6.45	130
J	Financial intermediation	0.9	3.2	0.52	0.29	0.14	0.45	9
K	Real estate, renting, and business activities	11.7	13.0	27.84	15.98	21.40	23.65	477
L	Public administration, defense, social security	–	6.9	1.03	0.02	0.03	0.30	6
M	Education	0.2	5.8	–	0.01	0.13	0.20	4
N	Health and social work	1.0	10.2	1.52	0.75	3.43	5.55	112
O	Other community, social and personal services	2.2	5.3	9.92	1.27	1.43	3.87	78
P	Private households with employed persons	–	1.7	–	0.00	0.00	0.00	0
A-P	Total	100	100	100	100.00	100.00	100	2,017

(b) Industry Distribution of Employment by MNE type (2004)

All figures in %. Data for the industries B ("Fishing") and P ("Private households with employed persons") are excluded because we have no observations in our sample.

	All	Domestic firms	Domestic Exporters	German MNEs	Foreign Firms	Two-Way MNEs
Agriculture, hunting and forestry	100.00	41.78	15.09	0.00	0.00	43.13
Mining and quarrying	100.00	88.98	0.87	10.16	0.00	0.00
Manufacturing	100.00	13.86	21.78	25.38	3.10	35.88
Electricity, gas, and water supply	100.00	93.91	0.00	6.09	0.00	0.00
Construction	100.00	39.22	2.62	4.68	1.22	52.26
Wholesale and retail trade, repairs	100.00	66.29	4.33	23.49	2.14	3.74
Hotels and restaurants	100.00	26.17	0.00	19.00	0.00	54.83
Transport, storage, and communication	100.00	19.03	0.05	33.60	0.00	47.32
Financial intermediation	100.00	88.08	0.00	11.92	0.00	0.00
Real estate, renting, and business activities	100.00	77.32	4.39	13.21	1.01	4.07
Public administration, defense, social security	100.00	100.00	0.00	0.00	0.00	0.00
Education	100.00	100.00	0.00	0.00	0.00	0.00
Health and social work	100.00	95.60	0.00	4.40	0.00	0.00
Other community, social and personal services	100.00	78.54	1.57	2.02	9.62	8.24
Total	100.00	39.54	10.45	22.12	1.80	26.08

(c) Size Distribution (2004)

This table gives the size distribution of firms by total employment in our sample and in the full *Dafne* dataset.

Size (by number of employees)	Regression sample (number)	Regression sample (in %)	*Dafne* (in %)
Small (10-100)	432	21.4	8.9
Medium (101-500)	884	43.8	6.8
Large (>500)	701	34.8	84.3
All	2,017	100.0	100.0

(d) Descriptive Statistics (2004)

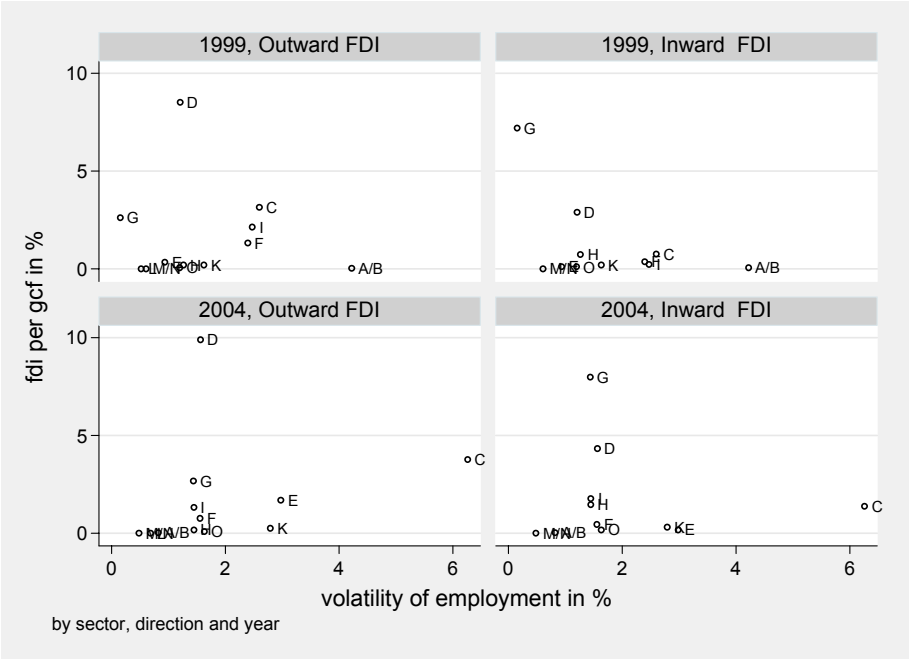
Wages = mean personnel expenditure per employee

