Employment Trajectories beyond Retirement in Germany

Daniela Hochfellner[a]

Carola Burkert[b]

November 5, 2013

Abstract

Extending employment careers of individuals beyond normal retirement age is one way of dealing with the impact of demographic aging on fiscal sustainability of the German statutory pension system. One alternative of working longer is to start claiming pension benefits and at the same time staying in the labor force. Our research complements existing literature by studying determinants of transitions to post retirement jobs within the same work environment vs. a different work environment of birth cohorts 1940 to 1942. We estimate proportional sub-hazard models accounting for competing risks using unique German social security data linked to pension accounts. Our findings suggest that retirees in Germany transition much faster when working in the same environment. Transition probabilities in a different work environment differ significantly by cohort and gender. The cumulative incidence of entering the same work environment decreases with increasing wages in the career job. Retirees with lower labor market attachment show a higher cumulative incidence of transitioning in different work environments. We also confirm the influence of firm characteristics on entering different job trajectories beyond retirement.

JEL Codes: J14, J26

Keywords: post-retirement employment, retirement transitions, working longer

[a] *Corresponding author*: Institute for Employment Research, Research Data Centre
Regensburger Str. 104, 90478 Nuremberg, Germany, email: daniela.hochfellner@iab.de
[b] Institute for Employment Research, Regional Directorate Hessen
Saonestr. 2-4, 60528 Frankfurt, Germany, email: carola.burkert@iab.de

1 Introduction

Low fertility rates, increasing life expectancy, and a low net migration rate accelerate demographic change in Germany. The resulting prospects are characterized by a striking decline of the population at working age, a rapid aging of the workforce, and an increasing share of the population being 65 years and older. These trends challenge the welfare state, the social security system, the labor market, and the individuals in many ways. In the near future social security is facing shortfalls which might result in lower benefits and replacement rates. Individuals are confronted with reduced pension income and the risk of living in old-age poverty. Labor shortages will influence processes on the labor market. The aforementioned scenarios all require future needs to overcome the shortages, not only in Germany but also in other countries. Social security budgets for example might profit from extending individuals' employment careers to a higher normal retirement age. Individuals might consider post retirement employment to gain additional income in retirement. These are only two out of many alternatives to cope with an aging society which are discussed in public policy. Governments of various European countries, as well as the U.S. and Canada are working on public policy reforms to countervail the rising difficulties of population aging by finding ways to maintain older workers in the labor market. To develop long-lasting efficient changes in public policy, the understanding of employment trajectories, transitions in employment, and constraints of the older workforce are important. While some individuals work longer by choice, others need to remain in the labor force for financial reasons. In turn, others might be pushed out of the labor force, because they lack the necessary skills labor markets demand, or because they are endowed with minor labor market attachments. Hence, different push and pull factors determine different employment outcomes within or beyond the retirement transition. Workers may leave the labor force directly from their career job or transition step wise through bridge jobs. Another alternative is to retire and start claiming pension benefits without leaving the labor force. Studying labor supply of retired workers is not only important for public policy. It also addresses a innovative and constantly growing field in academic research. The different concepts and driving forces of bridge employment and paid work after retirement are not understood in their complexity so far. In the U.K. and the U.S. post retirement employment is addressed in more detail, whereas there is little research on this topic in Germany. Data resources which support studies on post retirement employment in Germany are rare. By using unique German administrative data we contribute new insights to employment behavior of retirees. This paper discusses different employment outcomes for retirees who decide

to continue working beyond retirement. Our study examines to what extent employment histories, individuals' attributes, and firm characteristics influence the likelihood of pursuing jobs beyond retirement. We hereby distinguish between retirees who stay in the same work environment and retirees who start working in a completely different field, compared to their jobs before being retired. Proportional sub-hazard estimates accounting for competing risks allow for comparing transition times into different post retirement employment trajectories.

Section 2 contains an overview of the German institutional background in reference to the situation of older workers on the labor market and beyond retirement. We discuss in Section 3 existing theoretical concepts of working later in life. In addition, a summary of previous studies in this field of research is outlined in Section 4. Section 5 includes our theoretical framework and hypotheses whereas Section 6 describes the data and methodology used. We present our results in Section 7 and conclude with implications for public policy in Section 8.

2 Institutional Background

To understand the driving forces of staying in the labor force beyond retirement it is necessary to learn about the labor market participation of older individuals in Germany. The legal regulations of the German pension system have to be considered as well when analyzing post retirement employment trajectories.

2.1 Older Workers on the German Labor Market

In the past decade, labor market participation of older individuals, which is displayed in Figure 1 has increased continuously. The employment rate of the age group 60 to under 65 did rise strongly as well, albeit from a lower base (Arlt, Dietz, & Walwei, 2009; Dietz & Walwei, 2011). Nevertheless, in 2010 only half of the men and about one third of the women, aged 60 to under 65, were employed. Labor force participation beyond the normal retirement age of 65 is displayed in Table 1. Although the numbers are declining with age, there is still a considerable percentage of individuals employed beyond normal retirement age in 2010 for ages 65 to 69. The outlined statistics confirm that the labor force participation of older individuals is still on a low level. That is, existing initiatives addressing the inclusion of older workers in the labor force are heading in the right direction, although they are not entirely successful so far. For instance, firms are starting to appreciate older workers for their expertise, but this is only partially expressed in

Figure 1: Labor market participation age 60 to under 65 years, 2000 to 2010, by gender
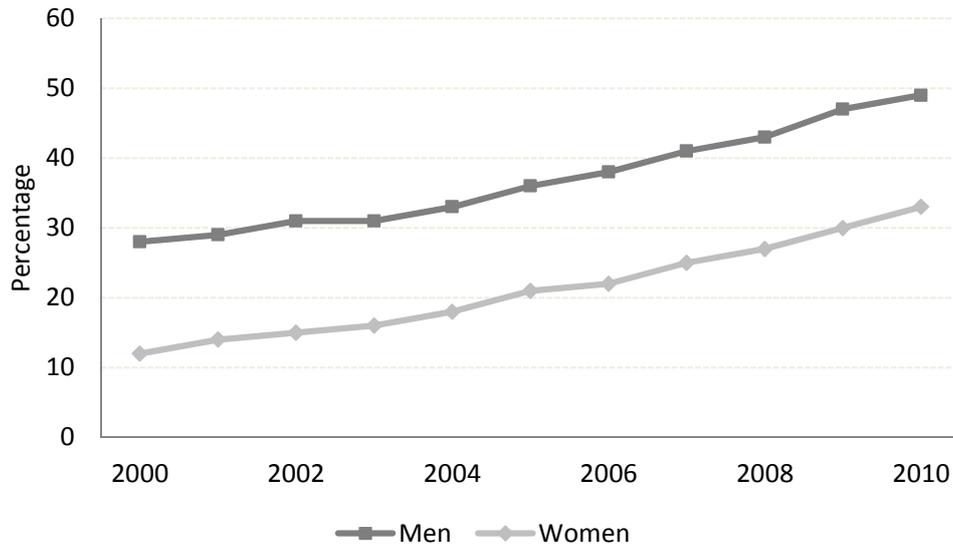
Table 1: Labor market participation beyond normal retirement age in 2010

Age	65	66	67	68	69
Employed (in per cent)	9.6	8.0	6.8	6.2	5.2

operational implementations. Few firms provide in-firm training designed especially for their older workers (Bellmann & Stegmaier, 2007).

2.2 The German Pension Insurance

The German pension system is currently designed as a pay as you go scheme to provide the standard of living in retirement for all private and public sector employees entitled to social security. Contributions are currently 18.9% of gross wages and are shared equally by employers and employees through payroll taxes up to a varying contribution limit (Künemund & Kolland, 2007). The pension benefits received are linked to lifetime income, as they are proportional to labor income averaged over the individuals' life

course. According to the Statistik der Deutschen Rentenversicherung (2013), the old-age pension payment for the average retiree [1] in 2012 per month was about 1,263.15€ in West Germany and 1,121.40€ in East Germany. Currently the German pension system still provides insured individuals a decent level of retirement income at low effective retirement ages (Bonin, 2009). But expenditures are continuously rising. In 2001 public pension expenditures made up 21 percent of public spending and 11.8 percent of GDP (Börsch-Supan & Wilke, 2006). The rising age dependency rate makes this untenable in the future. Fewer workers will be assigned to finance the benefits of more recipients. Adjustments to the existing system will have to be considered for future stability. Preliminary changes have already been made. The normal retirement age increases gradually from 65 to 67. As Figure 2 shows, actual retirement age has increased over recent years, but on average individuals still retire earlier than the normal retirement age of 65. Hence, raising retirement age cannot be the only reform to reduce expenditures. This measure will only help reduce expenditures if at the same time the extension of individuals' working lives is actively supported by public policy. Future reforms might contain cutbacks in the replacement rate resulting in lower benefits received.[2] This would be an additional burden for individuals living at the poverty threshold. The number of people age 65 and over receiving financial support along with their pension benefits increased from almost 260,000 in 2003 to approximately 410,000 in 2010.[3] An explanation for this goes back to the way benefits are calculated. Interruptions of employment or reduced working hours result in lower contributions and therefore directly affect the amount of benefits received. Steiner and Geyer (2010) predict that future pension incomes will decline due to unstable working careers, especially in the eastern part of Germany. This scenario worsens when replacement rates are reduced. Thus, extending working life for the purpose of paid work after retirement is one possibility for individuals to catch up on pension entitlement losses throughout their working career.

---

[1] The average retiree is defined as receiving an regular old age pension payment after contributing 45 years (Statistik der Deutschen Rentenversicherung, 2013)

[2] The replacement rate is defined as the percentage of workers lifetime income that is paid out by the pension system upon retirement. A worker with average lifetime income who was employed for 45 years currently receives about 70 percent of pre-retirement net earnings (Börsch-Supan & Wilke, 2006).

[3] Numbers retrieved from the genesis online database on December 05, 2012.

