DISCUSSION PAPER SERIES

No. 6745

INTERNATIONAL COMPETITIVENESS, JOB CREATION AND JOB DESTRUCTION - AN ESTABLISHMENT LEVEL STUDY OF GERMAN JOB FLOWS

Christoph Moser, Dieter M Urban and
Beatrice Weder di Mauro

INTERNATIONAL MACROECONOMICS

Centre for Economic Policy Research

www.cepr.org

Available online at: **www.cepr.org/pubs/dps/DP6745.asp**

ISSN 0265-8003

INTERNATIONAL COMPETITIVENESS, JOB CREATION AND JOB DESTRUCTION - AN ESTABLISHMENT LEVEL STUDY OF GERMAN JOB FLOWS

Christoph Moser, University of Mainz
Dieter M Urban, University of Mainz and CESifo
Beatrice Weder di Mauro, University of Mainz and CEPR

Discussion Paper No. 6745
March 2008

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: www.cepr.org

CEPR Discussion Paper No. 6745

March 2008

ABSTRACT

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

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 statistically significant but economically small effect of real exchange rate shocks on employment, comparable to the one found in studies for the United States. However, contrary to the United States, the employment adjustment (among surviving firms) operates mainly through the job creation rather than the job destruction rate. Job destruction occurs essentially through discrete events such as restructuring, outsourcing and bankruptcy. We suggest that these findings are consistent with a highly regulated labour market, in which smooth adjustment is costly and possibly delayed.

JEL Classification: F16 and F40
Keywords: attrition estimator, gross worker flows, international competitiveness, inverse probability weighted GMM and real exchange rate

Christoph Moser
Department of Economics
Johannes-Gutenberg-University of Mainz
Jakob-Welder-Weg 4
D-55128 Mainz
GERMANY
Email: christoph.moser@uni-mainz.de

Dieter M Urban
Institute for International Economic Theory
Johannes Gutenberg-University Mainz
D-55099 Mainz
GERMANY
Email: durban@uni-mainz.de

Beatrice Weder di Mauro
Department of Economics
Johannes-Gutenberg-University of
Mainz
Jakob-Welder-Weg 4
D-55128 Mainz
GERMANY
Email: beatrice.weder@uni-mainz.de

* The authors thank the Johannes Gutenberg-University Mainz for research funds and Mario Mechtel for valuable research assistance. We are very grateful to the IAB for their hospitality and, especially, Dana Müller for excellent assistance with data issues. For helpful suggestions and comments we thank Michael Klein, Curt Wolfgang Hergenröder, Wolfgang Franz and the participants at the IAW workshop on "Regional and Micro-level Effects of Globalization", the Annual Meeting of the European Trade Study Group in Athens, the University of Paderborn and the Copenhagen Business School.

Submitted 08 March 2008

1 Introduction

Large movements in real exchange rates lead many observers to fear equally large job relocations. In Europe, the recent appreciation of the Euro vis-*à*-vis the U.S. dollar has lead to calls for intervention in order to prevent massive job losses. Indeed, a number of studies of the United States have shown that movements in the real exchange rate impact net and gross job flows in manufacturing, and that this effect - albeit small in magnitude - increases with openness. Also, it has been shown that in the United States, the adjustment process works by increasing the rate of job destruction (Klein et al, 2003).[1] These results may, however, not be generalized to other countries, because differences in labor market institutions may influence adjustment magnitudes and patterns. Germany is an interesting case to contrast with the United States because of its heavy labor market regulation.

The aim of this paper is to study the response of job flows to shocks to international competitiveness at the establishment-level in Germany. More specifically, we pose three questions: First, is there an effect of a loss (or gain) in international competitiveness on employment of German firms? Second, does employment adjustment work through job creation or job destruction? And finally, how is adjustment achieved in an inflexible labor market?

Our results suggest that the answer to the first question is: yes. We find a statistically significant and robust adjustment effect of net job flows to changes in the real exchange rate. However - in line with results for the United States - it is small in magnitude. On the second question, we find that German firms adjust to a loss in international competitiveness primarily through lower job creation rather than through higher job destruction as has been observed in the US. Closer inspection reveals a possible answer to the third question since the earlier result holds only among surviving firms. Once we consider attrition through bankruptcy, the adjustment process switches back to the job destruction rate just as in the United States.

[1] Earlier contributions on the nexus of real exchange rate changes and the labor market are Grossman (1982), Branson and Love (1988), Revenga (1992), Sachs and Shatz (1994), Burgess and Knetter (1998), Gourinchas (1998), Goldberg and Tracy (2000) and Campa and Goldberg (2001), and Klein et al. (2003).

More generally, a highly regulated labor market could be the cause for this differing adjustment channel. Higher dismissal 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.[2] On the one hand, the burden of adjustment of net flows is then shifted towards a more flexible job creation rate among the firms that survive. 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 when negative shocks occur, or that adjustment costs through government regulation are so high that firms prefer to forgo adjustment. If redundant workers are not laid off, firms are not able to reduce fixed wage costs, profits deteriorate, and some firms will accumulate losses up to the point of bankruptcy. While labor market regulations may preserve jobs among established firms in the presence of negative external shocks to competitiveness, jobs are destroyed later on, when the least efficient firms or those most heavily pressured by foreign competition go out of business.

Three further findings corroborate the importance of German labor market institutions for firms' adjustment strategies: First, the gross job flow rate in Germany is lower than in other European countries or in the United States, possibly indicating smoothing of labor demand in the presence of labor protection. Second, the German labor market exhibits some islands of deregulation such as fixed-term contracts, which are not subject to employment protection. We find that establishments with a high share of employees with fixed-term contracts have larger worker gross flows as well as much larger job creation rates. Finally, we find that companies downsize their labor force through discrete events such as restructuring, spin-offs, outsourcing, sales or closure of parts of the establishment. This suggests that high costs of lay-off impede a prompt adjustment process and encourage sudden events of job destruction.[3]

[2]Similar results have been found for the French labor market (e.g. Gourinchas, 1999, or Abowd et al., 1999).

[3]For a survey on institutions and laws in the labor market see Blau and Kahn (1999). Bertola (1999) reviews the microeconomic foundation of labor market institutions.

Further contributions of our study are: First, our data allows us to refine the measurement of job reallocation rates and to investigate several variables related to labor market institutions. We take the model of Klein et al. (2003) who study industry specific job flows due to changes in the real exchange rate as a starting point. However, we measure job creation and job destruction *within* establishment rather than within industries and, hence, account more precisely for fluctuation at the firm level and therefore at the economy level. Furthermore, our results indicate that firms make use of flexible labor market instruments (fixed-term contracts) for adjustment, if available, and seek to circumvent labor market regulation via outsourcing or plant closure, if adjustment costs become prohibitive. Second, to our best knowledge we offer the first study in this strand of the literature that controls for attrition bias. Third, our data is based on a representative sample of all establishments in the German economy. While the existing literature has focused predominately on the manufacturing sector, we investigate the overall effect of international competitiveness on the labor market.

