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Methodological aspects of labour market data

Identification of the statutory retirement dates in the Sample of Integrated Labour Market Biographies (SIAB)

Svenja Lorenz,
Mona Pfister,
Thomas Zwick

Bundesagentur für Arbeit

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Svenja Lorenz, Mona Pfister, and Thomas Zwick (University of Würzburg)

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Die FDZ-Methodenreporte befassen sich mit den methodischen Aspekten der Daten des FDZ und helfen somit Nutzerinnen und Nutzern bei der Analyse der Daten. Nutzerinnen und Nutzer können hierzu in dieser Reihe zitationsfähig publizieren und stellen sich der öffentlichen Diskussion.

FDZ-Methodenreporte (FDZ method reports) deal with methodical aspects of FDZ data and help users in the analysis of these data. In addition, users can publish their results in a citable manner and present them for public discussion.

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Abstract

We analyse how administrative data on the labour history of individuals can be used to identify financial incentives within the pension system, even though these data do not include information on pension-relevant periods. We apply the Sample of Integrated Labour Market Biographies (SIAB 7514). The data consist of a two percent sample of the population of the Integrated Employment Biographies from 1975 to 2014 and are provided by the German Federal Employment Agency. We present a method for identifying the pensionable periods for old age pensions. In addition to birth date and gender, we show how to identify the qualification periods to determine whether an individual is eligible for one of the old age pension types (standard old age pension, old age pension for women, old age pension for the unemployed or under a progressive retirement plan, old age pension for persons with a long insurance record). Eligibility for a pension type then determines the earliest statutory retirement dates (normal retirement age (NRA) and early retirement age (ERA)). The knowledge about eligibility for a pension type enables us to compare the actual labour market exit age with the NRA and ERA for each birth cohort from 1936 to 1948 and to calculate the proportions of employees for the different paths out of the labour market. First, we explain the information that is necessary to identify the statutory retirement dates. We cannot identify periods of illness, inability to work, maternity, parenting, caregiving on a non-commercial basis or voluntary insurance payments from the SIAB. To assess the accuracy of pensionable periods calculated using the SIAB, we therefore use a high-quality administrative biographical dataset (Biographical Data of Selected Insurance Agencies in Germany (BASiD 5109)) that combines information on individual employment biographies (including qualification periods) with retirement information from the statutory retirement insurance records. We use the BASiD to collect information on employment states and other relevant variables that are not available in the SIAB. Moreover, we show that we can reduce the errors in identifying the relevant eligibility criteria for old age pension types to a negligible amount when we restrict our sample to employees with a high labour market attachment and short gaps in their labour market histories. We argue that the employees in our reduced sample are the employees of interest for analysing the impact of the financial incentives of the pension system on the labour market behaviour of older employees. Only these employees have a real choice of whether to work another year or to retire. We conclude that we can reliably identify individual statutory retirement dates in conventional individual labour market history datasets that do not directly contain retirement information. The additional information we generate makes these data sets a valuable alternative for the analysis of the labour market behaviour of older employees.

