

Bridge Unemployment in Germany: Response in Labour Supply to an Increased Early Retirement Age Among the Unemployed

Matthias Giesecke*

Michael Kind[†]

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Abstract

This study examines an increase in the early retirement age from age 60 to 63 for the group of older unemployed workers in Germany. As consequence of this policy reform, the time to retirement is increased from the perspective of recently unemployed individuals and therefore serves as a source of exogenous variation. We estimate continuous time hazard models for individuals at risk of leaving the state unemployment into employment or early retirement. As a result we find a positive impact of an increase of the time to retirement on the reemployment probability, while the probability to retire early through exemption clauses is negatively affected. Thus the reform sets the right incentives and is able to reduce old age unemployment.

Keywords: Labour Supply, Retirement Behaviour, Old Age Unemployment

JEL-Classification: J14, J26, J64

*Ruhr Graduate School in Economics, c/o Universität Duisburg-Essen, Room R11 T06 C32, Universitätsstraße 12, 45117 Essen, Germany. Telephone: +49 201 183 4721. Email: Matthias.Giesecke@uni-due.de.

[†]Ruhr Graduate School in Economics, c/o Ruhr Universität Bochum, Room GC 2/149, Universitätsstraße 150, 44801 Bochum, Germany. Telephone: +49 234 32 26912. Email: Michael.Kind@rwi-essen.de.

1 Introduction

The incidence of unemployment in late stages of working careers has enormous effects on subsequent employment and on retirement decisions. An important issue in this context is whether recently unemployed individuals avoid returning to a job and remain unemployed, that is, unemployment serves as a bridge until retirement. In contrast, individuals may return to work in order to increase their income and to accumulate savings for their retirement stock. Finally, they may neither continue unemployment nor enter reemployment but rather exit into early retirement due to exceptional rules.

Dynamic models of retirement decisions under uncertainty suggest that individuals reevaluate their retirement decision as unexpected events take place (see e.g. Stock and Wise (1990)). In models of this kind, the relative expected lifetime utility determines whether one is to retire immediately or at some later period. Unemployment provokes considerable reevaluation in the light of expected lifetime utility and changes the trade-off between staying unemployed, returning to a job or to retire early.

The institutional setting of the German public pension system adds even more complexity to the reemployment-retirement trade-off in case of a late-career job loss. Until 2006, the minimum age for early retirement due to unemployment was 60 years. Then, the German social security legislation was modified, such that the early retirement age (ERA) for the unemployed is being increased in monthly steps to age 63.¹ Once this reform has fully phased in by December 2011, older unemployed workers will face a three year increase of the ERA.² Thus, as the ERA is increased by the reform, one can argue that the decision problem of the worker changes *ceteris paribus*.

In this paper, the increase of ERA is used to examine the corresponding response in labour supply. The central research question is therefore, whether the increased ERA affects the decision of older unemployed workers to remain unemployed, to return to work or to retire early. The hypothesis in favour of the policy reform should be the existence of a positive relationship between the time to retirement and the reemployment probability.

¹Subsequently, Early Retirement Age is abbreviated by ERA. In the context of this paper, the ERA refers to the earliest possible retirement age for old age pension due to unemployment.

²Up to this date (fall 2011), data is only available until the end of 2009.

Thus, increasing the ERA for unemployed persons from 60 to 63 will increase the time to retirement and therefore, if anything changes, increase the reemployment probability for a given age. The reform may also affect the alternative of a pathway into early retirement due to exemption clauses. That is, potential entry costs of such pathways may be relatively smaller over a prolonged time horizon making the use of exemption clauses more attractive.

From an empirical point of view, the reform can be seen as a source of exogenous variation and as such it allows to identify a causal effect on employment and retirement behaviour following a late-career job loss. In our empirical analysis we condition on a sample of unemployed individuals of age 55 to 63 using data from the German Socio-Economic Panel (SOEP) for the years 1991-2010. For those individuals at risk, we estimate the hazard rates of leaving the state unemployment into employment or into some kind of early retirement given the change in the time until the ERA is reached and a set of socio-demographic indicators. Early retirement in this context refers to labour market exit through exemption clauses that we call a “cheap exit”. For instance, exemption clauses could be disability rules.

The results indicate a positive effect of the increase in ERA on reemployment probabilities. Even though the coefficients are not always statistically significant, they are very robust across various models. Thus we conclude that an increase in ERA increases the incentives to return to work. In addition we find a negative effect of the increased ERA on early retirement. As such individuals are less likely to make use of exceptional clauses. It can be concluded that the reform works in the intended way.

The remainder of this paper is structured as follows. In the next section we describe the institutional setting in more detail and provide theoretical considerations. Section 3 explains the data used and the econometric strategy. In Section 4 we present empirical results and Section 5 concludes.

2 Institutional Setting and Theoretical Considerations

2.1 Institutional Setting

The German public pension system has been converted into a pure pay-as-you-go pension system after World War II. In the course of a major reform in 1972, the generosity of the public pension scheme was increased dramatically. Inevitably, this system ran into severe financing problems due to demographic change and major disincentives (see e.g. Borsch-Supan (2000)).

A series of reforms, beginning in the early 1990's, was motivated by the necessity to adjust to today's requirements and to be suitable for future generations. It seems natural in such a setting, that the burden of a changing old age dependency ratio must somehow be allocated among those groups who participate in the public pension system.³

Therefore a policy reform was introduced into the German social security legislation, that reorganises the specific retirement rules for unemployed individuals.⁴ The reform was originally enacted in 1992 and eventually took effect starting in 2006.

The change in the relevant rule that has finally found its way to realisation can be described as follows. The former minimum age to enter old age pension due to unemployment is increased from 60 years to 63 years in monthly steps. This increase is realised for the years of birth from 1946 to 1948.⁵ Adding one additional month for each month of birth shows that the reform will phase in between January 2006 and December 2011. For instance, a person born in April 1947, will face a postponement of 16 months until eligibility for old age pension due to unemployment is achieved. In other words, this person cannot receive old age pension benefits due to unemployment as formerly starting in April 2007 but instead in August 2008. Finally we have a six-year period of the change in the time to the ERA that will be relevant to our analysis.⁶

Another important issue is with respect to changes in the unemployment insurance if they

³The old age dependency ratio is referred to as the ratio of pension benefit recipients to contributors.

