ISSN 1431-4118

Thünen-Series of Applied Economic Theory

Thünen-Reihe Angewandter Volkswirtschaftstheorie

Working Paper No. 64

Reemployment Rates over the Life Course: Is there still Hope after Late Career Job Loss?

by

Katharina Frosch

Universität Rostock
Wirtschafts- und Sozialwissenschaftliche Fakultät
Institut für Volkswirtschaftslehre
2006

Reemployment Rates over the Life Course: Is there still Hope after Late Career Job Loss?

Katharina Frosch*
Rostock Center for the Study of Demographic Change
and
University of Rostock

December 30, 2006

Abstract

The labor market situation for elderly job searchers is more difficult than for their younger counterparts. To identify patterns in the reemployment of the elderly, we analyze the employment histories of about 113.000 male job searchers in West-Germany. The analysis is based on a hazard rate model with piecewise constant intensities. We focus on age-specific reemployment rates. Individual characteristics, labor market indicators as well as the influence of the previous employment history on reemployment are accounted for. As expected, reemployment rates decline with age. Between 1975 and 1995, the negative impact of age on reemployment chances increases significantly. The obsolescence of human capital seems to play a decisive role for reemployment, especially for engineering occupations: From age 50 on, the negative age effect is significantly stronger than for other occupations.

Keywords: late career job loss, reemployment, hazard rate models, elderly engineers

JEL Classification: J64, J24, J14

*Rostock Center for the Study of Demographic Change, Konrad-Zuse-Str. 1, D-18051 Rostock, Phone: +49 (0)381/2081-148, Email: frosch@rostockerzentrum.de

1 Introduction

In many European countries, the employment situation for the elderly is not favorable. In the EU-15 countries, on average, roughly 48 % of those aged 55-64 participate actively in the labor market (OECD, 2006)[1]. With a labor force paticipation rate of 52 %, Germany performs slightly better. In most European countries, unemployment rates are lower for older than for younger people: for ages 55 and over, they average about 6.5 % in the EU-15 countries. However, in Germany, the share of elderly unemployed is almost twice as high – not to count those who opted for early retirement and therefore already disappeared from official statistics.

There are three points to anchor active labor market policy: Diminishing the rate of job loss, reducing unemployment duration, and increasing the rate of reemployment. All three pose special problems when it comes to old age unemployment: Displacement of elderly employees on the basis of early retirement schemes is a well-used instrument to reduce over capacities in the labor force. Generous severance payments ("the golden handshake") bridging some months or even years of non-employment until official retirement are an appropriate consolation for the early exit out of the labor force (Buchholz, 2006; Wübbeke, 2005).

Once out of work, reemployment speed and probability are generally both found to be lower after late career job loss than for prime-age workers (Hirsch et al., 2000). Chan and Stevens (2001), for example, analyze monthly employment histories constructed from the US Health and Retirement Study and find that only 61 % of displaced men aged 50 and over are employed two years after loosing their job. An US survey by Wanberg et al. (1996) shows that even if the elderly engage in frequent job seeking, they are less likely to find work than younger individuals with the same job search effort. A study for the Netherlands, conducted by Gorter et al. (1993), also supports that the low reemployment prospects for elderly job searchers are mainly caused by a low offer probability. In line with this results, van den Berg (1990a) finds that the proportion of offers considered acceptable equals 1 for ages 46-64 whereas it is slightly lower for ages 24-45[2].

[1] All statistics of this first paragraph are based on OECD labor market statistics for the most recent year available (2005).

[2] Bellmann and Brussig (2006) recently presented results based on the IAB Establishment Panel including about 16.000 German companies and come to different conclusions: 74 % of the establishments did not receive any application of persons aged 50 and over for their open positions. But if elderly job searchers applied for a job, almost half of them were offered a job.

A number of studies analyze unemployment duration and reemployment for West Germany using data from the German Socio-Economic Panel (Hunt, 1995, 2004; Steiner, 2001) or register data of the German Federal Employment Office (Wübbeke, 2005; Wilke, 2004; Fitzenberger and Wilke, 2004). Most authors include age in their analysis and find a negative effect on reemployment. However, age is often just treated as a control variable without further analysis of the underlying pattern (e.g. Steiner (2001)). Others exclude ages 50 and over in order to avoid early retirement issues (Hunt, 2004). Those basing their analysis on the elderly generation focus on the transition to (early) retirement and not on reemployment (e.g. Wübbeke (2005); Buchholz (2006)). Up to now, only Fitzenberger and Wilke (2004) explicitly refer to the reemployment pattern of the generation 50+ in Germany. However, their focus is on the implications of the extension of the maximum entitlement period for unemployment benefits for elderly job searchers in the late 1980s.

In this paper, we investigate age-specific reemployment rates. Our interest is the reemployment pattern after late career job loss. We analyze the employment histories of about 113.000 men in West Germany between 35 and 64 years using register data provided by the German Federal Employment Office for the years 1975 to 2001. After characterizing the comparative disadvantage of elderly job searchers with respect to reemployment prospects, we add some novelties to existing research. First, we assume that the effect of factors influencing reemployment is not independent of job searchers' age. We therefore study the effect of individual characteristics, labor market indicators and aspects of the job career on career from a life course perspective to identify age-specific reemployment patterns. Second, we expect the age effect on reemployment to vary over time and across occupations. To capture the variation of the age effect on reemployment over time, we picture how the relative impact of age on reemployment chances evolved in the last three decades. To identify differences in the strength of the age effect across occupations, we suggest analyzing age-specific reemployment prospects of engineers – being considered a scarce resource on the labor market – compared to other occupations.

Shedding light on these aspects is crucial in times of an aging workforce. Additionally, some popular early retirement programs will run out in the near future (OECD, 2005), reducing the scope for both, employers and employees, to shorten work life without any cogent reason (Eichhorst, 2006).

Our results show that, as expected, there is a significant negative effect of age on reemployment. All driving factors of reemployment display the

same pattern for elderly and younger job searcher. However, the effect of some factors such as nationality, previous salary or education is more pronounced for the elderly. The hump-shaped relationship between previous salary and reemployment prospects is for example much more pronounced for the elderly. Moreover, the relative impact of age increased between 1975 and 1995 ("accelerating age effect"), most probably due to attractive early retirement opportunities. During the last decade, however, this effect dilutes. We attribute this to the increasing availability of partial retirement ("Altersteilzeit"), reducing the need to use unemployment as a bridge to retirement. Furthermore, age particularly affects reemployment prospects in innovative occupations such as engineering ("negative innovation effect"): Between 50 and 59 years, engineers suffer more from the negative effect of age on reemployment prospects than their counterparts in other occupations.

The paper is organized as follows: Departing from a stylized job search model, we discuss the effect of individual characteristics, labor market indicators and aspects of the individual employment history on reemployment (Section 2). The reduced form model is then estimated using a piecewise-constant multiplicative hazard rate model for reemployment (Section 3). In Section 6, the results of five variants of the hazard rate model provide evidence about the effect of age on reemployment, the age-specific effect of the different driving factors for reemployment, the negative age effect over the last three decades and the negative innovation effect for engineering occupations. Section 5 concludes with a short summary and perspectives for further research.

2 Reemployment after late career job loss

In this section, we develop a conceptual framework combining a basic job search model with considerations about factors influencing unemployment duration and reemployment rates.

2.1 A stylized job search model

Our starting point is a stylized job search model involving two structural elements which is stepwise extended into a four-element model. For an overview about job search theory see Mortensen (1986). Individuals can be either unemployed or employed. The transition between the two states is characterized by the reemployment hazard (or: reemployment rate) λ, which can be defined as

$$\lambda = \eta \cdot (1 - F(w^*)) \tag{1}$$

Job offers are received at a constant rate η (by "chance"). Under a number of simplifying assumptions (Kiefer, 1988), the optimal search behavior of unemployed workers is described by a reservation wage strategy: Wages follow a distribution $F(w)$ and concrete wage offers are independently drawn from this distribution. A job is accepted if the wage w offered is higher than the reservation wage w^*, and else rejected ("choice"). According to Mortensen (1986) and Petrongolo (2001), the reemployment rate is consequently the product of the rate η at which job offers are received and the probability of acceptance $1 - F(w^*)$.

This model of "chance and choice" was extended by Narendranathan and Nickell (1985). They decompose η, the rate at which jobs are received, into the rate at which new jobs are discovered and the probability that a job is actually offered to a job seeker given he has applied for it. Building on this this three-factor approach, Gorter et al. (1993) mention four structural barriers to reemployment: Either existing jobs are not discovered (1) or for some reason, no applications are made for open positions the job searcher knows about (2). If an application is made, the employer might not offer a job because the expected productivity is insufficient (3). Even if the job is offered, conditions might not be attractive enough and the applicant declines the offer (4).

