International Competitiveness, Job Creation and Job Destruction - An Establishment Level Study of German Job Flows

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First Draft

This version: 05.07.2007

Abstract:

This study investigates the impact of international competitiveness on net employment, job creation, job destruction, and gross job flows for a representative sample of German establishments from 1993 to 2005. We find a significant but small effect of real exchange rate shocks on employment, comparable in magnitude to studies for the U.S.. However, contrary to the U.S., the employment adjustment (among surviving firms) operates mainly through the job creation rather than the job destruction rate. Job destruction seems to manifest itself rather in discrete events such as restructuring and bankruptcy. We suggest that these findings are consistent with a highly regulated labor market, in which smooth adjustment is costly and possibly delayed.

Key words: competitiveness, gross worker flows, real exchange rate, openness, bankruptcy.
JEL classification: F4.

Acknowledgement: The authors thank Johannes Gutenberg-University Mainz for research funds and Mario Mechtel for valuable research assistance. We are very grateful to the IAB for the hospitality and, especially, Dana Müller for excellent advice on data issues. We also thank Michael Klein for very helpful suggestions.

1) Introduction

Globalization angst seems to be on the rise in many countries and it usually centers on fears of massive job losses. Whenever the Euro goes through a phase of strength vis-à-vis the U.S. dollar, policymakers and politicians alike raise the question of negative effects on exports and on employment. A number of studies have shown for the U.S. that movements in the real exchange rate do significantly impact net and gross job flows in manufacturing, and that this effect increases with openness. Thereby, the adjustment process as exemplified in changing net and gross job flow rates seems to be mainly driven by a higher job destruction rate rather than the job creation rate.[1] Compared with the U.S., there is only limited evidence on the effects of openness and international competitiveness on job flows in Europe.

This paper aims at filling this gap. Based on an establishment-level data set from Germany, we investigate the following two questions: First, how large is the effect of a loss (or gain) in international competitiveness of German firms on employment? Second, does the adjustment mechanism work through job creation or job destruction?

Our results suggest that the answer to the first question is: small. We do find a statistically significant and robust adjustment effect of net job flows to changes in the real exchange rate but it is quite small. With respect to the second question German firms tend to adjust to a loss in international competitiveness in contrast to their American counterparts primarily through lower job creation rather than higher job destruction. However, this holds true only if one considers surviving firms. Once we consider attrition through default, the adjustment process switches back to the job destruction rate just as in the U.S.. In addition, the probability of default depends, among others, positively on a loss in international competitiveness.

[1] See e.g. Grossman (1982), Branson and Love (1988), Revenga (1992), Sachs and Shatz (1994), Burgess and Knetter (1998), Goldberg and Tracy (2000) and Campa and Goldberg (2001), and Klein et al. (2003).

A highly regulated labor market could be the cause for this differing adjustment channel. Higher firing costs due to severance payments or advance notice rules may reduce the sensitivity of the job destruction rate to changes in the real exchange rate. On one hand, the burden of adjustment of net flows is then shifted towards a more flexible job creation rate among the firms that survive.[2] On the other hand, labor market rigidities drive some firms into bankruptcy in bad times. To see why, note that firms are either not allowed to adjust their labor demand to their profit-maximizing level in the occurrence of shocks or adjustment costs through government regulation are so high that firms prefer to forgo adjustment. Then, redundant workers are not laid off, firms are not able to reduce fixed wage costs, profits deteriorate, and some firms accumulate losses up to the point of bankruptcy. While labor market regulation may preserve jobs among established firms in the presence of negative external shocks such as a real appreciation, jobs are destroyed through defaults in those firms that are least efficient or most heavily pressured by foreign competition.

There are three further findings of our analysis that underline the importance of German labor market institutions for firm adjustment strategies: First, the job gross flow rate is lower in Germany than in other European countries and the U.S., hinting at smoothing of labor demand in the presence of labor protection. Second, the German labor market exhibits some islands of deregulation, including the allowance of fixed-term contracts which are not subject to severance payments. In particular, establishments with a large share of workers with fixed-term contracts show larger worker gross flows as well as much larger job creation rates, but not larger job destruction rates. Finally, company restructurings through closure, spin-offs,

[2] These findings are in line with studies of the French labor market. Gourinchas (1999) finds that net employment changes are driven by decreasing job creation rather than increasing job destruction. Also Abowd et al. (1999) suggest that French firms rely upon entry flows to adjust their stock of employees.

and sales of establishment parts represent another channel through which the workforce is adjusted via job destruction.

Our study takes the model of Klein et al. (2003) who study industry specific job flows as a starting point. However, our data allows us to improve on the existing literature by using measures of job creation and job destruction rates *within* establishments rather than within industries. This measure is more closely associated with labor market adjustment cost. Moreover, we can proxy for various other establishment level determinants of worker flows such as sales, average wage costs, restructuring, share of fixed term contracts, and share of workers enrolled in vocational training programs. Furthermore, our study is not restricted to the manufacturing sector but relies on a representative sample of all businesses of the German economy. This allows us to get a better grasp of the overall effect of international competitiveness on the labor market. Indeed, it turns out that firms significantly affected by real exchange rate shocks are not confined to the manufacturing sector. Even though our sample covers the relatively short period from 1993 to 2005, it is important to note that our variables of interest, namely the real exchange rate, the employment level and gross domestic product still exhibit considerable variation and have gone through a full cycle.

The remainder of the paper is organized as follows: Section 2 discusses the channels through which openness and price competitiveness can impact employment. Section 3 presents the data and the estimation strategy, section 4 contains the empirical results and section 5 concludes.

2) International competitiveness and employment: theory and institutions

The focus of this paper is to study the impact of a change in price competitiveness on employment flows at the establishment level contingent on its openness. While we expect in general firms more open to international trade to be more affected by changes in the real exchange rate, there are different transmission *channels*. First, an appreciation renders domestic production more expensive relative to production abroad. Hence, the price competitiveness of domestic firms decreases and export sales decline. Firms may decide to absorb the negative shock and produce at overcapacity or, instead, reduce fixed costs by cutting net employment. In the latter case, such an adjustment may be implemented by less new job creation using natural attrition, or through worker lay-offs. Moreover, the adjustment may be asymmetric depending on whether the real exchange rate appreciates or depreciates.

Import competition constitutes a second channel through which real exchange rates may have an impact on employment fluctuation. A real exchange rate appreciation of the domestic currency may assist foreign firms in gaining market share in the domestic market due to decreasing relative production costs for foreign competitors. The domestic firm may once more compensate the loss in market share by adjustments in capacity utilization, inventory or employment. Hence, even those domestic firms that do not export themselves may be affected by real exchange rate fluctuations through foreign competition on the domestic market.

A third channel counteracts the first two channels. While a real exchange appreciation reduces the competitiveness of domestic production, it renders intermediate inputs cheaper. Hence, firms which heavily rely on raw material inputs may actually gain competitiveness through real exchange rate appreciations of the domestic currency relative to other domestic firms.

From a theoretical point of view, the direction and size of the overall effect of foreign exchange movements on employment remains unclear.

The labor market adjustment process in turn will depend on the institutional settings. While a shock to international competitiveness is exogenous to a firm, its reaction to it is clearly not. In particular, it will be constrained by the labor market institutions that impose adjustment costs to dismissals. Contrary to the liberal U.S. labor market, the German one is heavily regulated.[3] There are extensive labor protection laws which make individual and collective dismissals complex and costly. For instance, in the case of collective dismissals work councils and the local governments have to be consulted, the firm is required to negotiate a "social plan", which includes severance payments and retraining programs. Both in collective and individual dismissals the law provides extensive possibilities to appeal to labor courts. In the German Protection Against Dismissal Law ("Kündigungsschutzgesetz") dismissals are considered illegal, if they are "socially unjustified" and lack an "important" reason. The interpretation of these terms are mostly up to labor courts and these have tended to rule on the principle, that dismissals should be the "ultima ratio" and that work contracts should be continued whenever possible. The burden of proof whether a dismissal was justified is placed on the employers. Voluntary severance payments are often offered by the employer to convince a worker to quit (cancelation agreement) and avoid law costs which only the employer is burdened with.[4] As a consequence, job destruction is either prohibited or firing costs are often so large that firms choose to forgo dismissals. If dismissals are low in bad times, the need for job creation is lower in good times, too, and so are gross job flows. Hence, we expect the job destruction rate to react only weakly on external shocks such as of the real exchange rate or, indeed, any other external shock to labor demand.

[3] See e.g. Hunt (2000) or IMF (2006) for a description of German labour law.
[4] In the year 2002, there were 297 000 law suits pending which were appealing to the German Protection Against Dismissal Law.

Since the 1980s a series of mild reforms have been initiated to introduce some flexibility in labor protection by allowing new forms of employment contracts. In particular, there was the emergence of temporary employment agencies and the permission of fixed-term contracts. These instruments of flexibility have been widely used and as a consequence of it the overall employment protection as measured by the OECD has subsequently declined in Germany: The overall index of employment protection in 2002/2003 was only slightly above the average of the EU 15. However, the overall index masks large differences between regular and temporary employment. The former still has one of the most restrictive regulations and flexibility has been confined to the latter.[5] As a result, we expect stronger reactions in job flows of firms with, for instance, a larger share of fixed-term contracts to external shocks.