Figure 2: Average actual age at retirement, 2000 to 2010, by gender
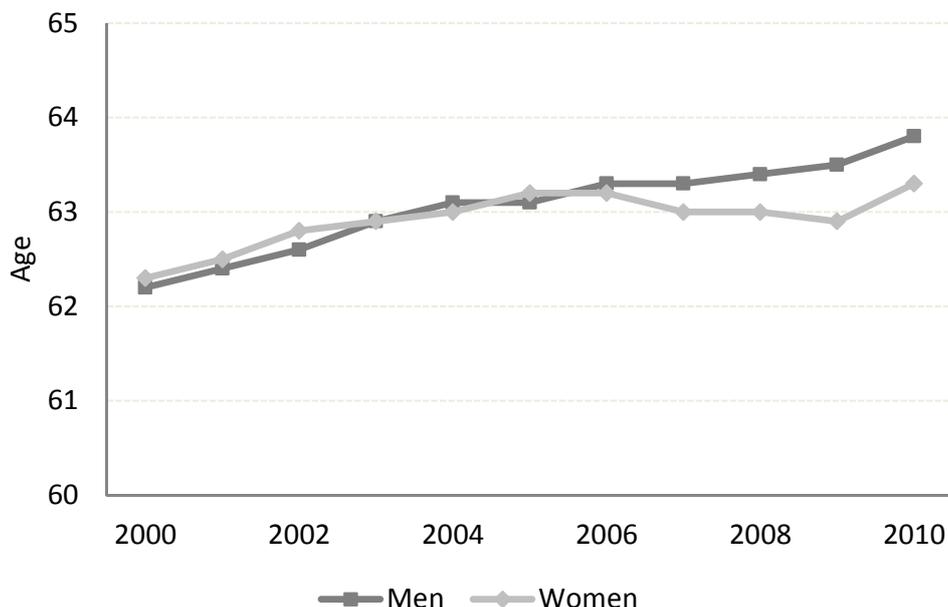
3 Theoretical Considerations on Working Longer

Institutional systems stimulate the separation of working life and retirement, although individualization and pluralization of the modern society offer more possibilities for individuals to arrange their lives. Both Kohli and Rein (1991) and Riley and Riley (1994) consider the concept of working continuously to accumulate savings to later spend on leisure in retirement obsolete. Individuals do not tend to assign working and leisure time to different phases in their life course. Due to an increase of alternative ways to transition between different stages in life, it is possible to combine work and leisure time. For instance, being employed beyond retirement is one way of doing so. Motivations for this are discussed in various theoretical concepts.

3.1 Life Course Perspective

The life course model (Kohli, 1985, 1989, 2000) separates individual's biographies in sequences within theoretically fixed transition boundaries: education, employment, and retirement. This trichotomy is mainly based on institutional frameworks that have emerged

in western societies over time. Hence, this model binds individuals to the structured and sequential patterns arising from the defined standard biography. The statutorily regulated duration of education and normal retirement age increase institutional influence on individuals' behavior. However, elements of this life course model experience increasing de-standardization; for instance the transition from work to retirement. Continuing employment beyond retirement dissolves the fixed boundaries of different stages in life. It offers more alternatives for transitioning between life course sequences and enables individuals to pursue their own plan of life (Beck, 1986). Post retirement employment is considered as a result of such individual life plans. Life course theory also suggests path dependency, which means that different life spheres are influenced by others (Wang, Zhan, Liu, & Shultz, 2008). For instance, social inequality is transferred (Fasang, 2012) through this dependency. This concept, when applied to retirement transitions, suggests that individuals will perceive retirement in different ways that are influenced by previous events in their lives (von Bonsdorff, Shultz, Leskinen, & Tansky, 2009).

3.2 Continuity Theory

The continuity theory (Atchley, 1989, 1992) is important to consider when studying how people make decisions about when to retire and life after retirement. It emphasizes that people, despite changes occurring in their lives, maintain the same preferences and habits evoked by their personalities. Individuals experience stress and discomfort if familiar structures and daily routines provided by working life change once they are retired. Maintaining these after retirement supports a smooth complete withdrawal from the labor market (Kim & Feldmann, 2000). This behavior is considered to be a strategy of successful aging (Backes & Clemens, 2003). Individuals choose to continue working beyond retirement, because work sets the structures and daily routines they need for their well-being. Continuing employment also helps individuals to stay engaged in social relationships and pursue active lifestyle patterns (Wang & Shultz, 2010). Achieving continuity is conditioned by age (Kim & Feldmann, 2000). It might not be possible to achieve continuity for some individuals, because older age is linked to more constraints (Elder, 1995). Poor health, for instance, can put constraints on individuals in their search for continuity.

3.3 Perception of Retirement

The new understanding of retirement as a balanced relationship between work, leisure and learning (Maxin & Deller, 2010; Riley & Riley, 1994) involves different perceptions and

definitions across disciplines. Sociology defines retirement as complete withdrawal from working life with economic consequences for society. This implies a dynamic definition which is not bound to a specific age at which the transition takes place. However, the normative retirement age is set through institutions. Retirement in an institutional sense happens at one point in time. It is directly related to the receipt of pension benefits. When applying this definition, retirement can be described within specific age boundaries (Künemund & Kolland, 2007). Following theses perceptions, statutory retirement is not equal to complete withdrawal from working life. Both the discrete and continuous perception of retirement are discussed in literature. Previous studies include concepts of bridge jobs, phased retirement, un-retirement, reverse retirement, or post-retirement employment, and silver workers. Different studies use these expressions in slightly different ways. For instance, some studies define bridge jobs as jobs following career employment prior to statutory retirement (e.g., Ruhm, 1990). Other studies analyze bridge jobs in a wider perspective, which also includes paid work in retirement (e.g., Hébert & Luong, 2008).

In Germany, it is mandatory for the employer to report the end of employment to social security at the normal retirement age. By default, all employment contracts end at the normal retirement age. In the case of continuing work, the employer has to extend the contract and turn in a second notification to social security. At the very least, continuing employment careers are interrupted by one day. For this reason, we follow the institutional definition and define an individual's beginning of retirement at the age at which she starts claiming pension benefits, not by the time of her complete withdrawal from the labor market. According to Pleau (2010), jobs beyond retirement are called post-retirement jobs (PRJ).

4 Current State of Research

Previous studies focus on timing of retirement and push and pull factors that affect an individual's decision making such as age, wage, health, or social security (e.g., Burtless, 1986; Fields & Mitchell, 1984; Radl, 2007; Stock & Wise, 1990). However, push and pull factors are mainly considered when referring to labor market exits, not when studying extending working careers. Only a few studies analyze employment patterns of the older workforce in a longitudinal perspective (e.g., Hébert & Luong, 2008; Maestas, 2010; Pleau, 2010; Smeaton & McKay, 2003). Most of these studies compare two points in time, and apply discrete methods (e.g., von Bonsdorff et al., 2009; Cahill, D.Giandrea,

& Quinn, 2005; Shultz, Morton, & Weckerle, 1998; Wang et al., 2008). Generalization of previous results is often not possible, because former studies mainly analyze isolated populations, such as specific occupations or industries (e.g., Adams & Rau, 2004; Davis, 2003; Hanson Frieze, Olson, & Murrell, 2011; Kim & Feldmann, 2000; Saba & Guerin, 2005; Shultz et al., 1998). The most influential factors of maintaining employment during retirement transitions according to the literature are: financial status, labor market attachment, and health (Shultz et al., 1998; Wang & Shultz, 2010). Another important factor, which so far has not been analyzed in detail, is the labor demand side. Firm characteristics may also function as push or pull factors.

4.1 Financial Situation

The financial situation of each individual is an important predictor of outcomes in retirement and working longer (Davis, 2003; Kim & Feldmann, 2000; Phillipson, 2004; Saba & Guerin, 2005; Wang et al., 2008). However, the direction of the financial impact is seen differently. Some studies connect working longer to lower incomes (e.g., Dittrich, Büsch, & Micheel, 2011; Dorbritz & Micheel, 2010; Hanson Frieze et al., 2011; Hershey, Henkens, & van Dalen, 2010; Hochfellner & Burkert, 2013; Kim & Feldmann, 2000; Micheel, Roloff, & Wickenheiser, 2010; Shacklock & Brunetto, 2011). In this case post-retirement employment is necessary to gain additional income. Individuals who face the risk of old-age poverty are more likely to work when they are retired. This applies, for instance, to divorced women or individuals with outstanding mortgages (Scherger, Hagemann, Hokema, & Lux, 2012; Smeaton & McKay, 2003), and minorities in general (Quinn & Kozy, 1996). However, other studies suggest that working longer is not a result of low wealth accumulation (Maestas, 2010; Scherger et al., 2012; Wang et al., 2008). Cahill, Giandrea, and Quinn (2006) find that leaving career jobs for a bridge job instead of complete retirement is also more likely for individuals at the upper end of the wage distribution. Wealthy people can spend more money without the need to generate additional income through paid work (Komp, van Tilburg, & van Groenou, 2010). Hence, they are more likely to extend their working life simply because they enjoy working, or because they want to increase their quality of life (McNair, 2006).

4.2 Labor Market Attachment

Individuals with higher labor market attachment are familiar with the structure and requirements of the labor market. They can integrate themselves much faster than

individuals who are less attached. Individuals with lower labor market attachment have less negotiating power (Phillipson & Smith, 2005), which results in fewer opportunities to find a job or continue a job beyond retirement (Lain, 2011). Unemployment experiences involve a loss of general and occupational specific human capital. The longer the duration of unemployment the higher the loss of human capital. Schellenberg, Turcotte, and Ram (2005) find that men and women returning to paid employment have all worked full-time prior to retirement. Smeaton and McKay (2003) state that the best predictor of being employed beyond retirement is to be employed prior to retirement. Maestas (2010) finds higher un-retirement rates among individuals who retired early. Women experience more interruptions in their working careers and thus might be less attached to the labor market (Barnes, Parry, & Taylor, 2004; von Bonsdorff et al., 2009). Post-retirement workers are often highly qualified (Crawford & Tetlow, 2010; Lain, 2012; Maxin & Deller, 2010; Scherger et al., 2012; Smeaton & McKay, 2003; Wang et al., 2008), which is in line with a higher labor market attachment.

4.3 State of Health

Previous research states that health has a significant impact on the decision to continue work after retirement (Phillipson & Smith, 2005; Saba & Guerin, 2005), including the fact that a person's disability to continue work after retirement (e.g. physical limitations and health problems) may inhibit pursuing paid work after retirement (Beehr, 1986; Davis, 2003; Dorbritz & Micheel, 2010; Feldman, 1994; Taylor, 2010; Wang et al., 2008). Individuals extending their working careers are generally in better health (Cahill et al., 2006; Crawford & Tetlow, 2010; Kohli & Künemund, 1996; Komp et al., 2010; Scherger et al., 2012). Kim and Feldmann (2000) determine that the effect of health on working later in life is reversely related to age. Hébert and Luong (2008) find that the probability of entering bridge employment does not vary due to health reasons.

4.4 Impact of Establishments

In addition, establishment characteristics influence work beyond retirement. The larger the firm the less likely the employees are to work beyond retirement (Dorbritz & Micheel, 2010; Micheel et al., 2010; Smeaton & McKay, 2003). In the last 20 years, mostly only large companies used early retirement policies in Germany to reduce costs (Wübbeke, 1999). This clearly underlines that selection at the firm level has to be considered as well. Employers do not offer post-retirement jobs in an equal distribution across their

employees. First, they may attract or displace specific workers (Lui Ping Loi & Shultz, 2007). For instance, it is more likely that workers with long tenure will be made an offer to extend employment (Hutchens, 2007). Second, some establishments might not be able to provide a workplace which is suitable for older employees (Dorbritz & Micheel, 2010). Smeaton and McKay (2003) find that extending working careers is connected to specific industries, such as distribution, hotels and restaurants, and other services, whereas this is less common in industries like construction and manufacturing.