Leaving out further particulars of the job offer decisions made by employers and the search behavior of the unemployed, we rewrite equation 1 as:

$$\lambda(x) = \psi \cdot P_{app} \cdot P_{off} \cdot P_{acc} \tag{2}$$

with ψ being the arrival rate of new jobs on the job market, P_{app} as probability to discover a job and apply for it, P_{off} as probability to get a job offer for the position applied for and $P_{acc} = 1 - F(w^*)$ as acceptance probability. The model can be understood as a stage model of job search (Petrongolo, 2001; Gorter et al., 1993): starting with the first stage, the arrival of jobs on the job market, the initial rate is subsequently adjusted by the application, offer and acceptance probabilities[3]. We further assume that all components

[3]The four elements of the job search model ψ, P_{app}, P_{off} and P_{acc} should not be assumed independent from each other. In some cases, they are influenced by the same factors: the salary level before job loss might be taken as a signal for productivity and influence offer probability P_{off}. On the other hand, it might increase reservation wage and reduce acceptance probability P_{acc}. Nevertheless, decomposing the job search process

are influenced by a set of independent variables x:

$$\lambda(x) = \psi(x_a) \cdot P_{app}(x_b) \cdot P_{off}(x_c) \cdot P_{acc}(x_d). \quad (3)$$

Vectors x_i, $i = a, ..., d$ relate to personal characteristics and the previous employment history of the searcher as well as to labor market and policy indicators (van den Berg, 1990b). As for each component in the model, different variables will be of importance, we added the index $i = a, ..., d$ to the vectors. In our specification, the wage distribution $F(w)$ included in P_{acc} can also depend on a set of independent variables (e.g. to account for differences across industrial sectors or time periods).

If one or more of the exogenous variables change after job loss and alter ψ, P_{app}, P_{off} or P_{acc}, the job search model is non-stationary (van den Berg, 1990a). As possible causes we may imagine business cycle effects, policy changes affecting the level of unemployment benefits and changes in the personal situation on the one hand (van den Berg, 1990a) or negative duration dependence on the other hand (see also Section 2.2).

2.2 Factors driving reemployment

Motivated by the previously cited empirical research of van den Berg (1990a), Gorter et al. (1993), Wanberg et al. (1996) and Bellmann and Brussig (2006) who state that the stages of the job search process differ for younger and older job searchers, we establish a framework of the main driving factors for reemployment and focus on age-specific differences in the strength of effect of these factors. Whenever possible, we link theoretical considerations and previous empirical findings to the job search model described in Section 2.1. Table 1 displays only those relationships between the main driving factors of reemployment and the four structural components of the job search model we discuss in this section, without the set of aspects and interrelations covered being exhaustive.

First of all, the job arrival rate ψ (in other words: the availability of open positions on the job market) is higher for job seekers endowed with human capital that is relevant with respect to employers' needs. But employers also incorporate worker's characteristics such as qualification or age[4] and employment history in their decisions. Consequently, the job offer probability P_{off}

into stages is fruitful for understanding the driving factors of reemployment.

[4]Other socio-demographic aspects commonly cited to affect reemployment are gender, nationality or marital status. We do not deal further with them as in our study, we consider them, if at all, only as control variables.

will be higher for job searchers with appropriate **human capital** and signaling **productivity**. Analogously, educational attainment and reemployment prospects – or more precisely, the availability of jobs (ψ) as well as the job offer probability P_{off} – are generally found to be positively related (Kletzer, 1998; Gilberg et al., 1999; Lüdemann et al., 2004). However, in sectors with a short half-life of knowledge, formal education quickly becomes obsolete. In such sectors, older job searchers with a high and specific qualification might have lost attractiveness for potential employers. Additionally, (Hirsch et al., 2000) show in a micro study for the US that the accessibility to occupations requiring a lot of training is lower for the elderly. On-the-job training is rare for older workers because employers decide upon the returns to training and account for the shorter pay-off period compared to younger labor force (Eichhorst, 2006). Apart from differences in human capital that can be objectively stated, it is a prevailing opinion that productivity and the capacity for innovation decline with age (Börsch-Supan et al., 2005). The

Theoretical aspects with respect to... (and examples for indicators)	ψ	P_{app}	P_{off}	P_{acc}
(a) human capital and productivity *(e.g. workers' characteristics such as age or qualification and previous employment history such as previous unemployment experience)*	x		x	
(b) aspects of physical and psycho-social health *(e.g. health indicators, unemployment duration leading to discouragement effects)*		x	x	
(c) financial considerations combined with labor market and retirement policies *(e.g. previous salary, size of last employer, unemployment benefits, early retirement schemes)*		x		x
(d) labor market situation *(e.g. in region, industrial sector,occupation, season or period)*	x		x	
(e) other socio-demographic factors *(e.g. gender, nationality, marital status)*				

Table 1: Stages of job search and driving factors for reemployment

underlying assumption is the deficit model of aging: A meta-analysis conducted by Verhaegen and Salthouse (1997) shows that not only physical strength, but also cognitive abilities such as reasoning, speed and episodic memory start declining by the age of 50. Even if for the majority of tasks, maximum performance is not necessary, older workers get less job offers because they are assumed to have lower work productivity and to be less able to innovate. Finally, implicit contracts and seniority rules might lead to higher costs for older than for younger workers (Hutchens, 1986) and a lower job offer probability P_{off} for the elderly.

An explanation for negative duration dependence, i.e. why reemployment rates λ are found to decline with **unemployment duration** (Gilberg et al., 1999; Wilke and Wichert, 2004), is also partially connected to human capital theory. In this context, McGregor (1978) lists three sets of factors that have a negative effect on the probability to apply for a job P_{app} as well as the job offer probability P_{off}: physical and mental debilitation, discouragement in job search and restrictive hiring standards. The latter happens because potential employers take long unemployment durations as a signal for weak motivation and low productivity which leads to a decreased job offer probability P_{off}. Likewise, unemployment episodes preceding the job loss also might be a drawback for reemployment. Another explanation for declining reemployment rates over time is given by Steiner (2001): Sorting effects might lead those with high re-employment probabilities leave unemployment at an early stage, leaving behind job searchers with comparatively lower reemployment probabilities.

Additionally to human capital considerations and the aspects of psychosocial health related to long unemployment durations already mentioned above, **health** in general is a key aspect of employability. The elderly are more often afflicted with health problems than younger workers. Karr and Apfelthaler (1981) found that age and health problems are the main inhibiting factors for reemployment, especially when combined. They even seem to outweigh the influence of other factors such as educational attainment. In the context of the four-component model of job search presented in Section 2, health problems reduce the probability to apply for a job P_{app}. If potential employers can perceive health problems, the job offer probability P_{off} might also decline.

Financial considerations influence both search effort (captured in P_{app}) and acceptance probability P_{acc}. As a general rule, search effort will be minimized (low P_{app}) or low-wage job offers declined (low P_{acc}) if the expected wage for a new job does not exceed the reservation wage w^* plus costs implied by job search. However, we should always take into account

unemployment insurance benefit and retirement policies when analyzing age-specific effects of financial considerations on reemployment rates. First, our attention will be on high wage earners compared to low wage earners. The reservation wage w^* will, other things equal, be higher for those with a high income before job loss than for low wage earners, at least until the end of the entitlement period when unemployment benefits depend on the salary level before job loss and the wage replacement rate is still high. In this context, Fallick (1991), Fitzenberger and Wilke (2004) and others show that the availability of unemployment benefits has a negative effect on reemployment rates λ. However, reservation wages w^* tend to decrease with unemployment duration. When the maximum entitlement period (depending on age, see Table 4 in the appendix) is reached, benefits orientate at the level of social security benefits. This leads to increased opportunity costs of not working increase particularly for high wage earners (Lüdemann et al., 2004). Empirical evidence presented by Gilberg et al. (1999) showing that earnings before job loss are positively related with the reemployment rate λ is in line with these considerations.

Additionally, we now describe the differences between younger and older job searchers with respect to financial considerations. For elderly unemployed close to retirement age, the motivation for active job search incorporated in P_{app} and the decision to accept an existing job offer P_{acc} is not only influenced by the cost of search, the level of unemployment benefits and the expected wage distribution. Besides work and unemployment, older individuals can also choose a third option, retirement, when maximizing their expected life time utility (Chan and Stevens, 2001; Stock and Wise, 1990). This has different implications for low and high wage earners. For low wage earners, the lack of financial resources is a strong motivation for accepting bridge employment for some years before retiring (Harris, 1981). In contrast, empirical evidence shows that higher wages earners and those who can rely on additional unearned income, are more probable to sustain the desired standard of living even if they retire early (Feldman, 1994). This could lead to a hump-shaped wage-reemployment profile for elderly job searchers. For younger job searchers, reemployment prospects would be rather expected to be positively related with previous salary, at least after exhaustion of the entitlement period for unemployment benefits. In this context, we should also keep in mind that that early retirement options using bridge unemployment and generous severance payments are much more prevalent in big corporations than in small companies, which could analogously lead to reduced job search effort (P_{app}).