Zusammenfassung

In diesem Methodenreport analysieren wir, wie administrative Personendaten, herangezogen werden können, um die finanziellen Anreize des Rentensystems und ihre Auswirkungen zu identifizieren. Diese Daten enthalten keine Informationen über rentenrechtliche Zeiten und Rentenansprüche. Für unsere Untersuchung nutzen wir die Stichprobe der Integrierten Arbeitsmarktbiographien (SIAB 7514), die von der Bundesagentur für Arbeit bereitgestellt wird. Dabei handelt es sich um eine 2% Stichprobe aus der Grundgesamtheit der Integrierten Erwerbsbiographien (IEB) des Instituts für Arbeitsmarkt- und Berufsforschung (IAB) für den Zeitraum 1975-2014. Wir beschreiben eine Vorgehensweise, um das individuelle Vorliegen der Anspruchsvoraussetzungen für die unterschiedlichen Altersrentenarten (reguläre Altersrente, Altersrente für Frauen, Altersrente wegen Arbeitslosigkeit oder nach Altersteilzeit oder Altersrente für langjährige Versicherte) der gesetzlichen Rentenversicherung zu ermitteln. Hierfür benötigen wir neben dem Geburtsdatum und dem Geschlecht der Beschäftigten die rentenrechtlichen Zeiten beziehungsweise Wartezeiten. Die Identifikation der Wartezeiten erlaubt es uns, die frühestmöglichen individuellen gesetzlichen Rentenalter (reguläres Renteneintrittsalter (NRA) und das Frühverrentungsalter (ERA)) für alle Personen im Datensatz zu bestimmen. Anschließend können wir für die Kohorten 1936-1948 das individuelle Arbeitsmarktaustrittsdatum mit den individuellen gesetzlichen Renteneintrittsdaten vergleichen und die Übergangspfade aus dem Arbeitsmarkt identifizieren. Zunächst erläutern wir, welche Informationen für die Identifikation der gesetzlichen Renteneintrittsalter notwendig sind. Hierfür beschreiben wir die institutionellen Regelungen der deutschen Rentenversicherung und ihrer gesetzlichen Änderungen. Im SIAB sind Krankheitszeiten, Zeiten der Arbeitsunfähigkeit, Mutterschaft, Kindererziehung, nicht-erwerbsmäßiger Pflege und freiwilliger Versicherungsleistungen nicht erkennbar. Für die Analyse der Genauigkeit der Berechnung der rentenrechtlichen Zeiten - trotz dieser Informationslücken - verwenden wir deshalb einen qualitativ hochwertigen administrativen biografischen Datensatz (Biographische Daten ausgewählter Versicherungsunternehmen in Deutschland (BASID 5109), der Informationen zur individuellen Erwerbsbiographie mit den Informationen der gesetzlichen Rentenversicherung verknüpft. Wir nutzen konkret die im BASiD zur Nachberechnung der rentenrechtlichen Zeiten verfügbaren Zustände im Erwerbsleben und weitere Informationen, die im SIAB nicht verfügbar sind. Darüber hinaus beschreiben wir ein Stichprobenverfahren, bei dem wir nur diejenigen Personen in unsere Stichprobe aufnehmen, deren Anspruchsvoraussetzungen der Altersrente wir praktisch immer korrekt ermitteln können. Wir zeigen konkret, dass wir die meisten Fehler bei der Bestimmung der relevanten Anspruchsvoraussetzungen auf ein unbedeutendes Maß reduzieren können, wenn wir unsere Stichprobe auf ältere Arbeitnehmer mit hoher Arbeitsmarktaffinität und geringen Lücken in der Arbeitsmarkthistorie beschränken. Wir argumentieren, dass dies ohnehin die relevante Untergruppe für Analysen des Arbeitsmarkts für Ältere ist, weil nur diese älteren Beschäftigten eine realistische Wahl zwischen einer weiteren Beschäftigungsteilnahme oder Verrentung haben. Wir kommen zu dem Schluss, dass wir in administrativen Personendatensätzen, die keine Informationen der gesetzlichen Rentenversicherung enthalten, das gesetzliche Rentenalter verlässlich identifizieren können. Diese Datensätze, wie zum Beispiel der SIAB, werden dadurch zu einer wertvollen Alternative für die Analyse des Einflusses der finanziellen Anreize des Rentensystems auf das Arbeitsmarktverhalten älterer Arbeitnehmer.

Keywords: old age pension types, statutory retirement ages, retirement pathways, employment history, retirement decision, Germany.