⁴The relevant clause in the German social security legislation (Sozialgesetzbuch) is § 237 Absatz 3 SGB VI in combination with Anlage 19 SGB VI.

⁵For more details, see the Appendix for the supplement 19 in SGB VI.

⁶Staubli and Zweimüller (2011) investigate labour market effects for a similar reform that took place in Austria between 2000 and 2006.

influence the decision to return to the labour market. In recent years, a series of labour market reforms have been enacted.⁷ Specifically, what matters for this study is the length of payment of regular unemployment insurance benefits before declining to social welfare benefits for older workers. The duration of unemployment benefit receipt has been subject to changes during the observation period between 1991 and 2010.⁸ Effectively, it is difficult to take these reforms into consideration in an empirical sense. As they are in interference with both the reforms of the public pension system and the relevant time frame, they may indeed play a role in the decision problem of an older unemployed worker. We have examined this problem in a simple model, where individuals are discriminated against each other in whether they are affected by the reform or not. We do not find any effect of the reforms of the length of unemployment benefit receipt.

2.2 Theoretical Considerations

It is important how unemployment of older workers may affect the subsequent decision process economically. The basic mechanisms are essential to understand how the policy reform may incentivise individuals to return to the labour market or not. A natural starting point for this exercise is the option value approach of Stock and Wise (1990). Following this framework, at each point in time an individual reevaluates the work-retirement trade-off with respect to relative expected lifetime utility.

In this paper, we consider only those individuals with a job loss such that they face a situation of unemployment by definition. The decision process is now characterised by a trade-off between staying unemployed, returning to a job or to choose a cheap exit. First, a job loss itself may alleviate the attractiveness of subsequent work. Jacobson et al. (1993) find that six years after a job loss, a typical U.S. worker still faces earnings reductions of roughly 25 percent. In such a scenario the expected future payoff from work decreases and therefore staying unemployed or retirement become relatively more attractive (Chan and Stevens, 1999). We expect the same basic mechanism to hold true for search costs to be induced by unemployment. Second, to compensate a decrease of financial resources

⁷Recent labour market reform acts are commonly known as the so called “Hartz reforms” in Germany, worked out by a commission in the early 2000’s.

⁸The relevant clause in the German social security legislation (Sozialgesetzbuch) is § 127 Grundsatz SGB III.

following a job loss, in contrast to the first case, an individual may have stronger incentives to return to a job and postpone retirement. Depending on which effect dominates, the theory then simply boils down to a deterministic problem to be solved by returning to the labour market if the expected lifetime utility of work is larger compared to staying unemployed or early retirement respectively. However, it must be kept in mind that for our population early retirement is subject to exemption clauses.

Now the reform comes into play. By definition, the reform is an extension of the time horizon to the ERA with a maximum of three years. In this context we observe three important mechanisms. First, the increased time to retirement is equivalent to an extended duration of unemployment *ceteris paribus*. Therefore, opportunity costs of unemployment increase and as a consequence the reemployment probability may increase due to the corresponding incentives to return to the labour market. Second, empirical evidence shows that there is a negative relationship between age and reemployment probability (see e.g. Chan and Stevens (2001)). These two basic effects may offset each other and ultimately it is an empirical question to investigate, whether the reform induces a positive response in labour supply in terms of an increasing reemployment probability.

The reform may affect the second alternative of a pathway into some kind of early retirement due to exemption clauses. That is, changes in the payoff structure due to an increase of the ERA may occur with respect to alternative retirement pathways. As exemption clauses potentially imply higher entry costs to such pathways, these may be partly alleviated as the ERA increases. Any benefits from exceptional early retirement rules may then be materialised over a longer period with relatively smaller entry costs. Thus, the state of unemployment may become less attractive in comparison to alternative pathways into early retirement. However the German legislation made it harder to make use of such clauses (e.g. the 58-rule is disestablished since 2008). Thus as the ERA increases it is harder to choose the "cheap exit". Therefore the net effect becomes unclear and is also empirically investigated.

3 Data and Econometric Strategy

3.1 Data

For this study we use data provided by the German Socio-Economic Panel (SOEP). It includes about 11,000 German households with some 20,000 individuals to be interviewed in subsequent years. As such, the SOEP is a representative sample of the German population. It allows access to a rich set of socio-demographic characteristics on the individual level as well as on the household level (see Haisken-DeNew and Frick (2005)).

The key information used in this paper is based on calendar records of employment status, unemployment status and retirement status. We use precise monthly information which is based on retrospective questions for the panel waves from 1991 to 2010. Individuals who participate in the survey answer these retrospective questions corresponding to the year before being interviewed. After we restrict our sample to individuals of age 55 to 63, we identify only those individuals that enter unemployment in the relevant observation period between 1991 and 2010.⁹ This proceeding rules out problems that are considered with left-censoring and we precisely know when unemployment spells are to begin. Subsequently, we then follow these unemployment spells over time. In a simple three state world we either observe spells to end in a transit to reemployment, in a transit to retirement or to be right-censored at the end of the observation period. In the case of right-censoring we do not know when a spell is to end. Further important restrictions on the base population are the exclusion of women and civil servants due to different legislative rules. The final sample consists of 685 male workers where 224 exhibit a transition into reemployment, 111 make use of exemption clauses and the remaining 350 stay unemployed (see Table 1).