The remainder of the paper is organized as follows: Section 5.2 briefly discusses the design of German labor market institutions. Section 5.3 presents the data and the estimation methodology, section 5.4 contains the empirical results, while section 5.5 concludes.

2 International competitiveness, employment and labor market institutions

Our aim is to study the impact of a change in openness and in price competitiveness on employment flows at the establishment level. We expect more open firms to be more affected by changes in the real exchange rate but the transmission could operate through several *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, cut net employment. In the

latter case, the adjustment in net employment of an establishment may be made through less new job creation using natural attrition, or through worker lay-offs. A second channel through which real exchange rates may have an impact on employment fluctuation is import competition. Foreign firms may gain market share in the domestic market after a real exchange rate appreciation of the domestic currency, because relative production cost have decreased for foreign competitors. The loss in market share may again be absorbed by the firm through capacity utilization adjustment and inventory adjustment or through adjustment in employment. Hence, domestic firms are affected by real exchange rate fluctuations through foreign competition on the domestic market even if they do not export themselves. A third channel counteracts the first two channels. While a real exchange appreciation reduces the competitiveness of domestic production, it renders intermediate inputs cheaper. Industries, which rely heavily on raw material inputs may actually gain competitiveness through real exchange rate appreciations of the domestic currency relative to other domestic sectors. Thus, in theory the effects of foreign exchange movements on employment may go in different directions and it is an empirical matter to determine, which channel is dominant.

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. As noted above, Germany is an interesting case because of its historically heavily regulated labor market.[4]

The German *Protection Against Dismissal Act* (henceforth PADA, "Kündigungsschutzgesetz") is the main source for general rules governing statutory protection against dismissal.[5] Since January 2004, it applies to all employees that have worked without interruption for more than six months in an establishment of at least ten

[4]The following paragraphs on the German labor law rely on Hunt (2000), IMF (2006), OECD (2004), Eger (2004), Bauer et al. (2007), Grund (2006) and Goerke and Pannenberg (2005). For an international comparison of the legislation of termination: http://www.ilo.org/public/english/dialogue/ifpdial/info/termination/countries/ (23.01.2008).

[5]Further sources of labor market legislation include the Civil Code ("Bürgerliches Gesetzbuch"), particularly §§613-630, the Part-Time and Fixed-Term Employment Act ("Teilzeit- und Befristungsgesetz") and the Works Constitution Act ("Betriebsverfassungsgesetz").

full-time employees. Under §1 PADA, the termination of an employment relationship by the employer has to be "socially justified" on the ground of one of the following reasons in order to become legally effective: i) dismissal upon lack of capability ("personenbedingte Kündigung"), e.g. dismissal because of permanent or repeated illness, ii) dismissal upon misconduct ("verhaltensbedingte Kündigung"), e.g. dismissal because of repeatedly warned unpunctuality or breach of trust; and iii) dismissal upon redundancy ("betriebsbedingte Kündigung"), e.g. closure of the business. In the case of redundancy, the employer has to prove that the jobs are really abolished, i.e. that the dismissed workers are not merely replaced by others. Moreover, such dismissals have to comply with the criterion of social selection ("Sozialauswahl"), i.e. those employees with functionally equivalent tasks that can be expected to have the best alternative job market option should be fired first (PADA §1(3)). The social selection criteria normally take into consideration inter alia length of tenure and age, implying that firms are not free to dismiss primarily low productivity workers. Furthermore, under the Works Constitution Act ("Betriebsverfassungsgesetz") §112, companies have to arrange a social compensation plan ("Sozialplan") in case of collective dismissal or major reallocations of employees within the company. Social compensation plans typically include severance payments and training programs.

Beyond the relative strictness of German dismissal rules, several authors stress that the uncertainty about firing costs can become substantial. Eger (2004) stresses that law in this area is predominantly judge made law due to many general clauses in the PADA. This implies that judicial enforcement may not even be uniform across the country (Goerke and Pannenberg, 2005). The burden of proof whether a dismissal was justified is placed on the employer. The German Federal Labor Court has developed the important general principle ("ultima-ratio") that a dismissal is void if there are less serious means available such as retraining or reallocation within the firm (Eger, 2004). Still, the Federal Labor Court insists upon consideration of each single case. Costs for dismissed workers to appeal to a labor court are relatively low and potential rewards considerable. Grund (2006) finds that one fourth to one third of dismissed employees receive severance payments from their former employers.

These payments rise with tenure and firm size. Furthermore, the author finds that collectively dismissed employees tend to receive higher severance payments (10,400 Euro) than individually dismissed ones (8,600 Euro). OECD (2004) reports that, on average, 265,000 cases were closed by German labor courts over the period 1999 to 2002, meaning that nearly one out of four layoffs is brought before the court. The length of the procedure takes three to four months on average, but may take up to three years. If an employee successfully appeals his dismissal, the termination of employment has not become legally effective in the first place, i.e. the employer has to pay all past-due salary for the time the case was pending in court even though the employee was no longer working for the firm (PADA §8). To circumvent the legal uncertainties of court rulings, voluntary severance payments are frequently offered by the employer to convince a worker to quit (cancellation agreement) and to avoid legal costs.[6]

In sum, German firms may not be able to adjust their workforce because dismissals are either prohibited or involve high lay off costs and legal uncertainty. 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, in a context of high labor protection we expect the job destruction rate to react only weakly to negative shocks to price competitiveness or, indeed, to any other external shock to labor demand. In the worst case, labor market rigidities are so strictly binding to a plant that it is driven into bankruptcy, leading to the closure of the establishment.[7] If we assume that the company's productivity

[6]Even though a number of limited reforms have been enacted to allow for more flexibility since the 1980s, the employment protection legislation in Germany has remained complex and restrictive in international comparison. The Part-Time and Fixed Term Employment Act ("Teilzeit- und Beschäftigungsgesetz", §14(2)) allows for time-limited employment without specific justification if the contract covers a term shorter than two years. In the wake, staffing agencies emerged, offering temporary employment not subject to the general protection laws. Similarly, the possibility of offering fixed-term contracts has opened a window for employers to circumvent the stringent protection rules. These instruments of flexibility have been widely used, and as a consequence the overall index of employment protection as measured by the OECD has subsequently declined. While the United States exhibits the lowest indicator of strictness of employment protection legislation, Germany - despite its improvement - still ranks no higher than 20th among 28 industrialized countries (OECD, 2004). Furthermore, the overall indicator masks large differences between regular and temporary employment in Germany. The former still has one of the most restrictive regulations and flexibility has been confined to the latter. Nevertheless, the emergence of a flexible fringe of the labor market should lead to observable differences in the reaction of job flows to negative shocks for firms using such flexible, fixed-term contracts.

