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Employers' selection behavior during short-time work

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Contents

Abstract

During the recession of 2008-09 Germany experienced a huge decrease in GDP. Employment, however, remained surprisingly stable. The so-called German labor market miracle is often ascribed to the intensive usage of short-time work. Despite the resurgence of this instrument, little is known about the employees affected by it. This paper analyzes whether employers select certain individuals for short-time work, where special focus is given on the effect of human capital. The analysis is based on a unique linked-employer-employee data set on short-time workers in the district of the employment agency of Nuremberg. We use methods of event history analysis to estimate transition rates from regular employment to short-time work. Our results indicate that employers select a broad range of workers for STW, irrespective of their level of human capital. Fears that short-time work is mainly applied to a certain group of workers are not confirmed.

Zusammenfassung

Während der Rezession der Jahre 2008 und 2009 sank das BIP in Deutschland stark. Nichtsdestotrotz blieb das Beschäftigungsniveau überraschend stabil. Das sogenannte deutsche Arbeitsmarktwunder wird oft auf die intensive Nutzung von Kurzarbeit zurückgeführt. Trotz des Wiederauflebens dieses Instruments, ist über die von Kurzarbeit betroffenen Beschäftigten wenig bekannt. Diese Studie analysiert, ob Arbeitgeber bestimmte Personen für Kurzarbeit auswählen, wobei der Einfluss des Humankapitals im Vordergrund steht. Die Analyse stützt sich auf einen einzigartigen linked-employer-employee Datensatz zu Kurzarbeitern im Arbeitsagenturbezirk Nürnberg. Unter Verwendung von Methoden der Ereignisanalyse werden Übergangsraten aus regulärer Beschäftigung in Kurzarbeit geschätzt. Unsere Ergebnisse zeigen, dass Arbeitgeber ein breites Spektrum an Arbeitnehmern für Kurzarbeit auswählen, unabhängig von deren Humankapital. Befürchtungen, dass Kurzarbeit hauptsächlich auf eine bestimmte Gruppe von Arbeitnehmern angewendet wird, werden nicht bestätigt.

JEL classification: J23, J24, J3

Keywords: short-time work, individual data, event history analysis

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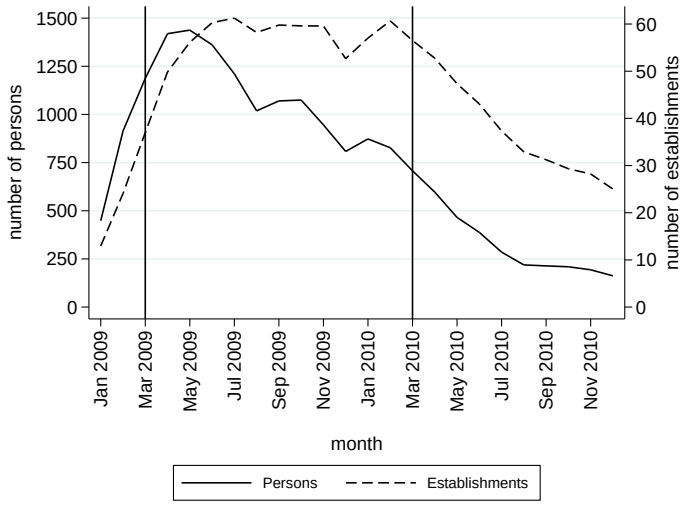
1 Introduction

During the last recession of 2008-09 Germany experienced a huge decrease in GDP but surprisingly few employment losses. At the same time the country's short-time work (STW) program was intensively used. Figure 1 displays the number of persons and establishments in the German scheme between January 2009 and December 2010. In May 2009

Figure 1: Development of Short-Time Work in Germany



Numbers in thousands.
Source: Own calculations based on data from the Federal Employment Agency.

about 56.000 establishments made use of the program, and STW compensation was paid to about 1.4 million employees. Compared to other countries the German STW scheme was one of the largest in terms of take-up. This circumstance has sparked renewed interest in the labor hoarding instrument, not only in Germany. An emerging strand of literature on the so-called German labor market miracle is concerned with determining the importance of STW during the crisis. However, to this day its contribution to the stable labor market situation is not without controversy. Burda/Hunt (2011) for instance, ascribe the largest part of the German labor-market miracle to employers' reluctant hiring behavior prior to the recession. Möller (2010) emphasizes that the reformation of the labor market between 2003 and 2005 as well as the behavior of management and unions led to increased flexibility at the firm level. Especially in the face of the considerable cost, the effectiveness of STW has also been disputed in many other countries which introduced or extended a program during the recession. The analysis of the German STW scheme hence provides insights that can also benefit other countries.

STW programs are geared to help firms[1] maintain jobs after a temporary demand shock. The basic idea is to enable firms to reduce working hours in order to cope with the occurring lack of work. In order to reimburse for a part of the resulting wage loss, employees receive STW benefits, which are generally financed by the unemployment insurance system. Nevertheless, working short-time may lead to a substantial loss of income for the individual.

[1] In the following, the terms firm, establishment, and employer are used interchangeably.

Thus, STW is a work-sharing scheme, which aims at distributing the lack of work across many shoulders and is hence designed to be fair by definition.

From a macro-economic perspective, there are two imperfections of STW[2]. First, STW schemes are subject to displacement effects. As other employment subsidies, they may preserve jobs that are economically unviable and consequently prevent necessary adaptions at the firm level. In this case, employers leave workers that hold unproductive jobs in STW. After the end of the program, however, these workers are likely to be laid-off. In this case STW acts as a "prelude to unemployment" (Mosley/Kruppe 1996: 133). Second, STW programs may be associated with deadweight cost. The unemployment insurance system bears the risk that STW supports jobs which employers would have maintained anyway. If short-time workers are mostly employees that are valuable to the firm, the preservation of their jobs after the end of the program is not surprising. Thus, a situation where dismissals systematically affect less productive employees while STW is applied to the more productive ones would indicate an unintended use of the scheme.

Consequently, the first step to evaluating the instrument of STW is to examine whether transitions to STW and unemployment occur systematically. This point has already been made by Büchel/Pannenberg (1992). If STW is used as intended, namely as a work-sharing scheme, one would expect a broad range of workers with differing attributes to be selected into the program. Since there is still limited knowledge about the persons affected by STW, we cannot be sure whether this is the case. This gap in the literature can be attributed to a lack of appropriate data: While information referring to the use of STW on a national or establishment level is available for a range of countries, data on short-time workers is scarce. To this day it is therefore not clear, who the short-time workers are. Is there even such a thing as a typical short-time worker? Put differently, do employers select certain individuals into STW while others others are laid-off?

This paper is hence concerned with the analysis of the characteristics of short-time workers as well as of workers who are dismissed. We focus on the influence of employees' human capital on the risk of working short-time and becoming unemployed. In doing so, we provide insight on potential selection behavior of employers during STW. Applying methods of event history analysis, we estimate transition rates from regular employment to STW as a function of individual and establishment characteristics. The same analysis is conducted for transitions to unemployment.

We exploit a unique data set, which is ideally suited for our purposes. It is the only German administrative data set that provides rich information on individual short-time workers. The data comprises the population of employees who worked short-time in Nuremberg, Germany between June 2008 and December 2010. From the data, we know the time of entry into short-time work of each employee. The same is true for entries into unemployment. Additionally, we dispose of the workers' employment biographies from 1975 onwards, which include information on a variety of individual characteristics such as formal

[2] For a discussion of the cost and benefit of STW see Arpaia et al. (2010) and Crimmann/Wießner/Bellmann (2010).

qualification, occupation, gender, age and nationality. With respect to the employing establishment data is provided on the branch of economic activity, firm size and the age of the firm. We consequently dispose of a linked-employer-employee data set, which allows the comprehensive analysis of short-time workers and their employers.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Information on the institutional background of STW is provided in section 3. Section 4 presents theoretical considerations on employers' selection behavior. After describing the data used in the analysis in section 5, we explain our empirical strategy in section 6. In section 7, we provide information on the characteristics of establishments with and without a STW scheme. Results from the descriptive analysis of employees transitions out of regular employment are provided in section 8.1. In section 8.2 the results obtained from the regression analysis are presented. The conducted robustness checks are laid out in section 8.3. Section 9 concludes.

2 Literature Review

Although the analysis of possible selection behavior during STW is important for the evaluation of the instrument, very little work on this subject – or on individuals affected by STW in general – exists. In the case of Germany the existing studies mostly refer to the early 1990s, where STW was used to adapt to structural changes in the aftermath of the reunification.

Völkel/Wiedemann (1997) provide comprehensive information on German short-time workers between 1990 and 1994. They draw on information from the Labor Market Monitor *(Arbeitsmarkt-Monitor)* of the Institute for Employment Research, a representative longitudinal survey of 0.1 percent of the population of working age. In 1990, two thirds of the surveyed short-time workers possess a vocational qualification, 6 percent are foremen. A further 6 percent graduated from a university, while 12 percent graduated from a *Fachschule*. Only 7 percent do not have a vocational degree. With regard to age, employees between 25 and 39 years make up 41 percent of the short-time workers, employees between 40 and 54 years account for 37 percent. This share rises to 50 percent in 1994. According to the authors this indicates the use of STW as a bridge to old-age pension in the 1990s. About 45 percent of the persons who have worked short-time between 1990 and 1992 are regularly employed one year after the end of the program.

The effects of STW on the individual employment biography are also examined by Büchel/Pannenberg (1992), who rely on survey data from the German Socio-Economic Panel. They first estimate a logit regression to determine the influence of individual characteristics on the probability of working short-time or being laid-off. Skilled workers as well as craftsmen and foremen have increased chances of being employed in STW, which Büchel/Pannenberg (1992) ascribe to the high transaction cost of dismissing these workers. 29 percent of the surveyed short-time workers exit to reemployment, 60 percent exit to job search. The remaining 11 percent either take part in training or leave the labor force altogether. Estimates of a second logit regression indicate a higher probability of being

reemployed for young workers, married persons and foremen and craftsmen. The longer a person receives STW compensation, the lower are their chances of finding regular employment.

The study of Fuchs/Jacobsen (1991) provides information on employees affected by STW for the US. The authors survey 1,500 short-time workers of a large manufacturing firm located in California. Workers in the middle and lowest salary ranges are slightly overrepresented relative to the entire workforce of the firm. Focusing on human capital, Koumakhov/Najman (2001) study the problem of labor hoarding in Russia using the Russian Longitudinal Monitoring Survey. They find employees with firm-specific human capital to be rather subject to compulsory unpaid leaves, while unskilled workers are more likely to be employed in STW.

Whereas literature on individuals working short-time is scarce, several papers are concerned with the effectiveness of STW schemes on a national or establishment level. The comprehensive study of Hijzen/Venn (2011) employs country level data from the OECD (2010) to implement a difference-in-difference approach. The authors make use of the variation of STW take-up rates across countries and time, which enables them to draw causal inference about the effects of STW on employment and average hours. With respect to permanent employees, their results provide clear evidence for a job preserving function of STW during the downturn, as well as some evidence for a reduction of average hours. No such effects are found with respect to temporary workers. Among the 16 countries examined, the largest impacts of STW on employment are estimated in Germany and Japan. Drawing on the same data, Cahuc/Carcillo (2011) estimate the effect of changes in STW take-up rates on changes in unemployment and employment rates, respectively. In order to account for the endogeneity of STW take-up rates, these are instrumented with features of the STW scheme before the beginning of the recession. The results support the findings of Hijzen/Venn (2011). Referring to the employment rate, permanent workers benefit more from STW schemes than do temporary workers. Furthermore, the authors' two-stage least squares estimation yields a negative relation between changes in the STW take-up rate and the overall unemployment rate. The findings obtained by the aforementioned studies are also confirmed by Arpaia et al. (2010), who cover the period from 1991*Q2* to 2009*Q3* using data on 27 European countries. A similar approach as in Cahuc/Carcillo (2011) is chosen by Boeri/Bruecker (2011), who instrument national STW take-up rates with the time passed since the respective country first introduced a STW program. Both their OLS and IV estimates indicate that STW contributes to the reduction of job losses, however, only if falls in output are sufficiently large. The authors stress that STW can actually increase employment losses during mild recessions and upturns. Their econometric results also point to the existence of large deadweight cost of STW in some countries. Van Audenrode (1994) shows that only generous enough STW programs are able to bring about an efficient level of both employment and working hours.

While these studies are directed at analyzing the effectiveness of STW, Burda/Hunt (2011) are rather concerned with decomposing the German labor market miracle. They identify three explanations for the missing job losses and quantify their effect. Employers' reluctance to hire prior to the 2008-09 recessions may explain 40 percent of the labor market

miracle, while wage moderation contributed another 20 percent. Moreover, Burda/Hunt (2011) emphasize the role of working time accounts during the crisis. According to them, the reduction of hours accumulated in these accounts acted as a substitute for STW.

On the firm level, the effects of STW have been analyzed by Calavrezo/Duhautois/Walkowiak (2010). Using French data, they apply a nearest neighbor matching on the propensity score to compare the exit rate of STW establishments and their counterfactuals. Their results show a positive relation between the use of STW in one year and establishment exit in the following. Aside from their macro level analysis, Boeri/Bruecker (2011) also assess the job saving effect of STW on the firm level. Based on German data from the IAB establishment panel, the authors exploit information on firms' prior experience with the program to instrument the use of STW in 2009. According to their IV results an increase in the share of short-time workers by 1 percent raises the firm's employment by about 0.37 percent. Boeri/Bruecker (2011) calculate that the point estimates correspond to about 400,000 jobs saved by the STW scheme. Another paper drawing on the data of the IAB establishment panel is Bellmann/Gerner (2011). They conduct a matching among a set of establishments that use STW. The same is done for a set of plants without a scheme. In order to estimate the effect of the last crisis, a difference-in-difference estimator is applied to each set, where the outcome variable is the change in employment. The authors' find weak evidence for the hypothesis that STW helped preserve employment during the crisis.

Finally, further studies analyze the determinants of the demand for STW on the firm level. Using a probit regression Crimmann/Wießner (2009) find that a bad profit situation in the previous year as well as the expectation of a negative development render a firm more likely to implement STW in the current year. Also, the higher the skill level of the workforce, the higher is the likelihood that a firm uses STW. These results are confirmed by Crimmann/Wießner/Bellmann (2010), who additionally find that export oriented firms are more likely to operate a STW scheme. Boeri/Bruecker (2011) regress the STW take-up rate, i.e. the share of employees working short-time, on firm characteristics. A higher share of workers with a university degree is found to negatively correlate with the STW take-up rate. The authors conclude that shocks rather than structural problems of firms determine STW take-up rates.

3 Institutional Background

Short-time work programs are not an invention of the last recession, but have mostly existed prior to 2008. In the course of the crisis some countries, however, introduced STW for the first time or loosened the eligibility criteria. Hijzen/Venn (2011) provide an extensive overview of STW schemes in 24 OECD member states, which documents crucial cross-country differences in the design features. Additional information is provided by Boeri/Bruecker (2011), who calculate 4 summary indicators of STW as well as national take-up rates. In terms of the latter, Belgium, Italy and Germany dispose of the largest schemes. A comprehensive overview of the design features of STW schemes in 27 European countries is provided by Arpaia et al. (2010). A summary of the regulations of the

German STW scheme is given in Dietz/Stops/Walwei (2011). Additional explanations of the legal rules are provided by the Federal Employment Agency (2009).

