The Impact of International Outsourcing on Individual Employment Security: A Micro Level Analysis

First Draft

Ingo Geishecker*

August 2005

Abstract

The paper analyses how international outsourcing affects individual employment security in German manufacturing industries between 1991 and 2001. The analysis is carried out at the micro level combining monthly spell data from the German Socio Economic Panel and industry-level outsourcing measures. By utilising micro level data, problems such as aggregation and potential endogeneity bias as well as crude skill approximations that regularly hamper industry level studies can be considerably reduced. The main finding is that international outsourcing significantly lowers individual employment security. Interestingly, the effect dies not significantly differ between high-, medium-, and low-skilled workers.

Keywords: international outsourcing, employment security, duration analysis

JEL classification: F16, F23. J63, J23

Corresponding Address:

Ingo Geishecker, Freie Universität Berlin,

Osteuropa-Institut, Garystr. 55, D-14195, Berlin, Germany

Tel: +49-30-83852081

Fax: +49-30-83852072

E-mail: geisheck@zedat.fu-berlin.de

*Free University Berlin and University of Nottingham. The author wishes to thank Steven B. Jenkins, Richard Upward, Katharina Wrohlich, Peter Haan and Arne Uhlendorff for valuable comments. The usual disclaimer applies.

1 Introduction

International outsourcing and its alleged negative labour market effects recently have generated considerable public concern in particularly against the backdrop of eastern enlargement of the European Union. In the public debate, the dominating view appears to be that international outsourcing severely threatens domestic jobs, a view that is fueled largely by anecdotic evidence. However, in the academic literature it is far from consensual what labour market impact international outsourcing in general has.

This study focuses on the German labour market which is an interesting case since it is not only the largest economy in Europe, but it is also far more open to international trade than for instance the U.S. Furthermore political and economic transition in the former communist Central and Eastern European countries (CEEC's) during the 1990's now allows for intensive production sharing with these economies at Germany's doorstep with potentially large implications for the German labour market.

Over the last years, a number of theoretical contributions such as Jones and Kierzkowski (2001), Arndt (1997), Arndt (1999), Kohler (2001), Kohler (2004), to mention only a few, have greatly advanced the literature on the potential labour market effects of international outsourcing for different skill groups. However, depending on the model's assumptions and framework low-skilled workers might gain or lose from international outsourcing in terms of income. Furthermore, all of the aforementioned general equilibrium models assume that labour market adjustments are achieved by sufficiently flexible relative wages. Although this may be justifiable in the long run, in the medium and short run, especially in a country such as Germany, relative wages might be fairly rigid. If this is the case then labour market adjustments to international outsourcing have to be mainly achieved by changes in employment.[1] At the same time the aforementioned models generally abstract from adjustment costs. However, as authors such as Davidson and Matusz (2004) convincingly show, if displaced workers experience spells of unemployment and in some cases have to be re-trained short run adjustment costs can consume a significant part of the overall gains from international trade. It is therefore important not to only focus on the long run effects of international outsourcing but to get also a better understanding of its immediate

[1] Krugman (1995) stresses the implications of rigid relative factor prices for employment and welfare in a parsimonious two country, two factor and two sector model. With rigid relative wages relative factor proportions, that is the ratio of skilled to unskilled workers, are also fixed in each sector. Thus, there is not sufficient scope for low skilled workers from the low skill intensive sector to move into the high skill intensive sector. As a result reduced demand for low skill intensive goods has to be met by unemployment of low skilled workers. Furthermore, due to reduced employment domestic income also falls, multiplying the immediate adverse effect.

short run effects.

Most empirical studies that investigate the impact of international outsourcing do so using aggregate industry-level data, which arguably has a number of limitations, such as possible aggregation bias, potential endogeneity issues and problematic skill definitions. The approach chosen for this study significantly differs from that of the previous literature and can be considered suitable to greatly reduce these limitations. By combining micro- and industry-level data one can assess the labour market impact of international outsourcing at the individual level. The main focus is on the question as to what extent international outsourcing affects employment and whether the effects differ between skill groups. Instead of estimating simple job separation models, a hazard rate model is estimated controlling for duration dependence. Utilising data on monthly employment spells, the study assess what impact individual and industry characteristics, particularly international outsourcing have on the probability of leaving employment.

Section 2 is concerned with the definition of international outsourcing and its measurement and gives a summary of the most recent development. Section 3 provides a short overview of the previous literature on labour market effects of international outsourcing. The empirical hazard rate model is introduced in Section 4 while Section 5 describes the data set and the used variables. Section 6 gives a detailed description of the empirical results for various model specifications. The general findings are that international outsourcing when precisely defined significantly lowers employment security for all skill groups. Furthermore, there are no statistically significant differences in the impact of international outsourcing across skill groups. Section 7 summarises and discusses the findings in relation to the literature.

2 International Outsourcing

Measuring international outsourcing presents a challenge. Authors such as Yeats (1998) seek to measure international outsourcing by directly quantifying trade with intermediate goods, assessing the intermediate character of the traded goods on the basis of disaggregated goods classifications. Imported parts and components are assumed to be intermediate goods imports of the respective broader industry that produces such parts and components. This procedure abstracts from the possibility that parts and components from one industry can be also used by other industries or by final consumers which may bias the measurement.

Other authors such as Campa and Goldberg (1997) and Feenstra and Hanson (1999) quantify international outsourcing by combining input coefficients found in input-output tables and trade data. The estimated value of imported intermediate inputs of an industry thereby largely depends on whether one applies a narrow or wide definition of international outsourcing. Campa and Goldberg (1997) and others assume that the total sum of imported intermediate goods in each industry represents a reasonable indicator for international outsourcing. But according to Feenstra and Hanson (1999) this “definition” might be too broad if one understands international outsourcing as the result of a make-or-buy decision. Following this approach, not the total sum of imported intermediate inputs but only the part that could be produced within the respective domestic industry corresponds to international outsourcing. However depending on the aggregational level, the range of products that an industry can produce varies. Accordingly, the more highly aggregated the industries are, the broader the definition of international outsourcing becomes.

I construct two measures of international outsourcing that largely follow the concepts proposed in Feenstra and Hanson (1999) and Feenstra and Hanson (1996). International outsourcing is defined as the shift of a two-digit industry's *core activities* abroad represented by the value of the industry's imported intermediate inputs from the same industry abroad as a share of the domestic industries production value. The challenge is now to measure the respective industries imports of intermediate goods. A simple procedure would be to assume that all imports from a certain industry abroad are directed towards the respective domestic industry and nowhere else. Essentially this would amount to the construction of industry level import penetration ratios which are however rather poor measures of industries' outsourcing activities. Instead input-output data is utilised in order to allocate imports according to their usage as input factors across industries:

$$OUTS_{it}^{narrow} = \frac{IMP_{it} * S_{it}}{Y_{it}} \quad (1)$$

with Imp_{it} denoting imported intermediate inputs and Y_{it} the production value of industry i at time t. S_{it} denotes the share of imports from industry i abroad that is consumed by the domestic industry i in t with $\sum_{i=1}^{I} S_{it} \times IMP_{it}$ =total imports from industry i that is used in agriculture, manufacturing, services, private and public consumption, investment and exports in t.