4.5 Our Contribution

So far, there is little research directly addressing post-retirement job (PRJ) trajectories in Germany, whereas in the U.K. or U.S. this topic is addressed in more detail. Our work complements previous studies in different ways. We will contribute new insights on predictors of different types of PRJ by analyzing a representative sample of the German labor force. We follow individuals' employment histories on a daily basis. This enables us to study the length of time until individuals start their first PRJ. Detailed information from the employing establishment allows us to distinguish between different job trajectories. PRJ which are held with the same employer and in the same occupation as the pre-retirement job can be seen as continuation of the employment career. Employees are staying within the same working environment (PRJ-SE). But it is also possible to start working in a complete different working environment (PRJ-DE), which usually implies a change of employer (von Bonsdorff et al., 2009; Wang et al., 2008), additionally in our study it also implies a change in occupation. Possible variations would be a change of employer without changing occupation, or a change of occupation within the same establishment. These alternative trajectories are defined as competing risks in our analyses, whereas the PRJ trajectories we focus on are PRJ-SE and PRJ-DE.

5 Hypotheses

The theoretical framework focuses on two different aspects. First, the lengths of being retired until starting a PRJ, and the factors, which influence PRJ-SE and PRJ-DE. The discussed theoretical considerations on working longer in section 3 lead to the assumption that retirees staying in the same work environment follow continuity theory. We expect transitions to PRJ-SE shortly after retirement, assuming that individuals want to achieve continuity. On the contrary, following life course theory, we expect people to start in PRJ-DE jobs. The institutional settings in Germany still determine a

mandatory retirement age, which separates working life from retirement. Although these boundaries have softened, people might still retire as planned by the institution. Once being in retirement, they have more options to choose from, also depending on events they experienced previous in life. This might lead to a higher possibility of switching fields. We consider four indicators as either push or pull factors which influence the entry to different post-retirement job trajectories, which we derive from the discussed literature in Section 4: the financial situation of the individual, their labor market attachment, health, and employer characteristics. Hypotheses addressing each of the mentioned push and pull factors are outlined in the following subsection.

5.1 Financial Situation

Financial security is perceived as a push or pull factor. It pushes individuals into the labor force who need additional income. They rely on their job, which makes switching PRJ more risk-averse. For wealthy individuals, financial security might be perceived as a pull factor to stay in the labor force. They have more alternatives to choose from, which makes them more flexible in their decision for a PRJ.

(I) *The likelihood to transition to a PRJ-SE is higher for individuals living below the poverty threshold.*

(II) *Individuals who are financially better off are more likely to change their employment environment in retirement taking a PRJ-DE.*

5.2 Labor Market Attachment

We distinguish between two different measures: labor market attachment in the short run versus the long run. The first one refers to characteristics of the last job prior to retirement, the second one measures labor attachment regarding the whole employment career prior to retirement.

(III) *Individuals who are employed prior to retirement are more likely to stay in their PRJ-SE, whereas individuals who are not employed show a higher probability of switching environments.*

(IV) *The likelihood of entering a PRJ-SE is higher for retirees with shorter gaps between their last job and their entry to retirement.*

(V) *The likelihood of entering a PRJ-DE increases with unemployment experience.*

12

5.3 State of Health

Individuals with poor health are more likely not to work at all in retirement. Our sample only includes retirees in the labor force, which means that we observe a selection of healthier retirees. Nevertheless, we are expecting transitions in different PRJ trajectories to vary by health. Individuals with poor health are less flexible on the labor market, because they may encounter only a limited number of jobs within their constraints.

(VI) *For individuals with poor health the likelihood of holding a PRJ-SE is higher than the likelihood of changing to a PRJ-DE.*

5.4 Impact of Firms

Establishment characteristics, as well as their political and strategical alignments, determine if establishments tend to hold on to their personnel and to offer them the possibility to continue work beyond retirement. Establishments might be more likely to layoff older workers or maintain a heterogeneous age structure. Thus employers' characteristics and practices influence later employment outcomes of retirees.

(VII) *This probability of entering PRJ-SE is higher for individuals employed at smaller establishments before retirement. Individuals employed in larger firms show a higher likelihood to enter PRJ-DE*

(VIII) *If the share of older workers in the establishment prior to retirement is higher, it is more likely that retirees transition to a PRJ-DE.*

6 Data and Methodology

6.1 The BASiD data

We use restricted administrative data of the German Pension Insurance linked to data of the German Federal Employment Agency called BASiD for our analyses[4]. Contributing to pension insurance is mandatory in Germany for most individuals, except self-employed and civil servants. Thus, approximately 90 per cent of the German working population is registered within the public pension system (Richter & Himmelreicher, 2008). The BASiD data contains one per cent of all insured individuals between the age of 15 and

---

[4] Data version used: BASiD 5109 v1. Data access was provided by the Research Data Center of the Federal Employment Agency of Germany at the Institute for Employment Research in Nuremberg, Germany and its on-site location at the University of Michigan in Ann Arbor, MI, USA.

68 who live in Germany in 2007. For the selected individuals, every single contribution is stored in the data file. This offers the possibility to analyze employment histories, starting with the entry into the labor market and progressing through the transition to retirement and beyond (Hochfellner, Müller, & Wurdack, 2012). The data include information on every social security job an individual has worked in. This information includes its duration, the daily wage, the occupation, the position, and characteristics of the respective employer, such as workplace, firm size, and industry. If individuals experience unemployment, the data set holds information on the amount of benefits received and the duration of each unemployment episode. Because employers have to notify if a worker is sick for more than six weeks, the data allow us to identify times in which workers are away on sick leave. In addition, there is lots of information available regarding pension receipt. This includes the date and type of retirement and the amount of benefits received. Demographic information on the individuals like gender, education, date of birth, place of residence, and nationality is available as well.[5] In our sample, we restrict the data to cohorts which are at the normal retirement age of 65 in 2007. As our main focus concentrates on studying different employment trajectories beyond the actual retirement transition we further restrict our sample to individuals who received regular old age pension benefits in 2007. In addition we dropped individuals insured by the miners' pension insurance. They are insured at a higher order and therefore are not comparable to the average retiree. This leaves us with a sample of 15,504 retirees of cohorts 1940 to 1942 for which we have daily longitudinal information available from the beginning of 1951 to the end of 2009. For the survival analysis we only kept the 4,694 individuals who are still part of the labor force in retirement. These are individuals who are either employed for at least 30 days during the first three years in their retirement, or registered job seekers.

6.2 Sample Descriptives

Selected descriptives are displayed in Table 2. Statistics are provided for our analysis sample which includes retirees who stay in the labor force. To compare them with retirees who are not employed beyond retirement we also provide descriptives for people who withdraw completely from the labor market. The retirees are equally distributed across the three cohorts, gender, and education. About 25 percent of the retirees in our sample are employed beyond retirement. This share is higher than official employment shares,

---

[5] For a detailed description of all variables in the BASiD data refer to Hochfellner, Müller, and Wurdack (2011).

14

due to the age-span we observe. The oldest retirees in our sample are 69 years old. The median retirement age varies between individuals who are in the labor force and individuals who are not. Individuals who work beyond retirement tend to retire earlier. The financial income is lowest for retirees searching a job. Individuals pursuing PRJ tend to be more attached to the labor market. They show less unemployment experience and switch jobs less often in comparison to job seekers and retirees not pursuing PRJ. The majority of retirees entering PRJ are employed full-time prior to retirement, the majority of job seekers are unemployed to a higher extent. Most of the post retirement workers choose to work in the same environment. However one third of them change the environment. Job seekers differ according to the establishment characteristics of their job prior to retirement from they other retirees in the sample. They tend to work in smaller establishments characterized by a high share of part time workers before they retire. Retirees on post-retirement jobs tend to work in smaller establishments prior to retirement as well, characterized by a high share of older workers.

6.3 Survival Analyses Framework

In the following analysis, we study the lengths of time until retirees start her first PRJ, and the factors which influence these transitions. There are competing PRJ, because people can choose between different alternatives but only enter one trajectory. Our events of interest are two specific employment trajectories. We categorize them according to changes in the work environment compared to the last job prior to retirement. Post-retirement jobs in the same work environment (PRJ-SE) are defined as staying with the same employer and holding the same occupation once being retired ($n = 2{,}051$). Post-retirement jobs in a different work environment (PRJ-DE) are associated with a change of employer and occupation ($n = 1{,}093$). Competing trajectories are defined as PRJ where only the employer ($n = 409$) or the occupation ($n = 149$) changes, as well as register as job seeker ($n = 992$). In our setup, which is pointed out in Figure 3 we observe individuals after they start claiming pension benefits at t^{start}, which sets them at risk for failure on their entry to retirement t^R. Individuals fail as soon as they experience one of the employment trajectories defined above at t^{PRJ}. They are no longer in the risk set and we end observing them at t^{end}. We censor analyses time after three years at t^{cens}, to make sure that every cohort can be followed for exactly three years in the sample.

Table 2: Sample characteristics

Cohort	no job	job	job seeker
No. of individuals	10,810	3,702	992
No. of establishments	8,647	3,263	701

Share of ...		in per cent	
Cohort 1940	32	35	31
Cohort 1941	34	33	36
Cohort 1942	34	32	33
Female	61	58	50
Male	39	42	40
Low skilled	26	20	25
Skilled	60	66	63
High skilled	10	8	10
Unknown	4	6	2

Labor force state before retirement		in per cent	
Full time	28	36	5
Part time	7	36	4
Partially retired	9	4	0
Disability retirement	17	3	2
Unemployed	31	17	88
Training	8	4	1

Type of post retirement job		in per cent	
Same firm/occupation	-	55	-
Different firm/occupation	-	30	-
Occupation differs	-	4	-
Firm differs	-	11	-
Job seeker	-	-	100

Individual characteristics		mean	
Retirement age	62	63	61
Pension receipt in Euro	799	811	818
# of unemployment periods	1.3	1.6	2.8
# of unemployment years	1.9	1.6	5.4
# of sick years	0.4	0.3	0.4
# of jobs	11.5	12.1	17.0

Firm prior to retirement		mean	
# of employees	443	206	283
Share of workers 50+	0.29	0.37	0.30
Share of part-time workers	0.25	0.22	0.67