In Germany, STW as a labor market instrument has a long standing tradition, dating back to as far as the beginning of the 20th century. In the past it was intensively used during the oil crises of 1975 and 1982, as well as in the 1990s in the aftermath of the German reunification (Brautzsch/Will 2010). At present, three types of STW exist, which are regulated by law in Book Three of the German Social Code. First, the so-called *Transferkurzarbeit* (transitional STW) is designed to buffer permanent employment losses due to restructuring at the firm level. Second, the so-called *Saison-Kurzarbeit* (seasonal STW) is directed at establishments which are affected by a seasonal lack of work and is granted from December 1st to March 31st. During the 2008-09 crisis the third type of STW, the so-called *Konjunkturelle Kurzarbeit* (STW for economic reasons), was by far made use of the most out of all three types of STW. This is why this paper is concerned with this type of STW, which is designed to help firms overcome a temporary lack of work.

Firms apply for STW with their local employment agency. After the agency consents, STW compensation is paid to the firm for all its short-time workers. The firm is then responsible for distributing the STW benefits to the employees. In order to be eligible for the third type of STW, firms need to experience a temporary, inescapable lack of work, which is defined as a wage cut of at least ten percent affecting at least one third of all employees. From February 2009 to December 2010 firms were also eligible when experiencing a wage cut that affected less than one third of all employees. In this case only the workers with a wage loss of more then ten percent were entitled to STW compensation. In general, the staff (e.g. the workers' council) has to consent to the implementation of STW. Only employees subject to social security contributions whose contract is not terminated are entitled to the benefits. Marginally employed workers and apprentices may not be employed in STW. During the recession, the maximum period of time that workers can be employed in STW was prolonged several times up to 24 months.

Once a firm is operating STW, it may cut up to 100 percent of the regular working hours. To compensate for the loss in earnings, employees receive STW benefits paid by the Federal Employment Agency. The benefit rate amounts to 60 percent (67 percent if the person has at least one child) of the net wage loss, which is equal to the replacement rate of unemployment benefits. However, STW is not without cost to the firm, since employers are obliged to cover a certain percentage of contributions to social security for the hours cut. Before February 1st 2009 this share amounted to 80 percent. In the course of the crisis the program became more generous, and 50 percent of this payment were reimbursed by the Federal Employment Agency from February 1st 2009 to March 31st 2012. Between July 1st 2009 and March 31st 2012, 100 percent were reimbursed from the 6th months of STW on or if short-time workers participated in training measures. Even in the case of a 100 percent reimbursement, the reduction in hours is not free of charge to the firm due to the existence of (quasi-)fixed labor cost. The higher the hourly wage rate or the higher the percentage of hours cut, the more expensive STW hence is to the firm (Crimmann/Wießner/Bellmann 2010).

STW is usually implemented within a firm on a monthly basis. During periods of STW, lay-offs as a measure to adjust to the occurring temporary lack of work are ruled out by jurisdiction. According to established case law, while operating a STW scheme employers are only allowed to lay-off workers for reasons relating to the individual worker or operational reasons other than those that led to the implementation of STW[3]. However, dismissals can be conducted in the months before the start and after the end of the program.

4 Theoretical Considerations

In case an establishment opts for the implementation of STW, it must decide which employees are to work short-time. We argue that there are three channels through which this decision is influenced.

First, if concerns about the cost of STW prevail, the firm faces incentives to achieve the necessary reduction in output by cutting hours of unskilled workers. As was laid out in the last section, the design features of STW implicate that employing low skilled workers in STW results in moderate cost due to their low wage rate. Consequently, a negative relation between the level of human capital and the risk of working short-time results from the cost channel.

Second, expectations about a near ending of the recession are likely to affect employers' labor hoarding decisions (Burda/Hunt 2011; Bohachova/Boockmann/Buch 2011). Firms which expect the lack of work to end soon, may be prone to apply the instrument of STW to all groups of employees, irrespective of their level of human capital.

Third, employers' behavior may be guided by fairness considerations, especially since STW as a work sharing scheme should be fair by definition. A whole strand of literature deals with the importance of justice in organizations[4]. The essence is the view of "organizations as arenas for long-term, mutual social transactions between the employees and the organization" (Cohen-Charash/Spector 2001: 285). Theoretical models of organizational justice postulate a positive relation between perceived justice and employees' work performance. Moreover, so called withdrawal behavior – the reduction of work effort in response to perceived injustice – is predicted. These relationships are confirmed empirically in a number of studies (see for instance Cohen-Charash/Spector (2001); Colquitt et al. (2001); Tortia (2008)) and are undisputed within the literature. Employers hence have good reasons to ensure that their behavior is perceived as fair, and therefore face incentives to select a broad range of employees into STW. In case employers' fairness considerations prevail, the individual level of human capital does consequently not determine the risk of working short-time.

One or more of these channels may be effective within a firm at the same time. Thus, from a theoretical point of view the influence of employees' human capital on the risk of working

[3] See among others Federal Labor Court (1997). Employers may lay-off individual workers if they find that their job is no longer affect by a temporary but by a permanent lack of work. In this case the employer has to prove that the lack of work is permanent.

[4] A survey of the literature is provided by Greenberg (1987, 1990).

short-time is not clear-cut. In contrast, the relationship to unemployment is undisputed within the literature on human capital theory. A high level of individual human capital is related with a low risk of being laid-off (Becker 1962; Nickell 1979).

In this paper, we therefore analyze empirically which employees are affected by STW. We estimate transition rates from regular employment to STW to determine the risk of working short-time. In order to complete our analysis we take into account unemployment as a competing risk to STW.

5 Data Description

5.1 Individual Data on Short-Time Workers

Our analysis exploits a unique linked-employer-employee data set that provides comprehensive information on STW establishments and all their employees – short-time workers as well as non-short-time workers – from administrative data sources. It is thus ideally suited to analyze the question of employers' selection behavior during STW.

The starting point is a unique data set that provides information on short-time workers in the district of the employment agency of Nuremberg[5] (hereafter simply referred to as Nuremberg). Establishments that conduct STW (henceforth referred to as STW establishments) are obliged to submit paper copies of lists of all employees working short-time to the responsible local employment agency. All lists submitted to the employment agency of Nuremberg were typewritten. In doing so, a data set was constructed, which provides monthly information on more than two thirds of all employees working short-time in Nuremberg between June 2008 and December 2010.[6] As the transcribed lists stem from the process of public administration, it is possible to combine the information on short-time workers with existing administrative data.

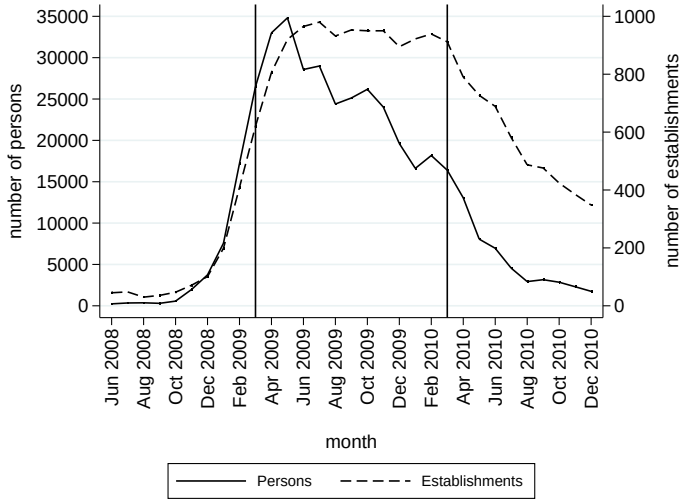
The data material from the transcription amounts to 59,253 short-time workers employed in 1,905 establishments. On average, employees in Nuremberg were affected by STW for 7 months. For 23 percent of all employees covered in the data, STW was paused for more than two months. Based on the data collected, the development of STW in Nuremberg is displayed in figure 2. Strikingly, the development of STW in Nuremberg is very similar to all of Germany. In the first quarter of 2009 we observe a sharp increase of both the number of short-time workers and STW establishments. While the number of short-time workers plummets quickly after May 2009, the number of STW establishments remains relatively stable until March 2010. For this reason, we divide the observed time span into three periods: the STW expansion period from June 2008 to March 2009, the STW plateau

[5] The district of the employment agency of Nuremberg comprises Nuremberg, Erlangen, Fürth, Lauf, Schwabach and parts of Roth.

[6] The lists on approximately one third of the short-time workers located in Nuremberg were not readily available for transcription, since their firm's payroll accounting was located outside the district of Nuremberg's employment agency. Lists for these short-time workers were submitted to other regional employment agencies and were only partly provided to the agency of Nuremberg for transcription.

period from April 2009 to March 2010, and the STW contraction period from April 2010 to December 2010.

Figure 2: Development of Short-Time Work in the District of Nuremberg



Source: Own calculations.

The structure of STW establishments in all of Germany does not differ too much from the one in Nuremberg. With regard to firm size a similar distribution emerges, although in Nuremberg STW establishments are in general larger in size (see table A.1 of the appendix). 20 percent of all German STW establishments are assigned to construction, while this number only amounts to 9 percent in Nuremberg (see table A.2 of the appendix). Both in Germany and Nuremberg manufacturing firms make up the majority of STW establishments. In Nuremberg, however, this number exceeds the one for Germany by 5 percentage points. Due to the striking similarities in the usage of STW and only small differences in the structure of STW establishments, we argue that our analysis is not subject to influences strongly particular to the Nuremberg region.

5.2 Combination with Process Data

In a first step, the short-time worker data is combined with the Establishment History Panel (BHP) of the Institute for Employment Research. The BHP contains yearly information from 1975 to 2008 on establishments in Germany with at least one employee on June 30th[7]. By linking the two data sets we are able to distinguish establishments with and without a STW scheme. Out of the 1,905 STW establishments included in the short-time worker data 1,797 can be found in the BHP of 2008.

In a second step, we combine the short-time worker data with the Integrated Employment Biographies (IEB) of the Institute for Employment Research. The IEB contains day-to-day information on individual employment biographies from administrative processes of the Federal Employment Agency. It provides, amongst others, information on gender, school

[7] For further details see Hethey-Maier/Seth (2010).

education and vocational training, occupation and occupational status as well as the employing establishment[8]. From the IEB we draw the individual employment biographies of each person who was for at least one day after 1990 employed in a STW establishment or an non STW establishment with similar attributes. Our data range from January 1975 to December 2010, where we are able to identify individual episodes of STW from June 2008 to December 2010.

The combined data is then prepared for analysis. First, we identify transitions from employment to unemployment[9]. Since information on the receipt of STW compensation is only available on a monthly basis, the data is transformed to be exact to the month rather than exact to the day. It is then possible to identify transitions from regular employment to STW, which may occur more than once for one employee[10]. As a next step, we construct some additional explanatory variables from our data. The values of the imputed[11] education variable are aggregated to three education levels: low qualified individuals (without vocational training), qualified individuals (with vocational training) and high qualified individuals (holding a degree from a university or a university of applied sciences). The Blossfeld (1985) classification of occupations is applied to the occupation variable. The Blossfeld occupations are then further aggregated to low skilled, skilled and high skilled occupations[12]. Seniority is computed from the data as the number of years a person has worked for the same employer. Finally, we add characteristics of the employing firm from the BHP of 2008.

Our final data set consists of monthly multi-episode data ranging from May 2008 to December 2010. Only episodes of employment subject to social security of persons who are allowed to work short-time are included. A person may exit regular employment several times, where the possible destination states are STW and unemployment. Individuals are defined to be at risk of STW or unemployment from May 2008 on[13]. We analyze 288,371 persons including 44,520 short-time workers. Within our data 52,937 exits to STW and 43,437 exits to unemployment occur. The summary statistics for the explanatory variables are given in table A.3 of the appendix.

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8 For further details see Oberschachtsiek et al. (2009).

9 A person is defined to become unemployed if an employment episode is followed by an unemployment episode within 31 days

10 We account for interruptions in the recipience of STW compensation of more than two months for the following reason. When an employer interrupts the STW program for two months or less, the granted period of STW compensation is prolonged by the duration of the interruption. This is not the case with interruptions of more than two months. Interruptions of two months or less are hence unlikely to reflect entrepreneurial strategy.

11 As the education variable in the IEB exhibits a high share of missing values, we apply imputation procedure 2b of Fitzenberger/Osikominu/Völter (2005) to the variable.

12 Occupations classified as agricultural, simple manual, simple service or simple commercial and administrative occupations by Blossfeld are defined as low skilled occupations. Occupations classified as qualified manual, qualified service, qualified commercial and administrative occupations by Blossfeld are defined as skilled occupations. Finally, we define high skilled occupations as those classified as technicians, engineers, semiprofessions, professions or managers by Blossfeld.

13 This is done to avoid the exclusion of persons which exit regular employment in June 2008, the first month in which we are able to observe exits to STW.

6 Empirical Strategy

Our empirical analysis examines whether the risk of STW differs across employees. Instead of implementing a STW scheme, establishments experiencing an inescapable lack of work may conduct lay-offs. As long as the firm is affected by a negative demand shock, its employees hence face two risks, working short-time or being dismissed. In order to complete our analysis, we hence take into account unemployment as a competing risk to STW. Our empirical strategy follows a two-stage approach. The first stage aims at identifying establishments without a STW scheme, but with characteristics similar to STW establishments (in the following referred to as similar non-STW establishments). We do so for three reasons.

First, we argue that the risk of working short-time is not restricted to employees of establishments that actually conducted STW. In case a non-STW establishment was provided with the possibility to implement the scheme, its employees were also at risk of working short-time. In order to capture the correct risk pool of employees it is thus decisive to include employees of establishments that actually opted for STW as well as workers of establishments that **may have** done so. Legislation requires the occurrence of an inescapable lack of work for STW to be implemented. We argue that the crisis affected STW and similar non-STW establishments equally. The latter would therefore fulfill the prerequisite of an inescapable lack of work.

Second, we want to take into account unemployment as a competing risk to STW. Establishments may, however, only lay-off workers before or after the implementation of a STW scheme. During the months when a STW scheme is operated, lay-offs are not available as a measure to adjust to the occurring lack of work. If we restricted our analysis to workers of STW establishments, we would consequently not estimate the true risk of unemployment. The inclusion of employees of similar non-STW establishments in the risk analysis accounts for this problem.

Third, this approach provides information on which firm characteristics render an establishment more likely to implement STW. This is valuable background information when analyzing the characteristics of workers in the scheme.

In the second stage of our empirical analysis we employ methods of event history analysis to estimate transition rates out of regular employment. Special focus is given on the influence of individual human capital. As possible destination states we take into account two competing risks, STW and unemployment. From a theoretical point of view, we expect a negative relation between workers' human capital and their risk of being laid-off. Based on our theoretical considerations presented in section 4 the influence of human capital on the risk of working short-time is, however, not clear. We therefore assume that the risk of STW does not correlate with the risk of unemployment, which enables us to treat the two risks as independent. In the second stage of our analysis we hence run separate regressions for transitions to STW and unemployment, respectively. The risk pool consists of employees of STW- and similar non-STW establishments.

7 Identification of Establishments

Non-STW establishments similar to STW establishments are identified by methods of propensity score matching[14]. Non-STW establishments serving as matches for STW establishments will possess similar features and can hence be assumed to be equally affected by the 2008-09 recession. Note that the sole purpose of the propensity score matching is the identification of similar non-STW establishments; we are not interested in the estimation of treatment effects of any kind.