As a conclusion, **labor market policies** and the availability of **(early)**

retirement schemes combined with job searchers' financial considerations influence reemployment prospects. As these policies underwent several reforms during the last three decades, it is intuitive that reemployment rates λ have a pronounced period-specific dimension. Early retirement options became available particularly starting with the early eighties. Additionally, in the mid 1980s, the maximum entitlement period for unemployment benefits was extended to successively younger age groups (Steiner, 2001; Hunt, 1995; Wübbeke, 2005). Fitzenberger and Wilke (2004) show in great detail how this institutional reform allowed to use unemployment benefits as an integral part of early retirement packages. Elderly frequently used unemployment as a bridge to retirement, often paired with generous severance payments offered by companies. As already stated above, this leads to reduced application and acceptance probabilities P_{app} and P_{acc} for elderly job searchers.

The period effect on reemployment rates also reflects the **labor market situation**. To get an impression of the main trends, Figure 4 (see Appendix A) displays unemployment rates for West German men from 1975 onwards. In the last 35 years, the unemployment rate developed as a step function (Bogai et al., 1994). It doubled twice, first around 1975 from full employment in the early 1970s to about 5 % and then again in the early eighties up to almost 10 %. A tight labor market might lead to lower job arrival rates ψ and reduce the reservation wage w^*, if job searchers experience strong competition (Wilke, 2004). Even if the latter aspect can in turn lead to increased search effort (captured in P_{acc}), the net effect of a tight labor market on reemployment prospects will be negative. Analogously, the availability of open positions differs across regions, industrial sectors and occupations. In some industrial sectors such as construction and tourism, pronounced seasonal effects also play a major role. Reemployment rates λ will consequently not only depend on the time period and season when job search takes place, but also on the region, the industrial sector and the occupation a job searcher aims on.

All four components of the job search model described in Section 2 – the job arrival rate ψ, the application probability P_{app} as well as the probability of job offer P_{off} and the probability to accept an existing job offer P_{acc} – are influenced by individual characteristics, previous employment history as well as labor market conditions and policy aspects (both concerning unemployment benefits and retirement schemes). Our theoretical considerations show that these factors might vary considerably between elderly and younger job searchers.

3 Econometric model

3.1 Piecewise-constant hazard rate model

In this section, we present an econometric model to estimate the effects of driving factors such as individual characteristics of the job searcher, previous employment history and labor market indicators on reemployment.

Gorter et al. (1993) underline that there are two possibilities to estimate job search models as presented in Section 2.1. The first possibility is to straightforwardly estimate the structural model. Though, as data about the different stages in the job-search process is hardly available, researchers have to differentiate between fewer stages. For example, van den Berg (1990a) estimates structural job search models based on the two component model in equation 1, involving only the rate η at which job offers are received and the acceptance probability $P_{app} = 1 - F(w^*)$. Apart from data availability, the estimation of structural models needs strong assumptions, e.g. about the wage distribution $F(w)$.

An alternative approach is to estimate the reduced form of the job search model, letting the reemployment rate depend on a vector of independent variables x without specifically considering the structural components. All studies dealing with reemployment rates for Germany cited in Section 1 follow an approach similar to this one. We also consider estimating a "fully" reduced form model appropriate as a first step to analyze reemployment after late career job loss.

Statistically, the reemployment hazard $\lambda(t)$ is the instantaneous probability to be reemployed at time $T = t$ given that reemployment did not happen before ($T < t$). The hazard rate λ describes how the reemployment process evolves over time after time t given that he has not been reemployed before (Blossfeld and Rohwer, 1995). Differently to an ordinary probability, it can rather be interpreted as "reemployment speed" (reemployment cases per time unit, namely person months under risk, i.e. in unemployment). Equation 4 denotes the reemployment hazard, depending additionally on a set of explanatory variables x:

$$\lambda(t, x(t)) = \phi_0(t)\phi(x(t)) \tag{4}$$

We thus concentrate on the overall effect of the independent variables on reemployment without disentangling the effects of the different components. The term $\phi_0(t)$ is the functional form how the reemployment hazard λ depends on non-employment duration t. It is called *absolute* baseline hazard because it denotes the absolute rate of reemployment cases per time

unit (e.g. person months under risk) for a specified reference group. The second component, $\phi(x(t))$, describes to what extent the hazard rate λ for a given duration t for a person with a set of independent time-constant or time-dependent explanatory variables $x(t)$ differs from the hazard rate for a chosen baseline group. By means of the duration dependent baseline hazard and the time-varying explanatory variables, we indirectly account for (negative) duration-dependence.

Following earlier research about unemployment durations, we parameterize the hazard function as a piecewise-constant exponential model (Blossfeld and Rohwer, 1995; Fallick, 1991) which can be denoted in the following way:

$$\lambda(t, x) = \lambda_0(t)e^{\beta x(t)} \tag{5}$$

In this specification, the time-varying baseline hazard λ_0 does not depend entirely on the data but is assumed to differ between and to be constant within given time intervals[5].

Term $\phi(x(t))$ is specified as $e^{\beta x(t)}$ in order to ensure a nonnegative hazard without constraining the parameter space of β (Kiefer, 1988). Each parameter in e^{β} indicates the effect of the respective explanatory variable in x in shifting the baseline hazard up- or downwards. We obtain an estimator for the parameter vector β applying standard maximum likelihood methods.

As more than half of all persons in our sample experience more than one unemployment episode during observation time, and Trivedi and Alexander (1989) show that fitting a common duration model to data from different spells involves a major misspecification, we extend our model allowing for multiple unemployment episodes per person. For further methodological details see also Vermunt and Moors (2005) who give a comprehensive description of different hazard rate models, parameter estimation and methodological problems.

3.2 Data and Variables

For the empirical analysis, we use register data from the German Employment office[6]. Employment histories of 2 % of all employees registered by the

[5]This is a difference to simple exponential models assuming the hazard rate $\lambda(t) = \lambda$ with $t \geq 0$ and $\lambda > 0$ being constant over time. The time-varying baseline hazard $\lambda_0(t)$ we suggest allows for more flexible modeling (Vermunt and Moors, 2005). However, differently to Cox's semi-parametric model (Cox, 1972), the time dependence is not left completely unspecified but assumed to be a step function of T and thus constant for given time intervals, e.g. from the first to the third month after job loss, then for month four to six and so on.

[6]Scientific use file "IABS, Regional File, 1975-1995".

social insurance system are provided on a day-to-day basis for East and West Germany from 1995 until 2001. Several millions of (un)employment spells produced by more than 500.000 employees allow for highly differentiated analysis. As our main interest is the age-specific pattern of reemployment, we only include West-German men in our analysis, in order to leave out gender differences in the work-life pattern and structural changes in East Germany due to the transformation process after reunification (Brasche and Wieland, 2000; Trappe and Rosenfeld, 1998).

The duration of a non-employment episode can be measured in days. But simply defining the duration as difference between start and end of the period in which unemployment benefits are granted can lead to severe biases. Job searchers do not receive benefits during idle periods, because of delayed registering or after entitlement exhaustion. We therefore follow the definition suggested by Fitzenberger and Wilke (2004) and define non-employment as the time elapsed since job loss and until reemployment if there is any, ignoring if a person receives unemployment compensation or not during this time. Nevertheless, the reader should keep in mind that non-employment does not necessarily mean unemployment but can also indicate that a person directly moved from unemployment e.g. to (early) retirement or self-employment.

To alleviate this bias, we concentrate on the first two years after job loss. To account for retirement, we censor non-employment episodes at age 65. Non-employment with a duration below one month is omitted in order to exclude short term non-employment due to frictional unemployment. The same applies to short time employment: if the new job is lost within 35 days following reemployment, reemployment is not accounted for and the non-employment episode continues. Furthermore, we fix the lower age limit for the start of our analysis at 35 years in order to leave out "job hopping" in early career stages. Additionally, defining a lower age limit for the start of a non-employment episode avoids left-censoring. Reemployment is not absorbing, meaning that a person can become non employed and reemployed several times (Gilberg et al., 1999).

For this study, the baseline hazard function refers to the time elapsed since job loss. It is specified as a categorical variable (2 to 3 months, 4 to 6 months, 7 to 9 months, 9 to 12 months, 13 to 18 months and 19 to 24 months). The vector of explanatory variables includes time constant and time-dependent variables from three domains, capturing the effects of the driving factors for reemployment described in Section 2.2:

1. *Demographic variables*: Current age, nationality and educational level

are specified as further explanatory variables. Except for current age which varies over time, all explanatory variables are measured at the time of job loss and assumed to remain constant over time. This assumption is realistic because after age 35, changes in education or nationality are not that frequent.