Loosening the concept of an industries *core activities*, wide outsourcing is somewhat less conservatively defined as a two-digit industries purchase of intermediate goods from abroad represented by the respective industries sum of imported intermediate goods from all manufacturing industries abroad as a share of the domestic industries production value:

$$OUTS_{it}^{wide} = \frac{\sum_{j=1}^{J} IMP_{ijt} * S_{ijt}}{Y_{it}} \quad (2)$$

Figure 1 shows the development of international outsourcing for the manufacturing industry as a whole. In general international outsourcing has grown substantially over the last years. Naturally wide outsourcing has a higher level than narrow outsourcing but the development of both appears to by fairly parallel. As can be seen, narrowly defined international outsourcing (as in equation 1) increased significantly by around 2.4 percentage points or 46 percent between 1991 and 2001 while broadly defined outsourcing (as in equation 2 increased by around 35 percent or 4.2 percentage points.

Figure 2 shows the evolvement of international outsourcing by two digit NACE industries. Even though international outsourcing is of very different importance for the separate industries and the dynamic patterns vary considerably almost every industry shows significant growth in its outsourcing intensity.

3 Previous Literature

By now there exists a large body of literature empirically assessing the labour market impact of international outsourcing. Typically, these studies use industry level data and are concerned with partial equilibrium effects as labour is implicitly or explicitly assumed to be immobile between sectors.[2]

Feenstra and Hanson (1996) provide one of the first empirical assessments of the impact of international outsourcing on the relative demand for low-skilled workers. In their study on the United States they approximate international outsourcing by the share of imports from a particular industry abroad in total domestic demand for that industry's products. Their empirical model is based on a translog cost function with capital as quasi fixed input. From this cost function, a cost share equation for non-production workers is derived. In order to assess the impact of outsourcing, Feenstra and Hanson extend the cost share equation to include the calculated industry's outsourcing intensity. Following this procedure, the authors report that approximately 15% to 33% of the increase of the cost share of non-production labour over the period 1979-1987 can be explained by international outsourcing. In a follow-up study Feenstra and Hanson (1999) apply a narrower definition of international outsourcing by focusing on imported intermediate inputs of an industry from the same industry abroad. According to this study international outsourcing can explain between 11% and 15% of the observed decline in the cost share of production labour in U.S. manufacturing between 1979 and 1990.

Other studies that follow a similar approach using industry level data include Anderton and Brenton (1999) and Hijzen, Görg, and Hine (2004) for the UK, Morrison-

[2]An exception is Egger and Egger (2005) who introduce spatial econometrics techniques to allow for inter-industry spillovers.

Paul and Siegel (2001) for the US, Egger and Egger (2003) for Austria and Falk and Koebel (2000) for Germany.

Although the aforementioned industry level studies have greatly advanced the understanding of the labour market effects of international outsourcing, they have some immanent shortcomings that potentially limit the applicability of their findings. First of all, the use of aggregated industry-level data can seriously bias estimated coefficients (See Theil (1954), Misra (1969), Gupta (1971) for a discussion of aggregation bias.). Furthermore most industry level studies assume international outsourcing to be exogenous to labour demand, an assumption that is rarely tested. If international outsourcing is, however, jointly determined with the demand for labour, estimated coefficients suffer from endogeneity bias. Authors such as Egger and Egger (2003) propose instrumental variable techniques to overcome this problem. Finding valid instruments may, however, prove to be difficult in practise. Finally, aggregated industry-level data regularly suffers from poor skill classifications, with most studies associating non-manual workers with high skills and manual workers with low skills. Clearly, this is only a crude approximation, however, due to limited data availability at the industry-level it is hard to assess to what extent this affects the estimation results.

More recently, a small strand of the literature strives to overcome these shortcomings by combining individual- and industry-level data and assessing the impact of international outsourcing in a micro econometric framework. While outsourcing is still defined at the industry level, its effects can now be measured at the disaggregated individual level. Furthermore, due to the disaggregated nature of the analysis, potential endogeneity of industry level variables is considerably reduced as individual characteristics are unlikely to effect industry level aggregates. Furthermore, micro level data regularly provide much more detailed information about individual skills.

Geishecker and Görg (2004) and Geishecker and Görg (2005) analyse the impact of international outsourcing for manufacturing wages for various skill groups using data from the German Socio Economic Panel. Their findings suggest that although at the aggregated level relative wages appear to be fairly stable, at the individual-level outsourcing has a significant positive impact on wages for high-skilled workers while low skilled workers suffer from absolute wage losses. The wage effects, however, differ with respect to the average skill intensity of an industry. Using the same data, Geishecker (2005) illustrates that when assessing the impact of international outsourcing for different skill groups, making use of additional information such as individual years of schooling instead of the common manual vs. non-manual skill classification can have a marked impact on the estimation results.

Egger, Pfaffermayr, and Weber (2003) assess the effects of international outsourcing for the transition probabilities of employment. Utilising a random sample of

Austrian social security data and controlling for unobserved heterogeneity the authors estimate a transition model for multiple states, i.e. employment in the service sector, the trade sector, the manufacturing sector, unemployment and out of labour force. Their results suggest that outsourcing significantly reduces the probability of transition into the manufacturing sector at least into that part of manufacturing that has a revealed comparative disadvantage and, thus, is more effected by international competition. However, as the authors do not control for time changing individual characteristics other than age, it would be interesting to see whether these results are robust to a less parsimonious model specification.

Munch (2005) analyses the impact of international outsourcing on job separations using yearly data for a 10% sub sample of the Danish population within a employment duration model. Estimating a single risk model, his general finding is that international outsourcing, at least when broadly defined, has a significant but small impact on individual job separation risks. Estimating a competing risk model and differentiating between exit into unemployment and changing job, he finds that international outsourcing increases the risk of becoming unemployed, however the effect is only statistically significant for low-skilled workers. For high-skilled workers, international outsourcing increases the probability of changing the job, but has no significant effect on the individual hazard of becoming unemployed.

4 Modelling employment duration

Instead of following Egger, Pfaffermayr, and Weber (2003) the empirical approach is similar to Munch (2005) as the risk of job loss is captured within a hazard rate model controling for the duration dependence of job separations. Accounting for duration dependence is essential as one would expect job insecurity to typically decline with job duration as employees accumulate firm specific human capital. Also, other factors such as labour market institutions that result in lower relative employment protection for employees with short tenure play a role. However, as to the exact functional form that duration dependence takes, little can be known a priori. Accordingly, a semi parametric characterisation of duration dependence is chosen. The underling assumption is that for each respondent the hazard rate is constant within a specified time interval but puts no further constraints on the functional form of the hazard.

The present study utilises a large sample of monthly spell data from the German Socio Economic Panel (GSOEP) for the years 1991 to 2001. Although employment transitions can in principle occur in continuous time, in the data one can only observe monthly spells.[3] Accordingly, a discrete time hazard model is specified. The data

[3]Other authors such as Egger, Pfaffermayr, and Weber (2003) and Munch (2005) only capture em-

allows to estimate employment transitions on a monthly basis and provides a large array of individual characteristics to control for individual heterogeneity. Nevertheless, unobserved characteristics might be important resulting in a misspecified model with omitted regressors. Not accounting for this problem potentially yields biased estimates of the duration dependence and the proportionate response of the hazard with respect to other regressors. However, as Dolton and von der Klaauw (1995) convincingly show, ignoring unobserved heterogeneity results in severe biases when an incorrect functional form for the baseline hazard is chosen. With a flexible characterisation of duration dependence, as it is applied in this study, ignoring or misspecifying unobserved heterogeneity has almost no consequences. As it is not entirely clear how these results transfer to other data sets than the one used by Dolton and von der Klaauw (1995) I control for unobserved heterogeneity following Heckman and Singer (1984) and allow for an unobserved individual effect that is assumed to follow an arbitrary discrete distribution with two points of support.