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Employment	2,017	1,294	7,628	10	208,199
Sales	2,017	384,726	2,150,382	187	56,100,000
Wages	2,017	53.67	19.97	9	208.96
Weighted industry-level value added (foreign)	2,017	11.10	31.95	0.00	152.55
Industry-level value added (domestic)	2,017	104.88	5.98	74.88	115.88

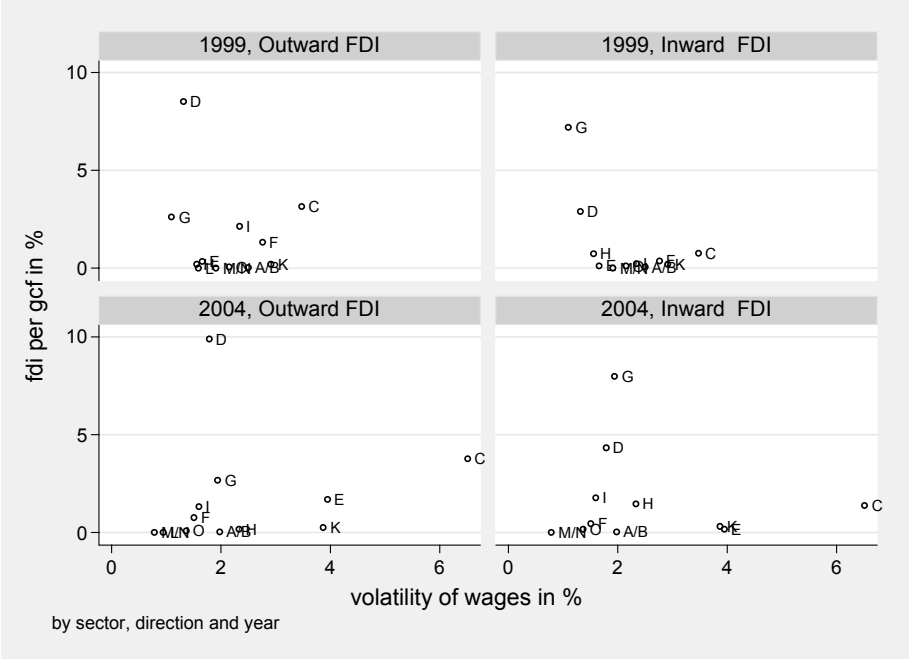
Figure 1: FDI and Industry-Level Volatility

A = agriculture, B = fishing, C = mining and quarrying, D = manufacturing, E = energy and water supply, F = construction, G = retail and wholesale trade, H = hotels and restaurants, I = transport and telecommunications, K = real estate, L = public administration, M = education, N = health, O = other services, P = private household services. Note that industry J = financial intermediation and insurance is not included in the graphs. gcf = gross fixed capital formation. Volatility = standard deviation of the growth rate of employment, wages, or output over a 5-year period * 100.