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1 Introduction

The German public pension system has more than 53 million insured persons and 26 million pensions and is the most important source of old age income in Germany (Deutsche Rentenversicherung, 2014; 2017a: 9).[1] The system faces enormous challenges incurred by the aging population (Atalay & Barrett, 2015; Bonin, 2009; Hanel, 2010; Staubli & Zweimüller, 2013; Engels et al., 2017; Geyer & Welteke, 2017).[2] The Federal Institute for Population Research predicts that the so-called old age dependency ratio (the share of the population aged over 65 relative to the population aged between 20 and 64) could increase from around 35% in 2016 to more than 60% in 2060 (Bundesinstitut für Bevölkerungsforschung, 2016: 15). The foreseeable ageing of the population has a substantial impact on labour participation, unemployment and retirement among those aged 60–70 years. Recent changes have been made to the German pension policy to increase labour market participation among older people (Brenke, 2013; Brussig, 2015; Steiner, 2017). Consequently, numerous studies have investigated issues such as how the pension system affects the age at which individuals retire or leave the labour market (Siddiqui, 1997; Berkel & Börsch-Supan, 2004; Hanel, 2010; Atalay & Barrett, 2015; Manoli & Weber, 2016; Seibold, 2017; Engels et al., 2017; Geyer & Welteke, 2017), and other factors that influence the labour market behaviour of older employees (Stock & Wise, 1990; Riphahn & Schmidt, 1995; Börsch-Supan et al., 2004; Dorn & Souza-Poza, 2004; Gruber & Wise, 2002; Hanappi, 2012; Chan & Stevens, 2004; Jürges et al., 2016; Schnalzenberger et al., 2014).

Many studies have examined the labour market for older employees in the German context using survey data, especially the German Socio-Economic Panel Study (GSOEP) (Siddiqui, 1997; Berkel & Börsch-Supan, 2004; Börsch-Supan et al., 2004; Giesecke & Kind, 2013; Jürges et al., 2016). The GSOEP is a detailed retrospective questionnaire that contains a wide range of socio-demographic characteristics at the individual and household levels, and hence allows a reconstruction of respondents' employment history (Giesecke & Kind, 2013; Geyer & Steiner, 2014). Survey data, however, might suffer from self-selection problems and measurement errors incurred by self-reporting of important variables such as earnings, unemployment, employment and labour market exit spells, as well as pension entitlements (Kempf, 2007; Geyer & Steiner, 2014). In addition, the observation period of survey data is usually limited in comparison with administrative data (Hochfellner, 2013).[3]

Administrative data from German public pension insurance accounts (*Versicherungskontenstichprobe* VSKT) have been used mainly to investigate how pension system changes have affected retirement decisions (Hanel, 2010, Geyer & Welteke, 2017; Engels et al., 2017). The VSKT[4] dataset includes a stratified random sample of German pension insurance accounts for

[1] The share of total gross benefits of the German Statutory Pension Insurance measured against the total benefit volume of all old age pension schemes is 97% in Eastern Germany and 70% in Western Germany. The share that employers pay for pension benefits (*Betriebliche Altersversorgung*) is 8% in Germany (Bundesministerium für Arbeit und Soziales (BMAS), 2016:13).

[2] The average benefit period for German statutory pensions was 13.6 years for men and 18.2 years for women in 1995. In 2016, the average benefit period increased to 17.6 years for men and to 21.6 years for women. This represents an average increase of 29% for men and 19% for women over the 21-year period (Deutsche Rentenversicherung, 2017a: 67).

[3] Kroh, Kühner and Siegers (2016) describe the GSOEP (1984–2015).

[4] FDZ-RV SUFVSKT2015 is a 25% sample of the population of the VSKT for the 1948 to 1985 birth cohorts (FDZ-RV, 2017).

all people aged between 15 and 67 years and contains essential information for calculating pension entitlements; e.g., old age pension contribution periods, earnings points (*Entgeltpunkte*), retirement dates as well as numbers and dates of birth of children (Forschungsdatenzentrum Deutsche Rentenversicherung, 2017).[5] Socio-economic variables (e.g., employment records), however, are reported only to the extent that is necessary for the calculation of retirement entitlements (Hochfellner, 2013; Geyer & Welteke, 2017).