Furthermore, it is necessary to control for left truncation which is an inevitable aspect of stock sampling. The sample period for observing employment duration starts in 1991.[4] Naturally, many respondents are already in employment for some time at that date. Similarly, new respondents that later enter the sample, might already be in employment for a considerable time. Fortunately, the GSOEP provides information about the employment history of each individual. One can therefore derive the duration of current employment spells even if they have started before 1991 or even before 1984, the first wave of the GSOEP, and correct for left truncation.

Formally the individual i discrete time hazard rate of leaving employment is defined as the probability of exit in the interval $(t-1,\ t)$ conditional upon survival until $t-1$:

$$\lambda_i(t, X_{it}, \gamma_{it}, \epsilon_i^m) = Pr(t-1 < T \leq t|\ T \geq t-1, X_{it}, \gamma_{it}, \epsilon_i^m) \tag{3}$$

where X_i denotes a vector of individual characteristics, γ_t a set of interval dummies flexibly capturing duration dependence and ϵ_i^m a time invariant individual error component that is distributed such that:

$$E(\epsilon_i^m) = \textstyle\sum_{m=1}^2 Pr(\epsilon_i^m) \times \epsilon_i^m = 0 \tag{4}$$

$$\textstyle\sum_{m=1}^2 Pr(\epsilon_i^m) = 1 \tag{5}$$

$$E(\epsilon_i^m, X_{it}) = 0 \tag{6}$$

ployment transition which take place between two years and disregard transitions that occur within one year.

[4]The choice of 1991 as the begin of the sample period is driven by the availability of NACE two-digit input-output data.

One can denote the individual probability of leaving employment in period t in terms of the hazard function as:

$$Pr(T=t|X_{it},\epsilon_i^m)_i = \lambda_i(t,X_{it},\gamma_{it},\epsilon_i^m) \times \prod^{t-1}(1-\lambda_i(t,X_{it},\epsilon_i^m) \tag{7}$$

Choosing a complementary log-log representation of the hazard rate:

$$\lambda_i(t,X_{it},\epsilon_i^m) = 1 - exp(-exp(\beta' X_{it} + \gamma_{it} + \epsilon_i^m)) \tag{8}$$

one can transform Equation 7 into:

$$\begin{aligned} Pr(T=t|X_{it},\epsilon_i^m) &= \left(\frac{1}{exp(-exp(\beta' X_{it} + \gamma_t + \epsilon_i^m))}\right)^{c_{it}} \\ &\times \prod^{t} exp(-exp(\beta' X_{it} + \gamma_{it} + \epsilon_i^m)) \end{aligned} \tag{9}$$

with $c_{it} = 1$ if the employment spell of individual i ends in t and $c_{it} = 0$ otherwise.

Now one can also write down the likelihood function that is to be maximized. However, since I explicitly want to allow for repeated spells by individual one additional integration step is required. Let k denote the number of employment spells by each individual then

$$\begin{aligned} L &= \prod_{i=1}^{n} \sum_{m=1}^{2} Pr(\epsilon_i^m) \prod_{k=1}^{K_i} \left(\frac{1}{exp(-exp(\beta' X_{it} + \gamma_t + \epsilon_i^m))}\right)^{c_{ikt}} \\ &\times \prod^{t_i} exp(-exp(\beta' X_{it} + \gamma_{it} + \epsilon_i^m)) \end{aligned} \tag{10}$$

denotes the overall likelihood function.

5 Data and Variable Definition

The empirical analysis is based on monthly individual-level spell data from the German Socio Economic Panel (GSOEP) for the period 1991 to 2001.[5] In every wave respondents are asked to give a record of their monthly work status during the previous year. Predefined categories are full- and part-time work, unemployment, house

[5]The data used in this paper was extracted from the SOEP Database provided by the DIW Berlin (http://www.diw.de/soep) using the Add-On package SOEPMENU for Stata(TM). SOEPMENU (http://www.soepmenu.de) was written by Haisken-DeNew (2005). The SOEPMENU generated DO file to retrieve the SOEP data used here is available from me upon request. Any data or computational errors in this paper are my own.

work, maternity leave, military service, education or pension. Due to the retrospective nature of the question and related recollection errors, data might be considerably noisy. Furthermore, work place related characteristics are only collected once a year adding considerable measurement error if an individual has more than one employment spell per year. There is however no reason to believe that this process is non-random, at least not after one controls for individual heterogeneity. Thus, one can derive consistent estimates. The data is re-organised as *person-period data* to foster *easy* estimation methods as discussed in Allison (1982) and Jenkins (1995). Employment spells can start at any time between 1991 and 2001. Employment spells that have started before the respondent has entered the sample are left truncated. I correct for that by using data on individual employment history. An employment spell ends if the respondent seizes to work and reports to have become unemployed or stays at home. Unfortunately, the data does not provide information on job-to-job transitions at least not on a monthly basis. Employment spells that end for other reasons, i.e education, military service, pension, maternity leave, are censored. The same is true if the respondent drops out of the sample or the sample period ends. Due to the longitudinal character of the data, respondents can have many different employment spells.

The sample is restricted to prime age (18 to 65 years) respondents who work in manufacturing (NACE sectors 15-36) at least once during the sample period. In order to avoid selection bias with respect to item non-response each explanatory variable is supplemented with a dummy for missing values and subsequently recoded to zero.

Duration dependence is captured by a set of dummies γ_{it} that are defined for employment durations of 1 to 6 months ($DD : 0 - 6$), 7 to 12 months ($DD : 7 - 12$), 13 to 36 months ($DD : 13 - 36$), 37 to 96 months ($DD : 37 - 96$) and more than 97 months ($DD :> 97$).

I control for a wide range of time changing and constant individual, work place and region related characteristics. The choice of included control variables builds on a large body of literature that analyses job turnover. Authors such as Royalty (1998), Zavodny (2003), Farber (1999) and Farber (2005) stress the relevance of gender, age, marital status, children, education, unemployment rates or technological change as determinants of job turnover. The vector X_it in Equation 10 consists of a set of basic demographic controls such as age ($AGE : 18 - 29$, $AGE : 30 - 49$, $AGE : 50 - 64$) gender ($MALE : Yes$), marital status ($MARRIED : Yes$), children in household ($CHILD : Yes$), nationality ($GERMAN : Yes$) and individual skills. The definition of skills is based on internationally comparable information following the International Standard Classification of Education (ISCED) as described in UNESCO (1997). The data allows to differentiate respondents with an educational attainment corresponding to (1) primary education, (2) lower secondary education or second stage of basic education, (3) secondary education, (4) post-secondary non tertiary education, (5) first stage of tertiary education or (6) second stage of tertiary education. In line with ISCED, low skilled workers ($ED : Low$) are defined as individuals with primary education, lower secondary or second stage of basic education. Medium skilled ($ED : Med$) workers are individuals with upper secondary education, post-secondary non tertiary education,

or first stage of tertiary education. High skilled workers ($ED : High$) are defined as individuals with some form of second stage of tertiary education.