[7]Sometimes an employment company ("Beschäftigungsgesellschaft") is founded, which temporarily takes over the workers of a collective dismissal and organizes the training programs. It is

is just sufficiently high to remain competitive in the market, an external shock in combination with a lack of flexibility to adjust in the short-run will lower its productivity and trigger its closure. Alternatively, firms may resort to restructuring and outsourcing to lower fixed costs.[8] Therefore, restructurings are expected to be associated with higher job destruction and creation rates and hence higher job gross flows.

3 Data set and empirical strategy

In this section we describe the data, and, in particular, the three samples on which we base our estimates. Then, take a first glance at our variables of interest and we introduce our estimation equation and describe the variables. Finally, we address various estimation issues.

3.1 Data and sample selections

Our main data source constitutes the IAB Establishment Panel from the Institute for Employment Research (IAB).[9] This panel started in 1993 with 4,265 establishments in West Germany (see for instance Koelling, 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, with the selection probabilities depending on the variation of the number of employees in the respective stratum.

closed after some time when the training programs are finished.

[8]Under Civil Code ğ 613a ("Bürgerliches Gesetzbuch"), existing labor contracts remain legally effective in the case of a takeover, if the same workforce continues to pursue the same tasks. However, domestic restructurings may be pursued to lower firing costs. If employers can successfully move workers that are intended to be dismissed into a new limited liability company of the same holding, they will be able to drive this unit into bankruptcy by downsizing its orders to this unit. If successful, the employer profits in two ways: It saves on severance payments and keeps control over who is dismissed. However, if restructurings are only made to circumvent labor protection laws, work councils will object the restructuring in the first place or labor courts may declare the collective dismissals upon redundancy socially unjustified. Plant relocation abroad is easier to undertake since it cannot be challenged by courts.

[9]The IAB-Establishment Panel data is 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, we refer to http://fdz.iab.de/en.

The stratum is defined over 16 industries, 10 categories of establishment size, and 16 German states (Länder). Large establishments are oversampled, but the sampling within each cell is random. Survey data is collected by professional interviewers of Infratest Sozialforschung on account of the German Institute of Employment Research. Participation of firms is voluntary but the response rate of more than 80% for repeatedly interviewed establishments is high. 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. Thus, we avoid changes in the composition of the sample due to new waves of establishments in later stages and the replacement of non-responding establishments by new random draws from the same stratum.[10] We exclude establishments with less than five employees, leaving us with little more than 400 establishments for which employment data is available for every sample year.[11] Relying also on the IAB Establishment panel, Addison and Teixeira (2006) and Schank (2005) opt for similar sample selections in their studies on the effects of works councils on employment and on productivity differences between overtime and standard-time establishments, respectively.[12] The disadvantage of a balanced panel is that it includes only surviving firms. This motivates us to also consider a second sample, containing all establishments that went bankrupt over the sample period *(attrition sample)* in addition to all establishments from the balanced sample. The third sample is an *unbalanced sample* where we strike a compromise between limiting noise due to changing firm composition and the desire to consider a larger firm sample. Thus, we include all firms that responded at least five times over the observation period. Our specifications on this sample allow for considerable efficiency gains as opposed

[10]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.

[11]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.

[12]Other empirical studies that rely on the IAB-Establishment Panel or Linked-Employer-Employee (LIAB) dataset include Bauer and Bender (2004), Zwick (2004), Zwick (2006) and Schank et al. (2007).

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 A first glance

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 exhibit considerable variation and have gone through a full cycle. Figure 1 shows aggregate figures on the real effective exchange rate and on the evolution of the export share for Germany over the sample period.

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

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 in Germany relative to about 30 other countries weighted by their

trade shares to Germany. We note that the real exchange rate went through a major cycle during the sample period. Against the background of a boom in domestic sales (especially in East Germany) after reunification and a 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 compared to 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[13] was negatively related to real exchange rate swings with a particularly marked reaction to the appreciation in the early to mid 90s.[14]

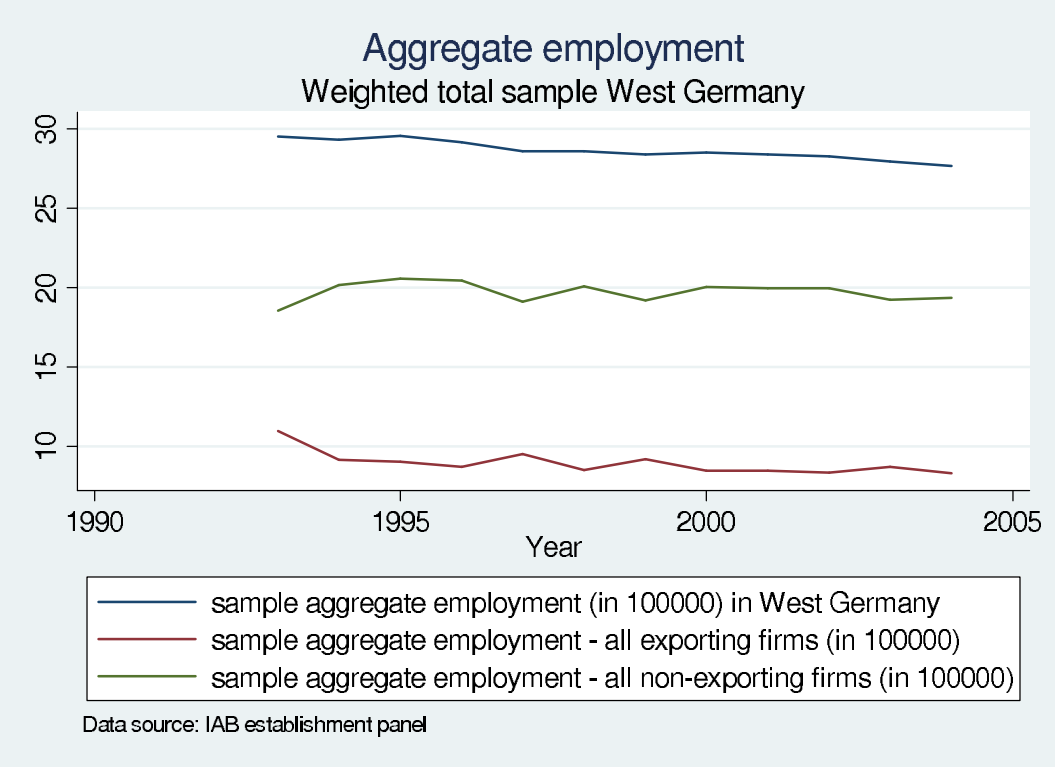

Figure 2: With sampling frequency weighted aggregate employment, employment in establishments with exports and without (in million).