Figure 3: Competing risks framework
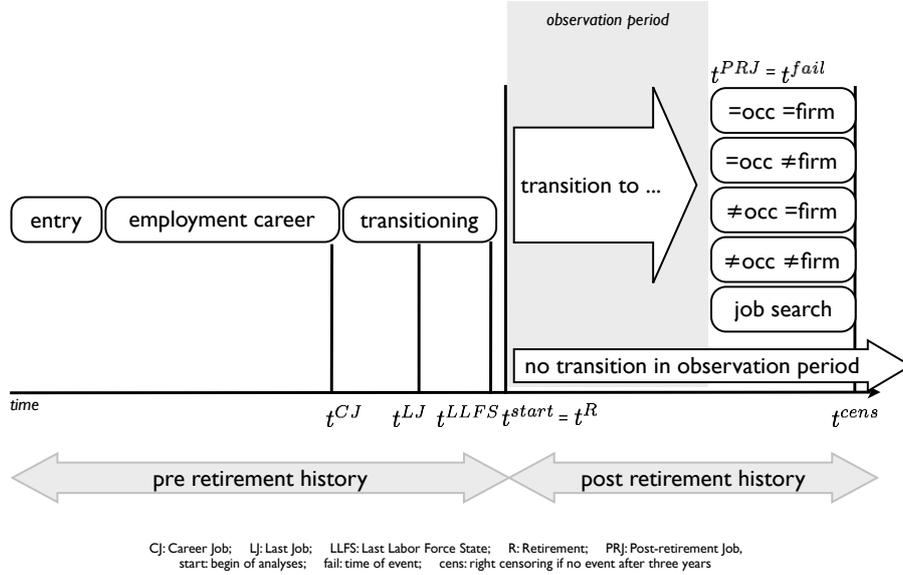
To control for the factors influencing the likelihood of entering PRJ throughout the life course, employment characteristics are measured at different stages in life. The model includes information at the time the individual was on her career job t^{CJ}, which is defined as longest job within an establishment according to Ruhm (1990). However the career job is not necessarily the job prior to retirement. This is why we generate variables containing information at the time of the last job prior to retirement t^{LJ}. In addition, we include variables at the time of the last labor force state the individual achieved before transitioning into retirement t^{LLFS}. This can be identical to the last job prior to retirement. If a person experiences unemployment before being retired, the last observation differs from the last job prior to retirement. Additional variables, which contain information on the complete employment history prior to retirement and the biography in retirement until finding a PRJ are computed. Kaplan Meier estimates show that the time until individuals enter their first PRJ differs by PRJ. Figure 4 shows transitions into the different job trajectories, when failure is defined as entering any kind of post-retirement job, without accounting for competing risks.

17

Figure 4: Post-retirement job trajectories

Time elapsed until first job
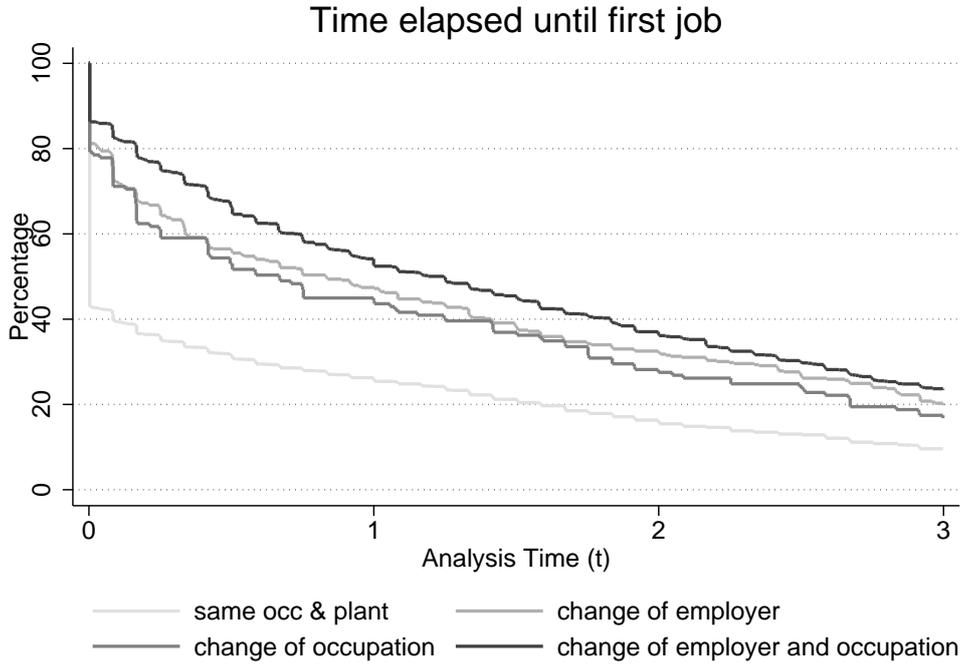
Source: BASiD, own calculations

6.4 Proportional Sub-hazard Model

Consider the event of interest the first PRJ-DE after being retired. In our analysis competing risks refer to the chance that instead of PRJ-DE, we observe a different event, for instance, PRJ-SE. This setup differs from the common right-censoring in survival analyses. Censored cases are still considered at risk to experience the event of interest, PRJ-DE, but it is unknown when the event will happens. On the other side, the competing event, PRJ-SE, is permanent and therefore impedes the event of interest, PRJ-DE, from happening (Cleves, Gould, Gutierrez, & Marchenko, 2010). In a competing risk framework the failure function, called cumulative incidence function (CIF), provides the better estimate compared to the survivor function. With competing events, the type of event which will occur is unknown until it occurs. The question we are interested in is "What is the probability that a person starts a PRJ-DE within $t = T$?". T denotes the time until the start of the first PRJ and K refers to the possible job trajectories an individual may enter, with $k = 0, \ldots, K$. Every individual can be displayed with a pair

(T,k). The CIF indicates the probability to fail until a point at time t from cause k.

$$P(T \leq t, K = k) \quad with\, k = 0, \ldots, K \tag{1}$$

The CIF can be computed by estimating one proportional hazard model for each k, but it is hard to interpret the coefficients of the fitted model on cumulative incidence, because the covariates can influence the hazard of the possible events differently. That is why we do not use the standard proportional hazard model, but estimate the influence of the covariates on the sub-hazard of the event of interest. The sub-hazard defines the failure of our events of interest, and at the same time keeps people who experience competing events at risk. In that way, they can be counted as not having any chance of failing (Cleves et al., 2010). Fine and Gray (1999) define the sub-hazard as

$$\overline{h}_k(t|\boldsymbol{X}) = \lim_{\Delta_t \to 0} \frac{P\{t < T \leq t + \Delta_t, K = k \mid T > t \, \vee \, (T \leq t \, \wedge \, K \neq k), \boldsymbol{X}\}}{\Delta_t} \tag{2}$$
$$with\, k = 0, \ldots, K$$

One advantage of modeling the sub-hazard, is that the CIF for each cause k can be calculated from it.

$$CIF_k(t|\boldsymbol{X}) = 1 - exp\{-\overline{H}_k(t), \boldsymbol{X}\} \tag{3}$$
$$= 1 - exp\{- \int_0^t \overline{h}_k(s)ds, \boldsymbol{X}\} \quad with\, k = 0, \ldots, K \tag{4}$$

To produce cumulative incidence functions for our event of interest PRJ-SE and PRJ-DE we estimate a competing risk regression suggested by Fine and Gray (1999) for each our events of interest.

$$\overline{h}_k(t|\boldsymbol{X}) = \overline{h}_{k,0}(t) \, exp(\boldsymbol{X}^T \boldsymbol{\beta}) \quad with\, k = 0, \ldots, K \tag{5}$$

We generate two indicators to measure the impact of the financial situation. The first one contains the benefits received per month, where ($\boldsymbol{BEN}$) is a vector of four income groups, which can vary over time.[6] The second one is the wage received at the end of the career job ($\boldsymbol{w^{CJ}}$). We derive our measure for labor market attachment from the following variables: the days being unemployed relative to the days being in the labor

---

[6] Thus, this measure includes no income from other sources. For the cohorts in our sample the existence of other pension income for example private or employer based pension plans is neglectable, because both of them are no major sources of income in older age (Schulze & Jochem, 2007).

force over the life course (***shui***), the last labor force state prior to retirement (***LLFS***), a vector of five states individuals can hold prior to retirement, and the gap in days between the last job prior to retirement and entry into retirement (***gap***). The health indicator equals the sum of sickness days relative to the days being in the labor force (***shsi***). Finally establishment characteristics, such as a vector of four plant size dummies (***PSZE***) and the share of workers age 50 and over within the plant (***shw50***) are generated for the establishment of the last job prior to retirement. Other independent variables we control for in the vector X are demographics like gender, education[7], nationality, birth cohort, and additional characteristics of the individuals' career job, such as the duration, occupation, position, and working time. Further plant characteristics of the job prior to retirement are industry, information on their employee structure, and a variable which indicates if the establishment has been closed. We also control for regional differences and the economic situation on the macro level by including regional unemployment rates. We split the sample by age and at the end of each year to account for varying covariates of age and unemployment rates in vector Y_t. This yields to our model we estimate for each of our event of interest $k = PRJ - SE$ and $PRJ - DE$.

$$
\begin{aligned}
\log \overline{h}_k(t) = \log \overline{h}_{k,0}(t) \{ &\boldsymbol{\beta}_{B,t}\boldsymbol{BEN}_t + \beta_C \log w^{CJ} + \boldsymbol{\beta}_L \boldsymbol{LLFS} + \beta_G gap \\
&+ \beta_U shui + \beta_S shsi + \boldsymbol{\beta}_P \boldsymbol{PSZE} + \beta_W shw50 \\
&+ \boldsymbol{\beta_X} \boldsymbol{X} + \boldsymbol{\beta_{Y,t}} \boldsymbol{Y_t} + \varepsilon \}
\end{aligned}
\tag{6}
$$

7 Results

Before we focus on our events of interest PRJ-SE and PRJ-DE, we briefly provide an overview of all post-retirement transitions we observe in the analysis sample in Figure 5. Almost 30 percent of our sample experience the transition in employment shortly after being retired. The majority of retirees stays within the same work environment, a certain amount changes to a different work environment. This is in line with Hébert and Luong (2008). From our estimated model we can derive the CIF for both of our events of interest. Figure 6 displays the probability of cumulative incidence of PRJ-SE on the left panel and PRJ-DE on the right panel for retirees of different cohorts. The probability that individuals born in 1940 have entered a PRJ-SE after one year in retirement is about 11 percent. Individuals of cohort 1941 do not differ. The probability increases somehow for