Finally, the 'Biographical Data of Selected Insurance Agencies in Germany' (BASiD 5109) dataset is an important source of information on the labour market behaviour of older people. It links the VSKT dataset to the panel data of the Federal Employment Agency ('Integrated Employment Biographies' and 'Establishment History Panel'). The latter mainly fill the gaps in individual and employer information in the VSKT dataset. The data combine information derived from individual biographies and their VSKT information and integrate some basic information on employers (Hochfellner et al., 2011; Hochfellner, 2013).[6] A drawback of the BASiD dataset is that it only includes 1% of people who were registered in the German pension insurance system on 31 December 2007, and therefore mainly includes retirement incidences of the 1940–1942 birth cohorts that went into regular retirement between 2000 and 2009 (Hochfellner, 2013; Hochfellner & Burkert, 2016). Consequently, we can observe the different paths to retirement for only a small number of birth cohorts and retirement years. Several studies have found, however, that the incentives for labour market transitions of older employees vary more between birth cohorts than within the observation window of individual people (Kortmann & Schatz, 1999; Bieber & Stegmann 2000; Schatz et al., 2002; Himmelreicher & Frommert, 2006). Hence, some results derived from data comprising a few birth cohorts might not be robust.

The aim of this report is to analyse whether individual administrative data from the German Federal Employment Agency can be used to analyse the labour market behaviour of older workers. More specifically, we argue that we can identify the financial incentives of the pension system and the labour market behaviour of older employees using these datasets, which have not been used for these purposes to date. We concentrate on the individual incentives inherent in the social security formulae and other aspects necessary to explain the labour market decisions of older employees (Stock and Wise, 1990; Börsch-Supan and Schnabel, 1999; Hanappi, 2012). To analyse the financial incentives of different pension options, we have to identify the normal and early retirement age determined by law on the basis of birth date and gender, as well as the eligibility for old age pension types, the deductions and supplements associated with retirement before or after the normal retirement age, and the actual individual retirement pathways derived from these dates. Administrative labour market history data do not, however, include direct information on, for example, the type of old age pension and the periods relevant

[5] Himmelreicher and Stegmann (2008) describe the dataset in detail.
[6] Hochfellner et al. (2011) describe the dataset in detail.

for pension contributions. For our investigation, we use the 'Sample of Integrated Labour Market Biographies 1975–2014' (SIAB 7514).[7] The essential advantage of the SIAB is that it provides a much larger sample size than the BASiD, for example.[8] Our version of the SIAB also allows us to observe a longer period of labour market exits for the 1936–1948 birth cohorts than the BASiD.[9] These birth cohorts reached their regular retirement age (standard old age pension) in 2001–2014.

We address the following issues in this paper.

First, we describe the legal rules for eligibility for the main types of German old age pension: standard old age pension, old age pension for women, old age pension for the long-term insured, old age pension for the unemployed or under a progressive retirement plan, and old age pension for the severely disabled.[10]

Second, we discuss what information is needed in the SIAB to identify eligibility for these pension types. In the German pension system, there are two statutory age thresholds: the early retirement age (ERA) and the normal retirement age (NRA). Pension entitlements depend on these statutory age thresholds in two ways. First, they determine the earliest age at which an individual is allowed to retire. Second, retirement before the NRA implies legally determined deductions in pension entitlements, whereas retirement after the NRA implies supplements. The statutory retirement dates therefore serve as the basis for calculating legal pension entitlements, including deductions and supplements for retiring before and after the NRA (Deutsche Rentenversicherung, 2017b).[11] As a consequence, the statutory retirement ages, the eligibility to retire earlier and the financial consequences of early or late retirement provide a reference point for older employees' labour market behaviour (Seibold, 2017). More specifically, on the basis of individual eligibility rules, we can calculate who leaves the labour market at the earliest possible date and who leaves later, and the financial consequences of these decisions. We use employees' precise dates of birth and other necessary information such as gender and pension contributions to identify individuals' earliest statutory ERA and NRA with daily precision. The NRA and ERA depend on the individual's eligibility for different pension types. Eligibility is usually tied to so-called pensionable periods and the additional conditions

[7] The following datasets of the Institute for Employment Research also include individual administrative labour market history data: Linked Personnel Panel (LPP-ADIAB), further training as a part of lifelong learning ("Berufliche Weiterbildung als Bestandteil Lebenslangen Lernens" WELL-ADIAB), Linked Employer–Employee Data of the IAB (LIAB), Panel Study Labour Market and Social Security ("Panel Arbeitsmarkt und soziale Sicherung" PASS-ADIAB), Working and Learning in a changing world ("Arbeiten und Lernen im Wandel" ALWA-ADIAB).