2. *Employment history*: To account for the employment history before job loss, the cumulated duration of non-employment previous to the current non-employment spell, the salary group in the last job and the industrial sector of the last employer are accounted for. We also incorporate information about multiple job losses.

3. *Labor market and policy indicators*: The current calendar period is included as a time varying explanatory variable to control for developments on the labor market and retirement policies over time. The season at start of non-employment is also accounted for to capture special pattern for occupations with high job mobility (i.e. due to seasonal work). The region of the last employer allows to capture specific aspects of the regional labor market.

Unfortunately, we have to leave out health indicators and the firm size of the last employer before job loss because the data set used does not include appropriate information on these aspects.

4 Results and Discussion

4.1 Age-specific reemployment chances

To give a first overview about reemployment after late career job loss, we plot Kaplan-Meier survival curves for different age groups (Figure 1). They show the share of people still unemployed (y-axis) conditional on the time elapsed since job loss (x-axis). At the beginning, this share is 100 % for all age groups.

The survival curves not differing significantly between ages 35 and 49, we summarize these age groups into one. However, starting at age 50, speed and probability of reemployment decreases. We can deduce this from the lower gradient of the survival curve during the first months after job loss and from the higher level of non-employed after 24 months. For the youngest age group, 79 % get reemployed within two years after job loss. For ages 50-54, this is only the case for 67 %. The older the job searchers, the worse

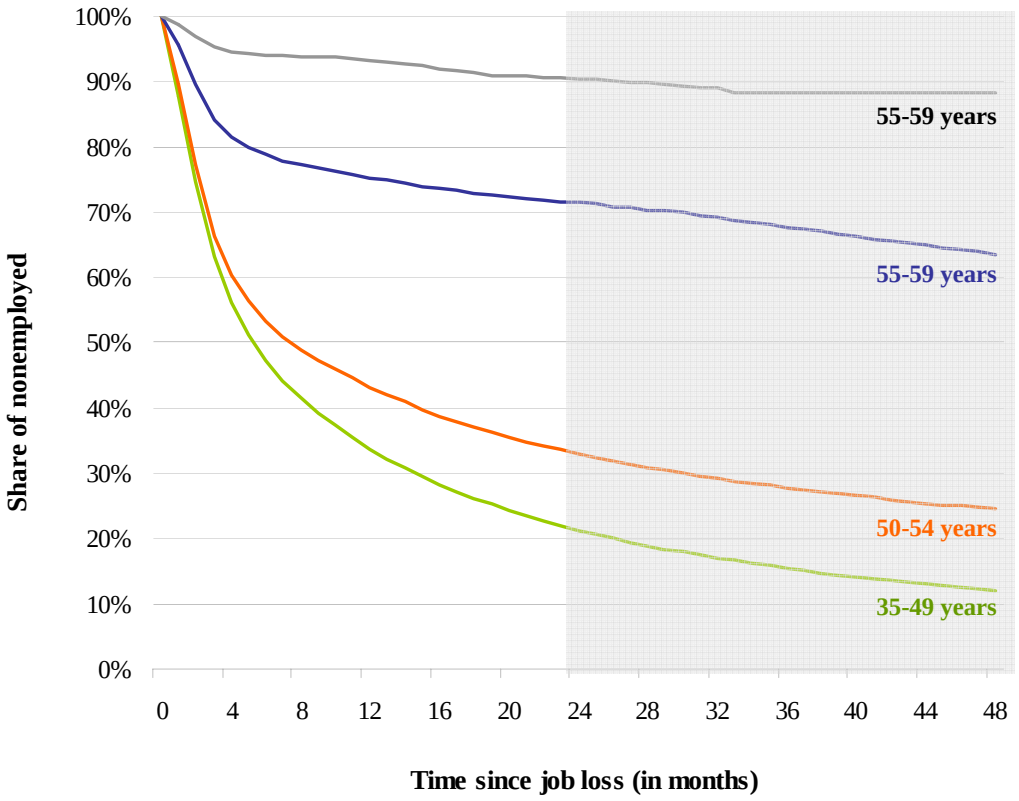

Figure 1: Kaplan-Meier survival estimates by age groups

their situation: for the upper two age groups, the share of reemployment cases drops to 29 % and 10 % respectively.

The survival curves presented above are not adjusted for any control variables. The relative disadvantage of older job searchers might as well result from the fact that they are overrepresented in sectors and educational groups with a low reemployment probability (Eichhorst, 2006). To control for such effects, we apply the piecewise-constant hazard rate model described in section 3.1. Current age, nationality, region, previous salary level, calendar period, cumulated duration of previous unemployment periods and industrial sector are included as explanatory variables. To make interpretation easier, we chose a categorical specification for the explana-

tory variables (e.g. low, medium, high and very high salary). The relative risks for a variable therefore have to be interpreted relative to the reference category set[7]. Estimators for the relative risk parameters in β are presented in Table 6 (**Model 1**). As we do not focus on absolute reemployment rates but on differences between groups, we do not report absolute baseline risks but convert them to relative risks like for all other variables.

The relative reemployment reemployment risk decreases over unemployment duration: it drops from 1 (reference category 2-3 months after job loss) to 0.34 in months 19-24 after job loss. As discussed in Section 2.2, this can be either attributed to a sorting mechanism or to negative duration dependence due to human capital depreciation as well as demoralisation effects.

As expected, the relative reemployment risk strongly declines with age. It is 41 percentage points higher for ages 35-39 than for the reference group, ages 50-54 years. The negative effect of age also persists after age 55: for job searchers aged 55-59 years, reemployment chances amount to only 37 % of the relative reemployment risk for ages 50-54. For job searchers aged 60 or older, reemployment happens even less frequently (relative risk of 0.12 compared to the reference group).

The results for the remaining explanatory variables go in line with previous empirical findings and the theoretical framework presented in Section 2.2. We nevertheless consider it crucial presenting the general results for all ages and relating them to the theoretical framework before further exploring differences in the reemployment risk pattern for older and younger job searchers in Section 4.2.

Besides age, other *demographic* variables affect reemployment prospects in the following way (see Table 6, **Model 1**):

- *Nationality.* Compared to Germans, foreign job searchers experience more difficulties to get reemployed. Their relative reemployment risk is 8 percentage points lower than that of their German counterparts. Other studies (Uhlendorff and Zimmermann, 2006; Wilke and Wichert, 2004; Steiner, 2001) find similar effects.

- *Educational attainment.* Having a vocational degree slightly increases reemployment chances compared to those without any degree. How-

[7] If "low salary" is set as reference category, the relative risk equals one for this category. The relative risks for the remaining categories medium, high and very high salary then show to what extent the hazard rate is shifted, c.p., upwards or downwards, compared to the reference category "low salary".

ever, with a relative risk of 0.81, reemployment chances are scarcer for academic job searchers than for other educational groups. This contradicts previous evidence that reemployment chances increase with the level of education (see Section 2.2). There are several possible explanations: Fitzenberger et al. (2006) and Hummel et al. (2005) underline that the education variable does not necessarily correspond, as it should, to a person's highest degree, but it is rather time inconsistent, most probably due to careless reporting on company side. Another reason could be that the average search time tends to increase with education (Wilke and Wichert, 2004). In this case, censoring after 24 months might lead to a downward bias in the parameter estimate for academic education. However, we exclude the latter explanation, as estimating the model without censoring after 24 months leads to an only slightly increased value (relative risk of 0.84).

Individual employment history also plays an important role for reemployment.

- *Previous unemployment.* Reemployment risks are negatively related to the cumulated duration of previous unemployment episodes. It does hardly make a difference if a job searcher lost his job for the first time or if he spent less than five years in non-employment. Though, those having been non-employed between five and ten years have a loss of 12 percentage point in reemployment risk compared to the reference group (without previous unemployment). A cumulated unemployment duration of 10 years or more even leads to a drop of 23 percentage points. If exceeding a certain level, previous unemployment seems to be taken into account in employers' decision making, as suggested by signaling theory (see Section 2.2).

- *Last salary.* For the first three salary groups, previous salary and relative reemployment risks are positively related: reemployment risks rise from 1 (for the reference group with a salary of less than 999 Euro) to 1.53 for those earning 1500-1999 Euro. For the highest salary group (2000 Euro or more), we observe a slight decrease to 1.41. Low income earners have no real incentive for reemployment because unemployment benefits and the subsequently paid social benefit are about the same as potential earnings in a new job. With increasing salary, the gap between benefits and last income grows, especially when entitlement to unemployment benefits ends. The slight drop for the highest salary group can be explained by the fact that high income earners usu-

ally have more financial assets and experience less pressure to quickly get reemployed. Thus, the trade-off between benefits and previous salary based on reservation wage theory we explained in Section 2.2 works.