Our intention is to explain how the reemployment probability is affected by an increased ERA. Therefore, the focus is on two different dependent variables, that is the reemployment probability and the early retirement probability. First, we define a binary variable to be zero as long as an individual remains unemployed. As soon as an individual exhibits

⁹The data used in this paper was extracted using the Add-On Package PanelWhiz for Stata. PanelWhiz (<http://www.PanelWhiz.eu>) was written by Dr. John P. Haisken-DeNew (john@PanelWhiz.eu). See Haisken-DeNew and Hahn (2010) for details. The PanelWhiz generated DO file to retrieve the data used here is available upon request. Any data or computational errors in this paper are the author's.

reemployment, this variable is assigned to be one. Second, we apply exactly the same principle for the transition behaviour out of unemployment into early retirement. Here, the binary indicator is zero as long as an individual remains unemployed and one as soon as an entry into early retirement has occurred.

To determine how reemployment and retirement probabilities are affected by an increase in the time to the ERA, the explanatory variable of central interest is the information, to what extent an individual faces such an increase. This variable measures the exogenous change in the time to retirement and this change exclusively depends on the year and month of birth of an individual. That is, whether an individual is affected by the reform is a question of being born before January 1946 (not affected) or not (affected). For those individuals who are born in or after January 1946, the ERA for an old age pension increases by one additional month for each month they are born later. The variable is constructed in a way that it takes on zero values for those who are not affected and counts the number of additional months for those who are affected (about 37 percent of the individuals in our sample are affected by the reform). Thus, once the reform has fully phased in, the reform variable will show a minimum of zero and a maximum of 36 additional months.

Table 1: Descriptive Statistics

	Mean	Std.Dev.	Min.	Max.
Additional Month(Reform)	10.32	(14.98)	0	36
Current Year Age	57.36	(1.60)	55	62
West Germany	0.49	(0.50)	0	1
Migrant	0.15	(0.36)	0	1
Subjective Health	0.75	(0.43)	0	1
Married	0.79	(0.41)	0	1
Home Owner	0.47	(0.50)	0	1
Dep. Child in Household	0.10	(0.30)	0	1
Years of Education	11.76	(2.53)	7	18
Unemployment Rate	11.09	(1.18)	9	13
Pre-retirement	0.07	(0.26)	0	1
Unemployed Partner	0.12	(0.33)	0	1
Retired Partner	0.11	(0.31)	0	1
N	685			
Absolute Number of:				
Stayed unemployed	350			
Become reemployed	224			
"Cheap Exit"	111			

Note: Authors' calculations based on SOEP (1991-2010).

Using the SOEP data, we can draw upon a large number of socio-demographic variables. We make extensive use of this kind of information as the retirement behaviour is de-

terminated by various individual-specific and household-specific characteristics. The set of explanatory variables includes age, region (east/west), migrant status, subjective health status, homeownership, dependent children, years of education, unemployment rate, participation in a pre-retirement programme, employment status of the spouse and the log gross income. From a decision-theoretic point of view, we model individual behaviour in the point in time that corresponds to a job loss. This leads to a data structure, where socio-demographic characteristics of individuals and households only play a role once an individual enters unemployment and not thereafter. Consequently in what follows and particularly in the duration framework, we make use of time-invariant regressors only.

3.2 Econometric Strategy

The analysis starts with a straightforward OLS framework, estimating the reemployment and retirement probability on a set of regressors including exogenous variation due to the reform steps. As we face a binary decision of being unemployed or leaving unemployment into employment or retirement respectively, we need to take this into account using a binary Probit model. While allowing for the discreteness of the dependent variable, this proceeding still faces a few shortcomings. First, the Probit framework very much relies on the normal distribution assumption of the error term. Second, we specifically analyse transitions out of unemployment and therefore need to take into account some kind of duration dependence. Third, due to the presence of right censoring we do not observe completed unemployment spells for the whole sample. Although the simple Probit framework may condition on the length of unemployment spells which could be included as a regressor, it does not provide appropriate mechanisms to account for right censoring. Therefore we propose an estimation technique which is able to handle these problems and hence make use of duration models, which are widely used in the relevant literature.¹⁰

The natural starting point in this framework is a formal statement on the probability distribution of unemployment spells, which is given by the cumulative distribution function

$$F(t) = \text{Prob}[T < t] \tag{1}$$

¹⁰See, among many others, Lancaster (1979), Nickell (1979), Chan and Stevens (2001), Steiner (2001) or Tatsiramos (2010).

where T is a random variable for the duration of unemployment and t is an arbitrary failure time of the unemployment spell.¹¹ Clearly, this is the probability that an unemployment spell is to end within the observation period. As an equivalent statement, the corresponding probability density function is

$$f(t) = dF(t)/dt \tag{2}$$

To describe the upper tail of the probability distribution, we define the survivor function to be

$$S(t) = \text{Prob}[T \geq t] = 1 - F(t) \tag{3}$$

which describes the probability of an unemployment spell to be equal or to exceed t . A useful concept within the duration framework is the hazard function, which is easily derived from the survivor function and can be written as

$$\lambda(t) = f(t)/1 - F(t) = f(t)/S(t) \tag{4}$$

A more precise statement of the hazard function in terms of probabilities is

$$\lambda(t) = \lim_{h \rightarrow 0} \frac{\text{Prob}[t \leq T < t + h | T \geq t]}{h} \tag{5}$$

where h is a small instant of time. The hazard function has a straightforward interpretation as it is the rate at which durations T will be completed in time t (see Kiefer (1988)). We treat time to be continuous although we draw on discrete time units. Since we have precise monthly information on unemployment spells and do not observe many transitions out of unemployment at one particular point in time this appears to be reasonable. We start from a fully parametric specification, modeling a proportional hazard specification of the form

$$\lambda(t|\mathbf{x}) = \lambda_0(t, \alpha) \cdot \phi(\mathbf{x}, \boldsymbol{\beta}) \tag{6}$$

¹¹See Kiefer (1988) for a comprehensive overview on economic duration data and hazard functions. The formal notation follows Kiefer (1988) or Cox and Oakes (1984), where $F(t) = \text{Prob}[T < t]$ instead of the usual convention, where $F(t) = \text{Prob}[T \leq t]$ which is useful for a more precise statement of the hazard function.

where $\lambda(t|\mathbf{x})$ is the hazard rate conditional on a set of socio-demographic characteristics \mathbf{x} , $\lambda_0(t, \alpha)$ is the baseline hazard and $\phi(x, \beta)$ is a scale factor. The basic principle of the proportional hazard framework is to factorise the hazard rate into a baseline which is a function of time only, and a scale factor which is a function of observed covariates. Consequently, all individuals have the same baseline hazard which changes over time. Socio-demographic characteristics are used in the estimation framework to scale the baseline hazard. We assume duration time T to be described by a Weibull distribution. The Weibull distribution is the best fit of what we observe in the data with respect to the length of unemployment spells.¹² To reduce the reliance on functional form assumptions of the baseline hazard, we additionally estimate a semi-parametric Cox model.