[13]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.

[14]The correlation coefficient is -0.43.

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 by 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-exporting 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.

3.3 Empirical strategy

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

$$\begin{aligned} \text{worker\_flow}_{\text{it}} &= \beta_1 \cdot job\_creation_{it-1} + \beta_2 \cdot job\_destruction_{it-1} + \\ &+ \beta_3 \cdot competitiveness_{it} + \beta_4 \cdot interest\_rate_t + \\ &+ \beta_5 \cdot Real\_GDP\_Growth_t + \beta_6 \cdot apprenticeship_{it} + \\ &+ \beta_7 \cdot fixed\_term\_contract_{it} + \beta_8 \cdot sales\_growth_{it} + \\ &+ \beta_9 \cdot Avg\_wage_{it} + \beta_{10} \cdot restructuring_{it} + \beta'_{11} \cdot size_{it} + d_i + \epsilon_{it} \end{aligned} \tag{1}$$

where

$$worker\_flow_{it} \in \{job\_creation_{it}, job\_destruction_{it}, net\_flow_{it}, gross\_flow_{it}\}$$

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 be heteroscedastic.

The standard measurement of job creation and job destruction is the aggregation of *net* employment increases throughout 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 the sum of job creation and destruction, and net job flows are 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 plant 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. 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:

$$worker\_flow_{it} = \frac{\Delta X_{it}}{0.5 \cdot employment_{it} + 0.5 \cdot employment_{it-1}}, \tag{2}$$

where $employment_{it}$ is the number of officially employed full- and part-time workers on 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[15], 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.

[15]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.

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 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:

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

with hourly wage costs denominated in United States Dollars and compiled by the United States Bureau of Labor Statistics. C is a set of 32 countries.

Following the model of Klein et al. (2003), we expect that a real exchange rate appreciation leads to a lower job creation rate and higher job destruction rate.[16] Furthermore, we anticipate that - for a given real exchange rate shock - the impact on an establishment's employment is more pronounced the more open the plant is. For this reason, we interact the percentage change of the wage-cost based real exchange rate ($\Delta wage\_costs_t$) with the firm-specific export share in sales ($openness_{it}$) to form the variable $competitiveness_{it}$

$$competitiveness_{it} = \Delta wage\_costs_t \cdot openness_{it}, \tag{4}$$

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

$$openess_{it} = \frac{1}{2} \sum_{\tau=t-2}^{t-1} \frac{Exports_{i\tau}}{Total\_Revenues_{i\tau}}. \tag{5}$$

We compute the openness variable from the average lagged export-to-revenues ratios in order to mitigate concerns that international trade could be endogenous.

[16] In the model of Klein et al. (2003), the real exchange rate enters on the demand side of the establishment. For an alternative model, where the exchange rate enters through its effect on the price of exports, import competition and imported intermediate goods, see for instance Campa and Goldberg (2001).

To sum up, we expect a positive (negative) sign on our coefficient of interest, $competitiveness_{it}$, for the $job\_creation_{it}$ and net_flow_{it} ($job\_destruction_{it}$).[17] We have no firm priors with respect to $gross\_flow_{it}$.

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 no specific prior. In addition, the percentage of workers with temporary work contracts ($fixed\_term\_contract_{it}$) in total work force measures to what extent 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 a work relation more frequently and generally increase worker turnover.

Furthermore, we construct a 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. Thus, restructuring also comprises 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.[18]

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 cost of this establishment for the same type

[17] For instance, we expect that real exchange rate appreciation (for a given level of openness) or a loss of international competitiveness leads to a lower job creation rate.

[18] Only when parts of a bankrupt firm are continued under new ownership, are labor protection rights of workers 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.

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.[19] Finally, the variable $interest\_rate_t$ stands for the short-term discount rate and is a proxy for the general macroeconomic environment. An overview of all variable definitions and the respective data sources is given in Table 12 in the Appendix.

To complete the variables description, we present some summary statistics. Table 1 shows the average net job flow rate, job creation rate, job destruction rate, and gross job flow rate by types of firms.

Table 1: Summary statistics by types of establishments

Type		Number of Obs. (avg.)	Net Flows (avg.)	Job Creation (avg.)	Job Destruct. (avg.)	Gross Flows
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; Number of observations corresponds to non-missing values of net flows.

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

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 United States 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%.

Table 2 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 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 have 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, in a sample of 13 European countries Gomez-Salvador et al. (2004) report the lowest average gross job flows for Germany. Moreover, Davis et al. (1996, p. 21) report job creation and destruction rates at a height of 9.1 and 10.2 percent, respectively, for the United States 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

Table 2: 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. The exact industry classifications are as follows: **agriculture** (agriculture, hunting, forestry), **mining and energy** (mining and quarrying, electricity, water), **food** (food products), **paper, textile, furniture** (textiles and clothing, tanning, leather; paper products, printing, publishing; furniture, jewellery, sports goods, games, other products), **chemical, wood** (wood, products, chemicals; rubber and plastic products; non-metallic mineral; basic metals; recycling), **machinery, motor vehicles** (fabricated metal, structural metal products; machinery; motor vehicles; other transport equipment; electrical equipment; precision and optical equipment), **construction** (building of complete constructions; building installation), **retailing** (sale, maintenance and repair of motor vehicles; retail sale; wholesale; retail trade, repair), **logistics** (transport, communication), **banking, insurance** (central banking, insurance and pension funding), **restaurants** (hotels, restaurants), **education**, **health care** (human health, social work activities), **services** (computer and related activities, research, legal, accounting, advertising, real estate activities; renting and business activities), **culture, sport, entertainment** (sanitation, cultural, other services), **public administration**.

some interesting insights. Our figures for job reallocation are smaller than theirs, even though in theory they should be higher since in our definition of job creation and of job destruction can take place in the same establishment.

3.4 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:

$$y_{it} = \sum_{l=1}^{p} \alpha_1 \cdot y_{i,t-1} + \beta_0 + \beta_1 \cdot x_{i,t-1} + \beta_2 \cdot z_{i,t-1} + \eta_i + \epsilon_{it}, \text{ for } t = 1 + p...T, \quad (6)$$

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 is 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 $\alpha_l, l = 1, ..., p$, are the regression coefficients with $|\sum_{l=1}^{p} \alpha_1| \leq 1$.[20] 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.

Nickell (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

[20] If a unit root exists, i.e. $|\sum_{l=1}^{p} \alpha_1| = 1$, 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.