---

[7] The education variable was corrected by applying the cleansing procedures proposed by Fitzenberger, Osikominu, and Völter (2006), because there are no quality checks for this variable during the social security notification procedure.
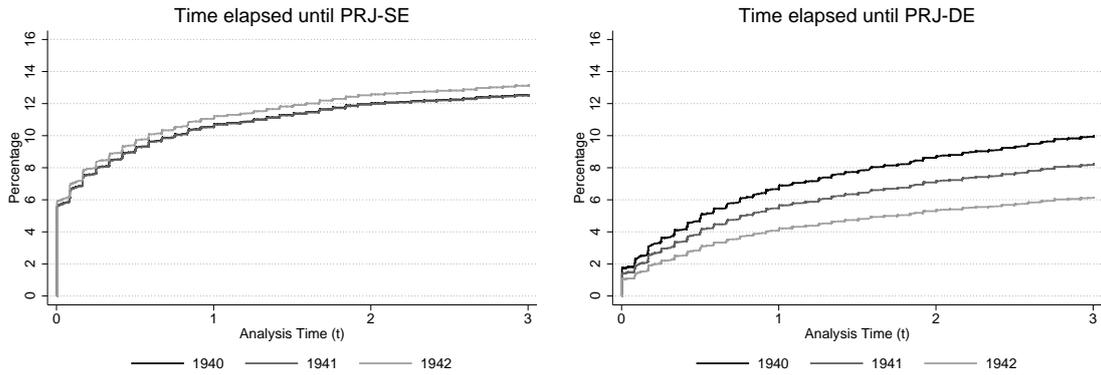
Figure 5: Cumulative Incidence of post-retirement labor market outcomes

PRJ trajectories (stacked)
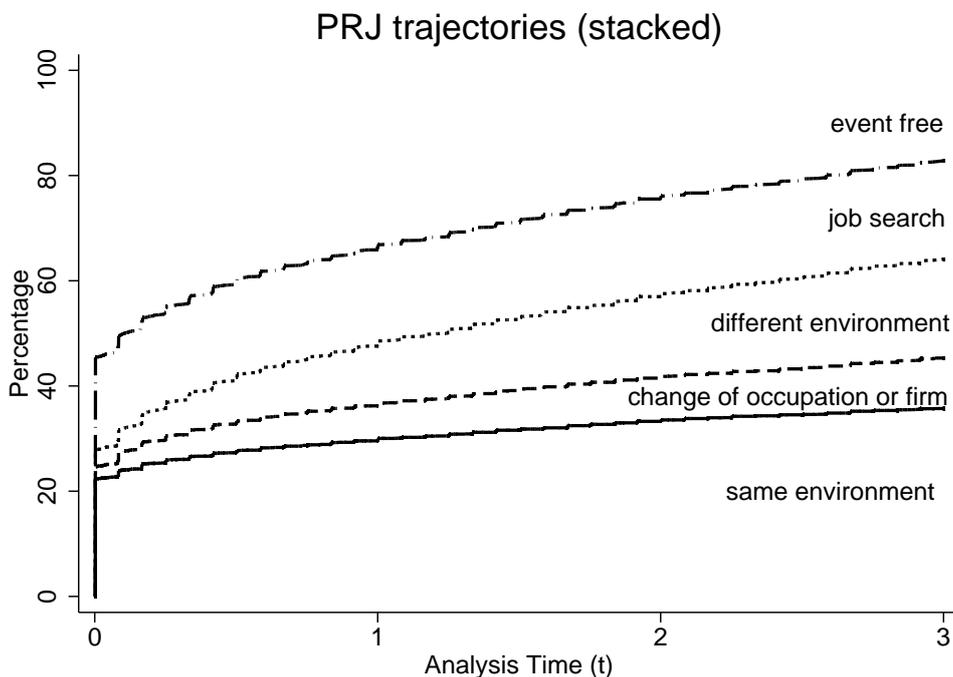
Source: BASiD, own calculations

the youngest cohort 1942. In addition, after one year almost all transitions to PRJ-SE are executed. The probability of cumulative incidence of PRJ-SE only increases marginally within the following two years. About half of the retirees transitioning in PRJ-SE enter their job shortly after retirement. However, this looks different in the right panel. The likelihood of cumulative incidence of PRJ-DE directly after retirement is only 2 percent. It increases to about 10 percent three years after retirement for the oldest cohort. The CIF increases over time for all cohorts. The probabilities of transitioning in PRJ-DE varies significantly across cohorts. After one year the likelihood of cumulative incidence of PRJ-DE is highest for cohort 1940, with approximately 7 percent. Individuals born in 1941 show a probability of 6 percent, the youngest cohort shows the lowest probability of about 4 percent. Figure 7 displays the probability of cumulative incidence of PRJ-SE on the left panel and PRJ-DE on the right panel for women and men respectively. The probability that women have entered a PRJ-SE one year after being retired is about 10 percent. Men differ slightly, but not significantly from women. As described above, after one year of retirement nearly all transitions to PRJ-SE are made. The probability of

21

Figure 6: Cumulative incidence functions of job trajectories, by cohort

cumulative incidence of PRJ-SE does only increase marginally within the following two years for both males and females. The probability of cumulative incidence of PRJ-DE increases with time being in retirement for both men and women. Probabilities of transitioning in PRJ-DE vary significantly by gender. After one year in retirement, the probability of cumulative incidence of PRJ-DE is higher for men, with approximately 7 percent. Women show a probability of 5 percent. To analyze how different factors

Figure 7: Cumulative incidence functions of job trajectories, by gender
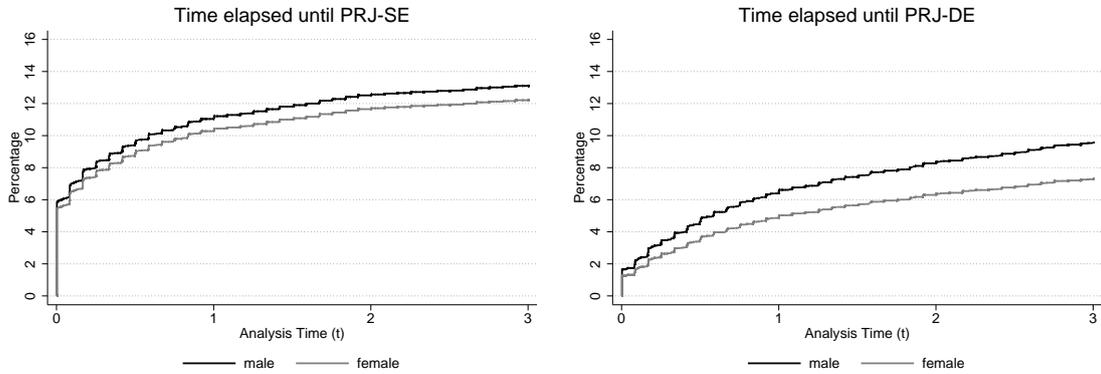
influence the cumulative incidence we now focus on the estimated sub-hazard ratios for our variables of interest. Higher values of the covariates imply a constant relative increase of the sub-hazard which equals a higher predicted cumulative incidence for the event of

interest at every point in time. The estimates are obtained from a full model, as well as from models estimated separately for men and women. As a robustness check we estimated separate models for each cohort. The interpretation of the results focuses on the full and gender specific models. However, we provide the estimates for the cohort models in the appendix. All models are conditioned on being in the labor force, as we do not include retirees who never experience either one of the PRJ trajectories or job search in the models. The exponentiated coefficients on the sub-hazard of experiencing PRJ-SE are displayed in Table 3. The estimates for transitioning in PRJ-DE are displayed in Table 4.[8]

7.1 Financial Situation

The sub-hazard on PRJ-SE of individuals with the lowest pension benefits is about 17 percent points lower than the sub-hazard of individuals whose pension payments are in the middle range of the distribution. Hence, the cumulative incidence of entering a PRJ-SE for individuals living on the poverty threshold is lower than for individuals living above the poverty threshold. However, this coefficient is only significant at the 10 percent level and vanishes in the models estimated separately for males and females. The wage of the career job seems to provide a higher significant estimate. An increase of the wage in the career job of 1 percent decreases the sub-hazard of entering PRJ-SE by about 5 percent. Thus, individuals who earn less show a higher cumulative incidence of entering PRJ-SE. This effect is not significant for females when estimating separate models by gender. Turning to the sub-hazard for entering PRJ-DE we find that both individuals with higher and lower incomes show a reduced sub-hazard compared to retirees on a middle income level. The predicted cumulative incidence of transitioning to PRJ-DE is highest for retirees on a middle income level. However, this seems to be only true for women, because the coefficients for pension income are only significant for the full model and the female model. The wage of the career job is also a better predictor for entering PRJ-DE. An increase of 1 percent significantly increases the sub-hazard of PRJ-DE by approximately 30 percent in all models. Thus, higher wages increase the probability of switching work environments beyond retirement. Summing up, we have to reject both our hypotheses I and II regarding the influence of the pension income on PRJ-SE and PRJ-DE. Whereas the decision of entering the labor force in retirement is driven by the amount of benefit receipt (Hochfellner & Burkert, 2013), we cannot confirm this

---

[8] The tables only include estimates for our coefficients of interest. Tables containing a full set of estimates can be obtained from the authors on inquiry.

for transitions in PRJ. However, we find that the wage of the career job predicts the cumulative incidence in the way that we suggested the pension income would do: The cumulative incidence of entering PRJ-SE decreases with increasing income, whereas it is the other way round for the cumulative incidence of PRJ-DE.

7.2 Labor Market Attachment

Compared to being full-time employed prior to retirement the sub-hazard for entering PRJ-SE is about 70 percent higher for retirees who work part-time prior to retirement and about 80 percent lower for retirees who were unemployed prior to retirement. This effect is highly significant and nearly the same for women and men. It turns the other way round for the probability of entry in PRJ-DE on a highly significant level for both women and men. The gap between the last job prior to retirement and retirement, however, is significantly influences the sub-hazard of entry in PRJ-SE. It decreases nearly by 1 percent for every day the gap gets longer. Unemployment experience is a better predictor for the likelihood of transitioning in a PRJ-DE, however not in the way we thought it would be. Increasing unemployment experience accumulated over the employment history is associated with a decrease of the sub-hazard and therefore a lower cumulative incidence of PRJ-DE. This relationship is not significant for the probability of transitioning in PRJ-SE. Regarding the influence of labor market attachment on the cumulative incidence of PRJ-SE and PRJ-DE we can confirm our hypotheses III and IV, but have to reject hypothesis V. In general, the probability of cumulative incidence for PRJ-SE is higher for retirees with higher labor market attachment, whereas retirees with lower labor market attachments show a higher likelihood of cumulative incidence of PRJ-DE.

7.3 State of Health

When interpreting the estimates of the health indicator, it has to be kept in mind that our results are conditional on being in the labor force. Assuming that most retirees who are in the labor force are at good health, we observe fewer retirees with poor health. Nevertheless, the health condition of the retirees does not influence the sub-hazard of entering PRJ-DE. Turning to PRJ-SE, we see that the sub-hazard increases with the extent of being sick, accumulated over the employment history. Retirees who have been on sick leave more frequently are more likely to experience PRJ-SE. However, this effect is only significant in the full and the female model. The findings lead us to partly reject hypotheses VI. The cumulative incidence for entering PRJ-SE is higher for retirees with

poor health, but there is no significant influence of health on changing work environments. An explanation for this might be that it is more likely to stay within the same work environment for these retirees, because they are familiar with the workplace and know that they can manage their job within their constraints, whereas if they change environments they might not be able to adjust to the new demands.