In the worst case, labor market rigidities are so strictly binding to a firm that it is driven into bankruptcy. Excessive establishment closures and firm bankruptcies are the result. Hence, we expect the job destruction rate to react in case of establishment closures and bankruptcies.

The following graph offers some first tentative insights into which channel may be dominant. Figure 1 shows aggregate figures on the real effective exchange rate and on the evolution of export share for Germany over the sample period 1993 to 2005. The openness measure is based on a representative sample of German establishments and the real effective exchange rate is measured as the average hourly labor costs in manufacturing of Germany relative to about 30 other countries weighted by their trade shares to Germany.

Insert Figure 1 about here

[5] See IMF (2006, p 119).

We note that the real exchange rate went through a major cycle during the sample period. Against the background of the boom in domestic sales (especially in East Germany) after reunification and the restrictive monetary policy to fence off inflation, the Deutschmark appreciated in real terms from the early to the mid 90s. Then, Germany experienced a longer phase of stagnation. Domestic consumption and investment remained subdued, coupled with low inflation and wage growth. Consequently, the effective real exchange rate started to depreciate and German export competitiveness recovered. Following the introduction of the Euro in 1999 the real exchange rate continued to depreciate mainly because of continued lower wage growth in Germany vis-à-vis the rest of the monetary union. This mitigated the effect of an appreciation of the Euro Dollar rate as of 2003. Overall the export share[6] was negatively related to real exchange rate swings with a particularly marked reaction to the appreciation in the early to mid 90s.[7]

According to Figure 2 average employment followed a steady downward trend, seemingly uncorrelated with the real exchange rate swings. However, distinguishing between exporting firms and non-exporting firms, reveals more cyclicality. For example, the real appreciation in early-to-mid 90s is accompanied with a marked decline in net employment in exporting firms and a rise in employment in non-traded goods firms. Hence, job losses in the trading sector seem to be largely absorbed by the non-traded goods sector. While the overall picture from aggregate data suggests that the impact of real exchange rate fluctuations on the unemployment rate is minor, labor market adjustment costs remain to be considered. Since macroeconomic figures tend to mask the reshuffling of labor across establishments, we will later turn to microeconometric analyses in order to better assess these adjustment costs.

[6] The export share is calculated over all establishments in our sample which is representative with appropriate weights for the West German economy covering both manufacturing and other sectors.
[7] The correlation coefficient is -0.43.

Insert Figure 2 about here

3) Data set and empirical strategy

3.1) Data and sample selections

Our main data source constitutes the IAB Establishment Panel from the Institute for Employment Research (IAB).[8] This panel started in 1993 with 4,265 establishments in West Germany (see for instance Kölling, 2000; Bellmann, 1997) and included roughly 16,000 establishments nationwide in 2005 due to several waves of additional establishments. The IAB panel is drawn from a stratified sample of the establishments included in the employment statistics register, whereby the selection probabilities depend on the variation of the number of employees in the respective stratum. The stratum is defined over 16 industries, 10 categories of establishment size, and 16 German regions (Lander). Large establishments are oversampled, but the sampling within each cell is random. Survey data are collected by professional interviewers of Infratest Sozialforschung on account of the German Institute of Employment Research. Participation of firms is not based on legal but on voluntary base. The response rate of more than 80% for repeatedly interviewed establishment is relatively high as compared to other non-official German establishment panel studies. We consider all available survey years in our empirical study, covering the sample period 1993 to 2005.

More precisely, we consider **three samples**. Our preferred sample consists of a **balanced panel** of establishments in order to capture the behavioral response of firms to exogenous shocks. This way, we avoid that changes in the composition of the sample due to new waves

[8] The IAB-Establishment Panel data are confidential but not exclusive. They are available for non-commercial research by visiting the Research Data Centre (FDZ) of the Federal Employment Agency at the Institute of Employment Research in Nürnberg, Germany. For further information, please refer to http://fdz.iab.de/en.

of establishments in later stages and the replacement of non-responding establishments by new random draws from the same stratum affect our results.[9] We also exclude establishments with less than 5 employees, leaving us with little more than 400 establishments for which employment data is available for every sample year.[10] Relying also on the IAB Establishment panel, Addison and Teixeira (2006) and Schank (2005) opt for similar sample selections in their studies on effects of works councils on employment change and on productivity differences between overtime and standard-time establishments, respectively.[11] The disadvantage of a balanced panel is that it includes only surviving firms. This motivates us to consider also a second sample, containing in addition to all establishments from the balanced sample all establishments that went bankrupt over the sample period (**attrition sample**). The third one that we consider for estimation is an **unbalanced sample** where we require a firm to respond to the questionaire at least during five years. Our specifications on this sample allow for considerable efficiency gains as opposed to the balanced panel and the attrition sample, since the number of observations increases almost six-fold. At the same time, consistency of estimates across all three samples assures us that the estimates are stable, since the numbers of observations vary considerably across the three samples.

3.2) Empirical strategy

We follow the labor economics literature in studying not only net employment fluctuations but also separately job creation rates, job destruction rates and gross job flows. The main argument for assessing gross job flows is to assess the total labor market adjustment costs

[9] New firms are representative with respect to employment but not necessarily with respect to the covariates. For example, there is a slight break in the average export share when new waves of establishments come in.
[10] To have a balanced sample while at the same time exploiting as large a time dimension as possible to have sufficient variability in the exchange rate variable, we had to exclude Eastern German establishments in the balanced sample, since Eastern German firms entered the IAB-Establishment Panel only in a later wave.
[11] Other empirical studies that rely on the IAB-Establishment Panel or Linked-Employer-Employee (LIAB) dataset include Bauer and Bender (2004), Zwick (2006), Zwick (2004) and Schank et al. (2007).

associated with exogenous shocks, which are obviously underestimated by net employment fluctuations. Our baseline estimation equation is a modified reduced form following the model of Klein et al. (2003):

$$\begin{aligned} wor\ker\_ flow_{it} = {} & \beta_1 \cdot job\_creation_{it-1} + \beta_3 \cdot job\_destruction_{it-1} + \beta_3 \cdot competitiveness_{it} + \\ & + \beta_4 \cdot \mathrm{int}erest\_rate_t + \beta_5 \cdot \mathrm{Re}al\_GDP\_growth_t + \beta_6 \cdot apprenticeship_{it} + \\ & + \beta_7 \cdot fixed\_term\_contract_{it} + \beta_8 \cdot sales\_growth_{it} + \beta_9 \cdot Avg\_wage_{it} + \\ & + \beta_{10} \cdot restructuring_{it} + \beta_{11}' \cdot size_{it} + d_i + \varepsilon_{it} \end{aligned} \quad (1)$$

where

$$wor\ker\_ flow_{it} \in \{job\_creation_{it}, job\_destruction_{it}, net\_flow_{it}, gross\_flow_{it}\}$$

and i denotes the establishment index, t the time index, β_k regression coefficients, d_i is a vector of either industry or establishment fixed effects, and ε_{it} the usual estimation error which may possibly be heteroscedastic.

The standard measurement of job creation and job destruction are the aggregation of *net* employment increases over all establishments with employment gains, and the aggregation of net employment decreases over all establishments which downsize, respectively (see, for instance, Davis and Haltiwanger, 1999). Gross job flows are correspondingly the sum of job creation and destruction, and net job flows the difference. The disadvantage of this definition is that the employment fluctuation *within* an establishment is ignored. For example, a real appreciation may cause a reduction of employees in the export division which may be compensated by an increase in employment in the marketing division. In this case, the standard definitions would not indicate any job creation or destruction although it actually took place.

Our dataset contains a measure of job creation and destruction *within* an establishment. Hence, we define job creation as any new hire of an establishment from outside, and job destruction as any separation of a worker from the establishment.[12] Hence, one and the same establishment can have job creation and destruction at the same time according to our definition but not according to the definition of Davis and Haltiwanger (1999). The two definitions are, of course, identical when it comes to the measurement of net flows. We employ the following definitions for the *rates* of job creation, job destruction, net flows, and gross flows in our estimations:

$$wor\,\text{ker}\_\ flow_{it} = \frac{\Delta X_{it}}{0.5 \cdot employment_{it} + 0.5 \cdot employment_{it-1}}, \qquad (2)$$

where $employment_{it}$ is the number of officially employed full- and part-time workers at June 31 of year t and ΔX_{it} stands for either the number of new workers within the first half of year t taken twice[13], or dismissed workers, or the sum of the two, or the difference of the two corresponding to $job\_creation_{it}$, $job\_destruction_{it}$, $gross\_flow_{it}$, and net_flow_{it}, respectively. The averaging of the denominator over two periods is taken from Davis and Haltiwanger (1999) and serves to smooth potential outliers in the data.

We employ three different types of covariates, namely a real exchange rate indicator, variables that capture features of labor market institutions, and other establishment-specific or macroeconomic control variables. Our explanatory variable of interest is the real exchange

[12] Our definitions are also distinct from the one of worker flows (rather than job flows). A gross worker flow would additionally include mobility of workers across workplaces within the establishment. See Definition 5 in Davis and Haltiwanger (1999). Since costs of workplace changes within an establishment are internal to the firm but search cost of dismissed workers external, we do not consider gross worker flows as the appropriate proxy for the size of labour market adjustment costs – at least if one associates negative externalities with them.