As explained in section 5.2 the BHP is combined with the short-time worker data to serve as a database for the matching process. Since we are interested in identifying only those non-STW establishments that closely resemble establishments with a scheme, we carry out a nearest neighbor matching using the psmatch2 Stata module (Leuven/Sianesi 2003). Within a caliper of 0.05 four nearest neighbors are matched with replacement to each STW establishment. The matched sample is restricted to establishments within the common support. We choose a logit model to estimate the propensity score, since it has a larger probability mass at its margins than the probit model. In a binary treatment case the two models, however, produce similar results (Caliendo/Kopeinig 2008).

The variables used to estimate the propensity score are measured in 2008. As control variables we include the following: The branches of economic activity control for the fact that the last recession caused varying loss of work across industries. Boeri/Bruecker (2011) argue that a lack of experience in the implementation of STW among younger firms may render them more reluctant towards this instrument. We therefore control for the firm's age by inclusion of the year of foundation. Furthermore, firm size is included, which was found to positively influence STW take-up (rates) in earlier studies (Boeri/Bruecker 2011; Crimmann/Wießner/Bellmann 2010). Additionally, we control for the shares of full-time, part-time and marginally employed workers which determine the flexibility of the establishment and hence the probability of implementing STW. Finally, the educational and occupational structure of the workforce is accounted for by shares of the respective subgroups of employees. Unfortunately, the BHP does not include information on further variables, such as the use of agency workers or changes in the profit situation, that have been found to determine the probability of STW by the aforementioned studies.

The results are displayed in table 1. According to our estimation, younger firms are indeed less likely to implement a STW scheme, whereas the influence of firm size is rather small. As expected the share of full-time employees strongly increases the probability of belonging to the treatment group. The same is true for the share of high qualified employees[15]. Note that this result does not directly relate to the theoretical considerations presented in section 4, since it only refers to the influence of the employment structure on the probability of

[14] Caliendo/Kopeinig (2008) give an introduction to propensity score matching. A more detailed description can be found in Guo/Fraser (2010).

[15] Qualified employees either hold a secondary school leaving certificate as their highest school qualification or completed vocational training. High qualified employees hold a degree from a university (of applied sciences). The shares of unskilled workers, skilled workers, craftsmen and formen as well as white-collar employees refer to the occupational status of the employees.

Table 1: Estimation of the Propensity Score (Logit Model)

Implementation of STW scheme		
Agriculture, forestry and fishing	-1.6990***	(-4.10)
Manufacturing	1.3902***	(24.73)
Electricity, gas, steam and air conditioning supply	-1.6085	(-1.78)
Accommodation and food service activities	-1.5132***	(-7.05)
Financial and insurance activities	-2.1159***	(-5.12)
Real estate activities	-2.6882***	(-5.97)
Public administration and defence; compulsory social security	-2.9308***	(-3.51)
Education	-1.9522***	(-4.86)
Human health and social work activities	-2.3838***	(-8.70)
Arts, entertainment and recreation	-1.3714***	(-3.58)
Other service activities	-1.4654***	(-6.87)
Households as employers; goods- and services production of households for own use	-4.1474***	(-4.14)
Year of foundation	-0.0167***	(-7.57)
Total number of employees	0.0012***	(7.72)
Share of full-time employees	1.9872***	(6.08)
Share of part-time employees	-0.3539	(-1.48)
Share of marginally employed	-0.2256	(-1.40)
Share of qualified employees	-0.0929	(-1.16)
Share of high qualified employees	0.6399***	(3.95)
Share of unskilled workers	-0.7060	(-1.86)
Share of skilled workers	-0.4111	(-1.04)
Share of craftsmen and foremen	-1.0161	(-1.96)
Share of white-collar employees	-0.9175*	(-2.38)
Constant	29.7514***	(6.76)
Observations	44,932	
$LRChi^2(23)$	3,126.87	
Pseudo R^2	0.207	

z statistics in parentheses

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

implementing a STW scheme. At this point of the empirical analysis no prediction can yet be made about the characteristics of individuals affected by STW.

The matching procedure successfully reduces the bias between STW and non-STW establishments, as can be seen from table 2. Caliendo/Kopeinig (2008) state that the standard-

Table 2: Mean Characteristics of Establishments before and after Matching

	before matching			after matching		
	with STW	without STW	p-Value	with STW	without STW	p-Value
Agriculture, forestry and fishing	0.003	0.011	0.002	0.003	0.003	0.819
Manufacturing	0.400	0.069	0.000	0.399	0.399	0.980
Electricity, gas, steam and air conditioning supply	0.001	0.001	0.738	0.001	0.001	0.787
Accommodation and food service activities	0.013	0.066	0.000	0.013	0.011	0.667
Financial and insurance activities	0.003	0.027	0.000	0.003	0.006	0.207
Real estate activities	0.003	0.070	0.000	0.002	0.002	0.852
Public administration and defence; compulsory social security	0.001	0.009	0.000	0.001	0.001	0.824
Education	0.004	0.026	0.000	0.004	0.005	0.648
Human health and social work activities	0.008	0.093	0.000	0.008	0.008	0.883
Arts, entertainment and recreation	0.004	0.019	0.000	0.004	0.003	0.667
Other service activities	0.013	0.055	0.000	0.013	0.013	0.992
Households as employers; goods- and services production of households for own use	0.001	0.078	0.000	0.001	0.000	0.682
Year of foundation	1990	1996	0.000	1990	1990	0.570
Total number of employees	77.4	11.5	0.000	53.1	57.1	0.684
Share of full-time employees	0.708	0.387	0.000	0.708	0.709	0.904
Share of part-time employees	0.226	0.532	0.000	0.225	0.220	0.498
Share of marginally employed	0.162	0.421	0.000	0.162	0.154	0.270
Share of qualified employees	0.525	0.413	0.000	0.525	0.537	0.302
Share of high qualified employees	0.061	0.039	0.000	0.061	0.060	0.915
Share of unskilled workers	0.194	0.116	0.000	0.194	0.182	0.196
Share of skilled workers	0.210	0.078	0.000	0.210	0.212	0.815
Share of craftsmen and foremen	0.016	0.007	0.000	0.016	0.019	0.219
Share of white-collar employees	0.307	0.224	0.000	0.307	0.315	0.442
Observations	1,797	43,135		1,792	5,174	

ized bias after matching should lie below 5 percent, which we achieve for all covariates but one[16]. The mean of the absolute bias is reduced from 36.3 before to 1.6 after matching, the pseudo R^2 decreases from 0.208 to 0.002. In the matched sample the probability of implementing STW at the establishment level can thus no longer be explained by the variables controlled for in the matching process. This can also be seen from figure A.1, which plots the distribution of the propensity scores of the matched sample. After excluding establishments off support, our matched sample contains 1,792 STW and 5,174 non-STW

[16] For the share of craftsmen and foremen the standardized bias after matching amounts to -5.5 percent.

establishments.

In the next step of our empirical analysis we estimate transition rates from regular employment to STW and unemployment, respectively. The risk pool is formed by all workers of STW and matched non-STW establishments. Due to the preceding nearest neighbor matching, additional variance is introduced to the estimation process as a whole (Caliendo/Kopeinig 2008). In practice, bootstrapping methods to estimate standard errors are widely applied, although Imbens (2004) states that there is little formal evidence to do so. Abadie/Imbens (2008) show that the standard bootstrap is in general not valid for matching estimators, even in the simple case with a single continuous covariate when the estimator is root-N consistent and asymptotically normally distributed with zero asymptotic bias.

We match STW- and non-STW establishments for the purpose of including employees of the latter in our regression analysis rather than to obtain matching estimators such as the average treatment effect on the treated. Still, we do not apply methods of bootstrapping to adjust the variance of our regression results, because the standard conditions for the bootstrap are not satisfied due to the extreme non-smoothness of nearest neighbor matching (Abadie/Imbens 2006). The standard errors of our regression analysis therefore underestimate the true variance, since the additional variance introduced by the matching procedure is not accounted for.

8 Empirical Analysis of Transition Rates

8.1 Descriptive Analysis

Table 3 describes the mean characteristics of the observed employees. We distinguish three possible endings of regular employment episodes. Either the person is still regularly employed, exits to STW or is laid-off. The left side of the table takes into account all employees, i.e. workers of STW as well as matched non-STW establishments. The right side is restricted to workers of STW establishments.

Table 3: Mean Characteristics of Employees by Exits out of Regular Employment

	all employees			employees of STW establishments		
	no exit	exit to STW	exit to unemployment	no exit	exit to STW	exit to unemployment
Seniority	9.461	12.244	4.214	9.391	12.244	3.498
Low qualified	0.139	0.156	0.221	0.169	0.156	0.230
Medium qualified	0.671	0.744	0.672	0.678	0.744	0.676
High qualified	0.173	0.093	0.087	0.142	0.093	0.083
Low skilled occupation	0.370	0.459	0.571	0.428	0.459	0.573
Medium skilled occupation	0.402	0.397	0.324	0.389	0.397	0.325
High skilled occupation	0.228	0.144	0.104	0.183	0.144	0.101
Female	0.381	0.275	0.353	0.304	0.275	0.317
Age	40.1	41.4	37.7	40.3	41.4	37.3
Non-German	0.106	0.124	0.166	0.123	0.124	0.175
Observations	264,445	41,627	36,543	102,441	41,627	17,426

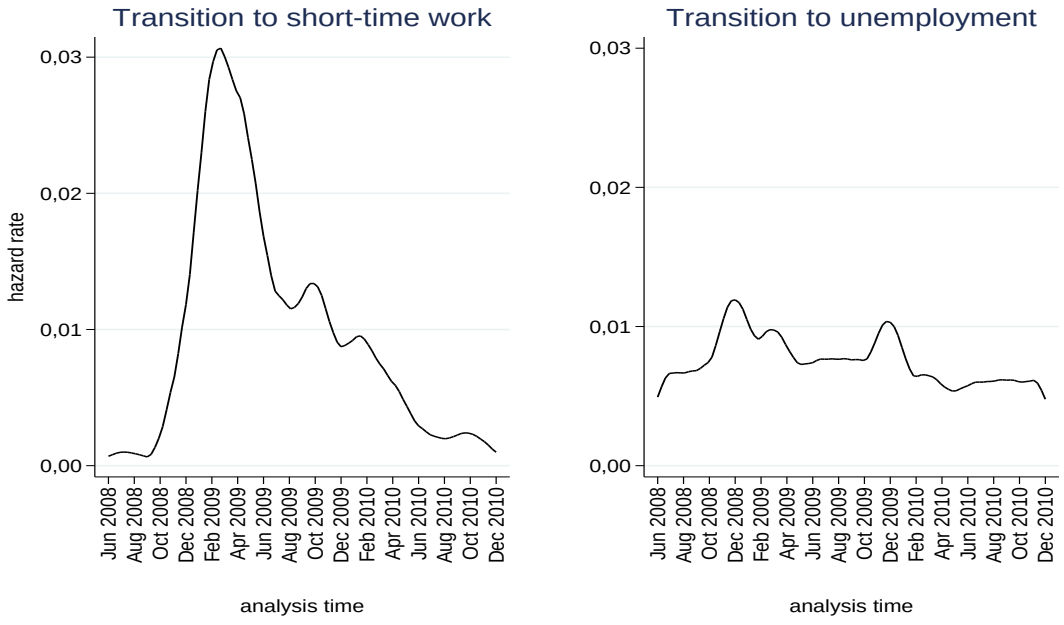
Over time an employee may exit regular employment more than once, possibly to different destination states. Therefore, the table considers for each destination state and employee the first episode that ends in the respective destination state.

The differences between the two sides of the table are not too pronounced. This is not surprising, as we controlled for the structure of the workforce when matching STW and non-STW establishments. With respect to the three possible outcomes, we observe striking differences in average seniority – a measure of firm-specific human capital. People who exit to STW have on average worked within the respective establishment for 12 years, while employees who are laid-off dispose on average of 4 years of seniority. In line with this, the share of workers with a low skilled occupation amounts to 57 percent among laid-off employees, while it equals 46 percent among employees working short-time, and 37 percent among workers who stay in regular employment.

These results have to be perceived with care, as they do not consider the timing of transitions. They do not take into account that employers' selection behavior may change in the course of the analysis period. This is, however, very likely since firms gather additional experience in handling the instrument of STW while operating a program. In the following, we will therefore take into account the timing of transitions out of regular employment.

Figure 3 displays the overall hazard rate for the transition to STW and unemployment, respectively. The hazard rates are computed from survivor functions produced by the Kaplan-Meier estimator. The risk of working short-time sharply increases after October 2008 peaking in March 2009. While the hazard rate drops quickly until August 2009, the fourth quarter of 2009 is marked by a slight re-rise of the hazard rate. In the course of 2010 the risk of STW declines almost continuously.

Figure 3: Overall Hazard Rates



Source: Own calculations.

While the hazard function for the transition to STW exhibits a right-skewed form with several local maxima, the curve describing the risk of unemployment runs rather flat. Note that our analysis also includes employees of firms without a STW scheme but characteristics similar

to STW-firms (see section 7). Nevertheless, the risk of unemployment is remarkably low. Assuming that non-STW and STW firms are equally hit by the crisis, it appears the former employ other measures than lay-offs to adjust the volume of work. These measure may have included the reduction of hours accumulated in working time accounts (Burda/Hunt 2011) and the less intensive use of agency workers (Dietz/Stops/Walwei 2011), measures that we are not able to control for when matching STW and non-STW firms on the basis of the BHP. However, the observation of a low transition rate to unemployment – even when employees of non-STW establishments are taken into account – mirrors what is by now referred to as the German labor market miracle.

In addition to the overall transition rates, we used the Kaplan-Meier estimator to comput hazard functions for groups of employees distinguished by three skill levels of education and occupation, respectively. For the transition to STW hazard functions of the different groups intersect. This is one reason for the choice of the empirical model described in the following.

8.2 Regression Analysis

Modell

Transition rates to STW and unemployment are estimated by a piecewise constant model with period specific effects including 16 two months intervals from May 2008 to December 2010. We choose this model for three reasons.

First, our descriptive analysis finds the hazard function for the transition to STW to be right-skewed with several local maxima. Parametric models of time dependence are not suited to reproduce such a hazard function (Blossfeld/Golsch/Rohwer 2007). Though these models would produce a right-skewed hazard function, the global maximum would be estimated to occur considerably later than March 2009. This is caused by the second local maximum in fall of 2009, which distorts the estimated hazard function.

Second, one might consider estimating a standard Cox model, which assumes proportional hazards throughout the whole period of analysis. On the basis of the Schoenfeld residuals (Schoenfeld 1982) we, however, find that this assumption does not apply in our case. When estimating a piecewise constant model with period specific effects, the hazards only need to be proportional within each period. This is true for most periods in our data.

Third, by taking into account period specific effects, we are able to estimate intersecting hazard functions as obtained by the descriptive analysis. This approach allows us to account for the possibility that the highest risk of STW (or unemployment, respectively) does not always affect the same group of employees throughout the analysis period.

Intervals for the piecewise constant model are chosen as small as possible. Setting intervals to a length of one month only results in the break down of the empirical model due to too many estimation coefficients. We therefore stick to 16 intervals of two months length.