A remaining problem in the analysis is with respect to unobserved heterogeneity. An individual's attitude towards work may, for example, impact both reemployment behaviour and choosing the "cheap exit". If unobserved characteristics are neglected in the analysis, the results might be biased. An econometric approach to deal with unobserved heterogeneity in the duration framework is a so called frailty model. The basic assumption is that unobserved heterogeneity is multiplicatively linked to the hazard function $\lambda(t|\alpha) = \alpha\lambda(t)$.¹³ In this paper, we use a frailty model assuming an inverse Gaussian distribution. The inverse Gaussian distribution implies that the relative variability in the sample due to the unobservables reduces over time and gradually leaves a more homogeneous sample.¹⁴ This assumption fits well into our application, as individuals with a higher affinity to work will have a higher reemployment probability. As a result, individuals with a lower affinity to work will remain longer in the sample creating a more homogeneous sample over time. Thus, to control for unobserved heterogeneity, we estimate the hazard function

$$\lambda_{\theta}(t|x) = \lambda(t|x)[1 - 2\theta \ln\{S(t)\}]^{-\frac{1}{2}} \quad (7)$$

As argued before, unemployed individuals face a decision problem among three alternatives. They either stay unemployed, choose the "cheap exit" or try to find a new job. It is

¹²The results are robust to alternative distributional assumptions such as the Gompertz or exponential distribution. Tests indicate that the Weibull distribution is superior in terms of fit.

¹³Note that α represents unobserved heterogeneity, being a random positive quantity with mean 1 and variance θ .

¹⁴See Gutierrez (2002) for more details.

therefore straightforward to implement a competing risk model between alternatives that are mutually exclusive. In this context, the different failure types reemployment or early retirement are not assumed to be independent from each other as in the previous models. In this paper the approach by Fine and Gray (1999) is used and in contrast to equation (5), the risk set is extended, which can then be written as

$$\lambda(t) = \lim_{h \rightarrow 0} \frac{\text{Prob}[t \leq T < t + h \text{ and event Type 1} | T > t \text{ or } (T \leq t \text{ and not event Type 1})]}{h} \quad (8)$$

Hence, the probability that an individual experiences event Type 1, conditional on not having failed before or at least not having experienced event Type 1 before, is estimated.

4 Results

We distinguish between two fundamental transition mechanisms which are presented separately. We begin with the results for the transition from unemployment into reemployment and then provide results for the transition from unemployment into early retirement. At the end both transition mechanisms will be regarded in one model (competing risk).

All models are estimated in two versions, one including log income in the period before entering unemployment and one without log income. This is due to the large number of missing values on the income variable.

We start with the transition from unemployment into reemployment, where reemployment is used as the binary dependent variable (OLS and Probit) or failure event (duration models) respectively. The results for OLS and Probit estimations provide a first insight on the basic mechanisms in Table 2. Important regressors such as age and subjective health show the expected signs. Increasing age reduces the probability to return to employment and a better self-rated health condition increases the reemployment probability. Living in West Germany implies a lower reemployment probability which may be explained by a more flexible labour market in East Germany.¹⁵ Entering unemployment due to a pre-retirement programme has the expected negative impact on reemployment since there is no necessity to return to work due to a contract between employer and employee. Most

¹⁵For more information see Bellmann and Hohendanner (2009).

Table 2: Ols and Probit (Dep. var.: Reemployment)

	Ols	Ols	Probit	Probit
Additional Month(Reform)	0.001 (0.001)	0.003** (0.001)	0.005 (0.004)	0.011** (0.005)
Age(55)	-0.093*** (0.010)	-0.098*** (0.012)	-0.311*** (0.038)	-0.335*** (0.045)
West Germany	-0.167*** (0.062)	-0.152** (0.073)	-0.518** (0.221)	-0.515* (0.267)
Migrant	-0.084* (0.049)	-0.079 (0.054)	-0.328* (0.192)	-0.310 (0.229)
Subjective Health	0.148*** (0.036)	0.143*** (0.039)	0.551*** (0.136)	0.578*** (0.150)
Married	0.045 (0.043)	0.049 (0.048)	0.163 (0.142)	0.171 (0.166)
Home Owner	0.022 (0.036)	0.002 (0.039)	0.057 (0.118)	-0.006 (0.129)
Dep. Child in Household	-0.109* (0.056)	-0.166*** (0.064)	-0.392** (0.187)	-0.621*** (0.239)
Years of Education	0.008 (0.007)	-0.001 (0.008)	0.024 (0.022)	-0.006 (0.027)
Reg. Unempl. Rate	-0.005 (0.006)	0.000 (0.007)	-0.015 (0.022)	-0.001 (0.026)
Pre-retirement	-0.201*** (0.044)	-0.194*** (0.050)	-1.142*** (0.311)	-1.231*** (0.396)
Unemployed Partner	-0.107** (0.052)	-0.084 (0.057)	-0.347* (0.183)	-0.271 (0.199)
Retired Partner	-0.034 (0.052)	-0.055 (0.056)	-0.120 (0.197)	-0.239 (0.226)
Log. Gross Income		0.022 (0.033)		0.074 (0.112)
Constant	0.489*** (0.159)	0.348 (0.272)	-0.050 (0.552)	-0.446 (0.966)
N	685	554	685	554
R ²	0.199	0.217		
PseudoR ²			0.181	0.203

Note: Authors' calculations based on SOEP (1991-2010). *** p<0.01; ** p<0.05; * p<0.1. Robust standard errors in parentheses. Marginal effects at the mean are reported for the Probit model. Age(55) is age centered at 55.

importantly, there is a positive but statistically insignificant coefficient on the reform variable (“Additional Month”). Only in the models including income, the coefficient is significantly different from zero.¹⁶ Thus, we find first evidence of a positive effect of the increased ERA for old age pension on reemployment in the OLS and Probit framework.