Other control variables include workplace related characteristics such as individual occupational placement as manager, professional, scientist or technician ($OCC : Manager$), clerk ($OCC : Clerk$), service worker ($OCC : Service$, crafts worker ($OCC : Craft$), skilled machine operator ($OCC : Swork$) or unskilled worker ($OCC : Uwork$). I also control for firm size in terms of employees($FS :< 20$, $FS : 21 - 199$, $FS : 200 - 1999$, $FS :>= 2000$) and public ownership of the employers company ($PUBOWN : Yes$). To capture regional differences I control for the unemployment rate at the level of the federal state ($UNEMP$) and include a set of federal state dummies. Furthermore, a dummy variable for whether the place of work is in the former East, a region subject to specific structural changes and related employment fluctuations, is included ($WorkinEast : Yes$).[6]

In the literature, job turnover models sometimes include a wage variable (e.g. Royalty (1998)). It is however questionable whether wage can be considered exogenous in the kind of model that is applied here. Furthermore, all determinants that are included to explain individual job separation would also be standard control variables in a wage regression. Thus, adding individual wage as a separate control variable would not significantly improve the model.

An essential part of the analysis is to merge individual-level data with two-digit industry-level information on outsourcing intensity and other industry characteristics. International outsourcing (OUT) is constructed by combining input-output data that are available from the German Statistical Office (Fachserie 18, Reihe 2) and OECD International Commodity Trade Statistics.

To capture the effects of technological change, industry research and development expenditure as a share of industry output is included in the model ($\frac{R\&D}{Y}$). Research and development (r&d) expenditure is only a crude measure of technological change. However, it is commonly used in the literature (see Berman, Bound, and Griliches (1994), Machin and Reenen (1998)) and alternative proxies of technological change are

[6]The region of residence is not necessarily the location of the workplace. Many East-Germans commute between their workplace in the West and home.

not available for Germany. Data on industry research and development expenditure are provided by the OECD STAN database. Unfortunately, prior to 1995 research and development expenditure is not available at the NACE two-digit level. Missing values are therefore imputed by regressing available data from 1995 to 2003 on a linear trend for each industry.

Industry level studies by authors such as Davidson and Matusz (2005), Klein, Schuh, and Triest (2003) Kletzer (2000) and Kletzer (2004) highlight the relevance of export orientation and international competition as determinants of job creation and job destruction. Following the approach of Davidson and Matusz (2005) a measure of net exports is included in the model: $\frac{NEXP}{Y} = \frac{Exp-Imp}{Y+Imp}$.

In addition to international outsourcing, technological change and net exports the model includes industry output (Y) and capital intensity differentiated by equipment and plant $(\frac{Equip}{Y})$,$(\frac{Plant}{Y})$ to control for time varying industry characteristics. Data on industry output and capital were provided by the German Statistical Office. Finally, I control for unobserved industry and region specific characteristics by within transforming the data by region and industry.[7] Summary statistics for the untransformed data are provided in Table 3.

6 Estimation and results

Equation 10 is maximized applying the Newton-Raphson algorithm.[8]

The results of the first specification are presented in Column I of Table 1. The hazard of exiting a job is largest within the first 6 months, probably reflecting German legislation that allows for a probationary period of up to 6 months. After that, the hazard of exiting employment monotonically declines with job duration. Conditional on job duration, the hazard of exiting employment increases with age. Furthermore, being female and having children in the household significantly increases the risk of leaving employment. Marital status and nationality, however, do not play a significant role.

With regard to workplace related characteristics, whether the workplace is located in the East or West of Germany does not significantly alter the individual hazard of exiting employment. Firm size plays a significant role, with workers in smaller firms facing a higher job insecurity. Public ownership of the workplace is not statistically

[7]This corresponds to estimating a unconstrained model including a full set of interacted industry and region dummies.

[8]All models are programmed using Stata's ml function for user written maximum likelihood estimators expanding on the *hshaz* routine written by Steven B. Jenkins. For a detailed description of the ml function see Gould, Pitblado, and Sribney (2003).

significant.

Occupational placement is another important determinant of individual employment security. Clerks face the lowest risk of exiting employment followed by managers, technicians, professionals and scientists as well as crafts workers. Accordingly, service, skilled and unskilled workers have the lowest employment security. Similarly, conditional on occupational placement, high- and medium-skilled workers have a significant lower risk of exiting employment than low-skilled workers.

Regarding the region and industry level variables, regional unemployment significantly lowers individual employment security. Furthermore, technological progress as captured by industry level research and development expenditure appears to be an important factor shaping individual employment security. Net exports are, however, found to be insignificant. With regard to the industry level capital intensity the picture is somewhat mixed. While equipment intensity is related to higher job insecurity, indicating a substitutability between labour and capital, capital in the form of plant is rendered insignificant. Regarding industry output, one has to differentiate the whole equation with respect to output to obtain the marginal effect. After differentiating, it becomes clear that higher industry output is related to higher employment security.

For this analysis the most interesting variable is of course international outsourcing (OUT). As the positive and highly significant coefficient indicates, higher industry-level outsourcing intensity negatively affects individual employment security. Ceteris paribus, a one percentage point increase in the industry outsourcing intensity increases the hazard of leaving employment by about three percent ($exp(3.051 * 0.01) - 1 = 0.031$).

In order to assess, to what extent international outsourcing affects employment security for different skill groups and whether there are significant differences between them, international outsourcing and education are interacted.[9] Column II of Table 1 presents the coefficient estimates for this specification. While the respective coefficients are statistically significant for all skill groups the effect of international outsourcing appears to be strongest for high-skilled followed by medium-skilled workers. However, when taking the standard errors of the coefficients into account, it turns out that the coefficients of the outsourcing variable are not statistically different between skill groups. Thus, statistically, international outsourcing affects employment security for low-skilled workers to the same extent as for high- and medium-skilled workers.

So far technological progress is assumed to have uniform effects across skill groups. In order to test this assumptions $R\&D/Y$ is interacted with skills. The estimations

[9] Preferably, one would estimate the model separately for sub samples of different skill groups in order to loosen the poolability constraint. Unfortunately, the number of job exits is too low to identify the model parameters for smaller sub samples.

results of this specification are reported in Column III of Table 1. Again, technological progress results in reduced employment security. The effect does, however, not significantly differ between skill groups. Albeit this result, international outsourcing interacted with medium skills is now only weakly significant suggesting that part of the effects of technological progress for medium skilled workers was previously captured by the outsourcing variable. Nevertheless, the impact of international outsourcing is still not statistically different between skill groups.[10]

In addition the model is estimated applying the somewhat less conservative wide definition of international outsourcing as in Equation 2. Applying the wide definition, international outsourcing is rendered insignificant (Column I of Table 2). Broadly defined international outsourcing is then interacted with education. It is found to have no significant impact on employment security (Column II and III of Table 2). The diverging results for narrow and wide outsourcing highlight the importance of precisely defining the outsourcing phenomenon. As has been discussed previously in Section 2, narrowly defined outsourcing can be understood as the outcome of a make or buy decision. Wide outsourcing, however, encapsulates all intermediate goods imports of an industry and therefore may be less correlated with an industries outsourcing activities explaining the lower statistical significance in the model.