(a) Employment volatility



(b) Wage volatility



(c) Output volatility

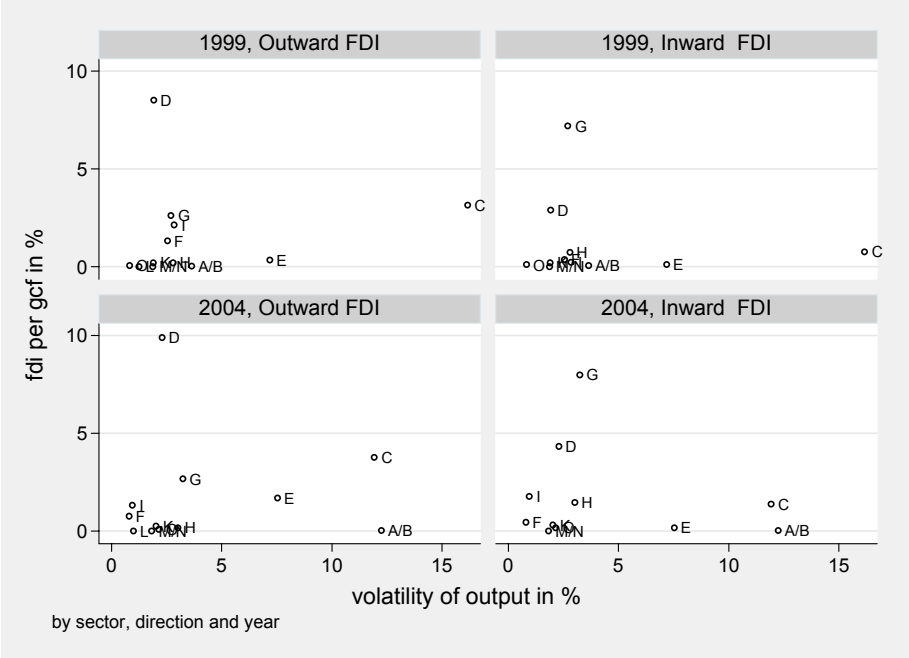


Table 2: Labor Demand Regressions

This Table presents the results of labor demand regressions using data for firms taken from the combined *Dafne-MiDi* database. The dependent variable is the level of employment. For each explanatory variable (lagged employment, sales, wages), we report the coefficient estimate as well as the coefficients of interaction terms with 0/1-ownership / exporter dummies. All variables are entered in log levels. Results are based on system GMM estimations. Robust standard errors are reported in parentheses. *, **, ***: significant at the 10%, 5% and 1% level, respectively.

a) With Interaction Terms

	(1)	(2)	(3)	(4)
Employment (*t*-1)	0.833***	0.872***	0.870***	0.886***
	(0.034)	(0.023)	(0.022)	(0.020)
Domestic Exporter			0.00200	-0.000734
			(0.0062)	(0.0060)
German MNEs (K3)		0.00509	0.00389	0.000234
		(0.0044)	(0.0045)	(0.0024)
Foreign Firms (K4)		-0.00115	-0.00166	-0.00529
		(0.0056)	(0.0068)	(0.0056)
Two-Way MNEs (K34)		0.00741	0.00723	0.00363
		(0.0070)	(0.0069)	(0.0033)
Sales	0.186***	0.117***	0.118***	0.101***
	(0.031)	(0.022)	(0.022)	(0.019)
Domestic Exporter			0.00479	0.00567
			(0.024)	(0.020)
German MNEs (K3)		-0.0389	-0.0467	-0.0236
		(0.033)	(0.030)	(0.023)
Foreign Firms (K4)		0.000704	0.00489	0.0114
		(0.043)	(0.046)	(0.033)
Two-Way MNEs (K34)		-0.0143	-0.0154	-0.00563
		(0.028)	(0.029)	(0.019)
Wages	-0.368***	-0.245***	-0.243***	-0.208***
	(0.13)	(0.082)	(0.080)	(0.066)
Domestic Exporter			-0.0114	-0.0108
			(0.067)	(0.058)
German MNEs (K3)		0.106	0.132	0.0599
		(0.096)	(0.085)	(0.081)
Foreign Firms (K4)		0.00926	0.0000526	0.0318
		(0.13)	(0.13)	(0.15)
Two-Way MNEs (K34)		0.0369	0.0415	-0.0509
		(0.083)	(0.085)	(0.087)
Aggregated variables				
Employment-weighted foreign industry value added				0.000137
				(0.00027)
Industry-level gross value added (Germany)				0.00460**
				(0.0020)
Industry-level gross value added (Germany, K3)				0.000460
				(0.0033)
Industry-level gross value added (Germany, K4)				-0.00167
				(0.0053)
Industry-level gross value added (Germany, K34)				0.00271
				(0.0032)
Constant	0.349	0.396	0.397	-0.102
	(0.44)	(0.30)	(0.27)	(0.36)
Time * industry dummies	yes	yes	yes	yes
Observations	6,099	6,099	6,099	6,099
Number of firms	2,482	2,482	2,482	2,482
Sargan test statistic	61.98	159.0	184.3	270.1
Degrees of freedom (Sargan test)	68	189	239	315
Sargan (p-value)	0.682	0.945	0.996	0.968
AR1 (p-value)	0.000	0.000	0.000	0.000
AR2 (p-value)	0.834	0.826	0.859	0.920