The model to be estimated can be represented as

$$h(t) = \exp\left(\alpha_t + X_t\beta_t\right), \quad t = 1, ..., 16 \quad . \tag{1}$$

X_t represents the vector of covariates and β_t the associated vector of coefficients. Robust standard errors are obtained using the Huber/White estimator (Huber 1967; White 1980, 1982). Equation (1) is estimated for the transition to STW and unemployment, respectively.

The explanatory variables included in the regression analysis control for individual as well as establishment characteristics. We incorporate three groups of variables reflecting the individual level of human capital. The focus is on seniority as a measure of firm-specific knowledge, which we argue is crucial to the employer. Formal human capital is reflected by the level of education as well as the skill level of occupation. We include the respective dummy variables, where the group of qualified employees and the group of employees holding a skilled occupation represent the respective reference category. Gender, age and nationality are incorporated in the analysis to control for potential discriminatory behavior of employers. The current risk of STW or unemployment may be influenced by past episodes of unemployment. However, we argue that these are strongly correlated with the individual level of human capital. Since we face a trade-off between the inclusion of further explanatory variables and estimation intervals that are to be kept as small as possible, we do not include past episodes of unemployment in our model.

In order to take into account characteristics of the employing firm that may influence the transition to STW or unemployment, we incorporate the following variables in our model. We include six dummy variables for the branches of economic activity that intensively used STW during the analysis period (Federal Employment Agency 2011). The year of foundation accounts for the fact that young companies may not be familiar with the instrument of STW, and thus more reluctant to its implementation. Boeri/Bruecker (2011) actually use former experience with the scheme to instrument current demand for STW. Finally, we expect the individual risk of STW to rise with the size of the employing establishment, since we found larger firms more likely to implement a STW scheme in section 7. Firm size is included by the respective dummy variables, where small firms are the reference category[17].

Regression Results

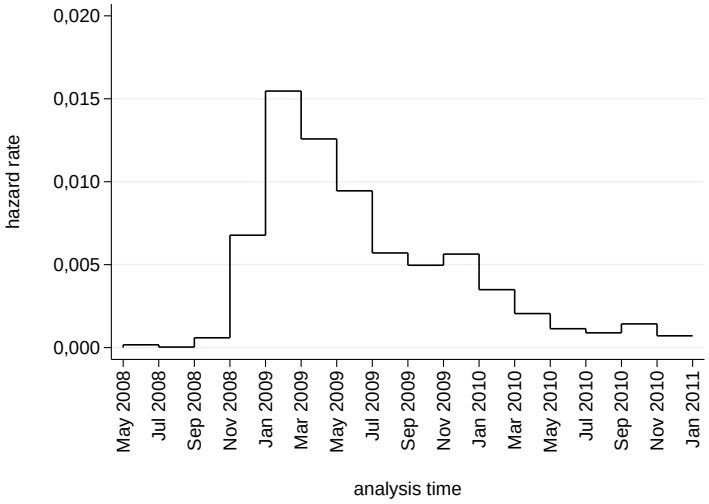
Transition rates into short-time work

The regression results obtained from the piecewise constant model for transitions to STW are given in table A.4 of the appendix. Figure 4 displays the estimated hazard function, which closely resembles the one obtained from the Kaplan-Meier estimator.

We first focus on the regression results with respect to the variables representing the level

[17] Very small establishments have less than 10 workers, whereas small ones employ at least 10 but less than 50 workers. Establishments with at least 50 and less than 250 employees are referred to as medium sized. Large establishments have at least 250 employees.

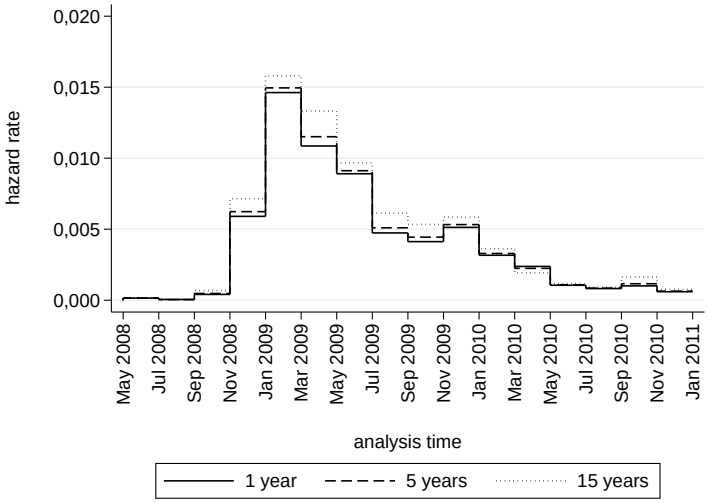
Figure 4: Transition Rate to Short-Time Work



Source: Own calculations.

of human capital. The effect of seniority on the risk of STW is significant and very close to zero for almost all estimation periods. To display this graphically the hazard functions for workers with 1 year, 5 years and 15 years of seniority are plotted in figure 5. For the three groups of employees, the risk of STW is basically the same and is hence not determined by seniority. According to our results, firm-specific skills are consequently not a criterion for employers to select workers to STW.

Figure 5: Transition Rate to Short-Time Work by Seniority

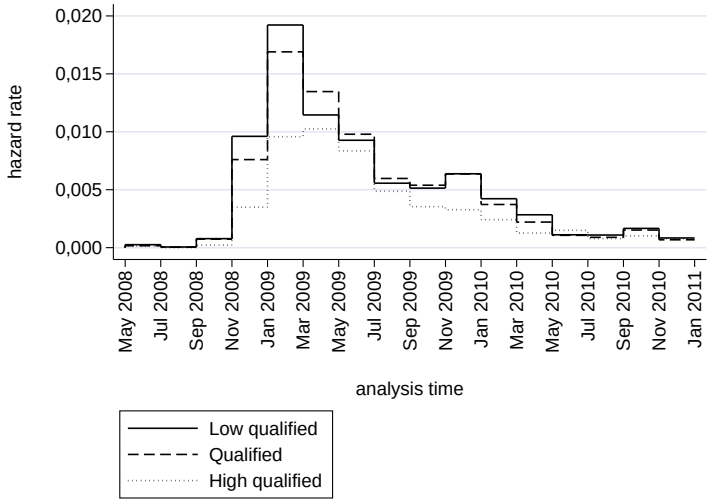


Source: Own calculations.

Different results are obtained with respect to education – one of our measure of formal human capital. The corresponding hazard functions are displayed in figure 6. Except for May and June 2010, high qualified employees always face the lowest risk of working short-time. Low qualified employees are affected by the highest risk of STW until February 2009. In March 2009, however, the hazard functions of low qualified and qualified workers intersect, leaving the former with a reduced risk of working short-time in this period. For

the following months of the STW plateau- and contraction period, the differences in the hazard rates are rather small compared to earlier months. We hence argue that there is no selective behavior of employers with respect to education after the STW expansion period.

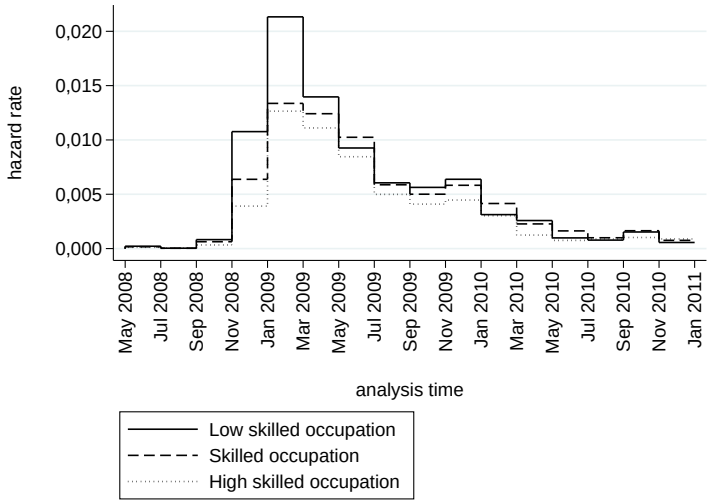
Figure 6: Transition Rate to Short-Time Work by Education



Source: Own calculations.

This finding is sustained by our regression results on the skill level of occupation – the second measure of formal human capital. The respective hazard functions are displayed in figure 7. With the beginning of the STW plateau period in March 2009 the hazard rate of workers with a low skilled occupation approaches the rates of the remaining two groups. It is thus only during the expansion period that our regression results indicate selection behavior of employers, in the way that workers with a low level of formal human capital are more likely to be selected for STW.

Figure 7: Transition Rate to Short-Time Work by Occupation



Source: Own calculations.

Based on our theoretical analysis in section 4, we argued that the relation between the individual level of human capital and the risk of working short-time is not clear-cut, depending on whether the influence of the cost of STW, fairness considerations or employers' expectations about the duration of the crisis prevails. In our analysis we do not find selective behavior of employers with respect to firm-specific human capital. Selection with respect to formal human capital is only observed during the STW expansion period. In the course of the plateau and contraction period firms do not choose short-time workers according to their formal human capital. We hence argue, that employers' behavior is mainly guided by the expectation of a nearby economic upturn as well as fairness considerations.

So far, our analysis did not find selective behavior of employers with respect to the level of human capital. The inclusion of gender, age and nationality in our empirical model also enables us to account for potential discriminatory behavior of firms. Except for the first two month of the analysis time, men face a higher risk of working short-time than women, although the differences in the hazard rates are not too pronounced (see figure A.2 of the appendix). This can be ascribed to men being more likely to hold an occupational status which may rather be subject to a lack of work (such as blue-collar jobs). Due to the strong correlation with the dummy variables reflecting the skill level of occupation, we were not able to include occupational status – which differentiates between unskilled and skilled workers as well as foremen and craftsmen and white-collar jobs – in our regression analysis. Workers' age does not influence the transition rate from regular employment to STW. The estimated effect is significant but close to zero, meaning that firms do not use age as a selection criterion. Transition rates with respect to nationality only differ during the STW expansion period in the way that non-German employees are more likely to work short-time.

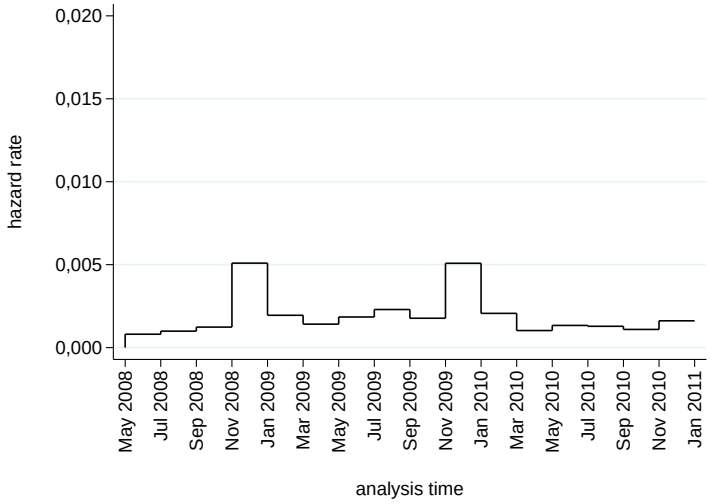
As additional controls we included establishment characteristics in our model. Not surprisingly, being employed in manufacturing, construction or transport – the branches of economic activity hardest hit by the 2008-09 recession – distinctly increases the risk of working short-time in most intervals. The establishment's age does not seem to play a decisive role in determining individual transition rates to STW. Also, regarding firm size no clear picture emerges.

Transition rates to unemployment

In a separate regression, we estimate the transition rate from regular employment to unemployment. The results are presented in table A.5 of the appendix, figure 8 displays the results graphically. The scale is chosen, so that the graph can easily be compared with the graph referring to the transition rate to STW (figure 4). The estimated hazard function is similar to the one obtained from the Kaplan-Meier estimator.

When looking at groups of employees, differences in the respective hazard rates show a negative relation between the level of individual human capital and the risk of unemployment. Figure 9 plots the transition rates to unemployment for three different levels of seniority. Not surprisingly, little firm-specific work experience strongly increases the risk of unemployment.

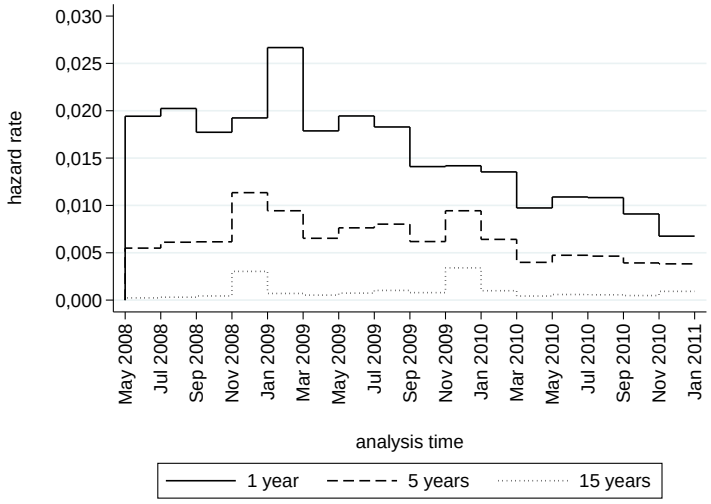
Figure 8: Transition Rate to Unemployment



Source: Own calculations.

This finding is underpinned by the results on the variables measuring formal human capital. Throughout the entire analysis period, the risk of unemployment is highest for low qualified workers. With respect to occupation the picture is even more pronounced. Compared to employees with a skilled or high skilled occupation, a low skilled occupation considerably increases the risk of being laid-off. Referring to gender, age and nationality no discriminatory behavior of employers is observed.

Figure 9: Transition Rate to Unemployment by Seniority



Source: Own calculations.

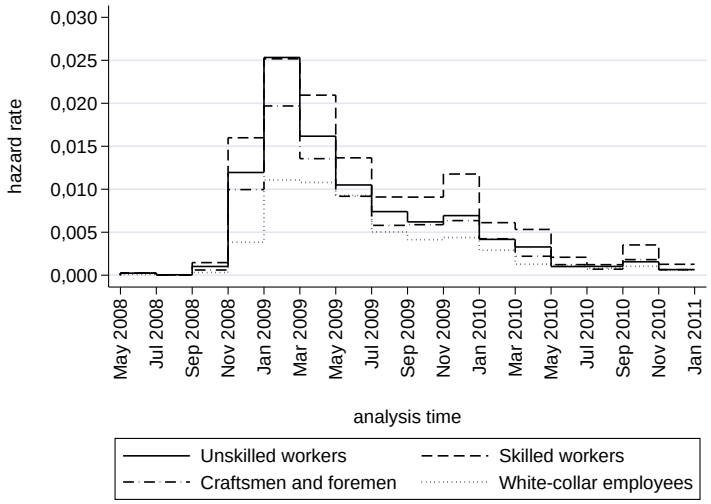
In summary, our results indicate that individuals with a low level of human capital are selected to be laid-off. This is not surprising and in line with standard human capital theory (Becker 1962; Nickell 1979). In contrast, individual transitions to STW are not coined by selective behavior of employers. As possible reasons we name employers expectations and fairness considerations.

8.3 Robustness Checks

We conduct two robustness checks. First, we control for workers occupational status instead of the skill level of occupation. Second, we exclude employees of non-STW establishments from the analysis.