To ease the interpretation of the estimated coefficients and to asses the economic relevance one can simulate the effect of international outsourcing on the employment hazard over the sample period. As the impact of broadly defined international outsourcing is negligible only narrow outsourcing is relevant for this analysis. Between 1991 and 2001 narrowly defined international outsourcing of all manufacturing industries increased by 2.4 percentage points (see Figure 1). Accordingly, the model predicts that between 1991 and 2001 international outsourcing increased the hazard of existing employment by approximately 7.6 percent ($exp(3.051 * 0.024) - 1$). In comparison the effects of technological progress are fairly modest. Between 1991 and 2001 research and development expenditure as a share of output increased from 2.58 percent to 2.64 percent. Accordingly, technological progress raises the hazard of leaving employment by less than one percent ($exp(12.72 * 0.0006) = 0.0077$). On the basis of the estimated coefficients from Column I of Table 1 one can also calculate the predicted hazard rate at the sample mean. Figure **??** shows the predicted hazard rate and provides a visualisation of the impact of international outsourcing. Within the first six months of employment international outsourcing raises the hazard of leaving employment by more than one percentage points. With higher employment duration the absolute changes in the hazard rate due to outsourcing are much smaller as the the hazard of

[10] To assess the robustness of the above results the model was also estimated interacting gender, education and outsourcing. However, the impact of international outsourcing does not markedly differ by gender.

leaving employment monotonically declines.

Using similar data, Geishecker and Görg (2004) and Geishecker and Görg (2005) analyse the impact of international outsourcing on wages.[11] They identify high-skilled workers to be the winners from international outsourcing with significant wage gains while low-skilled workers experience considerable wage losses. Contrasting these results, in terms of employment security, there is no comparable winner loser pattern according to worker skills. All skill groups suffer from narrowly defined international outsourcing in terms of decreased employment security.

7 Discussion

The paper expands the exiting literature by analysing the effects of international outsourcing for individual job security in a micro econometric framework utilising a large panel of individual monthly employment spell data. The approach is suitable to considerably reduce aggregation and potential endogeneity bias that hampers existing industry level studies. Furthermore, individual level data is arguably better suited to describe individual skills than the manual vs. non-manual workers skill approximation that is commonly used in the literature.

The impact of international outsourtcing on individual job security is assessed within a hazard rate model accounting for the duration dependence of job security. Workers with less than seven months of employment duration face the highest risk of leaving employment. Afterwards, job security monotonically increases over time. International outsourcing, when narrowly defined, is found to have a marked impact on individual employment security. Remarkably, the effect is statistically not different between high-, medium- and low-skilled workers.

This is an interesting result as it contrasts the findings of industry level studies that typically identify low-skilled workers to be adversely effected relative to high skilled workers (e.g. Egger and Egger (2003)). The results of the present study suggest that both low- and high-skilled workers lose from international outsourcing in terms of lower job security.

This is, however, not to say that relative demand for high and low skills is not affected at all. As the work of Geishecker and Görg (2005) and Geishecker and Görg (2004) suggest, there are marked relative demand shifts due to international outsourcing that substantiate in the form of wage gains for high-skilled and wage-losses for low-skilled workers. Accordingly, in a sense high-skilled workers are somewhat compensated for their lower job security by earning higher wages when in employment.

[11] Geishecker and Görg (2004) and Geishecker and Görg (2005) only analyse a sample of full-time employed males.

Medium skilled workers only suffer in terms of reduced job security but not in terms of wages. In contrast, low-skilled workers suffer twice. First, their job security is significantly reduced due to outsourcing and second when in employment they earn lower wages. Thus, low-skilled workers are clearly the losers from international outsourcing. From a policy perspective, addressing this problem is challenging. At the same time, as the heated public debate about the effects of international outsourcing and the crescending calls for protectionist measures highlight, finding ways of compensating the losers from international outsourcing may become essential to sustain public support for liberalised trade.

References

Allison, P. (1982): "Discrete time methods for the analysis of event histories," in *Sociological Methodology 1982*, ed. by S. Leinhardt, pp. 61–98. Jossey-Bass, San Francisco.

Anderton, B., and P. Brenton (1999): "Outsourcing and Low-Skilled Workers in the UK," *Bulletin of Economic Research*, 51(4), 267–285.

Arndt, S. W. (1997): "Globalization and the Open Economy," *North American Journal of Economics and Finance*, 8(1), 71–79.

——— (1999): "Globalization and economic development," *The Journal of International Trade and Economic Development*, 8(3), 309–318.

Berman, E., J. Bound, and Z. Griliches (1994): "Changes in the demand for skilled labor within U.S. manufacturing: evidence from the annual survey of manufacturing," *Quarterly Journal of Economics*, 109(2), 367–397.

Campa, J., and L. S. Goldberg (1997): "The evolving external orientation of manufacturing industries: evidence from four countries," Working Paper 5919, National Bureau of Economic Research.

Davidson, C., and S. J. Matusz (2004): "Should Policy Makers be Concerned About Adjustment Costs?," in *The Political Economy of Trade, Aid and Foreign Investment Policies: Essays in Honor of Ed Tower*, ed. by A. Panagariya, and D. Mitra. Elsevier, Amsterdam.

Davidson, C., and S. J. Matusz (2005): "Trade and Turnover: Theory and Evidence," *Review of International Economics*, forthcoming.

Dolton, P., and W. von der Klaauw (1995): "Leaving Teaching in the UK: A Duration Analysis," *Economic Journal*, 105(429), 431–444.

Egger, H., and P. Egger (2003): "Outsourcing and skill-specific employment in a small economy: Austria after the fall of the Iron Curtain," *Oxford Economic Papers*, 55, 525–643.

——— (2005): "Labor market effects of outsourcing under industrial interdependence," *International Review of Economics and Finance*, 14(3), 349–363.

Egger, P., M. Pfaffermayr, and A. Weber (2003): "Sectoral Adjustment of Employment: The impact of Outsourcing and Trade at the Micro Level," Discussion Paper 921, Institute for the Study of Labor.

Falk, M., and B. Koebel (2000): "Outsourcing of Services, Imported Materials and the Demand for Heterogeneous Labour: An Application of a Generalised Box-Cox Function," Discusssion Paper 00-51, Zentrum für Europäische Wirtschaftsforschung.

Farber, H. S. (1999): "Mobility and stability: The dynamics of job change in labor markets," in *Handbook of Labor Economics*, ed. by O. C. Ashenfelter, and D. Card, pp. 2439–2484. North Holland, Amsterdam.

——— (2005): "What do we know about job loss in the United States? Evidence from the Displaced Workers Survey, 1984-2004," *Economic Perspectives*, 2, 13–28.

Feenstra, R. C., and G. H. Hanson (1996): "Foreign Direct Investment, Outsourcing and Relative Wages," in *The Political Economy of Trade Policy: Papers in Honor of Jagdish Bhagwati*, ed. by R. C. Feenstra, G. M. Grossman, and D. A. Irwin, pp. 89–127. MIT Press, Cambridge, Massechusetts.