b) Sample Splits

	(1) Full sample	(2) Domestic exporters	(3) German MNEs	(4) Foreign Firms	(5) Two-Way MNEs
Employment (*t*-1)	0.833***	0.861***	0.949***	0.916***	0.912***
	(0.034)	(0.057)	(0.037)	(0.041)	(0.051)
Sales	0.186***	0.156***	0.0701**	0.0793**	0.103**
	(0.031)	(0.051)	(0.029)	(0.030)	(0.046)
Wages	-0.368***	-0.351**	-0.0715	-0.134***	-0.237**
	(0.13)	(0.15)	(0.069)	(0.039)	(0.11)
Constant	0.349	0.391	-0.133	0.102	0.339
	(0.44)	(0.47)	(0.29)	(0.16)	(0.52)
Time * industry dummies	yes	yes	yes	yes	yes
Observations	6099	598	608	69	320
Number of firms	2482	262	251	35	123
Sargan test statistic	61.98	28.88	731.2	2.945	31.64
Degrees of freedom (Sargan test)	68	46	45	19	39
Sargan (p- value)	0.682	0.977	0.000	1.000	0.793
AR1 (p-value)	0.000	0.052	0.024	0.227	0.005
AR2 (p-value)	0.834	0.290	0.573	0.579	0.359

Table 3: Speed of Adjustment, Short- and Long-Run Elasticities

This Table gives results of tests on linear combinations of the coefficient estimates for the regressions reported in Table 2a, Column (2), (3), and (4). *, **, ***: significant at the 10%, 5% and 1% level, respectively.

	With FDI	With trade	With domestic and foreign aggregate variables
Speed of adjustment			
All	0.128***	0.130***	0.114***
Domestic Exporter		0.128***	0.114***
German MNE (K3)	0.123***	0.127***	0.113***
Foreign MNE (K4)	0.129***	0.132***	0.119***
Two-Way MNE (K34)	0.121***	0.123***	0.110***
Short-run output elasticity			
All	0.117***	0.118***	0.101***
Domestic Exporter		0.123***	0.107***
German MNE (K3)	0.079**	0.071***	0.078***
Foreign MNE (K4)	0.118***	0.123***	0.113***
Two-Way MNE (K34)	0.103***	0.102***	0.096***
Short-run wage elasticity			
All	-0.245***	-0.243***	-0.208***
Domestic Exporter		-0.255***	-0.219***
German MNE (K3)	-0.139	-0.111	-0.148**
Foreign MNE (K4)	-0.236*	-0.243*	-0.176
Two-Way MNE (K34)	-0.208**	-0.202**	-0.259***
Long-run output elasticity			
All	0.915***	0.903***	0.890***
Domestic Exporter		0.954***	0.934***
German MNE (K3)	0.638***	0.561***	0.685***
Foreign MNE (K4)	0.913***	0.969***	0.993***
Two-Way MNE (K34)	0.854***	0.831***	0.869***
Long-run wage elasticity			
All	-1.909***	-1.865***	-1.833***
Domestic Exporter		-1.983***	-1.915***
German MNE (K3)	-1.131	-0.880	-1.308**
Foreign MNE (K4)	-1.820*	-1.841*	-1.484
Two-Way MNE (K34)	-1.721**	-1.638**	-2.356***

Table 4: Robustness Tests – Sample Splits

This Table presents results of labor demand regressions using data for firms taken from the combined *Dafne-MiDi* database. The dependent variable is the change in the level of employment. For each explanatory variable (lagged employment, sales, wages), we report the coefficient estimate as well as the coefficients of interaction terms with 0/1 ownership/exporter dummies. All variables are entered in log levels. Manufacturing = industry D, Real estate = industry K. Large firms = firms with more than 500 employees. Results are based on system GMM estimations. Robust standard errors are reported in parentheses. *, **, ***: significant at the 10%, 5% and 1% level, respectively.