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

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

with the instrument matrix

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

and $\Delta\epsilon_i$ 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 2^{nd} 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, for robustness checks we will consider 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

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

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 corre-

lated 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 applying the two-step inverse probability weighted (IPW) GMM estimator. We first estimate the probability that a firm goes bankrupt or survives in a year by probit estimations for each year:[21]

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

for t=p+1,...,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-1} is a vector of exogenous covariates observed at time t-1 for all observations with $s_{it-1} = 1$, $\delta_t - 1$ is the corresponding coefficient vector, and υ_{it} the normally distributed error term. Among the exogenous covariates w_{it-1} in the selection equation (9) there should be at least one that is not contained at the same time in x_{it-1} (exclusion restriction). We follow Pavcnik (2002) and use the investment growth rate at time t-1 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-1} as part of w_{it-1}, as well. From this estimation of the survival probability in a year one can derive, by Bayes' Law, the cumulative survival probabilityp_{it} as follows:

$$p_{it} = p_{it-1} \cdot \hat{q}_{it}, \tag{10}$$

where $\hat{q}_{it}$ is the predicted probability $\hat{q}_{it} = P(s_{it} = 1|w_{i,t-1})$ from (9) and the

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

initialization is $p_{i,p+1} = \hat{q}_{i,p+1}$

In an attrition sample the population moment conditions (7) and (8) are defined for all observations, including the ones with $s_{it} = 0$ which are not in the sample. However, when assuming that survival is independent of the estimation error conditionally on $w_{i,t-1}$ (conditional independence assumption), Abowd et al. (2001) and Prokhorov and Schmidt (2006) show that (7) is equivalent to

$$E[W_i' \Delta e_t] = 0, \tag{11}$$

where $\Delta e_{it} = \Delta \epsilon_{it} \cdot \frac{s_{it}}{p_{it}}$ throughout all observations with $s_{it} = 1$, and analogously, (8) is equivalent to

$$E\left[\Delta y_{i,t-1} \epsilon_{it} \cdot \frac{s_{it}}{p_{it}}\right] = 0, \tag{12}$$

for t=p+1,...,T and for all observations with $s_{it} = 1$. Moreover, Prokhorov and Schmidt (2006) show that the estimator obtained from minimizing the GMM criterium function of the moment conditions (11) and (12) is efficient when the moment conditions are replaced by their sample analogue and even when $\hat{q}_{it}$ is only an estimate of $P(s_{it} = 1|w_{i,t-1})$. This describes the calculation of the IPW GMM attrition estimator and its covariance matrix.

When replacing $P(s_{it} = 1|w_{i,t-1})$ in equation (10) by the sampling probability of each strata, one can use the same IPW GMM estimator to take into account proper sampling weights. An unweighted GMM estimator is still appropriate whenever the estimated regression coefficients are homogeneous. An IPW GMM estimator with sampling weights, however, will indicate heterogeneity of the estimated coefficients when differing from the unweighted GMM estimator, and can therefore be considered as an (informal) specification test.

4 Empirical results

4.1 Baseline results

In Table 3, 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 4-6 are structured

symmetrically to Table 3 except for that they contain the estimates on the dependent variables job creation, job destruction, and gross flow, respectively. Tables 3-6 confine the analysis to the balanced panel.

Our first result is that there is a significant reduction in net employment due to a rise in wage costs of Germany relative to its trading partners, and that this 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 over the whole of West Germany.[22] 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.

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 4), but only weakly and even insignificantly determined by job destruction (see Table 5). In fact, the coefficient on the variable competitiveness is significant in 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 United States by Klein et al. (2003). The United States labor market seems to adjust to real exchange rate shocks primarily through the job destruction rate. As noted above, we suggest that the difference in the adjustment process between the United States and Germany may be explained by different labor market institutions.

While the asymmetric reaction of job creation and job destruction rates in our study for Germany is in contrast to the evidence from the United States, a comparable adjustment mechanism is known for France. Abowd et al. (1999) also find that the reaction of job creation is more sensitive to shocks than the job destruction rate.[23] Gourinchas (1999) explicitly examines 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 third result: Our hypothesis of a rigid labor market is corroborated by reviewing the control variable estimates. For instance, external temporary shocks such as

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

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

Table 3: 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; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

* significant at 10%; ** significant at 5%; *** significant at 1%;

through real GDP growth or sales growth are insignificant in explaining job flows within the balanced sample, suggesting that German labor market regulation induces employment smoothing. Furthermore, note that the macroeconomic and firm specific variables have a limited explanatory power for the job destruction rate in Table 5, indicating that there is little variation in the job destruction rate. This is

Table 4: Dependent variable job creation - balanced panel

	OLS	Fixed Effect	Blundell Bond (A)	Blundell Bond (B)
	(1)	(2)	(3)	(4)
Job creation (t-1)	0.3412***	-0.0022	0.1385**	0.1475**
	(5.23)	(0.06)	(2.25)	(2.41)
Job destruction (t-1)	0.0183	0.0034	0.0456	0.0438
	(0.39)	(0.07)	(0.77)	(0.74)
Competitiveness	0.0008***	0.0004**	0.0009***	0.0007**
	(3.23)	(2.12)	(3.33)	(2.54)
Interest rate	0.0032***	0.0052***	0.0045***	0.0045***
	(3.08)	(4.37)	(4.12)	(4.18)
Real GDP growth	0.2188**	0.1927**	0.1175	0.1253
	(2.19)	(1.99)	(1.12)	(1.22)
Apprenticeship	-0.1006***	-0.0907***	-0.0798***	-0.0793***
	(5.12)	(2.83)	(3.21)	(3.20)
Fixed term contract	0.2794***	0.2152***	0.3066***	0.3039***
	(3.79)	(3.30)	(3.64)	(3.63)
Sales growth	0.0015	0.0039	0.0006	0.0010
	(0.30)	(0.80)	(0.11)	(0.18)
Avg. wage	-0.0023	0.0004	-0.0120***	-0.0137***
	(0.71)	(0.07)	(3.22)	(3.69)
Restructuring	0.0101**	0.0106**	0.0098*	0.0089*
	(2.00)	(2.19)	(1.80)	(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; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

* significant at 10%; ** significant at 5%; *** significant at 1%;

consistent with the exceptionally low level of the job destruction rate found in the summary statistics of Tables 1 and 2 in comparison with data for the United States 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 to these shocks. Finally, larger average wage costs per employee again do not foster significantly job destruction but hinder significantly job creation. This sug-

Table 5: 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; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

* significant at 10%; ** significant at 5%; *** significant at 1%;

gests that insiders benefit from higher wages, while outsiders among the workforce bear the costs of a slowed job reallocation process.

Still, German law has created some islands of deregulation within the otherwise rigid labor market, for example through the emergence of fixed term contracts. 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

Table 6: 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; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.

* significant at 10%; ** significant at 5%; *** significant at 1%;

among firms who used them as a means of flexibility (see Table 3).