In our empirical model, we use three measures of human capital: seniority, the level of education and the skill level of occupation. We were not able to include occupational status due to the strong correlation with the skill level of occupation. In order to check the robustness of our results, we re-estimate the model, where the skill level of occupation is replaced by the occupational status as a measure of formal human capital. Figure 10 shows that our previous findings are sustained. White-collar employees are exposed to the lowest risk of

Figure 10: Transition Rate to Short-Time Work by Occupational Status



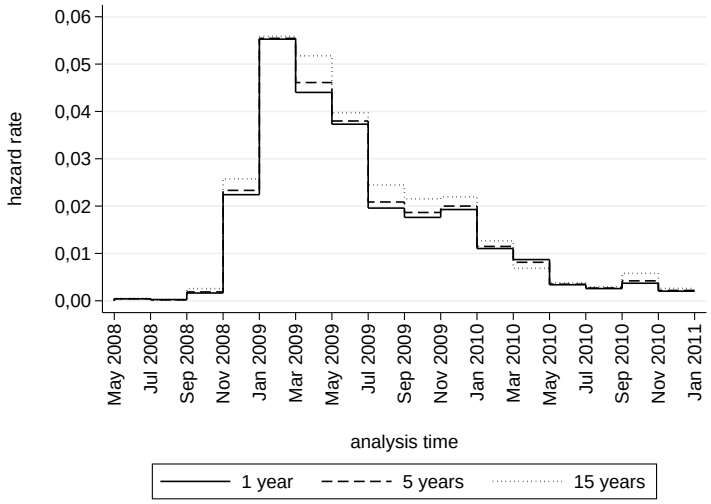
Source: Own calculations.

working-short time. While there are still differences in the hazard rates during March and April 2009, the rates approach after May 2009 rendering the risk of working short-time alike across the different groups. Therefore, we cannot speak of selective behavior during the STW plateau and contraction period.

As explained in section 6, our risk pool consists of employees of STW establishments as well as workers of non-STW establishments, which may have opted for the implementation of a STW scheme. The inclusion of the latter might, however, distort our results. This would be the case if the structure of employees of non-STW establishments differs from the one of STW establishments, so that the composition of the individuals included in the risk pool diverges once employees of non-STW establishments are considered. In order to rule out this possibility, we perform our analysis only taking into account workers of STW-establishments. The results are presented in table A.6 of the appendix. By definition, the estimated transition rates are higher than the rates obtained in section 8.2, since the risk pool is now smaller. As the same absolute number of transitions occurs in each period, the shape of the **overall** hazard function does not differ to the one displayed in figure 4. With respect to the individual characteristics included in the regression, very similarly

shaped hazard functions are obtained. To exemplify this, figure 11 plots the functions for different levels of seniority. We conclude that our results are not distorted by the inclusion of employees of non-STW establishments into the risk pool.

Figure 11: Transition Rate to Short-Time Work by Seniority



Risk pool restricted to employees of STW establishments Source: Own calculations.

9 Conclusion

In this paper we analyze the individual risk of short-time work (STW) between May 2008 and December 2010. As a competing risk, unemployment is taken into account. We ask whether these risks are determined by employees' characteristics, where special focus is given to the individual level of human capital.

Our results indicate that employers do not select short-time workers according to their level of human capital. There is almost no influence of seniority, our measure of firm-specific human capital, on the risk of working short-time. The level of education as well as the skill level of occupation are used to reflect formal human capital. An increased risk of STW for employees with a low degree of formal human capital can only be observed during the STW expansion period. During the plateau- and contraction period, differences in the respective transition rates are rather small. We conduct several robustness checks, which sustain these findings.

Non-selective behavior of employers may be explained by the expectation of a near end of the recession (Burda/Hunt 2011). In this case, employers may have been willing to apply STW to all groups of employees. As a further reason we name fairness considerations. Among employees the selection of certain individuals into STW may be perceived as unfair, which is likely to lead to counterproductive behavior (Cohen-Charash/Spector 2001; Colquitt et al. 2001). The overall risk of unemployment is rather small compared to the risk of STW. In line with standard literature, a low level of human capital is associated with an augmented risk of unemployment.

Our results suggest that STW is used as intended, namely as a work-sharing scheme. We find that a broad range of employees is affected by STW. Therefore, the loss of work is distributed on many shoulders. Fears that STW mainly affects unproductive workers, whose jobs may be cut after the termination of the program, are not confirmed. Neither can we confirm that STW is mostly applied to highly productive workers, whose jobs are likely to be preserved anyway. These results are not in line with earlier national and international studies, who mostly find one group of employees to be mainly selected for STW. However, these studies cannot easily be compared with our results since they do not refer to the time of the 2008-09 crisis.

Strictly speaking, the validity of the results presented in this paper is limited to the district of the employment agency of Nuremberg. However, the development of STW in Nuremberg as well as the structure of the STW establishments are similar to the whole of Germany. This leads us to believe, that the findings are not caused by properties particular to the Nuremberg area.

A Appendix

Table A.1: Distribution of Firm Size across STW Establishments

	Germany	Nuremberg
1 - 9 employees	58.25	46.36
10 - 49 employees	28.62	33.44
50 - 249 employees	10.73	15.58
More than 250 employees	2.39	4.62
Observations	136,656	1,797

numbers are given as percentage shares, deviations from 100 percent due to rounding

Table A.2: Distribution of Branches of Economic Activity across STW Establishments

	Germany	Nuremberg
Agriculture, forestry and fishing	0.63	0.33
Mining and quarrying	0.21	0.11
Manufacturing	35.45	40.01
Electricity, gas, steam and air conditioning supply	0.09	0.11
Water supply; sewerage, waste management and remediation	0.63	0.33
Construction	20.07	9.07
Wholesale and retail trade; repair of motor vehicles	14.83	17.31
Transportation and storage	5.06	4.01
Accommodation and food service activities	1.35	1.28
Information and communication	3.15	5.68
Financial and insurance activities	0.40	0.33
Real estate activities	0.48	0.28
Professional, scientific and technical activities	8.73	10.24
Administrative and support service activities	6.23	7.85
Public administration and defence; compulsory social security	0.05	0.11
Education	0.47	0.39
Human health and social work activities	0.56	0.83
Arts, entertainment and recreation	0.28	0.39
Other service activities	1.17	1.28
Households as employers; goods- and services production of households for own use	0.02	0.06
Activities of extraterritorial organisations and bodies	0.00	0.00
No information	0.16	0.00
Observations	136,656	1,797

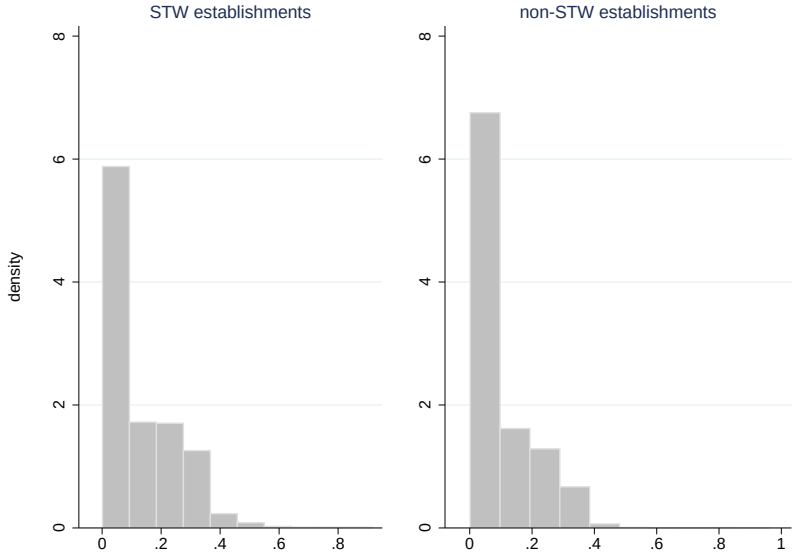
numbers are given as percentage shares, deviations from 100 percent due to rounding

Table A.3: Summary Statistics

Variable	Mean	Std. Dev.
Seniority	9.175	8.682
Low qualified	0.153	0.36
Qualified	0.686	0.464
High qualified	0.145	0.353
Low skilled occupation	0.416	0.493
Skilled occupation	0.39	0.488
High skilled occupation	0.195	0.396
Female	0.366	0.482
Age	39.885	11.45
Non-German	0.119	0.324
Manufacturing	0.423	0.494
Construction	0.028	0.165
Wholesale, retail; repair of motor vehicles and goods	0.087	0.283
Transport, storage, communication	0.05	0.217
Real estate, renting and business activities	0.253	0.435
Other service activities	0.013	0.115
Year of foundation	1986	12.069
Very small firm	0.064	0.244
Small firm	0.155	0.362
Medium sized firm	0.282	0.45
Large firm	0.499	0.5

402,955 observations ; 288,371 persons

Figure A.1: Distribution of Propensity Scores



Source: Own calculations.

Table A.4: Piecewise Constant Regression with Period Specific Effects

Transition rate from regular employment to short-time work		
t1: May, Jun 08	99.0843***	(7.88)
t2: Jul, Aug 08	-199.2109***	(-12.34)
t3: Sep, Oct 08	45.8492***	(7.62)
t4: Nov, Dec 08	28.3251***	(10.25)
t5: Jan, Feb 09	-18.1833***	(-10.57)
t6: Mar, Apr 09	-28.9041***	(-14.71)
t7: May, Jun 09	-35.8348***	(-12.88)
t8: Jul, Aug 09	-40.1931***	(-13.15)
t9: Sep, Oct 09	-76.8381***	(-27.62)
t10: Nov, Dec 09	-54.5189***	(-14.77)
t11: Jan, Feb 10	-33.8713***	(-9.07)
t12: Mar, Apr 10	-18.8711***	(-4.36)
t13: May, Jun 10	0.1328	(0.02)
t14: Jul, Aug 10	-5.9034	(-0.79)
t15: Sep, Oct 10	-20.6788**	(-3.00)
t16: Nov, Dec 10	-28.5072*	(-2.47)
Seniority t1	0.0130*	(2.33)
Seniority t2	-0.0521**	(-3.07)
Seniority t3	0.0368***	(12.78)
Seniority t4	0.0137***	(8.16)
Seniority t5	0.0056***	(4.52)
Seniority t6	0.0146***	(10.04)
Seniority t7	0.0059**	(2.83)
Seniority t8	0.0185***	(8.40)
Seniority t9	0.0184***	(8.93)
Seniority t10	0.0094***	(3.43)
Seniority t11	0.0097***	(3.76)
Seniority t12	-0.0147***	(-4.58)
Seniority t13	0.0077	(1.74)
Seniority t14	0.0080	(1.71)
Seniority t15	0.0344***	(8.36)
Seniority t16	0.0172*	(2.17)
Low qualified t1	0.4196**	(3.08)
Low qualified t2	0.2719	(1.83)
Low qualified t3	0.0597	(0.86)
Low qualified t4	0.2343***	(6.78)
Low qualified t5	0.1286***	(5.16)
Low qualified t6	-0.1621***	(-4.67)
Low qualified t7	-0.0546	(-1.10)
Low qualified t8	-0.0708	(-1.35)

Table A.4: (continued)

Low qualified t9	-0.0477	(-1.05)
Low qualified t10	0.0028	(0.05)
Low qualified t11	0.1257*	(2.10)
Low qualified t12	0.2510***	(3.92)
Low qualified t13	0.0412	(0.34)
Low qualified t14	0.2012	(1.66)
Low qualified t15	0.0888	(0.84)
Low qualified t16	0.2097	(0.97)
High qualified t1	-0.2889	(-0.97)
High qualified t2	-1.6967***	(-4.84)
High qualified t3	-1.2076***	(-6.96)
High qualified t4	-0.7786***	(-12.26)
High qualified t5	-0.5675***	(-14.79)
High qualified t6	-0.2737***	(-7.68)
High qualified t7	-0.1586**	(-3.13)
High qualified t8	-0.2051***	(-3.60)
High qualified t9	-0.4201***	(-7.56)
High qualified t10	-0.6630***	(-9.20)
High qualified t11	-0.4320***	(-6.23)
High qualified t12	-0.5597***	(-6.13)
High qualified t13	0.3403**	(3.20)
High qualified t14	-0.1309	(-1.03)
High qualified t15	-0.3969**	(-2.81)
High qualified t16	0.1323	(0.68)
Low skilled occupation t1	0.2514*	(2.32)
Low skilled occupation t2	0.2294	(1.74)
Low skilled occupation t3	0.2675***	(4.59)
Low skilled occupation t4	0.5239***	(17.39)
Low skilled occupation t5	0.4675***	(22.85)
Low skilled occupation t6	0.1175***	(5.02)
Low skilled occupation t7	-0.1010**	(-3.01)
Low skilled occupation t8	0.0301	(0.81)
Low skilled occupation t9	0.1182***	(3.56)
Low skilled occupation t10	0.0907*	(2.14)
Low skilled occupation t11	-0.2833***	(-6.49)
Low skilled occupation t12	0.1281*	(2.55)
Low skilled occupation t13	-0.5056***	(-6.10)
Low skilled occupation t14	-0.2414**	(-2.74)
Low skilled occupation t15	-0.0724	(-0.89)
Low skilled occupation t16	-0.2963	(-1.84)
High skilled occupation t1	-0.3487	(-1.52)
High skilled occupation t2	0.1617	(0.82)

Table A.4: (continued)

High skilled occupation t3	-0.6424***	(-5.83)
High skilled occupation t4	-0.4889***	(-9.23)
High skilled occupation t5	-0.0550	(-1.78)
High skilled occupation t6	-0.1116***	(-3.56)
High skilled occupation t7	-0.1920***	(-4.21)
High skilled occupation t8	-0.1631**	(-3.19)
High skilled occupation t9	-0.2012***	(-4.20)
High skilled occupation t10	-0.2656***	(-4.41)
High skilled occupation t11	-0.3159***	(-5.40)
High skilled occupation t12	-0.6024***	(-7.33)
High skilled occupation t13	-0.7706***	(-6.95)
High skilled occupation t14	-0.1199	(-1.03)
High skilled occupation t15	-0.4754***	(-4.07)
High skilled occupation t16	0.1599	(0.92)
Female t1	0.3974***	(3.78)
Female t2	0.4479***	(3.59)
Female t3	-0.3033***	(-5.23)
Female t4	-0.5448***	(-17.55)
Female t5	-0.1818***	(-9.08)
Female t6	-0.2620***	(-11.17)
Female t7	-0.1386***	(-4.23)
Female t8	-0.3359***	(-8.83)
Female t9	-0.3327***	(-9.54)
Female t10	-0.4998***	(-11.33)
Female t11	-0.3895***	(-8.65)
Female t12	-0.6792***	(-12.30)
Female t13	-0.4259***	(-5.43)
Female t14	-0.3216***	(-3.65)
Female t15	-0.3467***	(-4.49)
Female t16	-0.6495***	(-3.79)
Age t1	0.0169**	(3.17)
Age t2	0.0171***	(3.31)
Age t3	-0.0194***	(-7.02)
Age t4	-0.0053***	(-3.82)
Age t5	-0.0039***	(-4.16)
Age t6	-0.0103***	(-9.57)
Age t7	-0.0012	(-0.82)
Age t8	-0.0080***	(-4.69)
Age t9	-0.0037*	(-2.43)
Age t10	-0.0008	(-0.40)
Age t11	0.0069***	(3.43)
Age t12	0.0106***	(4.70)