[13] We implicitly assume that there is no seasonal component to job creation and destruction rates such that they are roughly the same in the first and second half of the year.

rate indicator. The real exchange rate most relevant for employment decisions of firms is one based on wage costs. Hence, our preferred measure of the real exchange rate is the German average hourly wage costs in manufacturing relative to a trade-weighted average across the major German trading partners ($wage\_costs_t$), or formally:

$$wage\_costs_t = \sum_{j \in C} \frac{hourly\_wage\_costs\_Germany_t}{hourly\_wage\_costs_{jt}} \cdot \frac{Exports_{jt}}{\sum_{i \in C} Exports_{it}}, \quad (3)$$

whereby hourly wage costs are denominated in U.S. Dollars and compiled by the U.S. Bureau of Labor Statistics. C is a set of 32 countries.

According to the model of Klein et al. (2003), the impact of the real exchange rate on the job flow rates is larger for establishments with a high export share in sales. For this reason, we interact the percentage change of the wage-costs based real exchange rate ($\Delta wage\_costs_t$) with the firm-specific export share in sales ($openness_{it}$) to form the variable $competitiveness_{it}$

$$competitiveness_{it} = \Delta wage\_costs_t \cdot openness_{it}, \quad (4)$$

where the export share ($openness_{it}$) is defined as:

$$openness_{it} = \frac{1}{2} \sum_{\tau=t-2}^{-1} \frac{Exports_{i\tau}}{Total\_Revenues_{i\tau}}. \quad (5)$$

We compute the openness variable from the average lagged export-to-revenues ratios in order to mitigate concerns that international trade could be endogenous. We expect a negative (positive) sign on our coefficient of interest, $competitiveness_{it}$, for the $job\_creation_{it}$ and net_flow_{it} ($job\_destruction_{it}$). We have no firm priors with respect to $gross\_flow_{it}$,.

To test the hypothesis that job flows, and particularly the job destruction rate, do not react much on external shocks we include the growth in sales ($sales\_growth_{it}$) and the growth in GDP per capita (real_GDP_growth_t). We expect a positive (negative) coefficient for sales

and GDP per capita on $job\_creation_{it}$ ($job\_destruction_{it}$) and net_flow_{it}. For $gross\_flow_{it}$ we have once more no specific prior. In addition, the percentage of workers with temporary work contracts ($fixed\_term\_contract_{it}$) in total work force (see for instance Addison and Teixeira, 2006) measures to what extend an establishment is subject to the regulated part of the labor market and which part is free of adjustment cost. Hence, we expect that an establishment with a large share of temporary workers may be encouraged to create more new jobs and expand their workforces, but also to terminate more frequently a work relation and generally increase worker turnover.

Furthermore, we construct a rough proxy to capture the employment effects of establishment restructuring. We apply the variable $restructuring_{it}$ that takes the value of one if there has been closure, spin-off, sales or acquisition of parts of the establishment during the last year, and zero otherwise. Restructuring comprises thus also the case when a firm goes bankrupt but part of an establishment of such a firm is bought up by another entrepreneur and some of the previous workforce is offered employment under new conditions. In this case, the establishment is not marked as bankrupt in our dataset but continues its sample life under its old identifier.[14] In any case, restructuring may thus be associated with more job destruction and creation, and more job gross flows.

Our establishment-specific control variables include variables on workforce characteristics, namely the percentage of apprentices ($apprenticeship_{it}$) and the average wage cost per employee (avg_wage_{it}). A high share of apprentices and a low average wage reflect a high share in low-skilled labor, which may be more prone to job loss. Of course, a higher average wage compared to other establishments may in principle also capture higher factor

[14] Only in the case when parts of a bankrupt firm are continued under new ownership, labor protection rights of workers are extinguished and new work contracts need to be written. In any other case of ownership change, the terms of contract will be taken over from the previous owner.

cost of this establishment for the same type of labor. In addition, the dummy vector $size_{it}$ controls for size effects well-known to affect job flow rates by categorizing establishments into 10 different employment classes according to their size.[15] Finally, the variable $interest\_rate_t$ stands for the short-term discount and proxy for the general macroeconomic environment. An overview of the all variable definitions and the respective data sources are given in Table 1 in the Appendix.

Next, we consider some summary statistics. Table 2 shows the average net job flow rate, job creation rate, job destruction rate, and gross job flow rate by types of firms. We note that average job creation and job destruction are quite similar across different types of firms and that they are on average much smaller than comparable flows for the U.S. Some patterns emerge from simply eyeballing the data. On the one hand, the firms generating high net employment growth tend to be large and/or open. On the other hand, the firms with higher wage costs or lower sales growth have lower employment growth. The employment effects of fixed term contracts are particularly interesting since they serve as an instrument of flexibility in an otherwise highly regulated market. The aggregate data shows the importance of this instrument since firms with a high share of fixed term contracts have created jobs at a rate of more than 10% and more than 3.5 % in net employment. In contrast to that, job creation in firms with low shares of fixed term contracts has amounted to just about 5 % and net employment has even declined by about 1%.

Insert Table 2 about here

Table 3 provides the export share and the job flow rates by industry. While it may not come as a big surprise that the largest average export shares are found in the manufacturing

[15] The relation between firm size and job flows is one of the strongest according to Davis et al. (1996).

sectors, these summary statistics reveal some considerable heterogeneity between and within sectors. Openness to trade is not confined to manufacturing and even relatively closed sectors like the public or non-profit sector still incorporate at least some very open establishments. Hence, it is important to include these sectors in the analysis to gauge the full effect of external shocks on the economy. There is also considerable variation in job flows across industries. For example, worker turnover is largest in restaurants and lowest in the mining and energy industries.

Overall, job creation and job destruction rates are very low compared to other countries, which may hint at regulatory rigidities in the German labor market. For example, Gomez-Salvador et al. (2004) report the lowest average gross job flows for Germany in a sample of 13 European countries. Moreover, Davis et al. (1996, p. 21) report job creation and destruction rates in height of 9.1 and 10.2 percent, respectively, for the U.S. between 1973 and 1988. In contrast to that our rates are roughly half of theirs (6.0 and 6.2 percent, respectively). Since Davis et al. (1996) confine themselves to intra-industry measures, while our estimates are based on *within* establishments, the figures cannot be directly compared. Still, they render some interesting insights. In fact, even though our estimates are expected to measure job reallocation *more precisely*, our figures are smaller then theirs, underlining the wedge in job reallocation rates.

Insert Table 3 about here

3.3) Further estimation issues

The postulated reduced form in equation (1) is a dynamic panel regression model, since (part of) the dependent variable appears with a time lag in the covariates. Some peculiarities have to be taken into account when estimating such a model.

A dynamic panel growth regression model can be written in a general form as follows:

$$y_{it} = \sum_{l=1}^{p} \alpha_l \cdot y_{i,t-l} + \beta_0 + \beta_1 \cdot x_{i,t-1} + \beta_2 \cdot z_{i,t-1} + \eta_i + \varepsilon_{it}, \qquad \text{for} \quad t=1+p\ldots T, \qquad (6)$$

where y_{it} is the dependent variable of group i at time t=1..T, x_{it} is a vector of pre-determined control variables, z_{it} is a vector of exogenous control variables, η_i an i.i.d. establishment-specific random effect, ε_{it} is the usual i.i.d. error term (possibly heteroscedastic but not autocorrelated), and $\beta_j, j = 0,1,2,$ and $\alpha_l, l = 1,\ldots, p,$ are the regression coefficients with $\left|\sum_{l=1}^{p} \alpha_l\right| \leq 1$.[16] The initial value of the dynamic process is assumed to be an i.i.d. random deviation from the steady state value.

A pre-determined (endogenous) covariate is defined as a random variable that is allowed to depend on past values of the dependent variable, but not on future values. When allowing for pre-determined variables x_{it}, the reverse causality from past values of the dependent variable to x_{it} is fully controlled for and the regression coefficient measures only the marginal effect from contemporary values of x_{it} to future values of the dependent variable. Hence, a regression coefficient of a pre-determined variable measures causality in a Granger sense.

[16] If a unit root exists, i.e. $\left|\sum_{l=1}^{p} \alpha_l\right| = 1$, then the Blundell and Bond (1998) estimator is still consistent but no longer efficient, as has been shown in Binder et al. (2005). The convergence rate can be obtained as $\alpha_1 - 1$ if p=1.

Nickel (1981) has shown that an FE-estimator on (6) is inconsistent, when the time dimension is small, because there is a correlation of the group mean of the error term with the lagged dependent variable. Moreover, Trognon (1978) has shown that an OLS-estimator is also inconsistent, because the lagged dependent variable is correlated with the random effect. The direction of bias is generally not known without further information on the covariance matrix of all variables, although closed form solutions of the bias term exist. However, if there is only one time lag of the dependent variable as covariate (p=1), then the estimated coefficients of the lagged-dependent variable are underestimated with an FE-estimator and overestimated with an OLS-estimator. For this reason, we report OLS and FE along with consistent dynamic panel estimators in our results to provide a cross-consistency check.