Our dummy variable *restructuring* is highly significant in explaining a larger job destruction rate. There are several legal channels to reduce workforce via such a discrete organizational change, depending on the specific facts of the case: i) dismissal upon redundancy ("betriebsbedingte Kündigung"), ii) sale of establishment parts,

when the business is on the verge of bankruptcy[24], iii) national outsourcing as a way to cut down wage costs, when a firm's business unit can be replaced by a subcontractor whose employees belong to another trade union with a lower collective wage agreement and iv) international outsourcing as another means to reduce wage costs. While all these channels capture job destruction, our definition of restructuring also captures the acquisition of establishment parts and, hence, also contributes significantly to job creation. Overall, the two effects roughly balance and net job flows remain unaffected.

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 4 and of the lagged job destruction rate in Table 5 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. Furthermore, the test on overidentifying restrictions and the test for second order autocorrelation 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 high interest rate goes along with more job destruction.

So far, we have not taken into account that our dataset is a stratified sample. In Table 7 we calculate a sampling weight which consists of the strata sampling probability multiplied with the employment share of all firms of the balanced sample in the employment of firms in the unbalanced sample for each strata. These weights render the sample representative with respect to employment. Then, we apply an IPW GMM estimator with these weights on the balanced sample for each job flow rate under the assumption of an exogenous competitiveness variable and our results remain remarkably robust.

Next, in Table 8, we turn 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 find a significant though economically small exchange rate effect on the net employment rate and the job creation rate, but no such impact on the job destruction or 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 now have a significantly larger job destruction rate and

[24]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 business albeit under new ownership.

Table 7: GMM IPW estimator with strata weights

	Net Flows	Job Creation	Job Destruction	Gross Flows
	(1)	(2)	(3)	(4)
Job creation (t-1)	0.0137	0.2256***	0.2119**	0.4375***
	(0.19)	(2.92)	(2.07)	(2.62)
Job destruction (t-1)	-0.0470	0.0895*	0.1375***	0.2280***
	(0.71)	(1.77)	(2.64)	(2.91)
Competitiveness	0.0015**	0.0011***	-0.0004	0.0007
	(2.43)	(2.56)	(0.77)	(0.95)
Interest rate	0.0038*	0.0040***	0.0002	0.0041
	(1.70)	(2.98)	(0.07)	(1.20)
Real GDP growth	0.1435	-0.0186	-0.1607	-0.1763
	(0.72)	(0.09)	(1.15)	(0.62)
Apprenticeship	-0.0472	-0.0986***	-0.0501	-0.1475***
	(1.32)	(3.40)	(1.33)	(2.60)
Fixed term contract	0.1151	0.1453**	0.0302	0.1754**
	(1.14)	(2.37)	(0.44)	(2.10)
Sales growth	0.0019	0.0026	0.0010	0.0039
	(0.26)	(0.35)	(0.12)	(0.29)
Avg. wage	0.0017	-0.0127***	-0.0143**	-0.0269***
	(0.37)	(2.66)	(2.47)	(2.83)
Restructuring	-0.0071	0.0128	0.0199**	0.0327**
	(0.74)	(1.29)	(2.55)	(2.18)
Observations	3203	3207	3205	3203
Firms	412	412	412	412
Hansen p-value	0.209	0.080	0.111	0.196
AR(1) p-value	0.000	0.000	0.000	0.000
AR(2) p-value	0.231	0.139	0.107	0.107

Notes: Firm-clustered t statistics in parentheses; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.
* significant at 10%; ** significant at 5%; *** significant at 1%;

- 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 also explain 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.

Table 8: Blundell-Bond estimates - unbalanced panel

	Net Flows	Job Creation	Job Destruction	Gross Flows
	(1)	(2)	(3)	(4)
Job creation (t-1)	0.0796***	0.0635***	0.0023	0.0474
	(2.66)	(2.61)	(0.10)	(1.25)
Job destruction (t-1)	0.0078	0.0444**	0.0429**	0.0811**
	(0.29)	(2.01)	(2.22)	(2.45)
Competitiveness	0.0010***	0.0005**	-0.0004	0.0003
	(3.11)	(2.49)	(1.58)	(0.10)
Interest rate	0.0005	0.0026***	0.0020***	0.0047***
	(0.69)	(4.08)	(3.23)	(4.64)
Real GDP growth	0.0629	0.0114	-0.0370	-0.0399
	(0.76)	(0.18)	(0.57)	(0.40)
Apprenticeship	-0.1195***	-0.1059***	-0.0095	-0.0923***
	(7.47)	(11.54)	(0.63)	(4.63)
Fixed term contract	0.2257***	0.3396***	0.1085***	0.4536***
	(7.01)	(14.64)	(4.64)	(13.13)
Sales growth	-0.0011	-0.0012	-0.0016	-0.0013
	(0.49)	(0.69)	(0.63)	(0.45)
Avg. wage	-0.0122***	-0.0203***	-0.0078***	-0.0285***
	(5.70)	(11.00)	(4.00)	(8.94)
Restructuring	-0.0210***	0.0073***	0.0290***	0.0356***
	(5.45)	(3.10)	(8.99)	(8.79)
Observations	21078	21078	21120	21078
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; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.
* significant at 10%; ** significant at 5%; *** significant at 1%;

Finally, we restrict the full sample to observations of firms which have strictly positive exports, because many observations in our sample indeed have zero export values. The results are reported in Table 13 in the Appendix and again we find almost the same estimates despite the fact that the sample shrinks to less than a third of all observations.

4.2 Industry-effects

In a further step we investigate whether the effects of competitiveness are industry-specific. 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.

Table 9: Blundell-Bond estimates with industry-specific effects

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

Notes: Unbalanced panel; only industry interaction terms are shown.
Firm-clustered t statistics in parentheses; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix. Unreported control variables are identical to the ones in Table 8.
* significant at 10%; ** significant at 5%; *** significant at 1%;

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 whose employment depends on real exchange rate shocks. Finally, there are industries outside manufacturing such as health care with extremely low average export shares and, nevertheless, significant reactions of their employment on real exchange rate shocks. The latter result becomes understandable if one recalls the information from Table 2 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.

4.3 Attrition estimates and bankruptcy

So far, we have been ignoring job destruction through bankruptcy[25] of firms. In Table 10, we apply the IPW GMM attrition estimation to the attrition sample. We take the growth rate of investment and the sum of previous restructurings as the excluded selection variable. Then, we estimate the expected value of the impact of a *competitiveness* shock on job flows as if the defaulted firms had survived. The first result remains robust but the second turns around. Net job growth still decreases in firms with a large export share when the real exchange rate appreciates. However, the adjustment process is now channeled through the job destruction rate as well.