[8] Antoni et al. (2016) describe the dataset in detail.

[9] We restrict the dataset to persons born before 01.01.1949. For later birth cohorts, the normal retirement age for the standard old age pension and old age pension for the long-term insured is not observable because we can only investigate labour market exits until 2014 in SIAB 7514.

[10] A progressive retirement plan involes a period of part-time work before retirement. Benefits under the partial retirement act (*Altersteilzeitgesetz*) are granted for employees who have reached the age of 55 (Section 2(1) No.1 AtG) and who have agreed on partial retirement with their employers. The Federal Employment Agency (*Bundesagentur für Arbeit*) partially subsidises the income losses of employees who worked part-time and reduced their working hours from the age of 55 until entry into retirement by 31 December 2009 (Section 1(2) AtG).

[11] The formula for calculating the monthly pension benefit is found in Pfister et al. (2018). The age factor considers pension deductions and supplements for the calculation of pension benefits.

for each type of old age pension. We use information on periods of employment and receipt of benefits from German Social Books II and III to calculate pensionable periods.

The SIAB does not contain all information necessary to precisely calculate eligibility. Examples are information on childbirth and periods of illness, inability to work, maternity, parenting, non-commercial caregiving or voluntary insurance payments. In addition, the SIAB is left-censored at the year 1975. This information is, however, available in the BASiD. We therefore use the information advantage of the BASiD to investigate the extent of the deviations in the calculation of the pensionable periods in the SIAB. We also cannot observe the necessary information on pension types that are open only to specific groups (pensions for severely disabled people or for people with reduced earnings capacity). Therefore, we discuss the consequences of these additional information gaps for the identification of the statutory retirement dates. Furthermore, we describe a sampling method that enables us to include only those employees whose eligibility for different types of old age pension can be identified almost without error. More specifically, eligibility can be measured almost accurately in the SIAB if we restrict our sample to employees with a high labour market affinity and few gaps in their labour market history.

Third, we determine which type of pension dominates another if individuals are eligible for more than one pension type. We assume that the pension type with the earliest NRA or ERA dominates other pension types because the deductions for early retirement are identical for all retirement options. Our domination analysis allows us to reduce the complexity of financial incentives in the pension system because we do not have to further consider the dominated pension types.

Fourth, we determine the NRA and ERA for each dominant pension type for all employees in our SIAB sample according to our identification method.

Fifth, we show how different labour market exit paths of older employees can be identified (labour market exit before NRA, labour market exit at the NRA and labour force activity after NRA) on the basis of the last individual labour market spell observed. We also show how to identify partial retirement and bridge unemployment[12] as transition patterns out of the labour market.

Sixth, we determine the proportions of people who leave the labour market before their NRA, exactly at their NRA or after their NRA for the 1936–1948 birth cohorts. We also determine the proportions of people who leave the labour market following unemployment or partial retirement.

[12] Exit from the labour market can follow a period of unemployment. Unemployment can serve as a transition from employment to retirement. Thus, unemployment benefits can be used as a bridge into (early) retirement (Giesecke & Kind, 2013).

2 Institutional background of Germany's pension system

The German public pension system was founded by Otto von Bismarck in 1889 and is one of the oldest social security systems in the world (Börsch-Supan & Schnabel, 1999).[13] In Germany, the most significant statutory pension insurance scheme (*Gesetzliche Rentenversicherung*) is based on book six of the social code. It covers more than 80%[14] of insured persons in Germany (BMAS, 2016a: 11; Deutsche Rentenversicherung, 2017a: 9).[15] Most private and public sector employees are compulsorily insured. Other groups with mandatory enrolment in pension insurance are trainees and people who have spent periods raising children, those with disabilities, on voluntary military service or federal volunteer service, those on social benefits and non-professional care providers (Section 1, 2 & 3 SGB[16] VI).[17] The German public retirement insurance is financed by a pay-as-you-go scheme (BMAS, 2016b). About 75% of the statutory retirement insurance budget comes from contributions levied through the payroll (currently 18.7% of gross income) and contributed in equal parts by employer and employee (Deutsche Rentenversicherung, 2017a: 9; Deutsche Rentenversicherung, 2017c).[18]