Among the class of consistent dynamic panel estimators, Arellano and Bond (1991) recommend a one-step GMM-system estimator built on the following generalized moment conditions

$$E\left[W_i^{'}\Delta\varepsilon_i\right]=0 \tag{7}$$

with the instrument matrix

$$W_i=\begin{bmatrix}\left[y_{i1}\,x_{i1}\ldots x_{ip}\,z_{i1}\ldots z_{iT}\right] & 0 & \ldots & 0\\ 0 & \left[y_{i1}\,y_{i2}\,x_{i1}\ldots x_{i,p+1}\,z_{i1}\ldots z_{iT}\right] & \ldots & \ldots\\ \ldots & \ldots & \ldots & 0\\ 0 & \ldots & 0 & \left[y_{i1}\ldots y_{i,T-p-1}\,x_{i1}\ldots x_{i,T-1}\,z_{i1}\ldots z_{iT}\right]\end{bmatrix}$$

and $\Delta\varepsilon_i$ denotes the (T-1-p)-dimensional vector of first-differenced error terms. All elements of the matrix W_i are valid instruments, because the lagged values of 2nd and higher order of the dependent variable are not correlated with the first differenced error term, where first-differencing wipes out the random effect.

While the full instrument matrix W_i maximizes efficiency, it may aggravate the weak-instrument problem. For this reason, we will consider for robustness checks a specification

that uses at most two time lags of the dependent variable as instruments for the endogenous lagged-dependent variable.

Blundell and Bond (1998) point out a weak-instrument problem (see, e.g. Staiger and Stock, 1997) that is most severe, whenever the dependent variable follows a near-unit root process or whenever the variance of the random effect is large relative to the variance of the error term, and suggest the additional moment conditions

$$E\left[\Delta y_{i,t-1}'\left(\eta_i + \varepsilon_{it}\right)\right] = 0\,, \tag{8}$$

for t=p+1,…,T. The moment conditions in (8) hold, because lagged first differences of the dependent variable have differenced out the random effect and are not correlated with the contemporary error term.

As usual in GMM estimation, the generalized moments (7) and (8) are replaced by their sample estimates and the GMM criterion function over all moment conditions is minimized with respect to all regression coefficients. Because the moment conditions (7) and (8) imply that observations are taken twice (in level and first differences), the applied solution is identical to a system GMM estimator on a regression system of variables in levels and first differences. The covariance matrix of the GMM criterion function depends on the regression estimates. Hence, a heteroscedasticity consistent one-step estimator replaces the estimated covariance matrix with an approximation (see Roodman, 2003, for details).

Since the validity of instruments is only ensured if the error term is not autocorrelated of second order, autocorrelation tests are performed. Furthermore, a Hansen test of overidentifying restrictions investigates whether the instruments are correlated with the error term.

On the attrition sample, we can control for attrition bias by estimating first the probability that a firm goes bankrupt in a year by probit estimations for each year:[17]

$$s_{it} = 1[w_{it}\delta_t + \upsilon_{it}], \tag{9}$$

for t=3,…,T, and where s_{it} is a dummy variable that takes the value one if a firm is still not bankrupt at time t, w_{it} is a vector of exogenous and normally distributed covariates observed at time t for all observations with $s_{it-1}=1$, δ_t is the corresponding coefficient vector, and υ_{it} the normally distributed error term. Among the exogenous covariates w_{it} in the selection equation (9) should be at least one that is not contained at the same time in x_{it} (exclusion restriction). We follow Pavcnik (2001) and use the investment growth rate as an indicator of the future prospect of an establishment. The second excluded selection variable is the number of closures, spin-offs, or sales of parts of the establishment during the sample life prior to the potential default date. Moreover, we employ the other control variables of the outcome equation x_{it} as part of w_{it}, as well.

Then the inverse Mills-ratio $\hat{\lambda}_{it}$ is formed out of the predictions derived from the probit estimates in (9) for each year and inserted into the dynamic panel model in first differences:

$$\Delta y_{it} = \alpha \cdot \Delta y_{i,t-1} + \beta_0 + \beta_1 \cdot \Delta x_{i,t-1} + \rho_3 d3_t \hat{\lambda}_{it} + ... + \rho_T dT_t \hat{\lambda}_{it} + \Delta\varepsilon_{it} \tag{10}$$

for t=3..T, where d3,…, dT are the dummy variables containing value one in the years 3,…,T, respectively. Equation (10) can then be estimated by the GMM method as described above. Significant coefficients ρ_k indicate a selection bias from attrition.

[17] See Wooldridge (2002), p. 585ff.

5) Results

5.1) Baseline results

In Table 4, we report estimation results on the dependent variable net employment flows. Column (1) contains OLS estimates augmented by fixed effects for firm size and industries, while column (2) replaces them by establishment fixed effects. Columns (3) and (4) describe the results of Blundell and Bond (1998) dynamic panel estimators where our main variable of interest – competitiveness – is either assumed to be exogenous or predetermined, respectively. Tables 5-7 are structured symmetrically to Table 4 except for that they contain the estimates on the dependent variables job creation, job destruction, and gross flow, respectively. Tables 4-7 confine the analysis to the balanced panel.

Insert Tables 4-7

Our first core result is that a reduction in net employment due to a rise in wage costs of Germany relative to its trading partners is the more pronounced, the larger an establishment's export share. However, the effect is surprisingly small. On average, real exchange rate induced net annual job fluctuations during our sample period only account for roughly 29 000 employees.[18] This confirms the impression gained from Figure 2. Even during the severe appreciation of the Deutschmark in the early-to-mid 90s period, adjustments in employment remained rather small. Note also, that this effect is stable across all four specifications despite the aforementioned inconsistency of the OLS and FE estimators.

[18] We make this inference from specification (3) in Table 4. Very similar numbers result from other specifications.

The second result of central interest is that the adjustment of net employment to exchange rate shocks seems to be strongly and significantly driven by job creation (see Table 5) but only weakly and even insignificantly determined by job destruction (see Table 6). In fact, the coefficient on the variable competitiveness is significantly explaining job destruction only when using the inconsistent fixed effect estimator but not when using the consistent dynamic panel estimators or the OLS estimator. This is in strong contrast to comparable results for the U.S. by Klein et al. (2003). The U.S. labor market seems to adjust to real exchange rate shocks primarily through the job destruction rate. We suggest that the difference in the adjustment process between the U.S. and Germany may be explained by different labor market institutions. The German labor market is much more rigid with higher severance payments, worker protection legislations, and codetermination rules. This may considerably reduce the adjustment of firm employment to the desired level through job destruction.

While the asymmetric reaction of job creation and job destruction rates in our study for Germany is in contrast to the evidence from the U.S., a comparable adjustment mechanism is known for France. Abowd et al. (1999) find also that the reaction of job creation is more sensitive to shocks than the job destruction rate.[19] Gourinchas (1999) examines explicitly the French real exchange rate and tends to find larger effects of real exchange rates on the job creation rate than on the job destruction rate for French trading industries. However, both effects are highly significant and the size of the effect on the job destruction rate is larger than our estimates for Germany.

The hypothesis of a rigid labor market is also corroborated by reviewing the control variable estimates. Quite surprisingly, external temporary shocks such as through real GDP growth or sales growth are insignificant in explaining job flows within the balanced sample. German

[19] Abowd et al. (1999) concentrate on exogenous shocks other than the real exchange rate.

labor market regulation seems to induce employment smoothing. To understand this result better, it is worthwhile noting that hardly anything explains the job destruction rate in Table 6, which means that there is little variation in the job destruction rate. This is consistent with the exceptionally low level of the job destruction rate found in the summary statistics of Tables 2 and 3 in comparison with data for the U.S. and other countries. But if hardly any workers are laid off in bad times, there is also less need to hire workers in good times, which may explain why there is also not enough variation in the job creation rate and net job flow rate to find a significant reaction on these shocks. Finally, larger average wage costs per employee again do not foster significantly job destruction but hinder significantly job creation, instead, thus shifting the benefits of larger wages to insiders and the burden to outsiders among the workforce.

Still, German law has created some islands of deregulation within the otherwise rigid labor market through the emergence of fixed term contracts. Moreover, a collective redundancy ("betriebsbedingte Kündigung") or sale of establishment parts are other ways of releasing workers under specific circumstances when the business is at the verge of bankruptcy.[20] Indeed, firms with a large share of fixed-term contracts have contributed massively to job creation. Interestingly, these firms do not lay off significantly more workers. Hence, it appears that fixed term contracts were a means to stimulate employment growth among firms who used them as a means of flexibility (see Table 4). Instead, our dummy variable *restructuring* which captures the latter channel of job destruction is highly significant in explaining a larger job destruction rate. Since restructuring also captures the acquisition of establishment parts, it also contributes significantly to job creation. Overall, the two effects roughly balance and net job flows remain unaffected.

[20] Recall that restructuring comprises sales of part of an establishment as a result of bankruptcy of the former owner. Possibly, this channel is a dominant way to dismiss workers and still continue the busines albeit under new ownership..