To understand this result, in Table 11 we present estimates of the probability of bankruptcy of firms, which mirror the first stage of the attrition estimates in Table 10. 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.[26] 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 column (1) of Table 11 shows that a real appreciation yields a significantly larger probability of bankruptcy if a firm has a relatively large export

[25] Our bankruptcy variable captures plant closures. Plant closures can, but need not necessarily, coincide with the bankruptcy of the plant. Ownership changes cannot lead to a "plant closure" in our dataset.

[26] Among the most important determinants of firm bankruptcies are firm size and firm age (e.g. Hall, 1987). Firm age is not properly reported in our dataset and can therefore not be used.

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 are more likely to go bankrupt. When we add the accumulation of past restructurings in column (2) of Table 11, we also find them to contribute to a larger probability of default. Finally, we incorporate the share of fixed-term contracts, which does not turn out to be significantly related to bankruptcy.

Table 10: GMM IPW attrition estimator

	Net Flows (1)	Job Creation (2)	Job Destruction (3)	Gross Flows (4)
Job creation (t-1)	0.2282***	0.2352***	0.0087	0.2456***
	(3.41)	(3.86)	(0.29)	(3.58)
Job destruction (t-1)	-0.0260	-0.0252	-0.0000	-0.0262
	(0.42)	(0.44)	(0.00)	(0.38)
Competitiveness	0.0019***	0.0010***	-0.0009**	0.0001
	(3.74)	(2.96)	(2.02)	(0.19)
Interest rate	0.0024	0.0040***	0.0015	0.0054
	(1.42)	(2.99)	(1.07)	(2.54)
Real GDP growth	0.1950	0.2312	0.0419	0.2799
	(1.01)	(1.55)	(0.30)	(1.31)
Apprenticeship	-0.0643*	-0.0557***	0.0114	-0.0413
	(1.64)	(2.64)	(0.29)	(0.85)
Fixed term contract	0.3817***	0.3487***	-0.0317	0.3182***
	(4.76)	(4.28)	(1.60)	(3.64)
Sales growth	0.0090	-0.0035	-0.0125**	-0.0159*
	(1.15)	(0.54)	(2.28)	(1.74)
Avg. wage	-0.0096**	-0.0158***	-0.0053	-0.0203***
	(2.31)	(4.29)	(1.39)	(3.34)
Restructuring	-0.0198**	0.0048	0.0247***	0.0295***
	(2.24)	(0.98)	(3.60)	(3.55)
Observations	3211	3215	3213	3211
Firms	493	493	493	493
Hansen p-value	0.178	0.044	0.526	0.117
AR(1) p-value	0.000	0.000	0.000	0.000
AR(2) p-value	0.510	0.156	0.241	0.828

Notes: Firm-clustered t statistics in parentheses; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.
* significant at 10%; ** significant at 5%; *** significant at 1%;

Table 11: Dependent variable bankruptcy

	Logit	Logit	Logit	Probit
	(1)	(2)	(3)	(4)
Job destruction (t-1)	2.0906***	1.8090***	1.8672***	1.0230***
	(3.47)	(2.97)	(3.06)	(3.19)
Competitiveness	0.0693**	0.0834**	0.0768**	0.0376**
	(2.02)	(2.38)	(2.07)	(1.96)
Sales growth (t-1)	-0.9462*	-0.6975	-0.7188	-0.3005
	(1.91)	(1.60)	(1.62)	(1.56)
Invest. growth (t-1)	-0.4700***	-0.2354	-0.2137	-0.0744
	(3.42)	(1.54)	(1.46)	(1.51)
Invest. expected (t-1)	-0.2436	-0.4654***	-0.4095***	-0.1767***
	(1.51)	(3.30)	(2.93)	(2.93)
Firm size (t-1)	-0.1064**	-0.1767***	-0.1761***	-0.0812***
	(2.39)	(3.64)	(3.56)	(3.87)
Past outsource		0.3329***	0.3197***	0.1485***
		(4.64)	(4.39)	(3.99)
Fixed term contract (t-2)			10.852	0.4749
			(1.39)	(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%.

Summing up, it appears that competitive pressure through real appreciation is comparable to the United States. 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.

5 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 United States. However, the adjustment to a loss in international competitiveness seems to work through different channels than in the United States. 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 bankruptcy is taken into account, the adjustment process switches back to the job destruction rate just as in the United States. In addition, the probability of

bankruptcy depends positively, among other things, 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 United States 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 costs 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 costs, 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.

A natural avenue for further research would be to investigate the welfare implications of these different adjustment processes. In the short run, a system which slows down job losses should benefit those who hold a job and shift the burden of a lower job creation rate onto the outsiders of the labor market, e.g. the young, unemployed and low skilled. In the longer run it seems that job destruction is not prevented but it takes place through discrete events of restructuring, outsourcing or bankruptcy. Further research should address questions such as: Is there "excessive" job destruction in restructuring events? What are the effects of the delayed adjustment on firm level productivity? Does a slower job creation rate affect the rate of innovation? Are there any effects of the slower turnaround on the labor market on overall growth?

References

Abowd, J., B. Crepon and F. Kramarz (2001). Moment Estimation with Attrition: An Application to Economic Models. *Journal of the American Statistical Association 96*, 1223–1331.

Abowd, J., P. Corbel and F. Kramarz (1999). The Entry and Exit of Workers and the Growth of Employment: An Analysis of French Establishments. *Review of Economics and Statistics 81*, 170–187.

Addison, J. and P. Teixeira (2006). The Effect of Works Councils on Employment Change. *Industrial Relations 45*, 1–25.

Bauer, T. and S. Bender (2004). Technological Change, Organizational Change, and Job Turnover. *Labour Economics 11*, 265–291.

Bauer, T., S. Bender and H. Bonin (2007). Dismissal Protection and Worker Flows in Small Establishments. *Economica 74*, 804–821.

Bellmann, L. (1997). The IAB Establishment Panel with an Exemplary Analysis of Employment Expectations. IAB-Topics No. 20 (IAB Nuernberg).

Bertola, G. (1999). Microeconomic Perspectives on Aggregate Labor Markets. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics, Vol. 3C*, pp. 2985–3028. Amsterdam: North-Holland.

Binder, M., C. Hsiao und H. Pesaran (2005). Estimation and Inference in Short Panel Vector Autoregressions with Unit Roots and Cointegration. *Econometric Theory 21*, 795–837.

Blau, F. and L. Kahn (1999). Institutions and Laws in Labor Market. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics, Vol. 3A*, pp. 1399–1461. Amsterdam: North-Holland.

Branson, W. and J. Love (1988). United States Manufacturing and the Real Exchange Rate. In R. Marston (Ed.), *Misalignment of Real Exchange Rates: Effects on Trade and Industry*. University of Chicago Press, Chicago, Illinois.