	(1) All firms	(2) Manufacturing	(3) Real Estate	(4) Large Firms
Employment (*t*-1)	0.870***	0.850***	0.896***	0.831***
	(0.022)	(0.038)	(0.028)	(0.036)
Domestic Exporter	0.00200	0.00940	0.00453	0.00146
	(0.0062)	(0.0073)	(0.013)	(0.0061)
German MNEs (K3)	0.00389	0.00563	0.000747	0.00164
	(0.0045)	(0.0055)	(0.0053)	(0.0044)
Foreign Firms (K4)	-0.00166	-0.000361	-0.0173	-0.000483
	(0.0068)	(0.011)	(0.011)	(0.0052)
Two-Way MNEs (K34)	0.00723	-0.000190	-0.00871	-0.000745
	(0.0069)	(0.0077)	(0.0095)	(0.0080)
Sales	0.118***	0.0944***	0.128***	0.118***
	(0.022)	(0.034)	(0.033)	(0.030)
Domestic Exporter	0.00479	0.0394	-0.0146	0.00135
	(0.024)	(0.024)	(0.021)	(0.028)
German MNEs (K3)	-0.0467	0.0318	-0.0114	-0.00582
	(0.030)	(0.027)	(0.024)	(0.027)
Foreign Firms (K4)	0.00489	0.000110	0.0516	0.0425
	(0.046)	(0.032)	(0.051)	(0.049)
Two-Way MNEs (K34)	-0.0154	0.0282	0.0162	0.0297
	(0.029)	(0.028)	(0.038)	(0.027)
Wages	-0.243***	-0.160**	0.00690	-0.116
	(0.080)	(0.063)	(0.079)	(0.079)
Domestic Exporter	-0.0114	-0.116*	0.0527	-0.00942
	(0.067)	(0.068)	(0.051)	(0.085)
German MNEs (K3)	0.132	-0.0884	0.0395	0.00742
	(0.085)	(0.076)	(0.067)	(0.083)
Foreign Firms (K4)	0.0000526	0.0284	-0.144	-0.130
	(0.13)	(0.096)	(0.14)	(0.14)
Two-Way MNEs (K34)	0.0415	-0.0636	-0.0354	-0.0950
	(0.085)	(0.083)	(0.099)	(0.080)
Constant	0.397	0.400*	-0.882**	0.237
	(0.27)	(0.21)	(0.38)	(0.29)
Time * industry dummies	yes	yes	yes	yes
Observations	6,099	1,955	1,353	2,143
Number of firms	2,482	787	575	856
Sargan test statistic	184.3	182.7	90.02	151.3
Degrees of freedom (Sargan)	239	209	138	197
Sargan (p-value)	0.996	0.905	0.999	0.993
AR1 (p-value)	0.000	0.001	0.000	0.000
AR2 (p-value)	0.859	0.594	0.819	0.202

Table 5: Robustness Tests – Different Dynamic Specifications

This Table presents results of labor demand regressions using data for firms taken from the combined *Dafne-MiDi* database. The dependent variable is the change in the level of employment. For each explanatory variable (lagged employment, sales, wages), we report the coefficient estimate as well as the coefficients of interaction terms with 0/1 ownership/exporter dummies. Column (1) shows the baseline specification, which is equivalent to Column (3) of Table 2a. Columns (2) and (3) use time and industry dummies separately. Column (4) adds additional lagged regressors, which are reported in Column (4b). Column (5) reports results of an estimation of the model equation in first differences. Column (6) gives the results of a difference GMM estimation. All variables are entered in log levels. Robust standard errors are reported in parentheses. *, **, ***: significant at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4) all in Δ	(5)
Employment (*t*-1)	0.870***	0.886***	0.853***	0.103*	0.372***
	(0.022)	(0.017)	(0.025)	(0.063)	(0.056)
Domestic Exporter	0.00200	0.00813	0.00763	-0.00166	-0.00365
	(0.0062)	(0.0066)	(0.0068)	(0.0067)	(0.0099)
German MNEs (K3)	0.00389	0.00459	0.00573	0.00448	0.000260
	(0.0045)	(0.0046)	(0.0047)	(0.0051)	(0.0054)
Foreign Firms (K4)	-0.00166	0.000277	0.00273	-0.00253	-0.00966
	(0.0068)	(0.0068)	(0.0068)	(0.0054)	(0.0082)
Two-Way MNEs (K34)	0.00723	0.00770	0.00839	0.00321	-0.00528
	(0.0069)	(0.0071)	(0.0070)	(0.0064)	(0.0094)
Sales	0.118***	0.101***	0.133***	0.265***	0.239***
	(0.022)	(0.019)	(0.024)	(0.090)	(0.074)
Domestic Exporter	0.00479	0.00205	-0.000806	0.0479	0.0129
	(0.024)	(0.023)	(0.026)	(0.068)	(0.069)
German MNEs (K3)	-0.0467	-0.0327	-0.0452	0.0357	-0.00587
	(0.030)	(0.033)	(0.033)	(0.027)	(0.033)
Foreign Firms (K4)	0.00489	0.0112	-0.000940	-0.00352	-0.0928
	(0.046)	(0.044)	(0.042)	(0.046)	(0.058)
Two-Way MNEs (K34)	-0.0154	-0.0119	-0.0189	0.0454	0.0231
	(0.029)	(0.028)	(0.030)	(0.043)	(0.039)
Wages	-0.243***	-0.27***	-0.314***	-0.63***	-0.66***
	(0.080)	(0.080)	(0.081)	(0.13)	(0.13)
Domestic Exporter	-0.0114	-0.0176	-0.00591	-0.130	-0.0177
	(0.067)	(0.062)	(0.072)	(0.20)	(0.20)
German MNEs (K3)	0.132	0.0929	0.126	-0.0811	0.0286
	(0.085)	(0.094)	(0.095)	(0.070)	(0.100)
Foreign Firms (K4)	0.0000526	-0.0194	0.0140	0.0296	0.264
	(0.13)	(0.13)	(0.12)	(0.13)	(0.17)
Two-Way MNEs (K34)	0.0415	0.0287	0.0526	-0.108	-0.0773
	(0.085)	(0.081)	(0.087)	(0.11)	(0.11)
Constant	0.397	0.565**	0.507	0.00748	–
	(0.27)	(0.27)	(0.32)	(0.0086)	–
Time dummies	no	yes	no	no	no
Industry dummies	no	no	yes	no	no
Time * industry dummies	yes	no	no	yes	yes
Observations	6,099	6,099	6,099	3,617	3,617
Number of firms	2,482	2,482	2,482	2,266	2,266
Sargan test statistic	184.3	209.2	206.0	96.01	109.7
Degrees of freedom (Sargan)	239	240	240	152	165
Sargan (p-value)	0.996	0.925	0.945	1.000	1.000
AR1 (p-value)	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.859	0.978	0.793	0.061	0.816