Turning to duration analysis, the hazard ratios for the transition from unemployment into reemployment are presented in Table 3.¹⁷ Increasing age reduces the hazard of leaving the state of unemployment into employment. A quite strong and positive effect can be found for subjective health assessment. As before, participation in a pre-retirement programme

¹⁶The p-values in the other two cases are .022 and .19 respectively.

¹⁷The hazard ratio represents the percentage change of the baseline hazard with respect to the corresponding regressor.

Table 3: Duration Analysis (Dep. var.: Reemployment)

	Cox	Cox	Weibull	Weibull	Frailty	Frailty
Additional Month(Reform)	1.007 (0.005)	1.014*** (0.005)	1.008 (0.005)	1.015** (0.006)	1.010 (0.008)	1.021** (0.009)
Age(55)	0.771*** (0.039)	0.749*** (0.043)	0.817*** (0.044)	0.789*** (0.050)	0.698*** (0.059)	0.681*** (0.073)
West Germany	0.465*** (0.120)	0.432*** (0.133)	0.390*** (0.112)	0.387*** (0.131)	0.103*** (0.035)	0.170*** (0.085)
Migrant	0.642 (0.182)	0.652 (0.217)	0.624 (0.187)	0.649 (0.228)	0.508 (0.232)	0.563 (0.292)
Subjective Health	1.927*** (0.347)	1.924*** (0.379)	1.940*** (0.373)	1.910*** (0.398)	2.790*** (0.823)	2.827*** (0.919)
Married	1.247 (0.227)	1.244 (0.256)	1.287 (0.264)	1.244 (0.284)	1.161 (0.348)	1.252 (0.442)
Home Owner	1.010 (0.143)	0.958 (0.150)	1.009 (0.156)	0.999 (0.172)	1.035 (0.256)	0.950 (0.256)
Dep. Child in Household	0.672* (0.157)	0.520** (0.168)	0.642* (0.171)	0.494** (0.173)	0.461* (0.195)	0.304** (0.162)
Years of Education	1.022 (0.028)	0.984 (0.032)	1.028 (0.031)	0.993 (0.035)	0.985 (0.040)	0.963 (0.053)
Reg. Unempl. Rate	0.964 (0.024)	0.981 (0.030)	0.951* (0.027)	0.974 (0.033)	0.852*** (0.025)	0.915** (0.040)
Pre-retirement	0.187*** (0.111)	0.140*** (0.105)	0.173*** (0.105)	0.127*** (0.095)	0.077*** (0.066)	0.066*** (0.069)
Unemployed Partner	0.663* (0.158)	0.678 (0.174)	0.646* (0.171)	0.652 (0.192)	0.497* (0.206)	0.528 (0.242)
Retired Partner	0.764 (0.184)	0.647 (0.177)	0.814 (0.207)	0.696 (0.200)	0.703 (0.287)	0.476* (0.210)
Log. Gross Income		1.146 (0.141)		1.132 (0.155)		0.866 (0.126)
Weibull parameter ρ			0.785*** (0.032)	0.783*** (0.038)		
Frailty parameter ρ					1.271*** (0.089)	1.216* (0.144)
Frailty parameter θ					12.568*** (6.286)	9.212** (8.278)
N	685	554	685	554	685	554

Note: Authors' calculations based on SOEP (1991-2010). *** p<0.01; ** p<0.5; * p<0.1. Robust standard errors in parentheses. Hazard ratios are reported (HR >1 positive effect; HR <1 negative effect). Age(55) is age centered at 55.

decreases reemployment probability. Dependent children in a household or an unemployed spouse apparently lower the reemployment probability which may indicate specific time use preferences. Similar to the OLS and Probit framework, the coefficient of the increase in ERA is positive but in some models insignificant.¹⁸ Due to the robustness of the sign and size of the coefficient we conclude that the reemployment probability of the recently unemployed increases as the time until ERA increases. This positive effect probably results from an increase in the incentives to return to work. An apparent characteristic of the estimation is the significance of the variable of interest, when controlling for income. Tests show that this characteristic is not due to the inclusion of the income variable into the

¹⁸In the models where the coefficient is insignificant, the p-values are around .16.

model. The important detail is that the individual reports his income. As such there might be an unobservable characteristic that is positively correlated with the probability to report income and reemployment.

As unobserved heterogeneity might be a source of bias in our results, we estimate a frailty model. The results are also shown in Table 3. Here an increase in time until achievement of the ERA still positively, but statistically insignificant, affects reemployment probabilities. Again, the hypothesis in favour of the policy reform, that an increase in the ERA should positively affect reemployment behaviour, can be supported by the empirical results. However, the significance once income is included in the model vanishes. Thus the argument stated above is confirmed. Since the sign and the size of the coefficient is very robust across various specifications, we argue that there is a positive impact of an increase in ERA on reemployment.

We now turn to the transition from unemployment into the state of early retirement due to exemption clauses and thus, early retirement is now used as the binary dependent variable (OLS and Probit) or failure event (duration models). Again, we start with simple OLS and Probit regressions which are listed in Table 4.