7.4 Impact of Firms

Concerning the influencing factors on the establishment level we do not find any evidence regarding the existing age structure in the establishments. We have to reconsider our assumption, that a high number of older individuals in the establishments prevents employers from hiring more older workers. The covariate is not significant in any of the estimated models. However the size of the establishments retirees worked in before retirement influences the cumulative incidence of PRJ-DE and PRJ-SE. The sub-hazard of entering PRJ-SE is approximately 11 percent higher for retirees employed in smaller establishments and 28 percent lower for retirees employed in large establishments. The sub-hazard of transitioning in PRJ-DE is about 50 percent higher for retirees who worked in large establishments. Summing up, we can only confirm hypotheses VII. This result is in line with the early retirement schemes provided by the German government, of which mainly only large firms made use. Smaller firms might be more in need of their older workers to maintain firm specific human capital and older workers in smaller firms may perceive the working environment as much more social. All these factors may lead to the intention to stay with the same employer.

Table 3: Exponentiated coefficients (failure: PRJ-SE; competing risk: PRJ-DE, change in employer or occupation, job search)

	Total	Men	Women
$BEN \leq 399$	0.832*	0.827	0.838
	0.081	0.100	0.139
BEN 400–699	1.061	1.120	0.944
	0.075	0.094	0.134
BEN 1000–1299	1.026	1.101	1.001
	0.079	0.163	0.086
$BEN \geq 1300$	0.983	0.816	0.975
	0.088	0.211	0.100
$\log w^{CJ}$	0.949**	0.835***	1.035
	0.025	0.030	0.038
$LLFS$ part-time	1.675***	1.577***	1.740***
	0.099	0.133	0.138
$LLFS$ partial retirement	1.088	0.872	1.241
	0.325	0.590	0.440
$LLFS$ disability retirement	0.521*	0.581	0.509*
	0.184	0.325	0.234
$LLFS$ unemployed	0.205***	0.190***	0.215***
	0.039	0.056	0.051
$LLFS$ training	0.960	1.164	0.950
	0.240	0.397	0.280
gap in days	0.998***	0.999***	0.998***
	0.000	0.000	0.000
$shui$	2.592	5.224**	1.042
	-1.528	-3.439	-1.103
$shsi$	23.38**	10.56	18.36*
	-36.56	-29.70	-32.03
$PSZE$ $10-49$	1.114*	1.094	1.189**
	0.072	0.103	0.099
$PSZE$ $50-249$	0.917	0.889	1.003
	0.069	0.092	0.101
$PSZE \geq 250$	0.728***	0.541***	0.939
	0.066	0.075	0.107
$PSZE$ unknown	0.381***	0.545	0.406
	0.142	0.290	0.245
$shw50$	1.012	0.917	1.077
	0.122	0.157	0.178
cohort 1941	0.997	0.971	1.005
	0.056	0.078	0.075
cohort 1942	1.050	1.031	1.042
	0.060	0.086	0.083
female	1.079		
	0.074		
# of observations	12,011	7,426	4,585
# of events	2,041	1,279	762
# of competing risks	2,169	1,111	1,058
AIC	28637.2	16334.9	9662.3
BIC	29147.4	16804.9	10099.5

Notes: Standard errors are clustered at the individual level in italics; ***/**/* denotes statistical significance at the 1/5/10 percent level. All models include age dummies, potential experience, actual length of employment career and no. of jobs and unemployment episodes, ethnic background dummies, three dummies indicating the education level, an east/west dummy and the unemployment rate. Further career job controls are twelve occupation dummies and tenure; employer controls are calculated for the last job prior to retirement and additionally include 10 industry dummies, a dummy indicating closure, as well as the share of female, part-time and high-skilled workers.

Table 4: Exponentiated coefficients (failure: PRJ-DE; competing risk: PRJ-SE, change in employer or occupation, job search)

	Total	Men	Women
$BEN \leq 399$	0.489***	0.692	0.174***
	0.099	*0.174*	*0.079*
BEN 400–699	0.719**	0.890	0.325***
	0.105	*0.156*	*0.108*
BEN 1000–1299	0.988	1.049	0.923
	0.137	*0.256*	*0.162*
$BEN \geq 1300$	0.646***	0.570	0.583**
	0.106	*0.254*	*0.124*
$\log w^{CJ}$	1.298***	1.365***	1.322***
	0.077	*0.110*	*0.112*
$LLFS$ part-time	0.248***	0.212***	0.226***
	0.050	*0.053*	*0.090*
$LLFS$ partial retirement	2.595***	1.026	4.663***
	0.501	*0.520*	*-1.092*
$LLFS$ disability retirement	2.561***	0.809	5.639***
	0.542	*0.271*	*-1.600*
$LLFS$ unemployed	2.260***	1.520**	3.492***
	0.316	*0.319*	*0.725*
$LLFS$ training	1.509	0.948	2.536***
	0.413	*0.375*	*0.859*
gap in days	1.000	1.000	1.000
	0.000	*0.000*	*0.000*
$shui$	0.033***	0.050**	0.033***
	0.030	*0.076*	*0.042*
$shsi$	30.90	1776.9*	0.171
	-93.73	*-7618.8*	*0.715*
$PSZE$ $10 - 49$	0.944	1.298	0.807
	0.136	*0.297*	*0.159*
$PSZE$ $50 - 249$	1.191	1.617**	0.975
	0.173	*0.365*	*0.196*
$PSZE \geq 250$	1.550***	1.834**	1.494*
	0.249	*0.473*	*0.318*
$PSZE$ unknown	1.273	1,405	1.109
	0.612	*-1.098*	*0.658*
$shw50$	0.952	0.915	0.977
	0.252	*0.356*	*0.396*
cohort 1941	0.815**	0.938	0.712**
	0.084	*0.152*	*0.100*
cohort 1942	0.603***	0.652**	0.574***
	0.076	*0.123*	*0.099*
female	1.327*		
	0.193		
# of observations	12,011	7,426	4,585
# of events	832	411	421
# of competing risks	3378	1,979	1,399
AIC	13210.1	5791.7	5463.3
BIC	13720.3	6261.7	5900.6

Notes: Standard errors are clustered at the individual level in italics; ***/**/* denotes statistical significance at the 1/5/10 percent level. All models include age dummies, potential experience, actual length of employment career and no. of jobs and unemployment episodes, ethnic background dummies, three dummies indicating the education level, an east/west dummy and the unemployment rate. Further career job controls are twelve occupation dummies and tenure; employer controls are calculated for the last job prior to retirement and additionally include 10 industry dummies, a dummy indicating closure, as well as the share of female, part-time and high-skilled workers.

8 Discussion of Results

Detailed knowledge of the labor market situation of the older workforce results in better public policy programs regarding the support of working longer. This knowledge can be used to create more efficient public policy reforms which will help to increase the employability and labor force participation of older workers. Currently, the political, academic, and public discourse focuses on the reasons why retired people are stay in the labor market. The question which is addressed is if post-retirement employment is forced due to old-age poverty, or if retirees go back in the labor market voluntarily because they want to stay active. We suggest that the political debate has to shift from discussing the reasons for post-retirement employment, towards a debate about the heterogeneity of the workforce beyond retirement and ways of how to support individuals according their specific needs. The main result of this paper is that motivations for post-retirement employment cannot be considered as mutually exclusive. Our study shows evidence for both arguments: People who have to work beyond retirement and people who want to work engage in post-retirement employment. This means that public policy has to develop target-oriented support through a public policy mix of different measures to account for heterogeneity in society. For instance, the support of post-retirement employment of individuals at the risk of old age poverty, as well as the support of post-retirement employment in reference to active aging of individuals is necessary. Both types of individuals are more likely to engage in post-retirement, however, the measure to help them participate in the labor market may not be the same. Public policy has to be aligned to the different peer-groups in the labor market.

In recent years policy changes have been introduced in Germany to increase incentives to work beyond 65, as well as to reduce barriers for working longer. To raise retirement income, the "Kombirente" is discussed in Germany. The upper limit of additional earnings for early retirees was supposed to be changed from $400 \, €$ to the amount of income from the job prior to retirement. We observe a higher share of working retirees at younger ages. So far some of these may have had to switch work environments, because of the earning limit. With the "Kombirente" they should gain more flexibility in continuing their working life. Brussig (2009) challenges public policy to offer more job opportunities for individuals who want or need to improve their income in retirement. Our results strengthen this argument. The longer transition times into PRJ-DE may be explained by longer searching times for jobs which meet the requirements of the older workforce. In comparison to other countries, the German occupational system rewards certificates more than experience.

Especially older individuals are trained in occupations which are disappearing due to technological change (Rinklake & Buchhholz, 2011). Therefore, if retirees do not have the possibility to stay in their work environment it may be difficult to transition to a PRJ-DE. Individuals who switch work environments have to find a new job first and then adjust to the new workplace. Providing more age-based job opportunities supports continuous and fast inflows to new work environments. In addition, further training on new technologies will help retirees to learn the demands of different work environments much faster. However, successful transitions depend to a large part on firm policies. We show that the probability of switching work environments is higher for individuals who are employed in large establishments prior to retirement. Thus, public policy can directly address large firms firstly by raising their awareness for post retirement jobs and secondly in providing benefits for these firms to keep the older workforce. Another support could be to provide specific training to employees who are employed in large establishments and help by placing them in different work environments. Further policy reforms should additionally support strategies and long-term concepts of human capital investment. Our results suggest labor market attachment as a highly reliable predictor of transiting in different PRJ. The job outcome depends on the degree of labor market attachment. Thus, investments in employability and lifelong learning is the most important instrument of public policy to keep older workers attached to the labor market. Although in general older employees in Germany show a lower risk of becoming unemployed, the probability of finding a job is low once becoming unemployed. In 2011, unemployment duration of older individuals was on average 17 weeks longer compared to younger ones (Bundesagentur für Arbeit, 2012). To avoid transferring this trend to lower labor market attachments, investments that strengthen labor market attachments and employability have to start well in advance of the retirement transition. Need for future research clearly addresses the quality of matches of older workers to jobs as well as vice versa. In addition, Smeaton and McKay (2003) and Kim and Feldmann (2000) recommend for comparative studies that examine how different institutional settings either support or prevent employees from working longer. Age-based workplaces lead to a more productive older workforce. Hence, different organizational and cultural environments have to be studied in more detail. This paper should be seen as baseline to study post retirement employment trajectories in Germany. The next step is the detailed investigation of the actual duration of different employment trajectories and turnover rates.