Table A.4: (continued)

Age t13	0.0101**	(2.91)
Age t14	0.0133***	(3.51)
Age t15	0.0109**	(2.78)
Age t16	0.0140*	(2.05)
Non-German t1	0.1260	(0.69)
Non-German t2	0.0460	(0.29)
Non-German t3	0.6625***	(9.90)
Non-German t4	0.3540***	(9.85)
Non-German t5	0.2960***	(11.33)
Non-German t6	-0.0717	(-1.90)
Non-German t7	0.1215*	(2.42)
Non-German t8	0.1331*	(2.48)
Non-German t9	-0.2564***	(-4.76)
Non-German t10	-0.0357	(-0.57)
Non-German t11	0.0888	(1.35)
Non-German t12	0.1686*	(2.42)
Non-German t13	-0.2251	(-1.63)
Non-German t14	-0.0898	(-0.64)
Non-German t15	-0.1071	(-0.84)
Non-German t16	0.0752	(0.31)
Manufacturing t1	1.8763***	(4.25)
Manufacturing t2	2.8886***	(6.20)
Manufacturing t3	5.3626***	(7.56)
Manufacturing t4	2.5788***	(24.73)
Manufacturing t5	3.3219***	(35.65)
Manufacturing t6	4.1375***	(27.77)
Manufacturing t7	2.3203***	(23.80)
Manufacturing t8	3.6228***	(19.03)
Manufacturing t9	3.8762***	(21.11)
Manufacturing t10	2.0974***	(16.12)
Manufacturing t11	4.0827***	(12.05)
Manufacturing t12	4.6518***	(9.26)
Manufacturing t13	1.5707***	(6.56)
Manufacturing t14	2.8228***	(6.06)
Manufacturing t15	0.2845	(1.86)
Manufacturing t16	1.5012***	(3.45)
Construction t1	1.7254***	(3.62)
Construction t2	1.9920**	(2.89)
Construction t3	3.8717***	(5.07)
Construction t4	2.0035***	(12.98)
Construction t5	1.9936***	(15.49)
Construction t6	1.9869***	(10.03)

Table A.4: (continued)

Construction t7	0.5587**	(3.28)
Construction t8	1.9644***	(8.06)
Construction t9	2.4864***	(11.23)
Construction t10	1.1558***	(6.33)
Construction t11	3.6687***	(10.35)
Construction t12	3.4860***	(6.57)
Construction t13	0.1442	(0.44)
Construction t14	1.8359***	(3.38)
Construction t15	-0.9547***	(-3.52)
Construction t16	1.4988**	(2.70)
Wholesale, retail; repair of motor vehicles and goods t1	0.8196	(1.74)
Wholesale, retail; repair of motor vehicles and goods t2	0.1649	(0.22)
Wholesale, retail; repair of motor vehicles and goods t3	3.7851***	(5.21)
Wholesale, retail; repair of motor vehicles and goods t4	1.4628***	(11.76)
Wholesale, retail; repair of motor vehicles and goods t5	2.1278***	(20.87)
Wholesale, retail; repair of motor vehicles and goods t6	3.4633***	(22.49)
Wholesale, retail; repair of motor vehicles and goods t7	1.4409***	(12.81)
Wholesale, retail; repair of motor vehicles and goods t8	3.0126***	(15.07)
Wholesale, retail; repair of motor vehicles and goods t9	2.5451***	(12.85)
Wholesale, retail; repair of motor vehicles and goods t10	1.3662***	(9.15)
Wholesale, retail; repair of motor vehicles and goods t11	3.1851***	(9.17)
Wholesale, retail; repair of motor vehicles and goods t12	3.8759***	(7.59)
Wholesale, retail; repair of motor vehicles and goods t13	0.1817	(0.65)
Wholesale, retail; repair of motor vehicles and goods t14	3.0366***	(6.36)
Wholesale, retail; repair of motor vehicles and goods t15	-0.7602***	(-3.78)
Wholesale, retail; repair of motor vehicles and goods t16	1.7161***	(3.55)

Table A.4: (continued)

Transport, storage, communication t1	-0.1014	(-0.15)
Transport, storage, communication t2	-14.3912***	(-30.19)
Transport, storage, communication t3	4.0107***	(5.53)
Transport, storage, communication t4	1.1032***	(8.23)
Transport, storage, communication t5	1.9833***	(18.79)
Transport, storage, communication t6	2.7844***	(17.25)
Transport, storage, communication t7	1.7492***	(15.59)
Transport, storage, communication t8	2.1055***	(9.69)
Transport, storage, communication t9	2.0494***	(9.74)
Transport, storage, communication t10	1.1150***	(6.94)
Transport, storage, communication t11	3.3474***	(9.52)
Transport, storage, communication t12	2.3697***	(4.37)
Transport, storage, communication t13	-0.3990	(-1.01)
Transport, storage, communication t14	1.7357**	(3.23)
Transport, storage, communication t15	-2.2187***	(-5.17)
Transport, storage, communication t16	1.6104**	(3.18)
Real estate, renting and business activities t1	-0.5655	(-0.97)
Real estate, renting and business activities t2	0.6074	(1.13)
Real estate, renting and business activities t3	2.9465***	(4.06)
Real estate, renting and business activities t4	1.5144***	(13.39)
Real estate, renting and business activities t5	1.6373***	(16.49)
Real estate, renting and business activities t6	2.9112***	(19.16)
Real estate, renting and business activities t7	1.2565***	(12.05)
Real estate, renting and business activities t8	2.6385***	(13.54)
Real estate, renting and business activities t9	2.5883***	(13.75)
Real estate, renting and business activities t10	1.7241***	(12.86)
Real estate, renting and business activities t11	3.5458***	(10.39)
Real estate, renting and business activities t12	4.0433***	(8.01)
Real estate, renting and business activities t13	1.3167***	(5.44)

Table A.4: (continued)

Real estate, renting and business activities t14	2.7956***	(5.96)
Real estate, renting and business activities t15	-0.4987**	(-3.00)
Real estate, renting and business activities t16	0.7876	(1.73)
Other service activities t1	0.8805	(1.22)
Other service activities t2	-14.4758***	(-30.67)
Other service activities t3	-13.7025***	(-19.28)
Other service activities t4	-1.2800*	(-2.18)
Other service activities t5	0.0239	(0.08)
Other service activities t6	0.5659	(1.30)
Other service activities t7	0.3995	(1.45)
Other service activities t8	-0.0849	(-0.12)
Other service activities t9	-16.5369***	(-89.21)
Other service activities t10	1.1988***	(4.84)
Other service activities t11	1.2970	(1.94)
Other service activities t12	1.9963**	(2.61)
Other service activities t13	-1.0113	(-0.98)
Other service activities t14	3.7659***	(7.23)
Other service activities t15	-2.2545*	(-2.23)
Other service activities t16	3.8445***	(7.61)
Year of foundation t1	-0.0542***	(-8.58)
Year of foundation t2	0.0950***	(11.77)
Year of foundation t3	-0.0282***	(-9.24)
Year of foundation t4	-0.0177***	(-12.65)
Year of foundation t5	0.0061***	(6.97)
Year of foundation t6	0.0112***	(11.26)
Year of foundation t7	0.0152***	(10.83)
Year of foundation t8	0.0166***	(10.81)
Year of foundation t9	0.0350***	(25.04)
Year of foundation t10	0.0243***	(13.09)
Year of foundation t11	0.0129***	(6.83)
Year of foundation t12	0.0050*	(2.29)
Year of foundation t13	-0.0034	(-1.05)
Year of foundation t14	-0.0015	(-0.41)
Year of foundation t15	0.0074*	(2.13)
Year of foundation t16	0.0103	(1.78)
Very small firm t1	0.5799***	(4.50)
Very small firm t2	-0.7489*	(-2.12)
Very small firm t3	-0.4175*	(-2.34)
Very small firm t4	-0.2965**	(-2.85)

Table A.4: (continued)

Very small firm t5	-0.3548***	(-6.40)
Very small firm t6	-0.1675**	(-3.16)
Very small firm t7	-0.1002	(-1.51)
Very small firm t8	-0.1130	(-1.46)
Very small firm t9	-0.2728***	(-3.52)
Very small firm t10	0.2171**	(2.63)
Very small firm t11	0.2675***	(3.48)
Very small firm t12	-0.4737***	(-4.10)
Very small firm t13	0.0316	(0.24)
Very small firm t14	0.2452	(1.71)
Very small firm t15	0.3499**	(2.70)
Very small firm t16	0.3836	(1.84)
Medium sized firm t1	-1.5583***	(-11.36)
Medium sized firm t2	-2.5787***	(-5.95)
Medium sized firm t3	-0.2952***	(-3.39)
Medium sized firm t4	0.4941***	(9.40)
Medium sized firm t5	0.1178***	(4.18)
Medium sized firm t6	0.2094***	(6.83)
Medium sized firm t7	0.0124	(0.30)
Medium sized firm t8	0.0740	(1.57)
Medium sized firm t9	-0.0310	(-0.67)
Medium sized firm t10	0.3764***	(6.75)
Medium sized firm t11	0.2707***	(5.23)
Medium sized firm t12	-0.3579***	(-5.58)
Medium sized firm t13	-0.0395	(-0.49)
Medium sized firm t14	0.2371*	(2.45)
Medium sized firm t15	-0.0655	(-0.69)
Medium sized firm t16	-0.3508*	(-2.00)
Large firm t1	-2.9982***	(-14.77)
Large firm t2	0.7206***	(4.09)
Large firm t3	0.1610*	(2.19)
Large firm t4	0.6576***	(13.21)
Large firm t5	0.0465	(1.74)
Large firm t6	-0.0787**	(-2.59)
Large firm t7	-0.4246***	(-9.92)
Large firm t8	-0.2419***	(-5.11)
Large firm t9	0.0768	(1.76)
Large firm t10	-0.1624**	(-2.72)
Large firm t11	-0.6561***	(-11.27)
Large firm t12	-0.5036***	(-7.99)
Large firm t13	-1.9914***	(-17.01)
Large firm t14	-1.2957***	(-9.98)

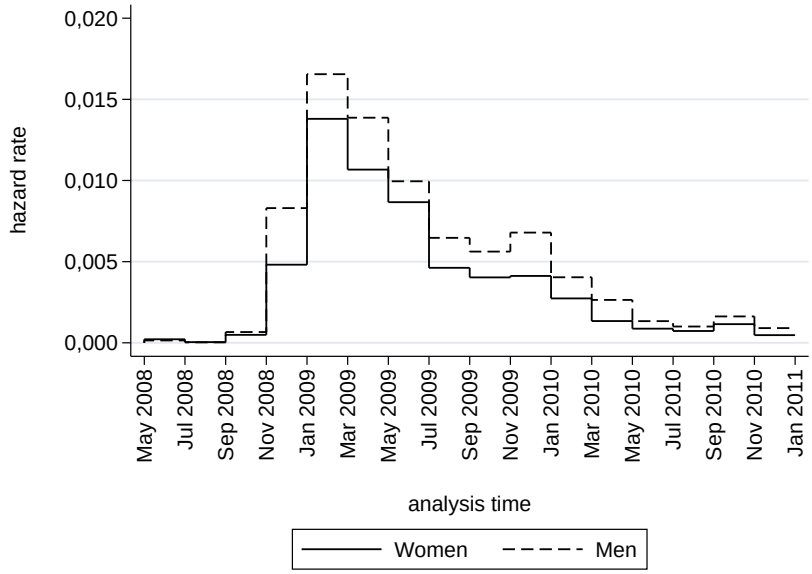
Table A.4: (continued)

Large firm t15	-1.3454***	(-10.86)
Large firm t16	-1.2047***	(-5.90)
Observations	3,060,529	
Number of subjects	288,365	
Number of events	52,936	
Wald Chi^2	3,446,424.14	
Prob > Chi^2	0.0000	

z statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure A.2: Transition Rates to Short-Time Work by Gender



Source: Own calculations.

Table A.5: Piecewise Constant Regression with Period Specific Effects

Transition rate from regular employment to unemployment		
t1: May, Jun 08	11.1810***	(3.40)
t2: Jul, Aug 08	8.4457*	(2.58)
t3: Sep, Oct 08	3.0523	(1.03)
t4: Nov, Dec 08	-3.6875	(-1.45)
t5: Jan, Feb 09	-4.2999	(-1.55)
t6: Mar, Apr 09	0.5874	(0.18)
t7: May, Jun 09	5.4010	(1.67)
t8: Jul, Aug 09	-8.3758*	(-2.57)
t9: Sep, Oct 09	3.2566	(0.99)
t10: Nov, Dec 09	11.4703***	(4.03)
t11: Jan, Feb 10	2.3763	(0.69)
t12: Mar, Apr 10	-5.9584	(-1.52)
t13: May, Jun 10	-18.6524***	(-5.12)
t14: Jul, Aug 10	-10.8988**	(-3.04)
t15: Sep, Oct 10	-1.4060	(-0.38)
t16: Nov, Dec 10	28.8071***	(6.40)
Seniority t1	-0.3158***	(-24.29)
Seniority t2	-0.2993***	(-23.98)
Seniority t3	-0.2644***	(-24.95)
Seniority t4	-0.1320***	(-25.03)
Seniority t5	-0.2598***	(-27.83)
Seniority t6	-0.2518***	(-22.31)
Seniority t7	-0.2338***	(-21.85)
Seniority t8	-0.2060***	(-21.74)
Seniority t9	-0.2061***	(-21.18)
Seniority t10	-0.1019***	(-20.34)
Seniority t11	-0.1868***	(-19.38)
Seniority t12	-0.2231***	(-18.18)
Seniority t13	-0.2082***	(-19.29)
Seniority t14	-0.2116***	(-19.71)
Seniority t15	-0.2101***	(-20.07)
Seniority t16	-0.1420***	(-16.36)
Low qualified t1	0.2307***	(4.71)
Low qualified t2	0.3629***	(7.38)
Low qualified t3	0.3491***	(7.99)
Low qualified t4	0.2327***	(5.87)
Low qualified t5	0.1726***	(3.84)
Low qualified t6	0.1285*	(2.33)
Low qualified t7	0.3764***	(7.40)
Low qualified t8	0.3173***	(6.05)

Table A.5: (continued)