——— (1999): "The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979-1990," *Quarterly Journal of Economics*, 114(3), 907–940.

Geishecker, I. (2005): "International Outsourcing and German Manufacturing Wages," *Journal of Applied Social Science Studies*, 125(1), 87–95.

Geishecker, I., and H. Görg (2004): "Winners and Losers: Fragmentation, Trade and Wages Revisited," Working Paper 385, German Intitute for Economic Research.

——— (2005): "Do unskilled workers always lose from fragmentation?," *North American Journal of Economics and Finance*, 16, 81–92.

Gould, W., J. Pitblado, and W. Sribney (2003): *Maximum Likelihood Estimation with Stata*. Stata Corporation, College Station, Texas.

Gupta, K. L. (1971): "Aggregation Bias in Linear Economic Models," *International Economic Review*, 12(2), 293–305.

Haisken-DeNew, J. P. (2005): "SOEPMENU: A Menu-Driven Stata/SE Interface for Accessing the German Socio-Economic Panel," mimeo http://www.soepmenu.de.

Heckman, J. J., and B. Singer (1984): "A method for minimizing the impact of distributional assumptions in econometric models for duration data," *Econometrica*, 52(2), 271–320.

Hijzen, A., H. Görg, and R. C. Hine (2004): "Outsourcing and the skill structure of labour demand in the United Kingdom," *Economic Journal*, (forthcoming).

Jenkins, S. P. (1995): "Easy Estimation Methods for Discrete-Time Duration Models," *Oxford Bulletin of Economics and Statistics*, 57(1), 129–138.

Jones, R. W., and H. Kierzkowski (2001): "A Framework for Fragmentation," in *Fragmentation: New Production Patterns in the World Economy*, ed. by S. W. Arndt, and H. Kierzkowski, pp. 17–34. University Press, Oxford.

Klein, M. W., S. Schuh, and R. K. Triest (2003): "Job creation, job destruction, and the real exchange rate," *Journal of International Economics*, 59, 239–265.

Kletzer, L. G. (2000): "Trade and Job Loss in US Manufacturing, 1979-1994," in *The Impact of International Trade on Wages*, ed. by R. Feenstra. University of Chicago Press, Chicago.

——— (2004): "Trade-related Job Loss and Wage Insurance: A Synthetic Review," *Review of International Economics*, 12(5), 724–748.

Kohler, W. (2001): "A Specific-Factors View on Outsourcing," *North American Journal of Economics and Finance*, 12(1), 31–53.

——— (2004): "International Outsourcing and Factor Prices With Multistage Production," *Economic Journal*, 114(494), C166–C185.

Krugman, P. (1995): "Growing World Trade: Causes and Consequences," *Brookings Papers on Economic Activity*, (1), 327–377.

Machin, S., and J. V. Reenen (1998): "Technology and changes in skill structure: Evidence from seven OECD countries," *Quarterly Journal of Economics*, 113(4), 1215–1244.

Misra, P. (1969): "A Note on Linear Aggregation of Economic Relations," *International Economic Review*, 10(2), 247–249.

Morrison-Paul, C. J., and D. S. Siegel (2001): "The Impacts of Technology, Trade and Outsourcing on Employment and Labor Composition," *Scandinavian Journal of Economics*, 103(2), 241–264.

Munch, J. R. (2005): "International Outsourcing and Individual Job Separations," mimeo, University of Copenhagen.

Royalty, A. B. (1998): "Job-to-Job and Job-to-Nonemployment Turnover by Gender and Education Level," *Journal of Labor Economics*, 16(2), 392–443.

Theil, H. (1954): *Linear Aggregation of Economic Relations*. North Holland, Amsterdam.

UNESCO (1997): "International Standard Classification of Education," Discussion paper, UNESCO.

Yeats, A. (1998): "Just how big is global production sharing?," Policy Research Working Paper 1871, World Bank.

Zavodny, M. (2003): "Technology and Job Separation Among Young Adults," *Economic Inquiry*, 41(2), 264–278.