The exit rates into early retirement decrease with age. Those who perceive their health condition to be good are less likely to retire on such pathways, which contrasts the reemployment scenario in Table 2. Home ownership, which serves as a proxy for assets, is positively significant. This indicates that wealthier people may be able to afford to retire early. Participation in a pre-retirement programme apparently increases the probability for early retirement status. Concerning the variable of interest, we find that an additional month until the ERA for old age pension due to unemployment is achieved, negatively affects the probability to retire early (using exceptional rules). Referring to the probit estimates, an increase of one month of the ERA decreases the probability to use the “cheap exit” by 0.9 percentage points. This result is robust to different model specifications, when compared to Table 5. Here the hazard ratios are about 0.98 in all specifications.¹⁹ This result suggests that an additional increase of the ERA by one month decreases the baseline hazard to retire early by roughly 2 percent.²⁰

¹⁹p-values of below .2.

²⁰An increase of the ERA by one year decreases the "cheap exit" probability by about 20% (0.98^{12}).

Table 4: Ols and Probit (Dep var.: Early retirement)

	Ols	Ols	Probit	Probit
Additional Month(Reform)	-0.002** (0.001)	-0.003*** (0.001)	-0.010** (0.004)	-0.014*** (0.005)
Age(55)	-0.020** (0.008)	-0.020* (0.010)	-0.085** (0.039)	-0.080* (0.043)
West Germany	0.110** (0.050)	0.062 (0.057)	0.514** (0.223)	0.253 (0.242)
Migrant	-0.030 (0.045)	-0.001 (0.055)	-0.098 (0.183)	0.031 (0.198)
Subjective Health	-0.121*** (0.036)	-0.086** (0.041)	-0.471*** (0.131)	-0.324** (0.142)
Married	-0.017 (0.036)	-0.076* (0.046)	-0.077 (0.162)	-0.313* (0.178)
Home Owner	0.075** (0.030)	0.092*** (0.033)	0.341*** (0.131)	0.391*** (0.138)
Dep. Child in Household	-0.011 (0.048)	0.029 (0.062)	-0.033 (0.214)	0.131 (0.234)
Years of Education	-0.004 (0.006)	-0.005 (0.007)	-0.024 (0.027)	-0.033 (0.030)
Reg. Unempl. Rate	0.000 (0.005)	-0.003 (0.006)	0.007 (0.021)	-0.006 (0.024)
Pre-retirement	0.159** (0.072)	0.189** (0.083)	0.538** (0.218)	0.592** (0.236)
Unemployed Partner	0.041 (0.042)	0.031 (0.047)	0.134 (0.175)	0.095 (0.190)
Retired Partner	0.100* (0.052)	0.120** (0.060)	0.412** (0.192)	0.442** (0.208)
Log. Gross Income		0.029 (0.025)		0.151 (0.124)
Constant	0.265** (0.116)	0.162 (0.227)	-0.661 (0.550)	-1.252 (1.041)
N	685	554	685	554
R ²	0.086	0.087		
PseudoR ²			0.095	0.091

Note: Authors' calculations based on SOEP (1991-2010). *** p<0.01; ** p<0.05; * p<0.1. Robust standard errors in parentheses. Marginal effects at the mean are reported for the Probit model. Age(55) is age centered at 55.

As mentioned above, unobserved heterogeneity could bias the results (e.g. people who are more opportunistic will have a higher probability to search for “cheap exits”). Therefore a frailty model is implemented and the corresponding results are to be found in Table 5. Even after controlling for unobserved heterogeneity, an increase in the ERA decreases the incentives for unemployed individuals to search for the “cheap exit”.

The decision between three alternatives that are mutually exclusive implies that choosing one alternative is equivalent with not choosing the other two. With respect to this interdependence, the econometric approach in the framework of duration analysis is a competing risk model. Table 6 includes two models, where the first column represents a model in which the event of interest is reemployment and the competing event is early retirement.

Table 5: Duration Analysis (Dep. var.: Early retirement)

	Cox	Cox	Weibull	Weibull	Frailty	Frailty
Additional Month(Reform)	0.990 (0.007)	0.988 (0.008)	0.991 (0.007)	0.991 (0.008)	0.983 (0.014)	0.984 (0.016)
Age(55)	1.363*** (0.129)	1.397*** (0.152)	1.360*** (0.123)	1.385*** (0.143)	1.849*** (0.335)	1.321** (0.166)
West Germany	1.241 (0.479)	1.045 (0.435)	1.253 (0.487)	1.025 (0.431)	1.570 (1.220)	0.548 (0.295)
Migrant	0.802 (0.231)	1.062 (0.316)	0.779 (0.226)	1.018 (0.302)	0.606 (0.352)	0.945 (0.449)
Subjective Health	0.528*** (0.105)	0.649** (0.142)	0.525*** (0.107)	0.654* (0.147)	0.276*** (0.113)	0.591 (0.230)
Married	0.865 (0.239)	0.641 (0.177)	0.851 (0.238)	0.628* (0.176)	0.724 (0.404)	0.462 (0.300)
Home Owner	1.657** (0.369)	1.798** (0.410)	1.629** (0.368)	1.742** (0.399)	2.653** (1.200)	1.957 (0.894)
Dep. Child in Household	0.887 (0.301)	1.027 (0.357)	0.927 (0.319)	1.070 (0.375)	0.860 (0.591)	0.806 (0.482)
Years of Education	0.970 (0.047)	0.976 (0.050)	0.968 (0.048)	0.969 (0.051)	0.936 (0.092)	0.930 (0.073)
Reg. Unempl. Rate	0.982 (0.035)	0.983 (0.039)	0.982 (0.036)	0.981 (0.039)	0.965 (0.070)	0.894 (0.062)
Pre-retirement	1.405 (0.421)	1.457 (0.460)	1.519 (0.457)	1.616 (0.507)	2.306 (1.389)	1.963 (0.986)
Unemployed Partner	1.285 (0.358)	1.192 (0.371)	1.382 (0.389)	1.296 (0.406)	1.910 (1.074)	1.299 (0.483)
Retired Partner	1.846** (0.501)	1.790** (0.494)	1.831** (0.506)	1.787** (0.498)	3.351** (1.851)	1.828 (1.234)
Log. Gross Income		1.047 (0.206)		1.058 (0.209)		0.547*** (0.111)
Weibull parameter ρ			1.746*** (0.145)	1.742*** (0.154)		
Frailty parameter ρ					3.492*** (0.291)	1.862 (0.962)
Frailty parameter θ					3.2e+06*** (6.8e+06)	1.984 (10.013)
N	685	554	685	554	685	554

Note: Authors' calculations based on SOEP (1991-2010). *** p<0.01; ** p<0.5; * p<0.1. Robust standard errors in parentheses. Hazard ratios are reported (HR >1 positive effect; HR <1 negative effect). Age(55) is age centered at 55.