Turning to the remaining control variables, it is worth mentioning that the OLS estimator overestimates the coefficient on the lagged job creation rate in Table 5 and of the lagged job destruction rate in Table 6 compared to the Blundell-Bond estimator. The opposite holds for the fixed effect estimator. Since this is expected from econometric theory, we feel comfortable that the dynamic panel estimator is well-specified. Also the test on overidentifying restrictions and the test on autocorrelation of second order do not indicate any misspecifications. Overall, there is little evidence of a dynamic adjustment process. Only the job creation and gross flow rate react weakly to past real depreciations. Moreover, a large share of apprentices is detrimental to job creation and a large interest rate goes along with more job destruction. Surprisingly, high interest rates are also associated with more job creation. The latter result may be driven by the reaction of monetary policy to inflationary pressures during times of booming labor demand.

Next, we turn in Table 8 to the unbalanced sample, which encompasses all German establishments with at least more than five employees and more than five observations over the sample period. Once more, we do find a significant though economically small exchange rate effect on the net employment rate and the job creation rate, but fall short in noticing such an impact on the job destruction and gross job flow rate. Even the point estimates are fairly similar to the balanced sample despite the six-fold increase in the sample size. In general, however, the larger sample increases the efficiency of estimates and renders more covariates significant. For example, firms with a large share of fixed term contracts have now a significantly larger job destruction rate and – surprisingly – a larger average wage cost of an establishment decreases job destruction. The latter may be explained by higher average wages being associated with higher qualifications. Since workers with higher qualifications have lower turnover rates, this may explain also the lower job destruction rate. One minor caveat

remains with respect to the estimate of the job creation rate in the unbalanced sample. The Hansen-test on overidentifying restrictions is highly significant, indicating that the instrument matrix is not spanned within the moment-space. Since the point estimates of this specification are stunningly close to the ones of the balanced sample, this problem seems not to bias the estimated coefficients.

Insert Table 8 about here

5.2) Industry-effects

In a further step we investigate whether the effects of competitiveness are industry-specific. Thereby, we replace the *competitiveness* variable by its interaction with 16 industry dummies. Table 9 reports the regression results for the unbalanced panel. For the sake of brevity , we only show the estimates on the interaction terms. Three results are remarkable. First, the classical manufacturing industries with large export share such as machinery and transport equipment are significantly affected by real exchange rate shocks. Second, there are other industries outside of manufacturing such as the banking and insurance industry which also have a considerable average export share and their employment depends on real exchange rate shocks. Finally, there are industries outside manufacturing such as health care with extremely low average export shares and still significant reactions of their employment on real exchange rate shocks. The latter result becomes understandable if one recalls the result from Table 3 that even sectors with low average export share have some establishments with very large export share among them. This insight confirms our hypothesis that it is important to include *all* sectors into the analysis if one wants to gauge the entire impact of exogenous shocks to the economy.

Insert Table 9 about here

5.3) Attrition estimates and default

So far, we have been ignoring job destruction through bankruptcy of firms. In Table 10, we apply the attrition estimation (10) to the attrition sample. We take as excluded selection variable the growth rate of investment and the sum of previous restructurings. When we estimate the expected value of the impact of a *competitiveness* shock on job flows as if the defaulted firms had survived, the first core result remains robust but the second turns around. Net job growth still decreases in firms with large export share when the real exchange rate appreciates. However, the adjustment process is channeled now through the job destruction rate rather than the job creation rate. In line with this change, the correction factors in the second stage equation (10) become significant at least for some years and dependent variables.

Insert Table 10 about here

To understand better how this result comes about, we present in Table 11 estimates of the probability of default of firms, which mirror the first stage of the attrition estimates in (9). However, we pool all years together for otherwise the competitiveness variable degenerates to an export share variable, since the time variation is lost. Moreover, we include typical variables that the literature has found to determine the bankruptcy of firms. Among the most important are firm size and firm age (e.g. Hall, 1987). Unfortunately, firm age is not properly reported in our dataset and can therefore not be used. Instead, our baseline specification includes the selection variables job destruction, sales growth in the period previous to default,

and the investment prospects for the year of default based on a firms judgment made a year before.

A logit estimate in specification (1) shows that a real appreciation yields a significantly larger probability of default if a firm has a relatively large export share. We also find the well-established size-effect, with smaller firms being more likely to default. Furthermore, firms that had a large job destruction rate in the previous year, and firms with lower investment growth in the previous period. When we add the accumulation of past restructurings in specification (2) of Table 11, we find them also to contribute to a larger probability of default. Finally we incorporate the share of fixed-term contracts, which turns out to be not significantly related to bankruptcy.

Summing up, it appears that competitive pressure through real appreciation is just similar as in the U.S. However, the surviving firms are forced by the regulation of the German labor market to shift the employment adjustment to the job creation rate. This does not mean, however, that job losses are prevented. Instead, job destruction increases through real appreciations, because some firms are driven into bankruptcy without the chance to adjust their labor force and avoid the costs of overcapacity.

6) Conclusion

This paper finds that the effect of a loss (or gain) in international competitiveness of German firms on employment is small in magnitude and comparable with findings for the U.S. However, the adjustment to a loss in international competitiveness seems to work through different channels than in the U.S.. In Germany it operates mainly through lower job creation

rather than higher job destruction. However, this is true only if one considers surviving firms. Once attrition through default is taken into account, the adjustment process switches back to the job destruction rate just as in the U.S.. In addition, the probability of default depends, among others, positively on a loss in international competitiveness.

These empirical findings are robust to a variety of estimation methods such as dynamic panel data estimators, different sub-samples, and corrections for establishment attrition. Moreover, they are not confined to manufacturing but are found across all industries.

We suggest that the difference between Germany and the U.S. in the adjustment channel of net employment could be the consequence of a highly regulated labor market. Higher firing costs due to severance payments or advance notice rules may reduce the sensitivity of the job destruction rate to changes in the real exchange rate. The adjustments of net flows are then shifted towards a more flexible job creation rate among the firms that survive. However, since firms are either not allowed to adjust their labor demand to their profit-maximizing level in the occurrence of shocks or adjustment cost through government regulation are so high that firms prefer to forgo adjustment, redundant workers are not laid off, firms cannot get rid of fixed wage cost, and this may drive some firms into bankruptcy in bad times. While labor market regulation may preserve jobs among established firms in the presence of negative external shocks such as a real appreciation, jobs are destroyed through defaults in the firms which are least efficient or most under international competitive pressure.

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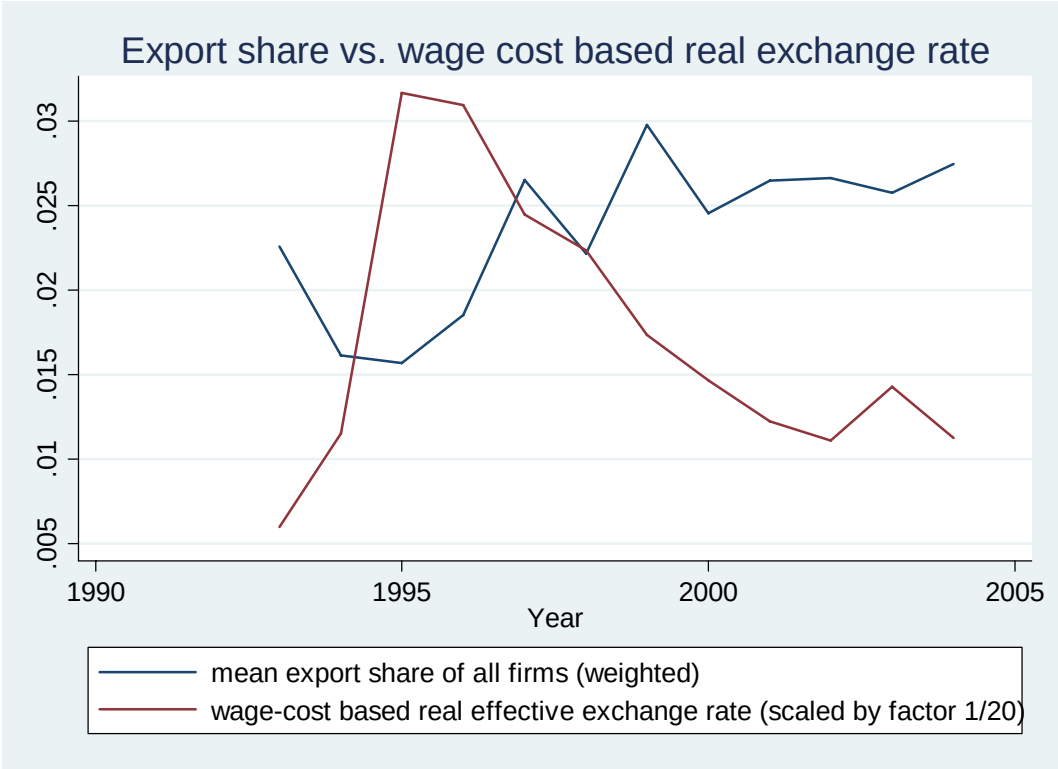