A Figures and Tables

Figure 1: Outsourcing over time

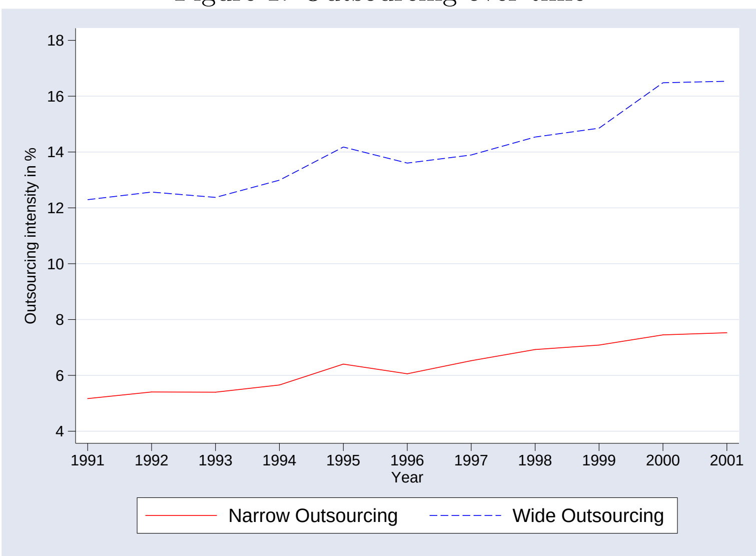

Figure 2: Outsourcing over time by industry

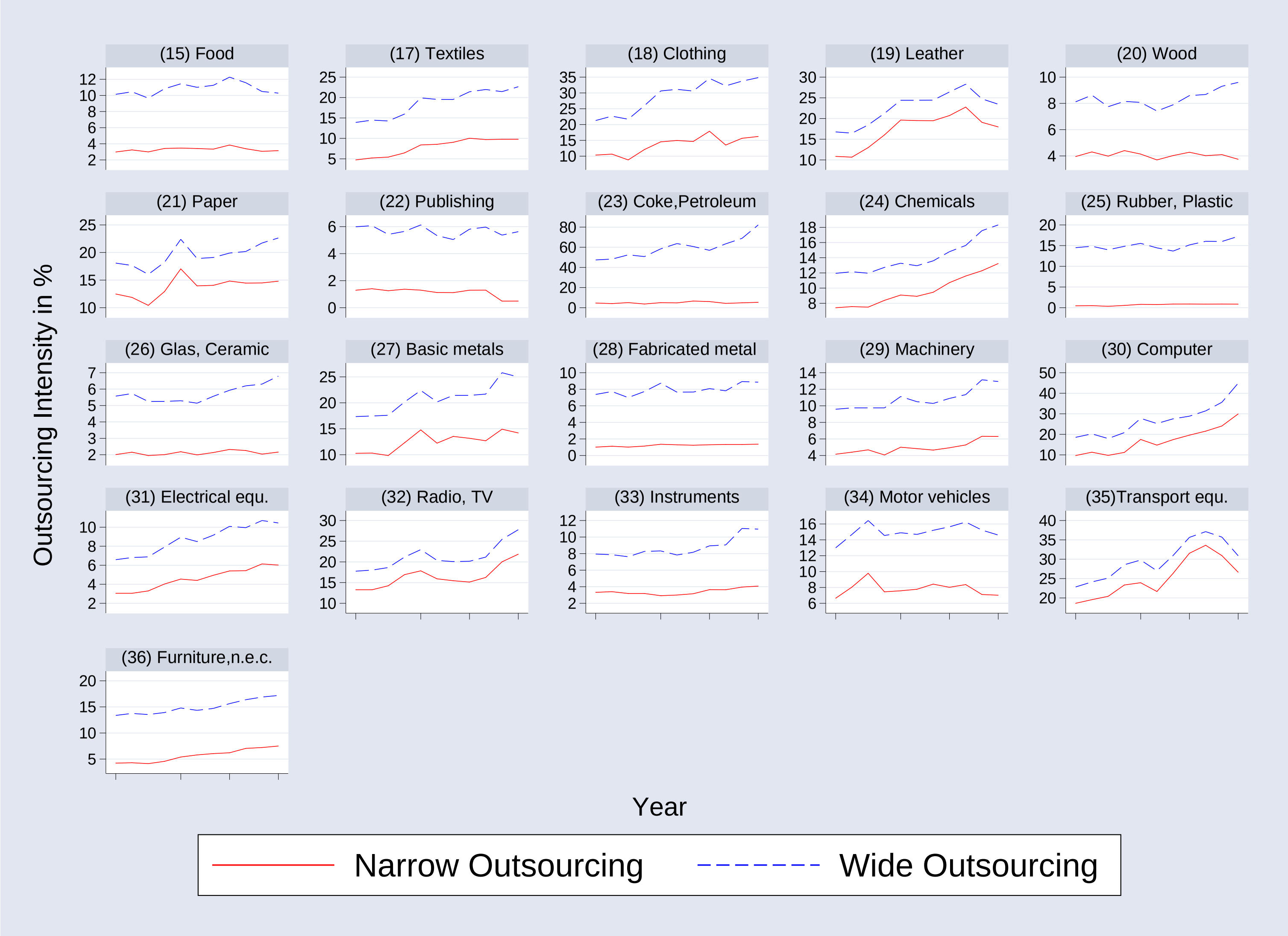

Figure 3: Prediction of hazard rate, cumulated effect of international outsourcing

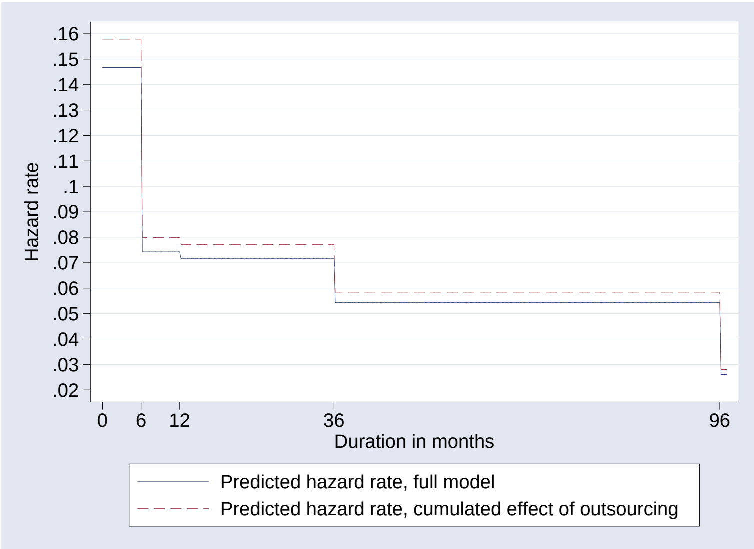

Table 1: Hazard Rate Model - Narrow Outsourcing

	I		II		III	
$DD : 0-6$	1.794	(0.095)***	1.798	(0.095)***	1.797	(0.095) ***
$DD : 7-12$	1.073	(0.099)***	1.078	(0.099)***	1.077	(0.099) ***
$DD : 13-36$	1.037	(0.098)***	1.041	(0.098)***	1.040	(0.098) ***
$DD : 37-96$	0.749	(0.100)***	0.754	(0.100)***	0.753	(0.100) ***
$AGE : 30-49$	-0.026	(0.042)	-0.023	(0.042)	-0.020	(0.042)
$AGE : 50-64$	0.204	(0.058)***	0.207	(0.058)***	0.209	(0.058) ***
$MALE : Yes$	-0.969	(0.045)***	-0.962	(0.046)***	-0.962	(0.046) ***
$CHILD : Yes$	0.228	(0.039)***	0.228	(0.039)***	0.229	(0.039) ***
$MARRIED : Yes$	-0.038	(0.041)	-0.043	(0.041)	-0.043	(0.041)
$GERMAN : Yes$	0.055	(0.043)	0.043	(0.044)	0.041	(0.044)
$WorkinEast : Yes$	-0.065	(0.103)	-0.061	(0.103)	-0.060	(0.103)
$FS :< 20$	0.280	(0.051)***	0.283	(0.052)***	0.280	(0.052) ***
$FS : 21-199$	0.177	(0.050)***	0.181	(0.050)***	0.178	(0.050) ***
$FS : 200-1999$	-0.066	(0.051)	-0.065	(0.051)	-0.068	(0.051)
$PUBOWN : Yes$	-0.006	(0.158)	0.008	(0.158)	0.003	(0.159)
$OCC : Manager$	-0.187	(0.053)***	-0.191	(0.053)***	-0.193	(0.053) ***
$OCC : Clerk$	-0.215	(0.056)***	-0.213	(0.056)***	-0.215	(0.056) ***
$OCC : Service$	0.014	(0.068)	0.014	(0.068)	0.005	(0.069)
$OCC : Craft$	-0.082	(0.052)	-0.086	(0.052)*	-0.089	(0.052) *
$OCC : Swork$	0.073	(0.056)	0.074	(0.056)	0.070	(0.056)
$ED : High$	-0.172	(0.062)***	-0.313	(0.097)***	-0.311	(0.096) ***
$ED : Med$	-0.194	(0.051)***	-0.293	(0.078)***	-0.297	(0.078) ***
$UNEMP$	0.078	(0.010)***	0.078	(0.010)***	0.078	(0.010) ***
$Y * 10^{-3}$	0.003	(0.002)	0.003	(0.002)	0.003	(0.002)
$R\&D/Y$	12.720	(3.281)***	13.008	(3.321)***		
$R\&D/Y * ED : High$					12.768	(4.029) ***
$R\&D/Y * ED : Med$					15.836	(3.996) ***
$R\&D/Y * ED : Low$					12.545	(3.352) ***
$(Exp-Imp)/(Y+Imp)$	-0.916	(0.932)	-0.904	(0.939)	-0.900	(0.939)
$Equip/Y$	3.119	(0.976)***	3.149	(0.979)***	3.169	(0.979) ***
$Plant/Y$	1.522	(1.630)	1.620	(1.637)	1.602	(1.637)
OUT	3.051	(1.273)***				
$OUT * ED : High$			5.003	(1.700)***	5.018	(1.856) ***
$OUT * ED : Med$			4.478	(1.590)***	3.224	(1.888) *
$OUT * ED : Low$			2.631	(1.295)**	2.772	(1.316) **
$Constant = \epsilon_i^{m=1}$	-4.932	(0.053)***	-4.925	(0.053)***	-4.928	(0.053) ***
$P(\epsilon_i^{m=1})$	0.898	(0.007)***	0.899	(0.007)***	0.899	(0.007) ***
$\epsilon_i^{m=2}$	2.595	(0.042)***	2.590	(0.042)***	2.591	(0.042) ***
$P(\epsilon_i^{m=2})$	0.102	(0.007)***	0.101	(0.007)***	0.101	(0.007) ***
Observations	241373		241373		241373	
$Wald-Chi^2$	1809.22***		1816.58***		1818.05***	