- *Industrial sector of previous employer.* Compared to the manufacturing sector, relative reemployment risks are between 6 (Construction) and 55 (Agriculture, Mining and Energy) percentage points higher for all other sectors. On the one hand, the manufacturing sector underwent deep structural changes during the last decades. Reemployment opportunities are scarce in this sector as the kind of employment the job searchers are qualified for often does not longer exist. On the other hand, job stability might be lower in other sectors and therefore reemployment more frequent than in manufacturing.

The *labor market situation as well as employment and retirement policies* are captured in the variables calendar period, season at job loss and region (the latter two mainly with respect to the labor market situation).

- *Calendar period.* Compared to the first period from 1975 to 1979, reemployment prospects are between 31 and 45 percentage points lower in the subsequent periods. Overall, we observe a decline from 1975 to 1995 with the biggest drops in the first half of the 1980s and another, smaller one in the beginning of the 1990s. This development, as assumed also by Wilke and Wichert (2004), is most probably due to the tight situation on the labor market with rising unemployment rates (1981-1983 and 1993-1997, see also Figure 4 in the Appendix). For the most recent period, from 1995 to 2001, there is a slight recovery compared to the previous period.

- *Season at start of unemployment.* The relative reemployment risk for those having lost their job between July and September is 0.66, compared to 1 if job loss happens in the first three months of a year (reference group). It seems to be easier to get reemployed when job loss happens in the winter months than in the summer months (for similar findings and explanations see Lüdemann et al. (2004)). We attribute this effect to seasonal occupations we typically find in the construction or the tourism sector: If somebody gets non-employed in winter, the probability to get reemployed latest next spring is quite high. If job loss happens – for whatever reason – in the "busy" summer months, reemployment is less probable.

- *Region.* Without going into further detail, relative reemployment risks are lower in regions with a weak labor market situation (i.e. Saarland, North Rhine-Westphalia or Bremen).

The results described for Model 1 for ages 35 to 64 are in line with previous empirical findings and provide a good basis for the more detailed analysis of the factors influencing reemployment after late career job loss in the next two sections. However, van den Berg (2001) stresses that in hazard rate models, especially parametric ones as our model, misspecification may lead to severe biases. For this reason, we conducted robustness checks. Running a (semi-parametric) Cox model with an unspecified baseline hazard rate (Cox, 1972) does not show any differences in the tendency of results and very small quantitative changes. The same is true if we estimate the parameters without restricting the observation period to 24 months. Including short time employment (below 35 days) or omitting the control for multiple episodes does not lead to different interpretations, neither.

4.2 Comparing old and young: The "accelerated age effect"

The theoretical framework in Section 2.2 suggests that the effect of some driving factors of reemployment depends on job searchers' age. Fitting the model separately for younger job searchers (35 up to 55 years) and older job searchers (55 up to 65 years) allows us to identify such inter-group differences. Results are summarized in Table 6 (**Model 2** and **Model 3**). From the first view, the relative-risk pattern seems to be similar for most aspects. However, the effect of nationality[8], education, season at job loss, period, last salary as well as negative duration dependence is more pronounced for older than for younger job searchers.

Two examples show that these findings go in line with the theory developed in Section 2.2: The drop of reemployment risk from the high to the very high salary group described above is stronger for older job searchers (from 1.51 to 1.03, see Table 6, **Model 3**) whereas for younger unemployed, the hump-shape in the salary-reemployment profile is far less pronounced (1.53 to 1.51, **Model 2**). As stated in Section 2.2, accepting bridge employment between job loss and (early) retirement is most often motivated by financial needs whereas higher income earners with, on average, higher private and public pension entitlements as well as unearned income, are less willing to accept a new job before retiring.

[8]For a detailed analysis of the joint effect of age and nationality on reemployment see also the recent study of Bruder and Frosch (2006).

Period	35–49 years	50–64 years	Difference?
1975–1979	1	1	no
1980–1984	0.70***	0.64***	yes (**)
1985–1989	0.69***	0.55***	yes (***)
1990–1994	0.55***	0.38***	yes (***)
1995–2001	0.56***	0.50***	yes (**)
different pattern?			yes (***)
Significance levels :	$*$: 10%	$**$: 5%	$***$: 1%

Table 2: Relative reemployment risks by age and period

A second difference between elderly and younger job searchers is the development over calendar time. The decrease in relative reemployment risks between 1975 and 2001 is much higher for older job searchers than for their younger counterparts (see Table 2). Have people been growing "too old" for the labor market at ever earlier age? To assess if the negative effect of age on reemployment has been accelerating over the last decades, we plot the relative reemployment risk for age group 35-54 years and for age group 55-64 years (see Figure 2). The relative risk for the first period, 1975 to 1979, is chosen as reference category and set to 1 for both groups. We stress at this point that we do *not* compare the reemployment chances of old and young directly in this part of the analysis. We rather draw a picture about how reemployment rates developed over the last three decades *relative* to the first period (1975–1979) for younger job searchers on the one side and for older job searchers on the other side.

The reemployment pattern over calendar time shows that both age groups experience the downward tendency in reemployment prospects described in Section 4.1. However, the patterns start to differ from the early 1980s onwards: Whereas the situation of the younger age groups stabilizes after the two main downturns in the early eighties and the early nineties, the negative trend for older job searchers continues. Wald-tests show that the relative risk for older and younger job searchers differs significantly for all periods (at 1 %-level, except the first one which is used as reference category and set to 1). For complete estimation results see **Model 2** and **Model 3** in Table 6 (Appendix 6). The results are again robust with respect to different model specifications.

Most probably, the increasing availability of early retirement schemes starting in the 1970s, partly paired with a "golden handshake" from company side, affected the incentive to return to work (for an overview of retirement and labor market policies for elderly see Table 4). We attribute

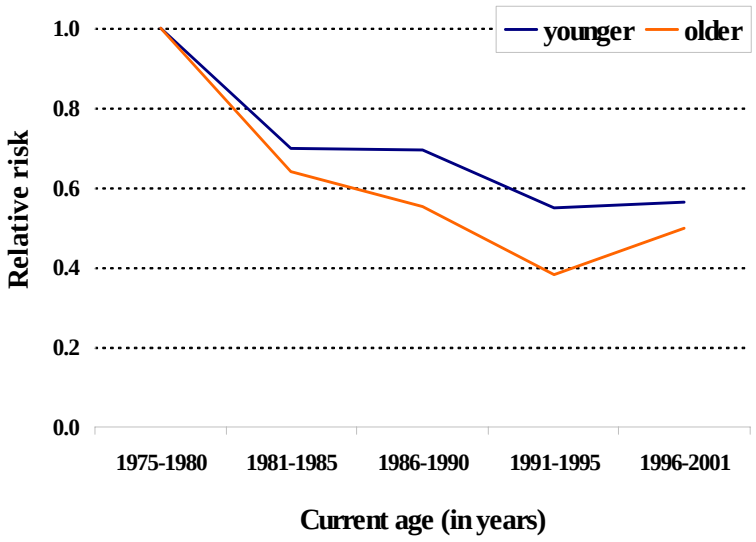

Figure 2: Accelerating age effect

the continuing negative trend in reemployment prospects for the elderly in the first half of the 1980s to the labor market policy of this period: "bridge unemployment" between the last job and retirement (Buchholz, 2006) was fostered by the the "58-rule". It allowed those aged 58 or over to receive unemployment benefits for up to 32 months without being obliged to search for a job. At age 60, retirement without any deduction in public pension entitlements was possible after a minimum unemployment duration of 18 months. Fitzenberger and Wilke (2004) analyze these policy effects in great detail and find a similar effect of the extension of the maximum entitlement period in the mid of the 1980s[9].

In the most recent calendar period, 1995–2001, we note a slight recovery of the relative reemployment risk for ages 50+. We attribute this to the increasing entry into partial retirement programs from the mid 1990s on ("Altersteilzeit"). These programs, first introduced in 1991, permit to

[9]We introduced dummy variables into the model to test the influence of labor market and retirement policies for certain age groups. The results were in line with the explanations given above. However, the impact of labor market and retirement policies not being the main scope of the paper, we do not go into further detail.

reduce overall working time by 50 %, with a salary of about 80 % of the former full-time (!) net salary. Most participants choose the so called "block model". This means that they work two and a half years full time and then reduce their working time to zero for the remaining two and a half years. The program is strongly subsidized by the Employment Office. After the reform of the partial retirement law in 1996, the number of participants rose steadily to more than 150.000 in 2001 (OECD, 2005). Bridge unemployment was replaced by the financially more attractive block model of the partial retirement program, improving indirectely reemployment rates. However, in the end, the negative effect on labor market participation rates for the generation 55+ remains the same.

The differences in the salary effect and the accelerating age effect over the last three decades underline the importance of financial and policy issues on the decision to return to active work life at an older age. As Fitzenberger and Wilke (2004), we find that the policy changes in the 1980s had a considerable negative effect on reemployment of elderly. We additionally discover a recovery effect during the last observation period, which is very probably related to the de facto replacement of bridge unemployment by partial retirement possibilities. These findings are also relevant with respect to future policy changes: in 2008, the maximum entitlement period for unemployment benefits for elderly will be reduced from formerly 32 months to 18 months. Theoretically, this should lead to improved relative reemployment risks [10] as bridge unemployment can be used only at a later age.