Burgess, S. and M. Knetter (1998). An International Comparison of Employment Adjustment to Exchange Rate Fluctuations. *Review of International Economics 6*, 151–163.

Campa, J. and L. Goldberg (2001). Employment versus Wage Adjustment and the U.S. Dollar. *Review of Economic and Statistics 83*, 477–489.

Davis, S. and J. Haltiwanger (1999). Gross Job Flows. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics, Vol. 3B*, pp. 2711–2805. Amsterdam: North-Holland.

Davis, S., J. Haltiwanger, and S. Schuh (1996). *Job Creation and Destruction*. MIT Press, Cambridge MA and London.

Eger, T. (2004). Opportunistic Termination of Employment Contracts and Legal Protection against Dismissal in Germany and the USA. *International Review of Law and Economics 23*, 381–403.

Goerke, L. and M. Pannenberg (2005). Severance Pay and the Shadow of the Law: Evidence for West Germany. CESifo Working Paper No. 1619.

Goldberg, L. and J. Tracy (2000). Exchange Rates and Local Labor Markets. In R. Feenstra (Ed.), *The Impact of International Trade on Wages*. NBER, University of Chicago Press.

Gomez-Salvador, R., J. Messina and G. Vallanti (2004). Gross Job Flows and Institutions in Europe. *Labour Economics 11*, 469–485.

Gourinchas, P.-O. (1998). Exchange Rates and Jobs: What Do We Learn from Job Flows? *NBER Macroeconomics Annual, The MIT Press, Cambridge*.

Gourinchas, P.-O. (1999). Exchange Rates Do Matter: French Job Reallocation and Exchange Rate Turbulence. *European Economic Review 43*, 1279–1316.

Grossman, G. (1982). The Employment and Wage Effects of Import Competition in the United States. NBER Working Paper No. 1041.

Grund, C. (2006). Severance Payments for Dismissed Employees in Germany. *European Journal of Law and Economics 22*, 49–71.

Hunt, J. (2000). Firing Cost, Employment Fluctuations and Average Employment: An Examination of Germany. *Economica 67*, 177–202.

IMF (2006). Germany: Selected Issues, IMF Country Report No. 06/17.

Klein, M., S. Schuh, and R. Triest (2003). Job Creation, Job Destruction, and the Real Exchange Rate. *Journal of International Economics 59*, 239–265.

Koelling, A. (2000). The IAB-Establishment Panel. *Schmollers Jahrbuch/Journal of Applied Social Science Studies 120*, 291–300.

Nickell, S. (1981). Biases in Dynamic Models with Fixed Effects. *Econometrica 49*, 1417–1426.

OECD (2004). Employment Outlook. Organization for Economic Co-Operation and Development.

Pavcnik, N. (2002). Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants. *Review of Economic Studies 67*, 245–276.

Prokhorov, A. and P. Schmidt (2006). GMM Redundancy Results for General Missing Data Problems. Michigan State University, mimeo.

Revenga, A. (1992). Exporting Jobs? The Impact of Import Competition on Employment and Wages in US Manufacturing. *Quarterly Journal of Economics 107*, 255–284.

Roodman, D. (2003). Stata Module: xtabond2, Center for Global Development, Washington D.C. http://ideas.repec.org/c/boc/bocode/s435901.html.

Sachs, J. and H. Shatz (1994). Trade and Jobs in U.S. Manufacturing. *Brookings Papers on Economic Activity 1*, 1–78.

Schank, T. (2005). Are Overtime Plants More Efficient than Standard-Time Plants? A Stochastic Production Frontier Analysis Using the IAB Establishment Panel. *Empirical Economics 30*, 693–710.

Schank, T., C. Schnabel and J. Wagner (2007). Do Exporters Really Pay Higher Wages? First Evidence from German Linked Employer-Employee Data. *Journal of International Economics 72*, 52–74.

Staiger, D. and J. Stock (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica 65*, 557–586.

Trognon, A. (1978). Miscellaneous Asymptotic Properties of Ordinary Least Squares and Maximum Likelihood Estimators in Dynamic Error Components Models. *Annales de l'INSEE 30/31*, 631–657.

Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data.* The MIT Press, Cambridge MA, London.

Zwick, T. (2004). Employee Participation and Productivity. *Labour Economics 11*, 715–740.

Zwick, T. (2006). The Impact of Training Intensity on Establishment Productivity. *Industrial Relations 45*, 26–46.

6 Appendix

Table 12: Variable description and 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

Variable description and data source (continued)

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
Bankruptcy	Non-response of a plant due to closure between t-1 and t. Plant closure not due to relocation within municipality.	IAB establishment panel
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 13: German exporters - full sample

	Net Flows	Job Creation	Job Destruction	Gross Flows
	(1)	(2)	(3)	(4)
Job creation (t-1)	-0.0114	0.0059	0.0049	0.0233
	(0.25)	(0.14)	(0.18)	(0.44)
Job destruction (t-1)	0.0274	0.0572	0.0843*	0.0870*
	(0.56)	(1.55)	(1.72)	(1.93)
Competitiveness	0.0008***	0.0004**	-0.0003	0.0000
	(2.64)	(2.20)	(1.54)	(0.12)
Interest rate	0.0008	0.0036***	0.0029***	0.0064***
	(0.75)	(4.06)	(2.97)	(4.59)
Real GDP growth	0.1416	0.1006	-0.0649	0.0597
	(1.17)	(1.13)	(0.76)	(0.46)
Apprenticeship	-0.1644***	-0.0753***	0.0086	0.0138
	(2.69)	(3.44)	(1.59)	(0.22)
Fixed term contract	0.3318***	0.3665***	0.0386	0.4012***
	(5.74)	(6.94)	(1.63)	(6.77)
Sales growth	0.0115***	0.0005	-0.0158**	-0.0105**
	(3.32)	(0.20)	(2.36)	(2.51)
Avg. wage	-0.0082	-0.0214***	-0.0070*	-0.0236***
	(1.59)	(9.80)	(1.69)	(4.17)
Restructuring	-0.0209***	0.0059*	0.0276***	0.0327***
	(3.84)	(1.73)	(6.42)	(6.17)
Observations	5668	5668	5682	5668
Firms	1959	1959	1961	1959
Hansen p-value	0.014	0.069	0.146	0.186
AR(1) p-value	0.000	0.000	0.000	0.000
AR(2) p-value	0.541	0.609	0.375	0.934

Notes: Firm-clustered t statistics in parentheses; 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 of first order autocorrelation; AR(2) is test of second order autocorrelation; Hansen test is heteroscedasticity-consistent test on overidentifying restrictions on the instrument matrix.
* significant at 10%; ** significant at 5%; *** significant at 1%;