Low qualified t9	0.2976***	(5.75)
Low qualified t10	0.4344***	(9.55)
Low qualified t11	0.3042***	(5.42)
Low qualified t12	0.1297*	(2.09)
Low qualified t13	0.3385***	(6.29)
Low qualified t14	0.3696***	(7.26)
Low qualified t15	0.4158***	(7.85)
Low qualified t16	0.5330***	(7.83)
High qualified t1	-0.6020***	(-7.47)
High qualified t2	-0.6160***	(-8.21)
High qualified t3	-0.8059***	(-9.70)
High qualified t4	-0.7069***	(-11.88)
High qualified t5	-0.6898***	(-11.23)
High qualified t6	-0.7020***	(-9.74)
High qualified t7	-0.4648***	(-6.81)
High qualified t8	-0.5763***	(-8.47)
High qualified t9	-0.7363***	(-9.46)
High qualified t10	-0.5481***	(-8.31)
High qualified t11	-0.5292***	(-7.15)
High qualified t12	-0.7122***	(-7.89)
High qualified t13	-0.5751***	(-6.95)
High qualified t14	-0.5636***	(-6.79)
High qualified t15	-0.5796***	(-6.37)
High qualified t16	-1.5071***	(-7.58)
Low skilled occupation t1	0.7780***	(17.12)
Low skilled occupation t2	0.6264***	(13.89)
Low skilled occupation t3	0.9340***	(22.41)
Low skilled occupation t4	0.7109***	(20.91)
Low skilled occupation t5	0.5558***	(14.78)
Low skilled occupation t6	0.5780***	(12.75)
Low skilled occupation t7	0.6485***	(14.42)
Low skilled occupation t8	0.4663***	(10.44)
Low skilled occupation t9	0.7092***	(15.51)
Low skilled occupation t10	0.7826***	(19.85)
Low skilled occupation t11	0.7233***	(14.79)
Low skilled occupation t12	0.8073***	(14.13)
Low skilled occupation t13	0.7605***	(14.90)
Low skilled occupation t14	0.7337***	(14.63)
Low skilled occupation t15	0.9066***	(17.03)
Low skilled occupation t16	1.0937***	(16.11)
High skilled occupation t1	-0.4833***	(-5.91)
High skilled occupation t2	-0.3082***	(-4.25)

Table A.5: (continued)

High skilled occupation t3	-0.5168***	(-6.45)
High skilled occupation t4	-0.5927***	(-9.99)
High skilled occupation t5	-0.4534***	(-7.60)
High skilled occupation t6	-0.3366***	(-4.90)
High skilled occupation t7	-0.3160***	(-4.58)
High skilled occupation t8	-0.1284*	(-2.06)
High skilled occupation t9	-0.4213***	(-5.73)
High skilled occupation t10	-0.4872***	(-7.70)
High skilled occupation t11	-0.2978***	(-4.09)
High skilled occupation t12	-0.0295	(-0.36)
High skilled occupation t13	-0.2420**	(-3.05)
High skilled occupation t14	-0.0915	(-1.15)
High skilled occupation t15	-0.1721*	(-2.02)
High skilled occupation t16	-0.9151***	(-5.78)
Female t1	0.0027	(0.07)
Female t2	-0.0734	(-1.80)
Female t3	-0.0553	(-1.51)
Female t4	-0.1716***	(-5.39)
Female t5	-0.2601***	(-7.30)
Female t6	-0.1894***	(-4.45)
Female t7	-0.2199***	(-5.28)
Female t8	-0.1199**	(-2.88)
Female t9	-0.2670***	(-6.15)
Female t10	-0.2485***	(-6.56)
Female t11	-0.1157**	(-2.60)
Female t12	-0.0631	(-1.24)
Female t13	0.0594	(1.32)
Female t14	0.0378	(0.86)
Female t15	-0.0095	(-0.21)
Female t16	-0.1456*	(-2.43)
Age t1	0.0040*	(2.31)
Age t2	0.0040*	(2.29)
Age t3	0.0059***	(3.75)
Age t4	0.0080***	(5.58)
Age t5	0.0093***	(6.09)
Age t6	0.0106***	(5.84)
Age t7	0.0051**	(2.79)
Age t8	0.0038*	(2.08)
Age t9	0.0087***	(4.68)
Age t10	0.0099***	(5.99)
Age t11	0.0081***	(4.01)
Age t12	0.0066**	(2.96)

Table A.5: (continued)

Age t13	0.0044*	(2.16)
Age t14	-0.0002	(-0.10)
Age t15	0.0067**	(3.27)
Age t16	0.0202***	(7.61)
Non-German t1	0.0721	(1.37)
Non-German t2	0.1318*	(2.53)
Non-German t3	0.1427**	(2.97)
Non-German t4	0.2881***	(7.06)
Non-German t5	0.2928***	(6.37)
Non-German t6	0.2244***	(3.97)
Non-German t7	0.0325	(0.57)
Non-German t8	0.0854	(1.49)
Non-German t9	0.2089***	(3.78)
Non-German t10	0.1081*	(2.12)
Non-German t11	0.0959	(1.55)
Non-German t12	0.2386***	(3.61)
Non-German t13	0.0669	(1.10)
Non-German t14	0.2137***	(3.79)
Non-German t15	0.1074	(1.81)
Non-German t16	0.1627*	(2.13)
Manufacturing t1	0.1947	(1.89)
Manufacturing t2	0.2618**	(2.68)
Manufacturing t3	0.3844***	(3.92)
Manufacturing t4	0.4254***	(5.40)
Manufacturing t5	0.9459***	(9.70)
Manufacturing t6	0.9204***	(7.75)
Manufacturing t7	0.4954***	(5.38)
Manufacturing t8	0.6298***	(6.82)
Manufacturing t9	0.4367***	(4.16)
Manufacturing t10	-0.0290	(-0.38)
Manufacturing t11	0.2160*	(2.20)
Manufacturing t12	0.1542	(1.31)
Manufacturing t13	0.0988	(0.98)
Manufacturing t14	0.1402	(1.42)
Manufacturing t15	-0.0216	(-0.20)
Manufacturing t16	-0.2189	(-1.67)
Construction t1	0.6786***	(4.72)
Construction t2	0.7335***	(5.34)
Construction t3	1.0692***	(8.63)
Construction t4	1.9555***	(20.82)
Construction t5	1.3667***	(10.52)
Construction t6	0.9382***	(5.70)

Table A.5: (continued)

Construction t7	0.7521***	(5.50)
Construction t8	0.6653***	(4.55)
Construction t9	1.1865***	(9.35)
Construction t10	1.3972***	(15.32)
Construction t11	0.5286***	(3.53)
Construction t12	0.7116***	(4.35)
Construction t13	0.6440***	(4.33)
Construction t14	0.5944***	(3.86)
Construction t15	0.8673***	(6.28)
Construction t16	1.2291***	(7.98)
Wholesale, retail; repair of motor vehicles and goods t1	0.2777*	(2.35)
Wholesale, retail; repair of motor vehicles and goods t2	0.3401**	(3.02)
Wholesale, retail; repair of motor vehicles and goods t3	0.1609	(1.41)
Wholesale, retail; repair of motor vehicles and goods t4	0.2341*	(2.44)
Wholesale, retail; repair of motor vehicles and goods t5	0.7252***	(6.47)
Wholesale, retail; repair of motor vehicles and goods t6	0.7725***	(5.75)
Wholesale, retail; repair of motor vehicles and goods t7	0.4887***	(4.49)
Wholesale, retail; repair of motor vehicles and goods t8	0.6622***	(6.03)
Wholesale, retail; repair of motor vehicles and goods t9	0.2847*	(2.32)
Wholesale, retail; repair of motor vehicles and goods t10	-0.4271***	(-4.33)
Wholesale, retail; repair of motor vehicles and goods t11	0.2895*	(2.51)
Wholesale, retail; repair of motor vehicles and goods t12	0.2892*	(2.14)
Wholesale, retail; repair of motor vehicles and goods t13	0.2438*	(2.03)
Wholesale, retail; repair of motor vehicles and goods t14	0.0757	(0.61)
Wholesale, retail; repair of motor vehicles and goods t15	-0.1687	(-1.30)
Wholesale, retail; repair of motor vehicles and goods t16	-1.3041***	(-6.79)

Table A.5: (continued)

Transport, storage, communication t1	0.0182	(0.13)
Transport, storage, communication t2	0.1744	(1.37)
Transport, storage, communication t3	-0.0541	(-0.42)
Transport, storage, communication t4	0.0681	(0.64)
Transport, storage, communication t5	0.6870***	(5.86)
Transport, storage, communication t6	0.7485***	(5.26)
Transport, storage, communication t7	0.1894	(1.53)
Transport, storage, communication t8	0.5124***	(4.25)
Transport, storage, communication t9	0.1038	(0.78)
Transport, storage, communication t10	-0.4800***	(-4.42)
Transport, storage, communication t11	0.1516	(1.21)
Transport, storage, communication t12	0.2786	(1.87)
Transport, storage, communication t13	0.0165	(0.12)
Transport, storage, communication t14	0.2852*	(2.21)
Transport, storage, communication t15	-0.1664	(-1.16)
Transport, storage, communication t16	-1.0054***	(-5.10)
Real estate, renting and business activities t1	1.0877***	(10.80)
Real estate, renting and business activities t2	0.9920***	(10.51)
Real estate, renting and business activities t3	1.0809***	(11.26)
Real estate, renting and business activities t4	1.2966***	(17.11)
Real estate, renting and business activities t5	1.5780***	(16.25)
Real estate, renting and business activities t6	1.7597***	(15.00)
Real estate, renting and business activities t7	1.1982***	(13.42)
Real estate, renting and business activities t8	1.2717***	(14.11)
Real estate, renting and business activities t9	1.3135***	(13.04)
Real estate, renting and business activities t10	0.7435***	(10.42)
Real estate, renting and business activities t11	1.0538***	(11.33)
Real estate, renting and business activities t12	1.2223***	(11.02)
Real estate, renting and business activities t13	1.0279***	(10.98)

Table A.5: (continued)

Real estate, renting and business activities t14	1.0352***	(11.07)
Real estate, renting and business activities t15	0.8830***	(8.86)
Real estate, renting and business activities t16	0.3509**	(2.98)
Other service activities t1	1.5116***	(11.87)
Other service activities t2	1.0596***	(7.55)
Other service activities t3	1.0289***	(7.39)
Other service activities t4	1.3155***	(12.13)
Other service activities t5	1.4267***	(10.81)
Other service activities t6	1.7832***	(11.74)
Other service activities t7	1.8703***	(16.73)
Other service activities t8	1.4194***	(10.13)
Other service activities t9	0.9797***	(6.09)
Other service activities t10	0.5172***	(3.95)
Other service activities t11	1.2659***	(8.89)
Other service activities t12	1.1027***	(6.16)
Other service activities t13	1.7850***	(14.27)
Other service activities t14	1.9527***	(15.55)
Other service activities t15	0.9134***	(5.14)
Other service activities t16	0.6899***	(3.55)
Year of foundation t1	-0.0077***	(-4.66)
Year of foundation t2	-0.0062***	(-3.79)
Year of foundation t3	-0.0037*	(-2.48)
Year of foundation t4	-0.0004	(-0.31)
Year of foundation t5	-0.0000	(-0.02)
Year of foundation t6	-0.0027	(-1.63)
Year of foundation t7	-0.0049**	(-3.00)
Year of foundation t8	0.0020	(1.20)
Year of foundation t9	-0.0039*	(-2.37)
Year of foundation t10	-0.0079***	(-5.53)
Year of foundation t11	-0.0035*	(-2.01)
Year of foundation t12	0.0006	(0.29)
Year of foundation t13	0.0070***	(3.82)
Year of foundation t14	0.0031	(1.75)
Year of foundation t15	-0.0017	(-0.90)
Year of foundation t16	-0.0170***	(-7.47)
Very small firm t1	0.3885***	(5.04)
Very small firm t2	0.1072	(1.40)
Very small firm t3	0.3896***	(5.84)
Very small firm t4	0.2914***	(5.40)

Table A.5: (continued)

Very small firm t5	0.1422*	(2.18)
Very small firm t6	0.1546*	(2.09)
Very small firm t7	0.1837*	(2.42)
Very small firm t8	0.1279	(1.61)
Very small firm t9	0.4948***	(7.35)
Very small firm t10	0.4954***	(8.86)
Very small firm t11	0.1908*	(2.37)
Very small firm t12	0.2949***	(3.36)
Very small firm t13	0.3309***	(4.00)
Very small firm t14	0.1283	(1.45)
Very small firm t15	0.3978***	(5.06)
Very small firm t16	0.5499***	(6.16)
Medium sized firm t1	0.0508	(0.91)
Medium sized firm t2	-0.1875***	(-3.58)
Medium sized firm t3	0.0331	(0.68)
Medium sized firm t4	-0.1289**	(-3.04)
Medium sized firm t5	-0.0775	(-1.69)
Medium sized firm t6	-0.1006	(-1.88)
Medium sized firm t7	-0.0050	(-0.09)
Medium sized firm t8	0.1169*	(2.10)
Medium sized firm t9	0.0030	(0.06)
Medium sized firm t10	-0.1661***	(-3.47)
Medium sized firm t11	-0.0320	(-0.56)
Medium sized firm t12	0.0267	(0.42)
Medium sized firm t13	0.0801	(1.28)
Medium sized firm t14	0.0019	(0.03)
Medium sized firm t15	-0.0294	(-0.49)
Medium sized firm t16	-0.3982***	(-5.20)
Large firm t1	-0.3132***	(-5.16)
Large firm t2	-0.4378***	(-7.62)
Large firm t3	-0.5125***	(-9.26)
Large firm t4	-0.2782***	(-6.00)
Large firm t5	-0.2600***	(-5.24)
Large firm t6	-0.6002***	(-9.98)
Large firm t7	-0.3716***	(-6.18)
Large firm t8	-0.2569***	(-4.24)
Large firm t9	-0.6969***	(-11.09)
Large firm t10	-0.7855***	(-14.56)
Large firm t11	-0.6282***	(-9.71)
Large firm t12	-0.7083***	(-9.71)
Large firm t13	-0.2933***	(-4.38)
Large firm t14	-0.3141***	(-4.88)

Table A.5: (continued)

Large firm t15	-0.7436***	(-10.83)
Large firm t16	-0.9373***	(-10.94)
Observations	3,060,529	
Number of subjects	288,365	
Number of events	43,437	
Wald Chi^2	534,124.16	
Prob > Chi^2	0.0000	

z statistics in parentheses

$^{*}\ p < 0.05, ^{**}\ p < 0.01, ^{***}\ p < 0.001$

Table A.6: Piecewise Constant Regression with Period Specific Effects

Transition rate from regular employment to STW (only employees of STW establishments)		
t1: May, Jun 08	107.1509***	(8.25)
t2: Jul, Aug 08	-187.0636***	(-12.14)
t3: Sep, Oct 08	52.4387***	(9.14)
t4: Nov, Dec 08	40.1892***	(14.58)
t5: Jan, Feb 09	-6.1341***	(-3.72)
t6: Mar, Apr 09	-19.7124***	(-10.45)
t7: May, Jun 09	-21.9764***	(-8.09)
t8: Jul, Aug 09	-29.1319***	(-9.62)
t9: Sep, Oct 09	-63.4290***	(-23.23)
t10: Nov, Dec 09	-38.0611***	(-10.16)
t11: Jan, Feb 10	-20.3647***	(-5.34)
t12: Mar, Apr 10	-4.3000	(-0.96)
t13: May, Jun 10	19.0850**	(2.81)
t14: Jul, Aug 10	8.8753	(1.13)
t15: Sep, Oct 10	2.0912	(0.28)
t16: Nov, Dec 10	-9.5658	(-0.77)
Seniority t1	0.0119*	(2.18)
Seniority t2	-0.0606***	(-3.81)
Seniority t3	0.0318***	(10.74)
Seniority t4	0.0099***	(5.99)
Seniority t5	0.0007	(0.61)
Seniority t6	0.0116***	(8.30)
Seniority t7	0.0045*	(2.22)
Seniority t8	0.0159***	(7.34)
Seniority t9	0.0144***	(7.05)
Seniority t10	0.0093***	(3.47)
Seniority t11	0.0098***	(3.84)
Seniority t12	-0.0171***	(-5.20)
Seniority t13	0.0081	(1.85)
Seniority t14	0.0097*	(2.05)
Seniority t15	0.0319***	(7.84)
Seniority t16	0.0179*	(2.23)
Low qualified t1	0.2568	(1.86)
Low qualified t2	0.2051	(1.35)
Low qualified t3	0.0467	(0.65)
Low qualified t4	0.2262***	(6.52)
Low qualified t5	0.0989***	(4.10)
Low qualified t6	-0.1861***	(-5.53)
Low qualified t7	-0.1339**	(-2.77)
Low qualified t8	-0.1146*	(-2.19)