Appendix

Table 5: Exponentiated coefficients (failure: PRJ-SE; competing risk: PRJ-DE, change in employer or occupation, job search)

	Total	1940	1941	1942
$BEN \leq 399$	0.832*	0.781	0.792	0.904
	0.081	*0.118*	*0.122*	*0.149*
BEN 400–699	1.061	1.094	1.098	0.908
	0.075	*0.128*	*0.136*	*0.106*
BEN 1000–1299	1.026	1.046	0.913	1.173
	0.079	*0.146*	*0.118*	*0.134*
$BEN \geq 1300$	0.983	0.909	0.927	0.947
	0.088	*0.145*	*0.137*	*0.148*
$\log w^{CJ}$	0.949**	0.937	0.967	0.918**
	0.025	*0.038*	*0.043*	*0.035*
$LLFS$ part-time	1.675***	1.645***	1.702***	1.614***
	0.099	*0.160*	*0.180*	*0.140*
$LLFS$ partial retirement	1.088	0.788	1.559	1.062
	0.325	*0.412*	*0.750*	*0.598*
$LLFS$ disability retirement	0.521*	0.250**	1.439	0.449
	0.184	*0.166*	*0.542*	*0.306*
$LLFS$ unemployed	0.205***	0.116***	0.180***	0.355***
	0.039	*0.035*	*0.065*	*0.111*
$LLFS$ training	0.960	1.561	1.295	0.406
	0.240	*0.520*	*0.529*	*0.225*
gap in days	0.998***	0.999***	0.998***	0.998***
	0.000	*0.000*	*0.000*	*0.000*
$shui$	2.592	3.884	2.138	5.054**
	-1.528	*-3.956*	*-2.210*	*-4.132*
$shsi$	23.38**	60.84	13.30	17.98
	-36.56	*-166.7*	*-38.86*	*-46.22*
$PSZE$ 10 − 49	1.114*	1.287**	1.086	0.972
	0.072	*0.155*	*0.111*	*0.091*
$PSZE$ 50 − 249	0.917	0.888	0.958	0.903
	0.069	*0.118*	*0.123*	*0.100*
$PSZE \geq 250$	0.728***	0.803	0.696**	0.609***
	0.066	*0.113*	*0.112*	*0.088*
$PSZE$ unknown	0.381***	1.065	0.039***	0.322**
	0.142	*0.634*	*0.044*	*0.153*
$shw50$	1.012	1.140	0.932	1.061
	0.122	*0.235*	*0.188*	*0.192*
female	1.079	1.119	0.969	1.047
	0.074	*0.140*	*0.112*	*0.111*
cohort 1941	0.997			
	0.056			
cohort 1942	1.050			
	0.060			
# of observations	12,011	4,731	3,957	3,323
# of events	2,041	703	665	673
# of competing risks	2,169	743	747	679
AIC	28637,2	8124,7	8344,5	8373,4
BIC	29147,4	8557,7	8759,2	8770,5

Notes: Standard errors are clustered at the individual level in italics; ***/**/* denotes statistical significance at the 1/5/10 percent level. All models include age dummies, potential experience, actual length of employment career and no. of jobs and unemployment episodes, ethnic background dummies, three dummies indicating the education level, an east/west dummy and the unemployment rate. Further career job controls are twelve occupation dummies and tenure; employer controls are calculated for the last job prior to retirement and additionally include 10 industry dummies, a dummy indicating closure, as well as the share of female, part-time and high-skilled workers.

Table 6: Coefficients (failure: PRJ-DE; competing risk: PRJ-SE, change in employer or occupation, job search)

	Total	1940	1941	1942
$BEN \leq 399$	0.489***	0.442**	0.336***	0.728
	0.099	*0.150*	*0.116*	*0.282*
BEN 400–699	0.719**	0.701	0.590**	0.911
	0.105	*0.162*	*0.156*	*0.269*
BEN 1000–1299	0.988	0.835	1.168	1.013
	0.137	*0.207*	*0.296*	*0.244*
$BEN \geq 1300$	0.646***	0.589*	0.924	0.400***
	0.106	*0.164*	*0.269*	*0.137*
$\log w^{CJ}$	1.298***	1.289***	1.637***	1.189
	0.077	*0.111*	*0.218*	*0.137*
$LLFS$ part-time	0.248***	0.278***	0.188***	0.209***
	0.050	*0.096*	*0.068*	*0.074*
$LLFS$ partial retirement	2.595***	5.390***	1.494	2.542***
	0.501	*-1.724*	*0.573*	*0.777*
$LLFS$ disability retirement	2.561***	3.154***	1.171	2.191*
	0.542	*-1.054*	*0.510*	*-1.001*
$LLFS$ unemployed	2.260***	2.539***	1.410	2.612***
	0.316	*0.608*	*0.338*	*0.721*
$LLFS$ training	1.509	0.818	1.687	1.569
	0.413	*0.454*	*0.598*	*0.814*
gap in days	1.000	1.000	1.000*	1.000
	0.000	*0.000*	*0.000*	*0.000*
$shui$	0.033***	0.378	0.085	0.000***
	0.030	*0.594*	*0.129*	*0.001*
$shsi$	30.90	0.006	0.989	1.001***
	-93.73	*0.032*	*-5.869*	*-4.476*
$PSZE$ $10-49$	0.944	0.782	1.073	0.793
	0.136	*0.182*	*0.288*	*0.242*
$PSZE$ $50-249$	1.191	1.029	1.348	0.975
	0.173	*0.252*	*0.348*	*0.285*
$PSZE \geq 250$	1.550***	1.610*	1.373	1.609
	0.249	*0.416*	*0.390*	*0.485*
$PSZE$ unknown	1.273	0.635	0.875	2.015
	0.612	*0.462*	*0.865*	*-1.711*
$shw50$	0.952	1.301	0.365*	0.858
	0.252	*0.552*	*0.193*	*0.417*
female	1.327*	1.326	2.292***	1.021
	0.193	*0.313*	*0.573*	*0.245*
cohort 1941	0.815**			
	0.084			
cohort 1942	0.603***			
	0.076			
# of observations	12,011	4,731	3,957	3,323
# of events	832	319	266	247
# of competing risks	3378	1,127	1,146	1,105
AIC	13210.1	4434.1	3574.8	3315.8
BIC	13720.3	4867.1	3989.5	3712.9

Notes: Standard errors are clustered at the individual level in italics; ***/**/* denotes statistical significance at the 1/5/10 percent level. All models include age dummies, potential experience, actual length of employment career and no. of jobs and unemployment episodes, ethnic background dummies, three dummies indicating the education level, an east/west dummy and the unemployment rate. Further career job controls are twelve occupation dummies and tenure; employer controls are calculated for the last job prior to retirement and additionally include 10 industry dummies, a dummy indicating closure, as well as the share of female, part-time and high-skilled workers.

References

Adams, G., & Rau, B. (2004). Job Seeking Among Retirees Seeking Bridge Employment. *Personnel Psychology*, *57*, 719-744.

Arlt, A., Dietz, M., & Walwei, U. (2009). *Besserung für Ältere am Arbeitsmarkt: Nicht alles ist Konjunktur* (Vol. 16; IAB-Kurzbericht No. 16). Nürnberg: Institute for Employment Research.

Atchley, R. C. (1989). A Continuity Theory of Normal Aging. *The Gerontologist*, *29*(2), 183-190.

Atchley, R. C. (1992). Continuity Theory, self, and social structure. In C. D. Ryff & V. W. Marshall (Eds.), *Families and retirement* (p. 145 - 158). Sage Publications.

Backes, G., & Clemens, W. (2003). *Lebensphase Alter. Eine Einführung in die sozialwissenschaftliche Alternsforschung. Grundlagentexte Soziologie* (2nd ed.). Juventa.

Barnes, H., Parry, J., & Taylor, R. (2004). *Working after State Pension Age: Qualitative research.* Department for Work and Pensions.

Beck, U. (1986). *Risikogesellschaft. Auf dem Weg in eine andere Moderne.* Suhrkamp.

Beehr, T. A. (1986). The Process of Retirement: A Review and Recommendations for Future Investigation. *Personnel Psychology*, *39*, 31-55.

Bellmann, L., & Stegmaier, J. (2007). IAB-Befragung zu älteren Arbeitnehmern in Deutschland: Ältere werden bei Einstellungen erheblich benachteiligt. Wenig betriebliche Aktivitäten zum Erhalt ihrer Beschäftigungsfähigkeit. *Soziale Sicherheit. Zeitschrift für Arbeit und Soziales*, *56*(5), 189-193.

Bonin, H. (2009). *15 Years of Pension Reform in Germany: Old Successes and New Threats* (Tech. Rep. No. 11). Bonn: IZA. (IZA Policy Paper)

Börsch-Supan, A. H., & Wilke, C. B. (2006). The German Public Pension System: How It Will Become an NDC System Look-Alike. In R. Holzmann & E. Palmer (Eds.), *Pension reform: Issues and prospects for non-financial defined contribution (ndc) schemes* (p. 573-610). Washington DC: The World Bank.

Brussig, M. (2009). Die Erwerbsbeteiligung älterer Arbeitnehmer/-innen in Deutschland im Wandel. Perspektiven der Arbeitsmarktforschung. *Zeitschrift für Gerontologie und Geriatrie*, *42*, 281-286.

Bundesagentur für Arbeit. (2012). *Arbeitsmarktberichterstattung: Der Arbeitsmarkt in Deutschland - Ältere am Arbeitsmarkt.* Author.

Bundesministrium für Arbeit und Soziales. (2011). *Rentenversicherungsbericht 2011.* Author.

Burtless, G. (1986). Social Security, Unanticipated Benefit Increases, and the Timing of

Retirement. *The Review of Economic Studies*, *53*(5), 781-805.

Cahill, K. E., D.Giandrea, M., & Quinn, J. F. (2005). *Are Traditional Retirements a Thing of the Past? New Evidence on Retirement Patterns and Bridge Jobs.* (U.S. Department of Labor, Bureau of Labor Statistics, Working Paper 384)

Cahill, K. E., Giandrea, M. D., & Quinn, J. F. (2006). Retirement Patterns From Career Employment. *The Gerontologist*, *46*(4), 514-523.

Cleves, M., Gould, W., Gutierrez, R. G., & Marchenko, Y. V. (2010). *An Introduction to Survival Analysis Using Stata.* College Station: Stata Press.

Crawford, R., & Tetlow, G. (2010). Employment, retirement and pensions. In J. Nazroo, N. Rogers, M. Stafford, & A. Steptoe (Eds.), *Financial circumstances, health and well-being of the older population in england. the 2008 english longitudinal study of ageing (wave 4)* (p. 11 - 75). Institute for Fiscal Studies.

Davis, M. A. (2003). Factors related to bridge employment participation among private sector early retirees. *Journal of Vocational Behavior*, *63*, 55-71.

Dietz, M., & Walwei, U. (2011). Germany - no country for old workers? *Journal for Labour Market Reserach*, *44*(4), 363-376.

Dittrich, D., Büsch, V., & Micheel, F. (2011). Working Beyond Retirement Age in Germany: The Employee's Perspective. In R. Ennals & R. H. Salomon (Eds.), *Older workers in a sustainable society* (p. 189-202). Frankfurt am Main: Peter Lang Internationaler Verlag der Wissenschaften.