Figure 1: Export share and labor-cost based real exchange rate

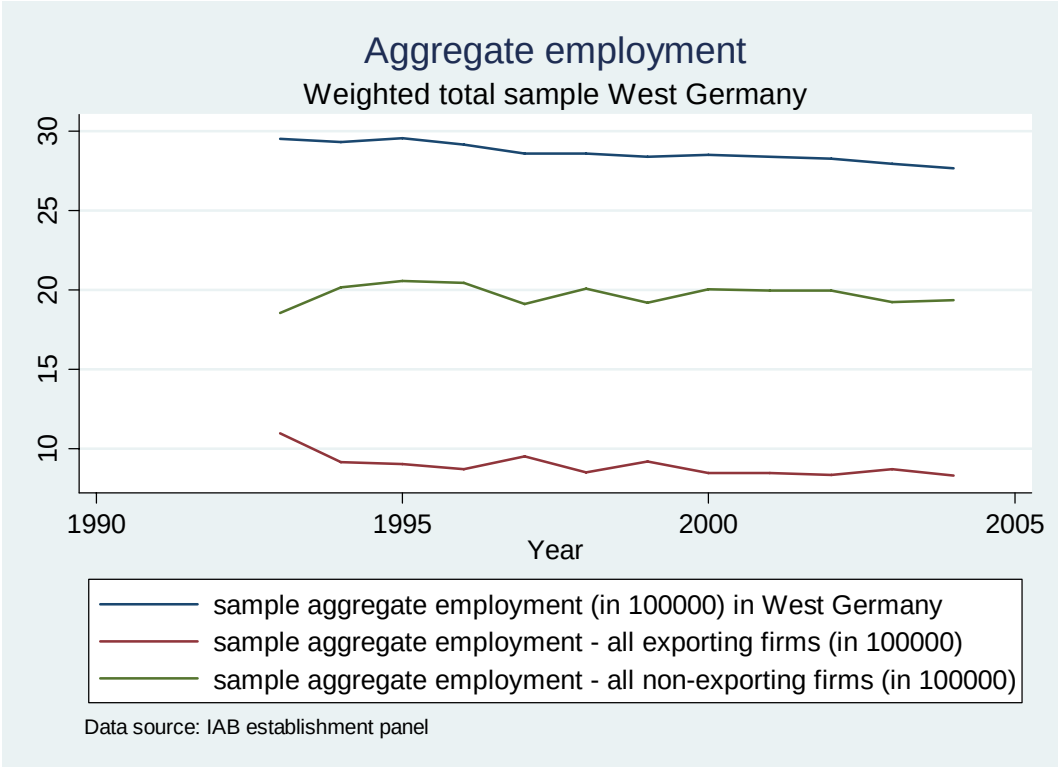

Figure 2: With sampling frequency weighted aggregate employment, employment in establishments with exports and without (in Million)

Table 1: Variable description and data source

Variable name	Description	Data source
Job creation	The number of new workers within the first half of year t divided by the average of the number of officially employed full- and part-time workers at June 31 of a year.	IAB establishment panel
Job destruction	The number of workers that leave the establishment within the first half of year t divided by the average of the number of officially employed full- and part-time workers at June 31 of a year.	IAB establishment panel
Net flows	*Job creation* minus *job destruction*.	IAB establishment panel
Gross flows	*Job creation* plus *job destruction*.	IAB establishment panel
Competitiveness	The change in *wage costs* from year t-1 to t multiplied by establishment i`s *openness*.	See below.
Wage costs	Real exchange rate measured as Germany´s average *hourly wage costs* in manufacturing relative to a trade-weighted average, i.e. German *exports* divided by sum of trading partners´ *exports*, across a set of 32 major trading partners.	See below.
Hourly wage costs	Hourly compensation costs for production workers in U.S. Dollar in country j in year t. These costs include hourly direct pay as well as employer social insurance expenditure and other labor taxes. This definition slightly differs from the definition of the International Labor Office (ILO) since total labor costs do not include recruitment, employee training and establishment services like cafeterias.	U.S. Bureau of Labor Statistics.
Exports	Exports from Germany to country j in year t (in thousand Euros).	Federal Statistical Office Germany.
Openness	Average share of exports on total revenues in year t-2 and t-1.	IAB establishment panel
Interest rate	Weighted discount/prime rate.	German Counsel of Economic Advisors.
Real GDP growth	Nominal GDP growth in Germany in year t, deflated by consumer prices; base year 2000.	IMF, International Financial Statistics, line 99bvr.
Apprenticeship	Share of apprentices on total employment in year t.	IAB establishment panel
Fixed term	Share of part-time workers on total employment in year t.	IAB establishment panel
Sales growth	Growth of total revenues from year t-1 to t.	IAB establishment panel
Avg. wage	Total wage sum in May of the reporting year t divided by total employment in year t.	IAB establishment panel

Table 1 (continued)

Restructuring	This variable captures organizational restructuring during the last year and takes the value of 1, if either one or both of the following questions is answered with yes, and 0 otherwise. Have parts of your establishment been completely shut down, outsourced or has a spin-off occurred during the last year, i.e. parts of your establishment have been continued as an independent firm? Have there been any organizational restructurings of the same kind that other establishments or parts of establishments have been integrated in yours?	IAB establishment panel
Invest. expected	Expected investments at establishment i for the following year.	IAB establishment panel
Firm size	Also denoted as *total employment* encompasses the total number of officially employed full- and part-time workers at June 31 of a year.	IAB establishment panel
Past outsource	Cumulative sum of past organizational restructurings that led to a complete shutdown, outsourcing or a spin-off of parts of the establishment.	IAB establishment panel

Table 2: Summary statistics by types of establishments

Type		Number of Observations[1]	Net Flows (avg.)	Job Creation (avg.)	Job Destruct. (avg.)	Gross Flows (avg.)
Export share	*(high)*	56838	0.50%	5.78%	5.23%	10.90%
	(low)	82556	-0.42%	6.12%	6.47%	12.49%
Exchange rate	*(high)*	43708	0.35%	5.95%	5.55%	11.40%
	(low)	95686	-0.54%	6.10%	6.56%	12.56%
Size	*(n<20)*	57743	-0.41%	6.03%	6.37%	12.31%
	(n>20<500)	64786	1.04%	6.19%	5.02%	11.05%
	(n>500)	15596	-0.94%	4.03%	4.98%	8.94%
Interest rate	*(high)*	41399	0.19%	6.49%	6.25%	12.64%
	(low)	97995	-0.46%	5.81%	6.18%	11.89%
GDP growth	*(high)*	64907	-0.16%	6.29%	6.41%	12.61%
	(low)	74487	-0.30%	5.77%	5.97%	11.64%
Apprenticeship	*(high)*	43650	-0.74%	4.69%	5.43%	10.11%
	(low)	95744	-0.08%	6.44%	6.42%	12.74%
Fixed term	*(high)*	44966	3.69%	10.15%	6.36%	16.34%
	(low)	94428	-1.12%	5.11%	6.17%	11.20%
Sales growth	*(high)*	81945	0.34%	6.64%	6.23%	12.75%
	(low)	57449	-1.15%	5.08%	6.16%	11.17%
Wage average	*(high)*	112040	-0.61%	6.01%	6.56%	12.50%
	(low)	27354	0.33%	6.10%	5.68%	11.65%
Restructuring	*(yes)*	11604	-3.84%	9.38%	13.17%	22.28%
	(no)	127790	-0.11%	5.94%	5.97%	11.82%

Notes: Averages are weighted by sampling probability of corresponding strata. If not otherwise indicated subgroups denoted as "high" and "low" correspond to above average and below average, respectively;
[1] Number of observations corresponds to non-missing values of net flows.

Table 3: Summary Statistics by Industry

Industry	Total Employment	Export Share (avg.)	Export Share (max.)	Net Flows (avg.)	Job Creation (avg.)	Job Destruction (avg.)	Gross Flows (avg.)
agriculture	23711	1.24%	100.00%	-0.01%	5.73%	5.68%	11.34%
mining and energy	168309	2.28%	100.00%	1.19%	4.25%	3.06%	7.29%
food	82866	1.16%	100.00%	-0.30%	5.27%	5.61%	10.84%
paper, textile, furniture	101193	4.16%	100.00%	-1.28%	4.14%	5.21%	9.15%
chemical, wood	347047	4.48%	100.00%	-0.62%	5.46%	6.07%	11.54%
machinery, motor vehicles	566487	6.02%	100.00%	-0.66%	5.07%	5.73%	10.79%
construction	143579	0.26%	100.00%	0.11%	8.01%	7.82%	15.75%
retailing	205637	2.73%	100.00%	-1.27%	5.18%	6.36%	11.42%
logistics	105972	5.91%	100.00%	0.62%	7.76%	7.13%	14.80%
banking, insurance	109710	1.08%	80.00%	-2.09%	2.72%	4.79%	7.49%
restaurants	35741	0.38%	100.00%	2.46%	9.67%	7.18%	16.75%
education	125786	0.28%	50.00%	0.49%	5.69%	5.17%	10.84%
health care	199743	0.07%	55.00%	0.10%	5.56%	5.45%	10.95%
services	142086	2.36%	100.00%	-0.25%	5.56%	5.68%	11.10%
culture, sport, entertainment	98284	0.85%	100.00%	-0.98%	6.56%	7.31%	13.59%
public administration	439739	0.60%	45.00%	0.58%	5.41%	4.76%	10.08%

Note: Averages are weighted by sampling probability of corresponding strata.