Table 6: Determinants of Firm-Level Employment Dispersion

This Table shows results from panel fixed effects regressions of the combined *Dafne-MiDi* database. In Column (1), we again report the baseline labor demand estimation from Table 2a. In the remaining columns, the dependent variable is the dispersion of employment as defined in the text in Section 2.2.3; the explanatory variables are the respective dispersion measures, too. The lag length of the instruments has been limited to three periods. Robust standard errors are reported in parentheses. *, **, ***: significant at the 10%, 5% and 1% level, respectively.

	(1) Baseline: Table 2a Column (1)	(2) Dispersion Regression w/ Cov Terms	(3) Dispersion Regression w/o Cov Terms	(4) Dispersion Regression w/o Cov Terms
Employment (t-1)	0.833***	0.0621	0.119*	0.00375
	(0.034)	(0.072)	(0.063)	(0.090)
Domestic Exporter				0.125
				(0.22)
German MNEs (K3)				0.0829
				(0.13)
Foreign Firms (K4)				0.154
				(0.100)
Two-Way MNEs (K34)				-0.188
				(0.20)
Sales	0.186***	0.619	0.617	0.188
	(0.031)	(0.41)	(0.45)	(0.12)
Domestic Exporter				-0.0958
				(0.21)
German MNEs (K3)				0.0412
				(0.23)
Foreign Firms (K4)				0.422
				(0.40)
Two-Way MNEs (K34)				0.691
				(1.02)
Wages	-0.368***	0.293***	0.354***	0.319***
	(0.13)	(0.067)	(0.098)	(0.070)
Domestic Exporter				2.117***
				(0.74)
German MNEs (K3)				0.175
				(0.96)
Foreign Firms (K4)				0.322
				(1.26)
Two-Way MNEs (K34)				-0.164
				(0.42)
Cov (employment (t-1), sales)		0.224		
		(0.29)		
Cov (employment (t-1), wages)		0.212		
		(0.46)		
Cov (sales, wages)		0.304		
		(0.93)		
Constant	0.349	-0.00295	-0.00331	0.00589
	(0.44)	(0.0097)	(0.011)	(0.0051)
Time * industry - dummies	yes	yes	yes	yes
Observations	6,099	3,646	3,646	3,646
Number of firms	2,482	2,276	2,276	2,276
Sargan test statistic	61.98	37.33	24.56	70.06
Degrees of freedom (Sargan)	68	65	36	123
Sargan (p-value)	0.682	0.998	0.926	1.000
AR1 (p-value)	0.000	0.037	0.012	0.026
AR2 (p-value)	0.834	0.306	0.154	0.853

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