Dorbritz, J., & Micheel, F. (2010). Weiterbeschäftigung im Rentenalter - Potenziale, Einstellungen und Bedingungen. *Bevölkerungsforschung Aktuell*, *31*(3), 2-7.

Elder, J., Glen H. (1995). The Life Course Paradigm: Social Change and Individual Development. In P. Moen, J. Glen H. Elder, & K. Lüscher (Eds.), *Examining lives in context: Perspectives on the ecology of human development* (p. 101-139). Washington, DC: American Psychological Association.

Fasang, A. E. (2012). Retirement Patterns and Income Inequality. *Social Forces*, *91*(2), 1-27.

Feldman, D. C. (1994). The Decision to Retire Early: A Review and Conceptualization. *The Academy of Management Review*, *19*(2), 285-311.

Fields, G. S., & Mitchell, O. S. (1984). Economic Determinants of the Optimal Retirement Age: An Empirical Investigation. *The Journal of Human Resources*, *19*(2), 245-262.

Fine, J. P., & Gray, R. J. (1999). A Proportional Hazards Model for the Subdistribution of a Competing Risk. *Journal of the American Statistical Association*, *94:446*, 496-509.

Fitzenberger, B., Osikominu, A., & Völter, R. (2006). Imputation rules to improve

the education variable in the IAB employment subsample. *Schmollers Jahrbuch. Journal of Applied Social Science Studies*, *126*(3), 405-436.

Hanson Frieze, I., Olson, J. E., & Murrell, A. J. (2011). Working Beyond 65: Predictors of Late Retirement for Women and Men MBAs. *Journal of Women & Aging*, *23*, 40-57.

Hébert, B.-P., & Luong, M. (2008). *Bridge Employment.* (Statistics Canada)

Hershey, D. A., Henkens, K., & van Dalen, H. P. (2010). What drives retirement income worries in Europe? A multilevel analysis. *European Journal of Ageing*, *7*(4), 301-311.

Hochfellner, D., & Burkert, C. (2013). Berufliche Aktivität im Ruhestand. *Zeitschrift für Gerontologie und Geriatrie*, *46*(3), 242-250.

Hochfellner, D., Müller, D., & Wurdack, A. (2011). BASiD - Biografiedaten ausgewählter Sozialversicherungsträger in Deutschland. [Computer software manual]. Nuremberg. (FDZ Datenreport 09/2011)

Hochfellner, D., Müller, D., & Wurdack, A. (2012). Biographical data of social insurance agencies in Germany * improving the content of administrative data. *Schmollers Jahrbuch. Journal of Applied Social Science Studies*, *132*, 443-451.

Hutchens, R. (2007). *Phased Retirement: Problems and Prospects.* Center for Retirement Research at Boston College, An Issue Brief. (Work Opportunities for Older Americans, Series 8)

Kim, S., & Feldmann, D. C. (2000). Working in Retirement: The Antecedents of Bridge Employment and Its Consequences for Quality of Life in Retirement. *The Academy of Management Journal*, *43*(6), 1195-1210.

Kohli, M. (1985). Die Institutionalisierung des Lebenslauf. Historische Befunde und theoretische Argumente. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *37*(1), 1 - 29.

Kohli, M. (1989). Institutionalisierung und Individualisierung der Erwerbsbiographie. In U. Beck & E. Beck-Gernsheim (Eds.), *Riskante freiheiten, individualisierung in modernen gesellschaften* (p. 219 - 244). Suhrkamp.

Kohli, M. (2000). Arbeit im Lebenslauf:Alte und neue Paradoxien. In J. Kocka & C. Offe (Eds.), *Geschichte und zukunft der arbeit.* Campus.

Kohli, M., & Künemund, H. (1996). *Nachberufliche Tätigkeitsfelder - Konzepte, Forschungslage, Empirie* (M. Kohli & H. Künemund, Eds.). Kohlhammer.

Kohli, M., & Rein, M. (1991). *Time for retirement. Comparative studies of early exit from the labor force* (M. Kohli, M. Rein, A.-M. Guillemard, & H. von Gunsteren, Eds.). Cambridge University Press.

Komp, K., van Tilburg, T., & van Groenou, M. B. (2010). Paid work between age 60 and 70 years in Europe: a matter of socio-economic status? *International Journal of Ageing and Later Life*, *5*(1), 45-75.

Künemund, H., & Kolland, F. (2007). Work and Retirement. In J. Bond, S. Peace, F. Dittmann-Kohli, & G. Westerhof (Eds.), *Ageing in society* (3rd ed., p. 167-185). London: Sage Publications.

Lain, D. (2011). Helping the Poorest Help Themselves? Encouraging Employment Past 65 in England and the USA. *Journal of Social Policy*, *40*(3), 493-512.

Lain, D. (2012). Working past 65 in the UK and USA: Occupational segregation or integration, Work, Employment and Society. *Work, Empoyment and Society*, *26*(1), 78-94.

Lui Ping Loi, J., & Shultz, K. S. (2007). Why Older Adults Seek Employment: Differing Motivations Among Subgroups. *Journal of Applied Gerontology*, *26*, 274-289.

Maestas, N. (2010). Back to work. Expectations and realizations of work after retirementBack to work. Expectations and realizations of work after retirement. *Journal of Human Ressources*, *45*(3), 718-748.

Maxin, L., & Deller, J. (2010). Activities in Retirement: Individual Experience of Silver Work. *Comparative Population Studies - Zeitschrift für Bevölkerungswissenschaft*, *35*(4), 801-832.

McNair, S. (2006). How can policy encourage older people to return to work, continue to learn and to remain in work? In *Institute for employment studies policy conference: Still working? the labour market and older people.*

Micheel, F., Roloff, J., & Wickenheiser, I. (2010). The Impact of Socioeconomic Characteristics on Older Employees' Willingness to Continue Working in Retirement Age. *Comparative Population Studies - Zeitschrift für Bevölkerungswissenschaft*, *35*(4), 869-902.

Phillipson, C. (2004). Work and retirement transitions: changing sociological and social policy contexts. *Social Policy and Society*, *3*(2), 155-162.

Phillipson, C., & Smith, A. (2005). *Extending working life: A review of the research literature.* (Department for Work and Pensions Research Report No 299)

Pleau, R. L. (2010). Gender Differences in Postretirement Employment. *Research on Aging*, *32*, 267-303.

Quinn, J. F., & Kozy, M. (1996). The Role of Bridge Jobs in the Retirement Transition: Gender, Race, and Ethnicity. *The Gerontologist*, *36*(3), 363-372.

Radl, J. (2007). Individuelle Determinanten des Renteneintrittsalters: Eine empirische Analyse von Übergängen in den Ruhestand. *Zeitschrift für Soziologie*, *36*(1), 43-64.

Richter, M., & Himmelreicher, R. K. (2008). Die Versicherungskontenstichprobe als Datengrundlage für Analysen von Versicherungsbiografien unterschiedlicher Altersjahrgänge. In *Drv schriften 79* (p. 34-61). Deutsche Rentenversicherung Bund.

Riley, M. W., & Riley, J. W. (1994). Structural Lag: Past and Future. In M. W. Riley, R. L. Kahn, & A. Foner (Eds.), *Age and structural lag: Society's failure to provide meaningful opportunities in work, family, and leisure* (p. 15-36). John Wiley & Sons.

Rinklake, A., & Buchhholz, S. (2011). Increasing inequalities in Germany - Older people's employment lives and income conditions since the mid-1980s. In H.-P. Blossfeld, S. Buchholz, & K. Kurz (Eds.), *Aging populations, globalization and the labor market: Comparing late working life and retirement in modern societies.* Cheltenham, UK/Northampton, MA: Edward Elgar.

Ruhm, C. J. (1990). Bridge Jobs and Partial Retirement. *Journal of Labor Economics*, *8*(4), 482-501.

Saba, T., & Guerin, G. (2005). Extending Employment Beyond Retirement Age: The Case of Health Care Managers in Quebec. *Public Personnel Management*, *34*, 195-214.

Schellenberg, G., Turcotte, M., & Ram, B. (2005). *Post-retirement employment.* (Statistics Canada, Perspectives, pp. 15-17)

Scherger, S., Hagemann, S., Hokema, A., & Lux, T. (2012). *Between Privilege and Burden. Work Past Retirement Age in Germany and the UK.* (Zes-Working Paper)

Schulze, I., & Jochem, S. (2007). Germany: Beyond Policy Gridlock. In E. M. Immergut, K. M. Anderson, & I. Schulze (Eds.), *The handbook of west european pension politics* (p. 660-710). Oxford: OUP.

Shacklock, K., & Brunetto, Y. (2011). A model of older workers' intentions to continue working. *Personnel Review*, *40*(2), 252-274.

Shultz, K. S., Morton, K. R., & Weckerle, J. R. (1998). The Influence of Push and Pull Factors on Voluntary and Involuntary Early Retirees' Retirement Decision and Adjustment. *Journal of Vocational Behavior*, *53*, 45-57.

Smeaton, D., & McKay, S. (2003). *Working after State Pension Age: Quantitative Analysis.* Department for Work and Pensions.

Statistik der Deutschen Rentenversicherung. (2013). *Aktuelle Daten 2013.*

Steiner, V., & Geyer, J. (2010). *Erwerbsbiographien und Alterseinkommen im demographischen Wandel: Eine Mikrosimulationsstudie für Deutschland* (No. 55). DIW Berlin. (Press conference, DIW Berlin)

Stock, J. H., & Wise, D. A. (1990). Pensions, the Option Value of Work, and Retirement.

Econometrica, *58*(5), 1151-1180.

Taylor, P. (2010). Cross-National Trends in Work and Retirement. In D. Dannefer & C. Phillipson (Eds.), *The sage handbook of social gerontology* (p. 540-550). Sage Publications.

von Bonsdorff, M. E., Shultz, K. S., Leskinen, E., & Tansky, J. (2009). The Choice Between Retirement and Bridge Employment: A Continuity Theory and Life Course Perspective. *International Journal of Aging and Human Development*, *69*, 79-100.

Wang, M., & Shultz, K. S. (2010). Employee Retirement: A Review and Recommendations for Future Investigation. *Journal of Management*, *36*, 172-206.

Wang, M., Zhan, Y., Liu, S., & Shultz, K. S. (2008). Antecedents of Bridge Employment: A Longitudinal Investigation. *Journal of Applied Psychology*, *93*(4), 818-830.

Wübbeke, C. (1999). Der Übergang von sozialversicherungspflichtiger Beschäftigung in den Rentenbezug zwischen sozialpolitischer Steuerung und betrieblichen Interessen - eine Untersuchung der Ursachen des Frühverrentungstrends in Westdeutschland für den Zeitraum von 1975 bis 1990 auf Basis der IAB-Beschäftigtenstichprobe. In *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung* (Vol. 32, p. 102-117). Institut für Arbetismarkt- und Berufsforschung.