In the third column the order is reversed. A brief look at the variable of interest, the number of additional months until ERA, indicates robustness of the results derived earlier. Even if the independence assumption of reemployment and “cheap exit” is dropped, there is a positive but insignificant²¹ effect of increasing the ERA by one additional month on reemployment behaviour. Using different econometric methods with different assumptions therefore shows that the reemployment probability increases as the time horizon to bridge unemployment is prolonged by an increased ERA. Furthermore, individuals seem to be less incentivised to take the “cheap exit”, which is a robust result across all different specifications. An increase of the ERA by one month decreases the baseline hazard to

²¹p-value of .11.

Table 6: Competing risk

	Reemployment	Reemployment (Inc.)	Early retirement	Early retirement (Inc.)
Additional Month(Reform)	1.008*	1.015***	0.986**	0.981**
	(0.005)	(0.005)	(0.007)	(0.008)
Age(55)	0.763***	0.739***	1.225***	1.267***
	(0.038)	(0.042)	(0.094)	(0.109)
West Germany	0.463***	0.437***	2.036*	1.607
	(0.120)	(0.135)	(0.745)	(0.616)
Migrant	0.647	0.644	0.866	1.097
	(0.183)	(0.213)	(0.247)	(0.321)
Subjective Health	1.972***	1.963***	0.451***	0.560***
	(0.357)	(0.389)	(0.089)	(0.121)
Married	1.269	1.293	0.789	0.588**
	(0.230)	(0.266)	(0.206)	(0.154)
Home Owner	0.992	0.928	1.623**	1.762***
	(0.139)	(0.145)	(0.342)	(0.381)
Dep. Child in Household	0.683	0.526**	0.995	1.235
	(0.159)	(0.170)	(0.332)	(0.426)
Years of Education	1.021	0.984	0.965	0.976
	(0.028)	(0.032)	(0.045)	(0.048)
Reg. Unempl. Rate	0.967	0.984	1.005	1.000
	(0.025)	(0.030)	(0.034)	(0.037)
Pre-retirement	0.187***	0.140***	1.948**	1.959**
	(0.111)	(0.105)	(0.574)	(0.610)
Unemployed Partner	0.653*	0.670	1.439	1.305
	(0.155)	(0.172)	(0.387)	(0.385)
Retired Partner	0.720	0.596*	1.867**	1.895**
	(0.177)	(0.168)	(0.518)	(0.535)
Log. Gross Income		1.135		1.116
		(0.139)		(0.220)
N	685	554	685	554

Note: Authors' calculations based on SOEP (1991-2010). *** p<0.01; ** p<0.05; * p<0.1. Robust standard errors in parentheses. Hazard ratios are reported (HR >1 positive effect; HR <1 negative effect). Age(55) is age centered at 55.

retire early by roughly 2 percent.

Thus individuals are more likely to become reemployed and less likely to choose a "cheap exit" when faced with an extended time horizon until the ERA is reached.

4.1 Political relevance

The results show the impact on the individual reemployment and "cheap exit" probability. In terms of policy relevance the overall effects are of interest. Therefore some ballpark figures are calculated to enable an evaluation of the political relevance.

Different effects have to be examined. First, the unemployment insurance saves money as people are more likely to become reemployed. As the results are derived within a duration analysis, one can also state that people are becoming reemployed faster. Second,

the people who are reemployed pay taxes to the government. Thus there is additional benefit resulting from the increased reemployment probability. Third, the unemployment insurance has to take care of the people who are less likely to take the "cheap exit" (i.e. who take the "cheap exit" at a later stage). Thus the first beneficial result to the unemployment insurance has to be compared to the additional spending due to the lower "cheap exit" probability. But fourth, the public pension system saves, as people take the "cheap exit" at a later stage. Thus the public pension system should be relieved.

Now each of the effects mentioned above will be roughly quantified.

The predicted median survival time of the people subject to the reform is about 17 months smaller than the one of the people not affected by the increase in the ERA. As such the people affected by the reform leave the state of unemployment 17 months earlier. The average monthly unemployment insurance/benefit they got while they were unemployed was about 900Euro. Thus the unemployment agency saves about 15,000 p.P. (17 months * 900Euro). With respect to the unemployment agency, roughly 10,000 people aged between 55-65 enter unemployment each year. As about one third of the sample becomes reemployed, the unemployment agency saves about 53 Mio. Euro per year (3,500 people * 15,000Euro). Since the yearly budget of the unemployment agency is about 4 billion Euro, the savings make up roughly 1.5% of the yearly budget.

In the 17 months the individuals are faster reemployed, they pay taxes. The in sample average amount of taxes (gross labour earnings- net labour earnings) is about 600Euro. Each individual pays about 10,000Euro (17 months * 600Euro) of taxes. As this refers to about 3,500 people per year, the additional tax income is ca. 35 Mio. Euro.