4.3 Comparing engineers with other occupations: The "negative innovation effect"

Identifying the effect of age on reemployment prospects in different occupations is motivated by the everlasting story of the impending scarcity of skilled labor which recently became a main topic in public discussion about demographic change. In a survey conducted by the VDI, the German Association of Engineers, 34 % of the 5000 companies included in the survey consider the lack of engineers being one of the main future challenges (VDI and IAO, 2002).

In this context, a common assumption is that if industry lacks skilled labor, e.g. engineers, employment chances for the elderly will increase in these occupations. But this effect can only become evident if older and younger engineers are (perfect) substitutes e.g. with respect to relevant

[10] Not necessarily compared to younger job searchers, but relative to the previous periods!

human capital – which is doubted by part of the scientific community (see Section 2.2). Additionally, compensating the skill gap with elderly engineers assumes that they have high propensity to return to employment instead of accepting early retirement opportunities. Thus, we are skeptical towards this hope and aim to empirically explore it.

Age group	Engineers	Other occupations	Difference?
35 to 39	1	1	no
40 to 44	0.95	0.89^{***}	no
45 to 49	0.86^{**}	0.77^{***}	no
50 to 54	0.37^{***}	0.53^{***}	yes (***)
55 to 59	0.03^{***}	0.10^{***}	yes (***)
60 to 65	0.01^{***}	0.03^{***}	yes (***)
different pattern?			yes (***)
Significance levels :	$*$: 10%	$**$: 5%	$***$: 1%

Table 3: Relative risks by age and occupation

Following a similar approach as in Section 4.2, we estimate the model separately for the two occupational groups. This time, we compare job searchers having worked in an engineering profession before loosing their job with job searchers who have worked in other occupations. As engineers are mainly employed in the manufacturing sector, we focus on this industrial sector in our analysis. Furthermore, we omit the education variable for both groups as most engineers have an academic degree. The complete estimation results are presented in Table 6 (**Model 4** and **Model 5**).

In Figure 3, the relative risk for engineers and other occupations is set to 1 for the youngest age group from 35-39 years (reference group). We can now identify the relative effect of age in each of the two groups. Until age 50, the trend in the relative reemployment pattern is similar for engineers and other occupations (no significant difference in the course of the relative risk profile). Subsequently, the effect of age starts to be stronger for engineers than for their counterparts in other occupations. The relative risk of reemployment for engineers in age group 50-54 years is only 37 % of the initial value in the reference age group. The drop for other occupations is less pronounced: relative employment chances for ages 50-54 are still 53 % of the youngest age group's reemployment prospects. For all subsequent age groups, the relative effect of age on reemployment is significantly stronger for engineers than for other occupations. This effect is again robust for the different model specifications tested (see Section 4.1).

It follows from the results that the effect of age on reemployment prospects

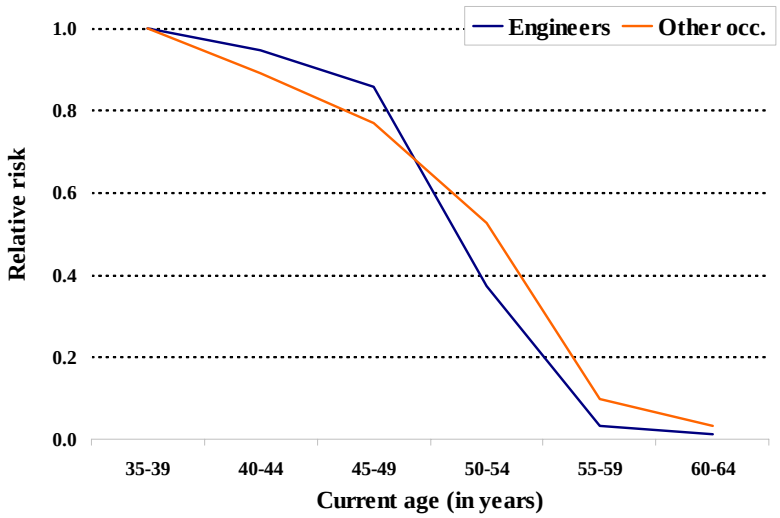

Figure 3: Negative innovation effect

is stronger for engineers. Coming from rather innovative or technical occupations on an advanced level, they might experience a higher loss of human capital over the life course than job searchers in other, less "innovative" occupations. This "negative innovation effect" on reemployment might even be downwardly biased as engineers (and other academic employees) suffer less from health afflictions than their colleagues in physically strenuous occupations. Though, we should not neglect that negative selection could also play a role: If engineers are considered being a scarce resource, those loosing their job at an older age despite the protection by collective agreements and seniority rules, will be probably negatively preselected with respect to their human capital and productivity. This might be picked up in the parameter estimate for the negative innovation effect.

All in all, the results show that a lack of skilled labor cannot be automatically satisfied by recurring to older job searchers. Late career unemployment will be only reduced on the long run if the relevant skills of the job searches do not become obsolete in the meanwhile and if incentives induced by unemployment benefits and early retirement opportunities do not drive out the motivation to return to employment.

5 Conclusion

Our objective was to analyze the reemployment chances after late career job loss for West-German men over the last three decades. We departed from a stylized job search model incorporating job arrival rate and probabilities for application, offer and acceptance. On this basis, we presented a theoretical framework of factors driving reemployment, focusing on their age-specific effects on reemployment. Using a piecewise-constant hazard model accounting for multiple non-employment episodes, we estimated the reduced form of the job search model. We incorporated individual characteristics (age, nationality and education), aspects of the previous employment history (salary at and sector of the last employer, previous unemployment) and labor market indicators (region, season at job loss, calendar period).

Our results go in line with previous empirical findings: Whether objective lack of the "right" human capital, age discrimination or health problems: Older unemployed have, other things equal, reduced reemployment prospects compared to their younger counterparts. The negative effect of age on relative reemployment starts to be evident at age group 50-54 years and then further increases. The reemployment chances of job searchers aged 55-59 amount to only 37 % of the relative reemployment risk for ages 50-54.

The first novelty of our analysis is that we separately look at the reemployment risk pattern for older and younger job searchers. We find that the effects of the explanatory variables are similar, though in most cases more pronounced for elderly job searchers. The two examples we consider in more detail, previous salary and the accelerated age effect between 1975 and 1995, show that the differences are in line with the theoretical framework established in Section 2.2. One the one hand, high wage earners can afford not to return to employment and to directly move to retirement after late career job loss. On the other hand, the attractiveness and availability of policy options for bridge unemployment as well as early and partial retirement options strongly influence the reemployment risk of the elderly.

The second new result is the "negative innovation effect". The negative effect of age on reemployment is stronger for engineers than for other occupations. Particularly between ages 50 and 59, they experience a higher decrease in relative reemployment risks (down to 0.37-0.03 of the initial value, as compared to a smaller reduction down to 0.53-0.10 for job searchers in other occupations). Even if negative selection works, we can deduce from this result that the reemployment chances of engineers are not, as often supposed, higher just because they are a scarce resource on the labor market. Most probably, this is due to the fact that the stock of human capital of

younger and older job searchers is less substitutable in innovative than in other professions because it becomes obsolete much faster.

For future research on the topic, we will incorporate unobserved heterogeneity into the model. Occupation groups will be accounted for, particularly to indirectly control for occupation specific unemployment rates as well as occupational strain and health issues. To alleviate possible selection biases that might influence the negative innovation effect, we will only include displaced employees in this future analysis. The weakly anonymized employment subsample, available on-site at the Research Data Center of the German Federal Employment Office, provides excellent possibilities for such an extended analysis and allows to include additional variables such as the firm size of the last employer before job loss.

However, for the effective design of labor market instruments increasing reemployment after late career job loss, we need more insight in the behavior of the structural components of job search as suggested by van den Berg (2001), Gorter et al. (1993) and started by Bellmann and Brussig (2006) for German data: If the job offer rate is low for older job searchers, the leverage for policy measures is mainly on company side. If application and acceptance probability decrease over the life course, incentives and counseling for older job searchers will have more impact.

Acknowledgments

The dataset used for this article is the anonymized IAB Employment Subsample, Regional File 1975 - 2001. Data is made available as a scientific use file, provided by the Research Data Center of the German Federal Employment Office in the Research Institute IAB.

The study was supported by the Rostock Center for the Study of Demographic Change, Research Unit I (Aging Labor Force) and the University of Rostock, Chair of Macroeconomics, Growth and Business Cycles.