Table A.6: (continued)

Low qualified t9	-0.0767	(-1.68)
Low qualified t10	-0.0683	(-1.21)
Low qualified t11	0.0504	(0.85)
Low qualified t12	0.2222***	(3.45)
Low qualified t13	-0.0215	(-0.18)
Low qualified t14	0.0948	(0.79)
Low qualified t15	0.0277	(0.26)
Low qualified t16	0.0639	(0.29)
High qualified t1	-0.2285	(-0.77)
High qualified t2	-1.4547***	(-4.21)
High qualified t3	-1.0851***	(-6.17)
High qualified t4	-0.6366***	(-9.86)
High qualified t5	-0.4996***	(-13.06)
High qualified t6	-0.2410***	(-6.83)
High qualified t7	-0.1411**	(-2.84)
High qualified t8	-0.1487**	(-2.61)
High qualified t9	-0.3412***	(-6.14)
High qualified t10	-0.6253***	(-8.71)
High qualified t11	-0.4401***	(-6.35)
High qualified t12	-0.5004***	(-5.47)
High qualified t13	0.3199**	(2.99)
High qualified t14	-0.1175	(-0.92)
High qualified t15	-0.2865*	(-2.04)
High qualified t16	0.1503	(0.78)
Low skilled occupation t1	0.3946***	(3.47)
Low skilled occupation t2	0.0891	(0.68)
Low skilled occupation t3	0.2221***	(3.74)
Low skilled occupation t4	0.4599***	(15.33)
Low skilled occupation t5	0.4541***	(22.64)
Low skilled occupation t6	0.1780***	(7.89)
Low skilled occupation t7	-0.0924**	(-2.78)
Low skilled occupation t8	0.0348	(0.94)
Low skilled occupation t9	0.0806*	(2.42)
Low skilled occupation t10	0.0518	(1.23)
Low skilled occupation t11	-0.2948***	(-6.67)
Low skilled occupation t12	0.1044*	(2.06)
Low skilled occupation t13	-0.5087***	(-6.15)
Low skilled occupation t14	-0.2009*	(-2.25)
Low skilled occupation t15	-0.1769*	(-2.21)
Low skilled occupation t16	-0.2849	(-1.72)
High skilled occupation t1	-0.1967	(-0.86)
High skilled occupation t2	0.1965	(1.01)

Table A.6: (continued)

High skilled occupation t3	-0.6817***	(-6.08)
High skilled occupation t4	-0.5506***	(-10.38)
High skilled occupation t5	-0.0973**	(-3.18)
High skilled occupation t6	-0.1601***	(-5.17)
High skilled occupation t7	-0.2386***	(-5.30)
High skilled occupation t8	-0.2138***	(-4.15)
High skilled occupation t9	-0.2551***	(-5.34)
High skilled occupation t10	-0.2798***	(-4.68)
High skilled occupation t11	-0.3442***	(-5.92)
High skilled occupation t12	-0.6659***	(-8.05)
High skilled occupation t13	-0.7136***	(-6.50)
High skilled occupation t14	-0.1768	(-1.56)
High skilled occupation t15	-0.3880***	(-3.31)
High skilled occupation t16	0.0516	(0.29)
Female t1	0.5237***	(4.96)
Female t2	0.5513***	(4.34)
Female t3	-0.1339*	(-2.29)
Female t4	-0.3771***	(-12.25)
Female t5	-0.0034	(-0.18)
Female t6	-0.0274	(-1.22)
Female t7	0.0782*	(2.43)
Female t8	-0.0833*	(-2.22)
Female t9	-0.1071**	(-3.09)
Female t10	-0.2845***	(-6.54)
Female t11	-0.2150***	(-4.84)
Female t12	-0.4759***	(-8.59)
Female t13	-0.2694***	(-3.46)
Female t14	-0.1248	(-1.44)
Female t15	-0.1687*	(-2.18)
Female t16	-0.5238**	(-3.15)
Age t1	0.0100	(1.83)
Age t2	0.0221***	(4.19)
Age t3	-0.0207***	(-7.47)
Age t4	-0.0060***	(-4.41)
Age t5	-0.0059***	(-6.58)
Age t6	-0.0135***	(-13.08)
Age t7	-0.0067***	(-4.67)
Age t8	-0.0130***	(-7.72)
Age t9	-0.0081***	(-5.39)
Age t10	-0.0058**	(-3.00)
Age t11	0.0003	(0.13)
Age t12	0.0052*	(2.30)

Table A.6: (continued)

Age t13	0.0032	(0.91)
Age t14	0.0049	(1.28)
Age t15	0.0043	(1.10)
Age t16	0.0043	(0.63)
Non-German t1	0.1178	(0.64)
Non-German t2	-0.0188	(-0.12)
Non-German t3	0.6104***	(9.00)
Non-German t4	0.2996***	(8.38)
Non-German t5	0.2854***	(11.35)
Non-German t6	-0.0421	(-1.16)
Non-German t7	0.0867	(1.76)
Non-German t8	0.1052*	(1.98)
Non-German t9	-0.3059***	(-5.69)
Non-German t10	-0.0982	(-1.58)
Non-German t11	0.0710	(1.10)
Non-German t12	0.1447*	(2.08)
Non-German t13	-0.2476	(-1.81)
Non-German t14	-0.1065	(-0.76)
Non-German t15	-0.1920	(-1.49)
Non-German t16	-0.0439	(-0.18)
Manufacturing t1	0.8077	(1.91)
Manufacturing t2	0.1780	(0.39)
Manufacturing t3	2.8837***	(4.08)
Manufacturing t4	0.2175*	(2.32)
Manufacturing t5	1.1470***	(13.67)
Manufacturing t6	1.9305***	(13.30)
Manufacturing t7	0.2660**	(3.06)
Manufacturing t8	1.4559***	(7.88)
Manufacturing t9	1.6155***	(9.02)
Manufacturing t10	0.1611	(1.36)
Manufacturing t11	2.2440***	(6.72)
Manufacturing t12	2.6073***	(5.21)
Manufacturing t13	0.1475	(0.68)
Manufacturing t14	1.1941**	(2.66)
Manufacturing t15	-1.3406***	(-11.15)
Manufacturing t16	-0.4799	(-1.24)
Construction t1	1.3773**	(3.07)
Construction t2	0.1396	(0.22)
Construction t3	2.2090**	(2.90)
Construction t4	0.5325***	(3.74)
Construction t5	0.5885***	(4.98)
Construction t6	0.4510*	(2.34)

Table A.6: (continued)

Construction t7	-0.9527***	(-5.97)
Construction t8	0.2969	(1.26)
Construction t9	0.7574***	(3.56)
Construction t10	-0.1692	(-1.01)
Construction t11	2.4163***	(6.98)
Construction t12	2.2234***	(4.23)
Construction t13	-0.6121*	(-1.99)
Construction t14	0.8240	(1.57)
Construction t15	-1.8799***	(-7.53)
Construction t16	0.1410	(0.29)
Wholesale, retail; repair of motor vehicles and goods t1	0.1987	(0.45)
Wholesale, retail; repair of motor vehicles and goods t2	-1.6855*	(-2.32)
Wholesale, retail; repair of motor vehicles and goods t3	1.9094**	(2.64)
Wholesale, retail; repair of motor vehicles and goods t4	-0.2961**	(-2.64)
Wholesale, retail; repair of motor vehicles and goods t5	0.5117***	(5.59)
Wholesale, retail; repair of motor vehicles and goods t6	1.7133***	(11.56)
Wholesale, retail; repair of motor vehicles and goods t7	-0.1041	(-1.05)
Wholesale, retail; repair of motor vehicles and goods t8	1.3416***	(6.98)
Wholesale, retail; repair of motor vehicles and goods t9	0.8409***	(4.41)
Wholesale, retail; repair of motor vehicles and goods t10	-0.0627	(-0.47)
Wholesale, retail; repair of motor vehicles and goods t11	1.7735***	(5.21)
Wholesale, retail; repair of motor vehicles and goods t12	2.3546***	(4.65)
Wholesale, retail; repair of motor vehicles and goods t13	-0.8553***	(-3.34)
Wholesale, retail; repair of motor vehicles and goods t14	1.8034***	(3.95)
Wholesale, retail; repair of motor vehicles and goods t15	-1.8390***	(-10.71)
Wholesale, retail; repair of motor vehicles and goods t16	0.1714	(0.42)

Table A.6: (continued)

Transport, storage, communication t1	-0.6782	(-1.05)
Transport, storage, communication t2	-15.1420***	(-33.42)
Transport, storage, communication t3	2.7955***	(3.85)
Transport, storage, communication t4	-0.0062	(-0.05)
Transport, storage, communication t5	0.8106***	(8.43)
Transport, storage, communication t6	1.5274***	(9.70)
Transport, storage, communication t7	0.5098***	(4.98)
Transport, storage, communication t8	0.8778***	(4.12)
Transport, storage, communication t9	0.7689***	(3.72)
Transport, storage, communication t10	0.0203	(0.13)
Transport, storage, communication t11	2.2552***	(6.51)
Transport, storage, communication t12	1.2453*	(2.30)
Transport, storage, communication t13	-1.1957**	(-3.12)
Transport, storage, communication t14	0.8038	(1.53)
Transport, storage, communication t15	-3.0121***	(-7.20)
Transport, storage, communication t16	0.3700	(0.81)
Real estate, renting and business activities t1	-1.3208*	(-2.31)
Real estate, renting and business activities t2	-1.9490***	(-3.55)
Real estate, renting and business activities t3	0.7853	(1.08)
Real estate, renting and business activities t4	-0.6030***	(-5.89)
Real estate, renting and business activities t5	-0.4460***	(-4.92)
Real estate, renting and business activities t6	0.6809***	(4.59)
Real estate, renting and business activities t7	-0.8554***	(-9.07)
Real estate, renting and business activities t8	0.4315*	(2.28)
Real estate, renting and business activities t9	0.2722	(1.48)
Real estate, renting and business activities t10	-0.2079	(-1.68)
Real estate, renting and business activities t11	1.7317***	(5.14)
Real estate, renting and business activities t12	2.0506***	(4.07)
Real estate, renting and business activities t13	-0.0577	(-0.26)

Table A.6: (continued)

Real estate, renting and business activities t14	1.2342**	(2.70)
Real estate, renting and business activities t15	-1.9975***	(-13.72)
Real estate, renting and business activities t16	-1.0923**	(-2.60)
Other service activities t1	0.7056	(1.00)
Other service activities t2	-16.1339***	(-35.34)
Other service activities t3	-13.7604***	(-19.33)
Other service activities t4	-2.6622***	(-4.55)
Other service activities t5	-1.6070***	(-5.14)
Other service activities t6	-1.1307**	(-2.62)
Other service activities t7	-1.1926***	(-4.41)
Other service activities t8	-1.6860*	(-2.32)
Other service activities t9	-17.0787***	(-93.09)
Other service activities t10	-0.1919	(-0.79)
Other service activities t11	0.1478	(0.22)
Other service activities t12	0.5495	(0.72)
Other service activities t13	-1.5311	(-1.50)
Other service activities t14	2.9646***	(5.88)
Other service activities t15	-2.9425**	(-2.93)
Other service activities t16	2.6200***	(6.25)
Year of foundation t1	-0.0572***	(-8.79)
Year of foundation t2	0.0906***	(11.76)
Year of foundation t3	-0.0298***	(-10.31)
Year of foundation t4	-0.0220***	(-15.89)
Year of foundation t5	0.0016	(1.91)
Year of foundation t6	0.0082***	(8.69)
Year of foundation t7	0.0099***	(7.26)
Year of foundation t8	0.0128***	(8.46)
Year of foundation t9	0.0300***	(21.98)
Year of foundation t10	0.0176***	(9.38)
Year of foundation t11	0.0076***	(3.99)
Year of foundation t12	-0.0007	(-0.31)
Year of foundation t13	-0.0116***	(-3.41)
Year of foundation t14	-0.0075	(-1.90)
Year of foundation t15	-0.0027	(-0.73)
Year of foundation t16	0.0024	(0.38)
Very small firm t1	0.9075***	(6.79)
Very small firm t2	-0.3291	(-0.91)
Very small firm t3	-0.1050	(-0.59)
Very small firm t4	-0.0509	(-0.49)

Table A.6: (continued)

Very small firm t5	-0.0425	(-0.79)
Very small firm t6	0.1143*	(2.23)
Very small firm t7	0.2202***	(3.38)
Very small firm t8	0.2117**	(2.76)
Very small firm t9	0.0943	(1.23)
Very small firm t10	0.5642***	(7.01)
Very small firm t11	0.6679***	(8.81)
Very small firm t12	-0.0844	(-0.74)
Very small firm t13	0.4314***	(3.35)
Very small firm t14	0.5638***	(3.98)
Very small firm t15	0.6674***	(5.14)
Very small firm t16	0.6631**	(3.13)
Medium sized firm t1	-1.7744***	(-13.02)
Medium sized firm t2	-2.7921***	(-6.44)
Medium sized firm t3	-0.4559***	(-5.19)
Medium sized firm t4	0.2979***	(5.78)
Medium sized firm t5	-0.0742**	(-2.75)
Medium sized firm t6	-0.0414	(-1.41)
Medium sized firm t7	-0.2696***	(-6.59)
Medium sized firm t8	-0.2352***	(-5.07)
Medium sized firm t9	-0.3248***	(-7.03)
Medium sized firm t10	0.0342	(0.62)
Medium sized firm t11	-0.0278	(-0.54)
Medium sized firm t12	-0.6563***	(-10.37)
Medium sized firm t13	-0.3567***	(-4.46)
Medium sized firm t14	-0.0974	(-1.00)
Medium sized firm t15	-0.3482***	(-3.71)
Medium sized firm t16	-0.5951***	(-3.37)
Large firm t1	-3.4160***	(-17.81)
Large firm t2	0.4374*	(2.44)
Large firm t3	-0.2800***	(-3.68)
Large firm t4	0.2955***	(6.05)
Large firm t5	-0.3438***	(-13.24)
Large firm t6	-0.5705***	(-19.35)
Large firm t7	-0.8228***	(-19.25)
Large firm t8	-0.8037***	(-16.88)
Large firm t9	-0.4926***	(-11.15)
Large firm t10	-0.6414***	(-10.81)
Large firm t11	-1.1553***	(-19.66)
Large firm t12	-1.0495***	(-16.57)
Large firm t13	-2.3990***	(-21.98)
Large firm t14	-1.7678***	(-13.96)

Table A.6: (continued)

Large firm t15	-1.5027***	(-13.43)
Large firm t16	-1.5259***	(-8.13)
Observations	1,105,985	
Number of subjects	115,673	
Number of events	52,936	
Wald Chi^2	1,117,718.01	
Prob > Chi^2	0.0000	

z statistics in parentheses

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

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