Notes: Standard errors in parentheses, * significant at 10%, ** at 5%, *** at1%
All data are within transformed by industry/region.
Default categories: $DD :> 97$, $AGE : 18-29$, $FS :>= 2000$, $OCC : Uwork$, $ED : Low$

Table 2: Hazard Rate Model - Wide Outsourcing

	I		II		III	
$DD: 0-6$	1.784	(0.095)***	1.798	(0.095)***	1.798	(0.095)***
$DD: 7-12$	1.064	(0.099)***	1.082	(0.099)***	1.082	(0.099)***
$DD: 13-36$	1.029	(0.098)***	1.044	(0.098)***	1.044	(0.099)***
$DD: 37-96$	0.741	(0.100)***	0.751	(0.100)***	0.752	(0.100)***
$AGE: 30-49$	-0.008	(0.042)	-0.008	(0.042)**	-0.009	(0.042)
$AGE: 50-64$	0.215	(0.058)***	0.210	(0.058)***	0.209	(0.058)***
$MALE: Yes$	-0.939	(0.046)***	-0.933	(0.046)***	-0.932	(0.046)***
$CHILD: Yes$	0.227	(0.039)***	0.232	(0.039)***	0.232	(0.039)***
$MARRIED: Yes$	-0.048	(0.041)	-0.055	(0.041)	-0.055	(0.041)
$GERMAN: Yes$	0.077	(0.044)*	0.090	(0.044)**	0.089	(0.044)
$WorkinEast: Yes$	-0.055	(0.103)	-0.051	(0.103)	-0.051	(0.103)
$FS: < 20$	0.282	(0.052)***	0.282	(0.052)***	0.282	(0.052)***
$FS: 21-199$	0.171	(0.050)***	0.171	(0.050)***	0.172	(0.050)***
$FS: 200-1999$	-0.072	(0.051)	-0.078	(0.051)	-0.078	(0.051)
$PUBOWN: Yes$	0.009	(0.157)	0.009	(0.157)	0.011	(0.158)
$OCC: Manager$	-0.175	(0.053)***	-0.178	(0.053)***	-0.180	(0.053)***
$OCC: Clerk$	-0.193	(0.057)***	-0.213	(0.057)***	-0.213	(0.057)***
$OCC: Service$	0.057	(0.069)	0.060	(0.069)	0.056	(0.070)
$OCC: Craft$	-0.089	(0.052)*	-0.092	(0.052)*	-0.093	(0.052)*
$OCC: Swork$	0.061	(0.056)	0.056	(0.056)	0.056	(0.056)
$ED: High$	-0.333	(0.062)***	-0.479	(0.124)***	-0.477	(0.125)***
$ED: Med$	-0.100	(0.039)***	0.147	(0.081)*	0.148	(0.082)*
$UNEMP$	0.081	(0.010)***	0.081	(0.010)***	0.081	(0.010)***
$Y * 10^{-3}$	0.002	(0.002)	0.002	(0.002)	0.002	(0.002)
$R\&D/Y$	12.164	(3.260)***	11.433	(3.268)***		
$R\&D/Y * ED: High$					12.187	(3.583)***
$R\&D/Y * ED: Med$					11.229	(3.371)***
$R\&D/Y * ED: Low$					11.296	(3.366)***
$(Exp-Imp)/(Y+Imp)$	-1.005	(0.930)	-0.889	(0.929)	-0.878	(0.931)
$Equip/Y$	3.258	(0.979)***	3.384	(0.982)***	3.375	(0.982)***
$Plant/Y$	0.550	(1.621)	0.494	(1.622)	0.493	(1.623)
OUT	0.501	(0.920)				
$OUT * ED: High$			2.752	(1.169)	2.583	(1.220)
$OUT * ED: Med$			-0.464	(0.956)	-0.412	(0.961)
$OUT * ED: Low$			1.582	(0.997)	1.630	(1.029)
$Constant = \epsilon_i^{m=1}$	-4.928	(0.053)***	-4.929	(0.053)***	-4.929	(0.053)***
$P(\epsilon_i^{m=1})$	0.898	(0.007)***	0.898	(0.007)***	0.898	(0.007)***
$\epsilon_i^{m=2}$	2.587	(0.042)***	2.580	(0.042)***	2.579	(0.042)***
$P(\epsilon_i^{m=2})$	0.102	(0.007)***	0.102	(0.007)***	0.102	(0.007)***
Observations	241373		241373		241373	
$Wald-Chi^2$	1801.41***		1808.30***		1811.00***	

Notes: Standard errors in parentheses, * significant at 10%, ** at 5%, *** at1%
All data are within transformed by industry/region.
Default categories: $DD: > 97$, $AGE: 18-29$, $FS: >= 2000$, $OCC: Uwork$, $ED: Low$

Table 3: Summary statistics

	Mean	Standard Deviation
Transition out of employment: Yes	0.012	(0.109)
$DD : 0 - 6$	0.183	(0.387)
$DD : 7 - 12$	0.128	(0.334)
$DD : 13 - 36$	0.268	(0.443)
$DD : 37 - 96$	0.288	(0.453)
$DD :>= 97$	0.132	(0.339)
$AGE : 18 - 29$	0.219	(0.413)
$AGE : 30 - 49$	0.587	(0.492)
$AGE : 50 - 64$	0.195	(0.396)
$MALE : Yes$	0.737	(0.440)
$CHILD : Yes$	0.511	(0.500)
$MARRIED : Yes$	0.737	(0.440)
$GERMAN : Yes$	0.788	(0.409)
Work in East: Yes	0.170	(0.376)
$FS :< 20$	0.151	(0.358)
$FS : 21 - 199$	0.287	(0.452)
$FS : 200 - 1999$	0.311	(0.463)
$FS :> 2000$	0.248	(0.432)
$PUBOWN : Yes$	0.010	(0.101)
$OCC : Manager$	0.274	(0.446)
$OCC : Clerk$	0.086	(0.280)
$OCC : Service$	0.016	(0.126)
$OCC : Craft$	0.354	(0.478)
$OCC : Swork$	0.181	(0.385)
$OCC : Uwork$	0.072	(0.258)
$ED : High$	0.144	(0.351)
$ED : Med$	0.133	(0.340)
$ED : Low$	0.722	(0.448)
$UNEMP$	9.862	(4.018)
$\frac{R\&D}{Y}$	0.023	(0.028)
$\frac{Exp-Imp}{Y+Imp}$	0.077	(0.113)
$Y * 10^{-3}$	81.158	(44.308)
$\frac{Equip}{Y}$	0.288	(0.086)
$\frac{Plant}{Y}$	0.170	(0.055)
OUT	0.057	(0.048)
Observations		241373