I am grateful to Prof. Dr. Thusnelda Tivig for guidance in the research project. Prof. Dr. Michael Kuhn as well as Dr. Pascal Hetze provided helpful comments. Thanks also to the participants of the 1^{st} European Workshop on Labor Markets and Demographic Change (Rostock, April 2006), of the 2^{nd} World Aging and Generations Congress (St. Gallen, September 2006) and of the Research Seminar in Economics (University of Rostock, Mai 2006) for their suggestions.

A Policy trends and labor market situation 1975–2001

In Table 4, we summarize main developments in labor market and retirement policy over the last three decades.

1975-1979	Maximum entitlement period for unemployment benefits 12 months for all ages. Official retirement age: 65 years in general, 60 years possible after long time unemployment ("vorgezogene Altersrente wegen Arbeitslosigkeit", since 1956). Introduction of an early retirement option at age 63 after 35 insurance years ("Altersrente für langjährige Versicherte"). Introduction of retirement at age 62 (1972/73) or at age 61 (1979) if permanently unable to work.
1980-1984	Further reduction of age limit for employment disability pensions to 60 years (1980).
1985-1989	From 1985 on stepwise extension of the maximum entitlement period for elderly (1988: age 42-43: 18 months, age 44-48: 22 months, age 49-53: 26 months, age 53+: 32 months). Receiving unemployment benefits starting from age 58 gets easier ("bridge unemployment": Combining maximum entitlement period of unemployment benefits with early retirement due to unemployment allows retirement with 57.5 years). "Vorruhestandsgesetz": Early retirement from age 58 on is subsidized by the Federal Employment Office on the basis of collective or factory agreements.
1990-1994	"Altersteilzeitgesetz": Partial retirement possible and subsidized starting with age 58, but not yet frequently used.
1995-2001	1996 reform of the "Altersteilzeitgesetz" leads to an increasing claim of partial retirement (31.12.2001: more than 150.000 partial retirees).

Table 4: Labor market and retirement policy 1975–2001

Figure 4 presents the main labor market trends from 1975 onwards. The seventies were characterized by low unemployment rates (2–4 %). Between 1980 and 1984, during the first recession, unemployment rates sharply rose to 8 %. The highest unemployment rates of the decade were reached with 9 % in 1985. Afterwards, unemployment started to fall. In the beginning of the nineties, the unemployment rate was again below 7 %. From 1992, unemployment rates began to rise again. The following years were marked by the second recession which led to an increase in unemployment rates with a peak in 1997 (12 %). After a short recovery in 2000, the unemployment rate stagnated around 12 % during the last years.

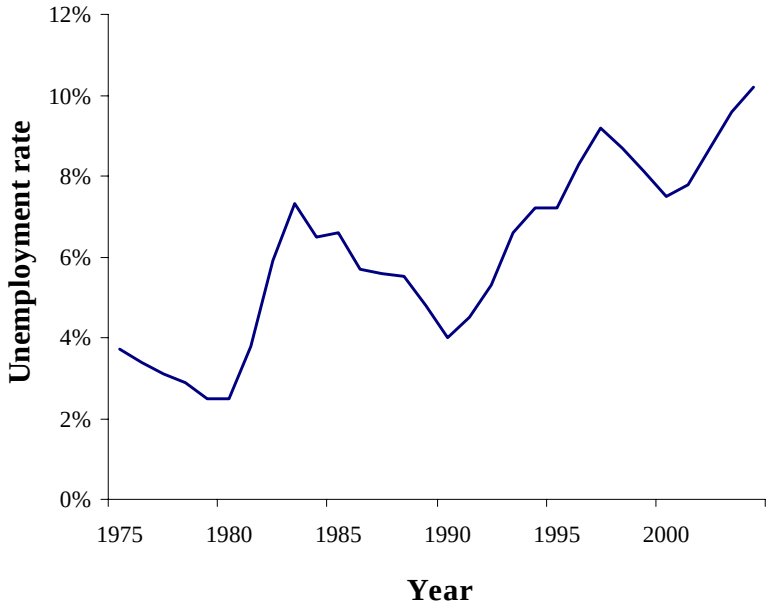

Figure 4: Unemployment rate in for West-German men, 1975–2004 (*Source: OECD (2006)*

B Result Tables

	Age groups	**Industrial Sectors**	**Occupations**
Model 1	35–64 (all)	all	all
Model 2	35–49 (younger)	all	all
Model 3	50–64 (older)	all	all
Model 4	35–64 (all)	manufacturing only	engineers only
Model 5	35–64 (all)	manufacturing only	other occupations

Table 5: Short descriptions of Models 1 – 5

Table 6: Relative risks for reemployment, Models 1 – 5

	Mod. 1 all	Mod. 2 35-49 years	Mod. 3 50-65 years	Mod. 4 Engi-neers	Mod. 5 Other occ.
Persons	113.147	79.851	41.793	5.504	37.395
Unempl. episodes	223.945	173.561	50.384	5.865	48.889
Reempl. cases	136.487	125.214	11.273	1.571	22.965
Reempl. quota	61 %	72 %	22 %	27 %	47 %
Time since job loss					
month 2-3	1	1	1	1	1
month 4-6	0.82 ***	0.83 ***	0.64 ***	0.81 ***	0.71 ***
month 7-9	0.55 ***	0.57 ***	0.29 ***	0.63 ***	0.52 ***
month 10-12	0.46 ***	0.48 ***	0.24 ***	0.65 ***	0.47 ***
month 12-18	0.41 ***	0.42 ***	0.24 ***	0.72 ***	0.43 ***
month 18-24	0.34 ***	0.36 ***	0.17 ***	0.59 ***	0.34 ***
Current age					
35-39	1.41 ***	1.33 ***		1	1
40-44	1.31 ***	1.26 ***		0.95	0.89 ***
45-49	1.19 ***	1.16 ***		0.86 **	0.77 ***
50-54	1	1	1	0.37 ***	0.53 ***
55-59	0.37 ***	0.70 ***	0.49 ***	0.03 ***	0.10 ***
60-65	0.12 ***		0.17 ***	0.01 ***	0.03 ***
Period					
1975-1980	1	1	1	1	1
1981-1985	0.69 ***	0.70 ***	0.64 ***	1.02	0.63 ***
1986-1990	0.67 ***	0.69 ***	0.55 ***	1.16	0.61 ***
1991-1995	0.52 ***	0.55 ***	0.38 ***	0.67 ***	0.44 ***
1996-2001	0.55 ***	0.56 ***	0.50 ***	0.89	0.52 ***

... continuation see next page ...

	Mod. 1 all ages	Mod. 2 35-49 years	Mod. 3 50-65 years	Mod. 4 Engineers	Mod. 5 Other occ.
Last salary					
0-999	1	1	1	1	1
1000-1499	1.39 ***	1.39 ***	1.48 ***	2.05 ***	1.50 ***
1500-1999	1.53 ***	1.56 ***	1.51 ***	2.07 ***	1.63 ***
2000+	1.41 ***	1.52 ***	1.07 **	1.65 ***	1.45 ***
Nationality					
german	1	1	1	1	1
non-german	0.92 ***	0.90 ***	0.87 ***	0.84	0.78 ***
not specified	1.25 ***	1.18 ***	1.69 ***	1.49 ***	1.41 ***
Previous unemployment					
no previous ue	1	1	1	1	1
up to 5 years	0.98 ***	0.98 ***	1.31 ***	0.54 ***	0.75 ***
5-10 years	0.88 ***	0.87 ***	1.27 ***	0.38 ***	0.65 ***
10-15 years	0.77 ***	0.72 ***	0.96		0.89
Season at job loss					
Jan-Mar	1	1	1	1	1
Apr-Jun	0.70 ***	0.71 ***	0.46 ***	1.02	0.74 ***
Jul-Sept	0.66 ***	0.68 ***	0.42 ***	0.96	0.71 ***
Oct-Dec	0.88 ***	0.89 ***	0.79 ***	1.07	0.97 *
Education					
no prof. edu.	1	1	1		
prof edu.	1.02 ***	1.04 ***	0.93 ***		
academic	0.81 ***	0.80 ***	0.61 ***		
not specified	1.02 **	1.02	1.05		

... continuation see next page ...