Table 4: Dependent variable net flows – balanced panel

	OLS	Fixed Effect	Blundell Bond (A)	Blundell Bond (B)
	(1)	(2)	(3)	(4)
Job creation (t-1)	0.2461	0.0095	0.1111	0.1119
	(3.17)***	(0.18)	(1.53)	(1.54)
Job destruction (t-1)	-0.1123	0.0792	0.0099	0.0048
	(1.70)*	(1.45)	(0.16)	(0.08)
Competitiveness	-0.0013	-0.0016	-0.0015	-0.0012
	(3.34)***	(3.96)***	(3.32)***	(2.74)***
Interest rate	0.0016	0.0022	0.0019	0.0018
	(1.17)	(1.54)	(1.43)	(1.30)
Real GDP growth	0.1748	0.1198	0.1500	0.1488
	(1.43)	(0.95)	(1.08)	(1.10)
Apprenticeship	-0.0911	-0.1156	-0.0633	-0.0640
	(3.48)***	(2.42)**	(1.97)**	(2.00)**
Fixed term contract	0.2779	0.2248	0.3017	0.3003
	(2.83)***	(3.35)***	(3.06)***	(3.05)***
Sales growth	0.0068	0.0089	0.0010	0.0009
	(1.18)	(1.63)	(0.18)	(0.16)
Avg. wage	0.0011	-0.0115	-0.0092	-0.0103
	(0.35)	(1.49)	(2.21)**	(2.49)**
Restructuring	-0.0121	-0.0078	-0.0093	-0.0092
	(1.60)	(1.04)	(1.16)	(1.18)
R-squared	0.17	0.40		
Observations	3203	3203	3203	3203
Firms			412	412
Hansen p-value			0.305	0.166
AR(1) p-value			0.000	0.000
AR(2) p-value			0.160	0.152

Notes: Firm-clustered t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; Blundell-Bond (A): Job creation (t-1) and job destruction (t-1) are assumed pre-determined and instrumented by full set of their valid time-lags; Blundell-Bond (B): in addition to (A) also Competitiveness assumed pre-determined and instrumented by full set of its valid time-lags; AR(1) is test on autocorrelation of first order; AR(2) is test on autocorrelation of second order; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

Table 5: Dependent variable job creation – balanced panel

	OLS (1)	Fixed Effect (2)	Blundell Bond (A) (3)	Blundell Bond (B) (4)
Job creation (t-1)	0.3412 (5.23)***	-0.0022 (0.06)	0.1385 (2.25)**	0.1475 (2.41)**
Job destruction (t-1)	0.0183 (0.39)	0.0034 (0.07)	0.0456 (0.77)	0.0438 (0.74)
Competitiveness	-0.0008 (3.23)***	-0.0004 (2.12)**	-0.0009 (3.33)***	-0.0007 (2.54)**
Interest rate	0.0032 (3.08)***	0.0052 (4.37)***	0.0045 (4.12)***	0.0045 (4.18)***
Real GDP growth	0.2188 (2.19)**	0.1927 (1.99)**	0.1175 (1.12)	0.1253 (1.22)
Apprenticeship	-0.1006 (5.12)***	-0.0907 (2.83)***	-0.0798 (3.21)***	-0.0793 (3.20)***
Fixed term contract	0.2794 (3.79)***	0.2152 (3.30)***	0.3066 (3.64)***	0.3039 (3.63)***
Sales growth	0.0015 (0.30)	0.0039 (0.80)	0.0006 (0.11)	0.0010 (0.18)
Avg. wage	-0.0023 (0.71)	0.0004 (0.07)	-0.0120 (3.22)***	-0.0137 (3.69)***
Restructuring	0.0101 (2.00)**	0.0106 (2.19)**	0.0098 (1.80)*	0.0089 (1.67)*
R-squared	0.31	0.54		
Observations	3207	3207	3207	3207
Firms			412	412
Hansen p-value			0.136	0.224
AR(1) p-value			0.000	0.000
AR(2) p-value			0.343	0.321

Notes: Firm-clustered t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; Blundell-Bond (A): Job creation (t-1) and job destruction (t-1) are assumed pre-determined and instrumented by full set of their valid time-lags; Blundell-Bond (B): in addition to (A) also Competitiveness assumed pre-determined and instrumented by full set of its valid time-lags; AR(1) is test on autocorrelation of first order; AR(2) is test on autocorrelation of second order; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

Table 6: Dependent variable job destruction – balanced panel

	OLS	Fixed Effect	Blundell Bond (A)	Blundell Bond (B)
	(1)	(2)	(3)	(4)
Job creation (t-1)	0.0939	-0.0127	0.0276	0.0358
	(2.96)***	(0.40)	(0.86)	(1.12)
Job destruction (t-1)	0.1310	-0.0749	0.0365	0.0399
	(3.33)***	(3.35)***	(1.21)	(1.32)
Competitiveness	0.0005	0.0011	0.0006	0.0005
	(1.53)	(3.37)***	(1.60)	(1.48)
Interest rate	0.0016	0.0030	0.0025	0.0027
	(1.45)	(2.59)***	(2.16)**	(2.32)**
Real GDP growth	0.0492	0.0730	-0.0295	-0.0192
	(0.48)	(0.69)	(0.27)	(0.18)
Apprenticeship	-0.0092	0.0246	-0.0160	-0.0147
	(0.42)	(0.63)	(0.59)	(0.55)
Fixed term contract	0.0054	-0.0114	0.0048	0.0035
	(0.14)	(0.55)	(0.13)	(0.18)
Sales growth	-0.0049	-0.0045	-0.0012	-0.0014
	(1.16)	(1.06)	(0.26)	(0.31)
Avg. wage	-0.0038	0.0118	-0.0026	-0.0031
	(1.07)	(1.69)*	(0.76)	(0.93)
Restructuring	0.0221	0.0183	0.0191	0.0182
	(3.74)***	(3.16)***	(3.04)***	(2.94)***
R-squared	0.07	0.30		
Observations	3205	3205	3205	3205
Firms			412	412
Hansen p-value			0.155	0.331
AR(1) p-value			0.000	0.000
AR(2) p-value			0.699	0.660

Notes: Firm-clustered t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; Blundell-Bond (A): Job creation (t-1) and job destruction (t-1) are assumed pre-determined and instrumented by full set of their valid time-lags; Blundell-Bond (B): in addition to (A) also Competitiveness assumed pre-determined and instrumented by full set of its valid time-lags; AR(1) is test on autocorrelation of first order; AR(2) is test on autocorrelation of second order; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

Table 7: Dependent variable gross flows – balanced panel

	OLS	Fixed Effect	Blundell Bond (A)	Blundell Bond (B)
	(1)	(2)	(3)	(4)
Job creation (t-1)	0.4341	-0.0158	0.1666	0.1834
	(6.48)***	(0.36)	(2.51)**	(2.79)***
Job destruction (t-1)	0.1497	-0.0707	0.0830	0.0849
	(2.70)***	(1.36)	(1.15)	(1.18)
Competitiveness	-0.0003	0.0006	-0.0003	-0.0001
	(0.75)	(1.63)	(0.64)	(0.32)
Interest rate	0.0049	0.0082	0.0070	0.0072
	(2.96)***	(4.46)***	(3.92)***	(4.07)***
Real GDP growth	0.2734	0.2663	0.0926	0.1099
	(1.71)*	(1.68)*	(0.56)	(0.68)
Apprenticeship	-0.1096	-0.0663	-0.0953	-0.0936
	(3.32)***	(1.25)	(2.33)**	(2.30)**
Fixed term contract	0.2888	0.2020	0.3112	0.3074
	(4.50)***	(2.88)***	(3.65)***	(3.65)***
Sales growth	-0.0030	-0.0000	-0.0013	-0.0018
	(0.40)	(0.01)	(0.15)	(0.21)
Avg. wage	-0.0064	0.0122	-0.0144	-0.0166
	(1.07)	(1.20)	(2.46)**	(2.88)***
Restructuring	0.0322	0.0288	0.0288	0.0270
	(3.99)***	(3.78)***	(3.34)***	(3.18)***
R-squared	0.24	0.47		
Observations	3203	3203	3203	3203
Firms			412	412
Hansen p-value			0.248	0.111
AR(1) p-value			0.000	0.000
AR(2) p-value			0.555	0.516

Notes: Firm-clustered t-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; Blundell-Bond (A): Job creation (t-1) and job destruction (t-1) are assumed pre-determined and instrumented by full set of their valid time-lags; Blundell-Bond (B): in addition to (A) also Competitiveness assumed pre-determined and instrumented by full set of its valid time-lags; AR(1) is test on autocorrelation of first order; AR(2) is test on autocorrelation of second order; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