Referring to the results for the "cheap exit", the individuals will choose the "cheap exit" at a later stage (have a lower probability to take the "cheap exit"). Here the individuals affected by the reform have a larger predicted median survival time of about 12 months. As already mentioned above, the average unemployment insurance/benefit payment is about 900Euro per month. Thus the unemployment insurance pays about 11,000Euro p. P. (12 months * 900Euro). As about one sixth of the sample chooses the "cheap exit", it is assumed that about 1,700 people (10,000 * 1/6) take the "cheap exit" each year. Thus the unemployment insurance has to pay an additional 19 Mio. Euro (1,700 people * 11,000Euro). Compared

to the saved 53 Mio. Euro this sums up to a plus of 25 Mio. Euro.

The intention of the reform is to relieve the pressure on the public pension system. Therefore the savings to the public pension system due to the later take up of the "cheap exit" are estimated. The average monthly transfer of the disability pension is about 700Euro. As the individuals take the "cheap exit" about one year later, this sums up to 8.500Euro p. P.(12 months * 8,500Euro). As about 1,700 people take the "cheap exit" each year, this amounts to roughly 15 Mio. Euro. Thus the effect seems to be relatively small.

5 Conclusion

This paper analyses the effect of a reform of the German public pension system on the reemployment probability and early retirement behaviour for older male workers. In the course of the reform, the ERA for an old age pension due to unemployment is increased by a maximum of three years in monthly steps. The sample is restricted to a pool of male individuals who enter unemployment between 1991 and 2010. Using data from the German Socio-Economic Panel allows to control for a rich set of socio-demographic factors, which may be part of a somewhat complex relationship between unemployment, reemployment and early retirement. Similar to the option value framework of Stock and Wise (1990) individuals evaluate their relative expected lifetime utility of each alternative and choose the most favourable one. An increase in the ERA may change the expected lifetime utility of each alternative as the time horizon of bridge unemployment increases. In this context, prolonged bridge unemployment should become less attractive, incentivising older unemployed workers to return to the labour market *ceteris paribus*. Moreover, searching for a "cheap exit" should as well become more favourable.

Using a variety of econometric methods to complement one another, we find evidence, that increasing the ERA for an old age pension will result in a higher probability to become reemployed. In addition the probability of choosing a "cheap exit" is decreased by an increased ERA. The higher reemployment probability due to an increase in ERA might be caused by an increase in the workers incentives to return to work. The sum of future earnings will be higher and the opportunity costs of unemployment are higher.

Thus returning to work becomes more favourable. The decreased probability of choosing a "cheap exit" can be explained by changes in German law that make it harder to choose such an exceptional clause. As such less people are able to take such a pathway into early retirement.

From a policy perspective this result is positive. The burden of payments from the public pension system seems to be reduced. People do become reemployed. Thus, the increase in the ERA thus leads to a lower proportion of unemployed and a lower proportion of retired among the elderly. Thus the system is financially relieved. However, these results apply to a very specific subgroup of the population which may draw on a decision set which is not very similar to the one of a typical older worker who directly transits from employment into retirement.

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A Reform Steps

Table 7: Supplement 19, Social Security Code (Anlage 19, SGB VI): Part I.

Increase of Retirement Age for Old Age Pension due to Unemployment					
Year of Birth	Increase			Early Claims	
	in Months	to Age (Years)	to Age (Months)	Year	Month
1937					
January	1	60	1	60	0
February	2	60	2	60	0
March	3	60	3	60	0
April	4	60	4	60	0
May	5	60	5	60	0
June	6	60	6	60	0
July	7	60	7	60	0
August	8	60	8	60	0
September	9	60	9	60	0
October	10	60	10	60	0
November	11	60	11	60	0
December	12	61	0	60	0
1938					
January	13	61	1	60	0
February	14	61	2	60	0
⋮	⋮	⋮	⋮	⋮	⋮
November	23	61	11	60	0
December	24	62	0	60	0
1939					
January	25	62	1	60	0
February	26	62	2	60	0
⋮	⋮	⋮	⋮	⋮	⋮
November	35	62	11	60	0
December	36	63	0	60	0
1940					
January	37	63	1	60	0
February	38	63	2	60	0
⋮	⋮	⋮	⋮	⋮	⋮
November	47	63	11	60	0
December	48	64	0	60	0
1941					
January	49	64	1	60	0
February	50	64	2	60	0
⋮	⋮	⋮	⋮	⋮	⋮
November	59	64	11	60	0
December	60	65	0	60	0
1942 - 1945	60	65	0	60	0

Source: Anlage 19, SGB VI.

Note: The figures displayed here reflect the reform steps for an increase in the regular age for eligibility of old age pension due to unemployment.

Table 8: Supplement 19, Social Security Code (Anlage 19, SGB VI): Part II.

Increase of Retirement Age for Old Age Pension due to Unemployment					
Year of Birth	Increase			Early Claims	
	in Months	to Age (Years)	to Age (Months)	Year	Month
1946					
January	0	65	0	60	1
February	0	65	0	60	2
March	0	65	0	60	3
April	0	65	0	60	4
May	0	65	0	60	5
June	0	65	0	60	6
July	0	65	0	60	7
August	0	65	0	60	8
September	0	65	0	60	9
October	0	65	0	60	10
November	0	65	0	60	11
December	0	65	0	61	0
1947					
January	0	65	0	61	1
February	0	65	0	61	2
March	0	65	0	61	3
April	0	65	0	61	4
May	0	65	0	61	5
June	0	65	0	61	6
July	0	65	0	61	7
August	0	65	0	61	8
September	0	65	0	61	9
October	0	65	0	61	10
November	0	65	0	61	11
December	0	65	0	62	0
1948					
January	0	65	0	62	1
February	0	65	0	62	2
March	0	65	0	62	3
April	0	65	0	62	4
May	0	65	0	62	5
June	0	65	0	62	6
July	0	65	0	62	7
August	0	65	0	62	8
September	0	65	0	62	9
October	0	65	0	62	10
November	0	65	0	62	11
December	0	65	0	63	0
1949 - 1951	0	65	0	63	0

Source: Anlage 19, SGB VI.

Note: The figures displayed here reflect the reform steps for an increase in earliest possible claims for old age pensions due to unemployment.