	Mod. 1 all ages	Mod. 2 35-49 years	Mod. 3 50-65 years	Mod. 4 Engineers	Mod. 5 Other occ.
Sector					
Manufacturing	1	1	1		
Agri., Min., Energy	1.55 ***	1.42 ***	3.27 ***		
Construction	1.06 ***	0.97 **	1.70 ***		
W+R trade	1.52 ***	1.35 ***	3.82 ***		
Trans. and Comm.	1.11 ***	0.99	2.30 ***		
Services	1.29 ***	1.17 ***	2.80 ***		
NFP and private hhlds	1.10 ***	0.97 **	2.57 ***		
Regauth. + soc. ins.	1.20 ***	1.04 ***	3.17 ***		
not specified	1.83 ***	1.55 ***	4.67 ***		
Region					
Schleswig-Holstein	1	1	1	1	1
Hamburg	0.80 ***	0.82 ***	0.61 ***	1.28	0.90 **
Lower Saxony	1.02	1.04 **	0.90 *	0.99	0.97
Bremen	0.85 ***	0.87 ***	0.67 ***	0.93	0.89 *
North Rhine-Westph.	0.81 ***	0.84 ***	0.60 ***	0.94	0.80 ***
Hesse	0.97 *	0.99	0.84 ***	1.03	1.00
Rhineland-Palatinate	1.12 ***	1.12 ***	0.99	1.15	1.15 ***
Baden-Württemberg	0.96 **	0.98	0.82 ***	0.93	0.95
Bavaria	1.23 ***	1.26 ***	1.20 ***	1.00	1.24 ***
Saarland	0.76 ***	0.81 ***	0.43 ***	0.56 **	0.62 ***

Significance levels : $*$: 10% $**$: 5% $***$: 1%

References

Bellmann, L. and Brussig, M. 2006. Selective Hiring of Older Employees in Germany – Evidence from the IAB-Establishment Panel. *Contribution to the IZA Research Seminar, July 11* .

Blossfeld, H.-P. and Rohwer, G. 1995. Techniques of Event History Modeling: New Approaches to Causal Analysis. Lawrence Erlbaum Associates.

Bogai, D., Hess, D., Schröder, H., and Smid, M. 1994. Binnenstruktur der Langzeitarbeitslosigkeit älterer Männer und Frauen. *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung* 27:73–93.

Brasche, U. and Wieland, S. 2000. Alter und Innovation. *Vierteljahreshefte zur Wirtschaftsforschung* 69:124–141.

Börsch-Supan, A., Düzgün, I., and Weiss, M. 2005. Altern und Produktivität: Zum Stand der Forschung. Unpublished Report, MEA Mannheim.

Bruder, J. and Frosch, K. 2006. Age and Foreign Nationality – A Double Drawback for Reemployment in Germany? *In* Thünen-Series of Applied Economics, Working Paper No. 65. University of Rostock.

Buchholz, S. 2006. Globalization, Uncertainty and Late Careers in Society, chapter Men's Late Careers and Career Exits in West Germany. Routledge Advances in Sociology.

Chan, S. and Stevens, A. 2001. Job Loss and Employment Patterns of Older Workers. *Journal of Labor Economics* 19:484–521.

Cox, D. 1972. Regression Models and Life Tables. *Journal of the Royal Statistical Society B* 34:187–203.

Eichhorst, W. 2006. Beschäftigung Älterer in Deutschland: Der unvollständige Paradigmenwechsel. *IZA Discussion Paper No. 1985* .

Fallick, B. 1991. Unemployment Insurance and the Rate of Re-Employment of Displaced Workers. *The Review of Economics and Statistics* 73:228–235.

Feldman, D. 1994. The Decision to Retire Early: A Review and Conceptualization. *Academy of Management Review* 19:285–311.

Fitzenberger, B., Osikominuy, A., and Völterz, R. 2006. Schmollers Jahrbuch, chapter Imputation Rules to Improve the Education Variable in the IAB Employment Subsample.

Fitzenberger, B. and Wilke, R. 2004. Unempoyment Durations in West-Germany Before and After the Reform of the Unemployment Compensation System During the 1980s. *ZEW Discussion Paper No. 24* .

Gilberg, R., Hess, D., and Schröder, H. 1999. Wiedereingliederung von Langzeitarbeitslosen. *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung* 32:281–299.

Gorter, C., Nijkamp, P., and Rietveld, P. 1993. Barriers to Employment: Entry and Re-entry Possibilities of Unemployed Job Seekers in The Netherlands. *De Economist* 141:70–95.

Harris, L. 1981. Aging in the Eighties: America in Transition. *Washington, DC: National Council on Aging* .

Hirsch, B., Macpherson, D., and Hardy, M. 2000. Occupational Age Structure and Access for Older Workers. *Industrial and Labor Relations Review* 53:401–418.

Hummel, E., Jacoebbinghaus, P., Kohlmann, A., Oertel, M., Wübbeke, C., and Ziegerer, M. 2005. FDZ Datenreport: Stichprobe der Integrierten Erwerbsbiographien IEBS 1.0. Bundesagentur für Arbeit.

Hunt, J. 1995. The Effect of the Unemployment Compensation on Unemployment Duration in Germany. *Journal of Labor Economics* 13:88–120.

Hunt, J. 2004. Convergence and Determinants of Non-Employment Durations in Eastern and Western Germany. *Journal of Population Economics* 17:249–266.

Hutchens, R. 1986. Delayed Payment Contracts and a Firm's Propensity to Hire Older Workers. *Journal of Labor Economics* 4:439–457.

Karr, W. and Apfelthaler, G. 1981. Zur Dauer der Arbeitslosigkeit. *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung* 14:238–390.

Kiefer, N. M. 1988. Economic Duration Data and Hazard Functions. *Journal of Economic Literature* 26:646–679.

KLETZER, L. 1998. Job Displacement. *The Journal of Economic Perspectives* 12:115–136.

LÜDEMANN, E., WILKE, R., AND ZHAN, X. 2004. Censored Quantile Regressions and the Length of Unempoyment Periods in West Germany. *ZEW Discussion Paper No 57* .

MCGREGOR, A. 1978. Unemployment Duration and Re-Employment Probability. *The Economic Journal* 88:693–706.

MORTENSEN, D. 1986. Handbook of Labor Economics, Vol. 2, chapter Job Search and Labor Market Analysis. Amsterdam: North-Holland.

NARENDRANATHAN, W. AND NICKELL, S. 1985. Modelling the Process of Job Search. *Jorunal of Econometrics* 28:29–49.

OECD 2005. Aging and Employment Policies: Germany. OECD Publishing.

OECD 2006. Database on Labour Market Statistics. Internet: www.oecd.org.

PETRONGOLO, B. 2001. Reemployment Probabilities and Returns to Matching. *Journal of Labor Economics* 19:716–741.

STEINER, V. 2001. Unemployment Persistence in the West German Labour Market: Negative Duration Dependance or Sorting? *Oxford Bulletin of Economics and Statistics* 63:91–113.

STOCK, J. AND WISE, D. 1990. Pensions, the Option Value of Work, and Retirement. *Econometrica* 58:1151–1180.

TRAPPE, H. AND ROSENFELD, R. A. 1998. A Comparison of Job-Shifting Patterns in the Former East Germany and the Former West Germany. *European Sociological Review* 14:343–368.

TRIVEDI, P. K. AND ALEXANDER, J. N. 1989. Reemployment Probability and Multiple Unemployment Spells: A Partial-Likelihood Approach. *Journal of Business and Economic Statistics* 7:395–401.

UHLENDORFF, A. AND ZIMMERMANN, K. F. 2006. Differences in Unemployment Dynamics between Migrants and Natives in Germany. *Preliminary Version presented on the EEA-ESEM Conference, Vienna, August 24 - 28, 2006* .

van den Berg, G. 2001. Handbook of Econometrics, Vol. 5, chapter Duration Models: Specification, Identification and Multiple Durations. Elsevier.

van den Berg, G. J. 1990a. Nonstationarity in Job Search Theory. *The Review of Economic Studies* 57:255–277.

van den Berg, G. J. 1990b. Search Behaviour, Transitions to Nonparticipation and the Duration of Unemployment. *The Economic Journal* 100:842–865.

VDI and IAO 2002. Ingenieure ab 45. Technical report, VDI Verlag GmbH.

Verhaegen, P. and Salthouse, T. 1997. Meta-Analyses of Age-Cognition Relations in Adulthood. Estimates of Linear and Nonlinear Age Effects and Structural Models. *Psychological Bulletin* 122:231–249.

Vermunt, J. and Moors, G. 2005. Encyclopedia of Statistics in Behavioral Science, chapter Event History Analysis. Chichester, UK: Wiley.

Wanberg, C., Watt, J., and Rumsey, D. 1996. Individuals without Jobs: An Empirical Study of Job-Seeking Behaviour and Reemployment. *Journal of Applied Psychology* 81(1):76–87.

Wübbeke, C. 2005. Der Übergang von sozialversicherungspflichtiger Beschäftigung in den Rentenbezug zwischen sozialpolitischer Steuerung und betrieblicher Interessen. Eine Untersuchung der Ursachen des Frühverrentungstrends in Westdeutschland für den Zeitraum von 1975 bis 1990 auf der Basis der IAB-Beschäftigtenstichprobe. IAB.

Wilke, R. and Wichert, L. 2004. Dauer der Arbeitslosigkeit: Persönliche Erwerbsgeschichte ausschlaggebend. *ZEWnews November 2004* .

Wilke, R. A. 2004. New Estimates of the Duration and Risk of Unemployment for West-Germany. *Discussion Paper No. 04-26* .