Table 8: Blundell-Bond estimates – unbalanced panel

	Net Flows (1)	Job Creation (2)	Job Destruction (3)	Gross Flows (4)
Job creation (t-1)	0.0796 (2.66)***	0.0635 (2.61)***	0.0023 (0.10)	0.0474 (1.25)
Job destruction (t-1)	0.0078 (0.29)	0.0444 (2.01)**	0.0429 (2.22)**	0.0811 (2.45)**
Competitiveness	-0.0010 (3.11)***	-0.0005 (2.49)**	0.0004 (1.58)	-0.00003 (0.10)
Interest rate	0.0005 (0.69)	0.0026 (4.08)***	0.0020 (3.23)***	0.0047 (4.64)***
Real GDP growth	0.0629 (0.76)	0.0114 (0.18)	-0.0370 (0.57)	-0.0399 (0.40)
Apprenticeship	-0.1195 (7.47)***	-0.1059 (11.54)***	-0.0095 (0.63)	-0.0923 (4.63)***
Fixed term contract	0.2257 (7.01)***	0.3396 (14.64)***	0.1085 (4.64)***	0.4536 (13.13)***
Sales growth	-0.0011 (0.49)	-0.0012 (0.69)	-0.0016 (0.63)	-0.0013 (0.45)
Avg. wage	-0.0122 (5.70)***	-0.0203 (11.00)***	-0.0078 (4.00)***	-0.0285 (8.94)***
Restructuring	-0.0210 (5.45)***	0.0073 (3.10)***	0.0290 (8.99)***	0.0356 (8.79)***
Observations	21078	21078	21120	20742
Firms	5027	5027	5028	5027
Hansen p-value	0.369	0.009	0.699	0.220
AR(1) p-value	0.000	0.000	0.000	0.000
AR(2) p-value	0.225	0.485	0.863	0.186

Notes: Firm-clustered t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; Blundell-Bond: Job creation (t-1) and job destruction (t-1) are assumed pre-determined and instrumented by the second and third time-lag of predetermined variables; AR(1) is test on autocorrelation of first order; AR(2) is test on autocorrelation of second order; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

Table 9: Blundell-Bond estimates with industry-specific effects of competitiveness – unbalanced panel – Only industry interaction terms shown

Interaction term competitiveness with industry	Net Flows (1)	Job Creation (2)	Job Destruction (3)	Gross Flows (4)
Agriculturem forestry, fishing	-0.0399 (1.02)	-0.0203 (0.46)	0.0192 (2.07)**	-0.0014 (0.03)
mining and energy	-0.0017 (0.44)	0.0038 (1.48)	0.0063 (1.11)	0.0108 (1.37)
Food, drink, tabacco	0.003 (0.48)	0.0001 (0.14)	-0.0004 (0.43)	-0.0004 (0.23)
paper, textile, furniture	-0.0004 (0.31)	-0.0003 (0.52)	-0.0000 (0.02)	-0.0000 (0.13)
chemical, wood, pharmaceutical,	-0.0009 (2.12)**	-0.0004 (1.63)	0.0004 (1.22)	-0.0000 (0.06)
machinery, motor vehicles	-0.0009 (2.18)**	-0.0004 (1.90)*	0.0004 (1.20)	-0.0000 (0.04)
building, civil engineering	0.0489 (1.53)	0.0370 (1.27)	-0.0120 (1.51)	0.0249 (0.88)
retailing	-0.0016 (0.87)	-0.0012 (1.25)	0.0005 (0.35)	-0.0006 (0.43)
logistics	0.0029 (0.87)	0.0041 (1.27)	0.0012 (0.60)	0.0054 (1.29)
banking, insurance	-0.0810 (9.56)***	0.0224 (3.19)***	0.1041 (10.59)***	0.1278 (8.68)***
Restaurants, hotels	-0.0452 (0.84)	0.0301 (1.19)	0.0749 (1.47)	0.1046 (1.76)*
education	-0.1397 (1.81)*	-0.1436 (3.15)***	-0.0036 (0.10)	-0.1469 (4.86)***
health care, social assistance	-0.0297 (2.51)**	0.0174 (1.27)	0.0490 (5.18)***	0.0632 (2.97)***
Professional, scientific services	-0.0119 (1.52)	-0.0143 (2.91)***	-0.0022 (0.53)	-0.0165 (3.39)***
culture, sport, entertainment	0.0083 (0.57)	-0.0027 (0.86)	-0.0101 (0.67)	-0.0119 (0.74)
public administration	-0.0050 (0.39)	-0.0046 (0.22)	0.0023 (0.07)	-0.0006 (0.01)

Notes: Firm-clustered t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; Blundell-Bond: Job creation (t-1) and job destruction (t-1) are assumed pre-determined and instrumented by the second and third time-lag of the predetermined variables; AR(1) is test on autocorrelation of first order; AR(2) is test on autocorrelation of second order; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix. Unreported control variables are identical to the ones in Table 8.

Table 10: Attrition estimates

	Net Flows (1)	Job Creation (2)	Job Destruction (3)	Gross Flows (4)
Job creation (t-1)	0.1865	0.1785	0.0012	0.1723
	(2.73)***	(2.87)***	(0.04)	(2.52)**
Job destruction (t-1)	-0.0401	-0.0265	0.0126	-0.0126
	(0.76)	(0.52)	(0.54)	(0.21)
Competitiveness	-0.0012	-0.0004	0.0008	0.0004
	(2.43)**	(1.11)	(1.97)**	(0.73)
Interest rate	-0.0065	0.0000	0.0075	0.0061
	(1.46)	(0.00)	(2.18)**	(1.14)
Real GDP growth	-0.0985	-0.0462	0.1573	0.0835
	(0.29)	(0.17)	(0.57)	(0.20)
Apprenticeship	-0.0677	-0.0616	0.0076	-0.0494
	(1.92)*	(3.17)***	(0.22)	(1.12)
Fixed term contract	0.3316	0.3398	0.0072	0.3501
	(3.98)***	(4.71)***	(0.23)	(4.75)***
Sales growth	0.0059	-0.0002	-0.0062	-0.0056
	(0.97)	(0.04)	(1.29)	(0.68)
Avg. wage	-0.0104	-0.0140	-0.0032	-0.0159
	(2.73)***	(4.16)***	(0.90)	(2.85)***
Restructuring	-0.0200	0.0051	0.0252	0.0304
	(2.60)***	(1.04)	(4.20)***	(3.87)***
Chi_4	0.0038	0.0023	-0.0016	0.0010
	(1.70)*	(1.08)	(0.82)	(0.29)
Chi_5	-0.0010	0.0013	0.0023	0.0037
	(0.73)	(1.09)	(2.18)**	(2.11)**
Chi_6	0.0037	0.0020	-0.0020	0.0003
	(2.72)***	(1.82)*	(2.02)**	(0.24)
Chi_7	0.0017	0.0004	-0.0013	-0.0005
	(1.70)*	(0.56)	(1.88)*	(0.46)
Chi_8	-0.0005	-0.0005	0.0001	-0.0004
	(0.81)	(1.12)	(0.21)	(0.53)
Chi_9	-0.0000	0.0000	0.0002	0.0001
	(0.02)	(0.05)	(0.52)	(0.23)
Chi_10	-0.0005	-0.0004	0.0001	-0.0004
	(1.00)	(1.07)	(0.38)	(0.69)
Chi_11	-0.0004	-0.0004	0.0001	-0.0004
	(1.02)	(1.26)	(0.35)	(0.84)
Observations	3745	3751	3748	3745
Firms	551	551	551	551
Hansen p-value	0.145	0.159	0.681	0.430
AR(1) p-value	0.000	0.000	0.000	0.000
AR(2) p-value	0.513	0.169	0.586	0.565

Notes: Robust t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
Job creation (t-1) and job destruction (t-1) are assumed pre-determined and instrumented by full set of their valid time-lags; AR(1) is test on autocorrelation of first order; AR(2) is test on autocorrelation of second order; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

Table 11: Dependent variable default

	Logit (1)	Logit (2)	Logit (3)	Probit (4)
Job destruction (t-1)	2.0906 (3.47)***	1.809 (2.97)***	1.8672 (3.06)***	1.0230 (3.19)***
Competitiveness	0.0693 (2.02)**	0.0834 (2.38)**	0.0768 (2.07)**	0.0376 (1.96)**
Sales growth (t-1)	-0.9462 (1.91)*	-0.6975 (1.60)	-0.7188 (1.62)	-0.3005 (1.56)
Invest. growth (t-1)	-0.4700 (3.42)***	-0.2354 (1.54)	-0.2137 (1.46)	-0.0744 (1.51)
Invest. Expected (t-1)	-0.2436 (1.51)	-0.4654 (3.30)***	-0.4095 (2.93)***	-0.1767 (2.93)***
Firm size (t-1)	-0.1064 (2.39)**	-0.1767 (3.64)***	-0.1761 (3.56)***	-0.0812 (3.87)***
Past outsource		0.3329 (4.64)***	0.3197 (4.39)***	0.1485 (3.99)***
Fixed term contract (t-2)			1.0852 (1.39)	0.4749 (1.20)
Pseudo R-squared	0.05	0.06	0.06	0.06
Observations	3719	3719	3617	3617

Notes: Robust t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.