The calculation of individual pension entitlements is not trivial and must consider the individual's earnings history relative to the average wages of the German population (Börsch-Supan et al., 2004; Geyer & Steiner, 2014; Geyer & Welteke, 2017). Retirement entitlement is a product of four factors: (1) earnings points (*Entgeltpunkte*), (2) age (*Zugangsfaktor*), (3) pension

[13] For a more detailed description of the pension system in Germany see Börsch-Supan and Schnabel (1999) and Börsch-Supan and Wilke (2004).

[14] Of the 53.81 million statutorily insured persons in Germany, 37.03 million were actively insured in 2015 (Deutsche Rentenversicherung, 2017a: 9). Actively insured persons are all persons who have made at least one compulsory or voluntary contribution (*Pflichtversicherte oder freiwillig Versicherte*) or have credit periods (*Anrechnungszeiten*), such as periods of unemployment or work incapacity without receiving benefits, schooling or maternity leave, in the reporting year (BMAS, 2016a). Of the 25.65 million German statutory pensions in 2016, 18.31 million were old age pensions (Deutsche Rentenversicherung, 2017a: 9).

[15] The German public pension system consists of the following schemes: Statutory Pension Insurance; Civil Service Pension Scheme (*Beamtenversorgung*); Supplementary Old Age Scheme in the Public Service (*Zusatzversorgung im öffentlichen Dienst*); Farmers' Old Age Security (*Alterssicherung der Landwirte*); and Artists' Social Security (*Künstlersozialversicherung*) (BMAS, 2016).

[16] SGB stands for *Sozialgesetzbuch* (German Social Law).

[17] Of the 37.03 million actively insured persons, 31.02 million are compulsorily insured and 4.32 million are exempted from pension insurance because they were in marginally paid employment in 2015. Of those who are compulsorily insured, 94.5% are employees subject to social insurance contributions (Deutsche Rentenversicherung, 2017a: S.28). Until 31.12.2012, employees with earnings below the official minimum-earnings threshold (marginally paid employment) were exempted from the statutory pension insurance (*Gesetz zur Neuregelung der geringfügigen Beschäftigungsverhältnisse* (BGBl. I 1999, 388) from 24.3.1999). As of 01.01.2013 ("Gesetz zu Änderungen im Bereich der geringfügigen Beschäftigung" (BGBl. I, 247) from 05.12.2012), people in marginal paid employment (with a salary not exceeding €450 per month) are compulsorily insured with a flat-rate pension insurance contribution of 15% from the employer (Section 168(1) No. 1b SGB VI). However, marginally paid employees can opt out of pension insurance (Section 6 No. 1b SGB VI; Segebrecht & Vogel, 2013).

[18] The revenue of the statutory retirement insurance scheme in Germany was €256.19 billion in 2016, of which €215.42 billion came from employers and employees' contributions (Deutsche Rentenversicherung, 2017a: S.9). Contributions are paid in relation to income until a certain gross income limit (*Beitragsbemessungsgrenze*). Pfister et al. (2018: 12–13) describe the pension contribution limits in Western and Eastern Germany from 1951 to 2013.

value (*aktueller Rentenwert*) and (4) pension type (*Rentenartfaktor*) (Deutsche Rentenversicherung, 2017b).[19] The age factor includes pension deductions and supplements in the benefits calculation (Deutsche Rentenversicherung, 2017b). It is adjusted to the type of pension, the statutory retirement ages (ERA and NRA) and the actual retirement age. In this report, we focus on old age pensions in Germany.[20] The German statutory pension insurance provides, in addition to the standard old age pension (Section 235 SGB VI)), four different early old age retirement programmes for the 1936–1948 birth cohorts. This report considers the eligibility rules and actual usage of these programmes[21]:

(1) Old age pension for persons with a long insurance record (Section 236 SGB VI)

(2) Old age pension for severely disabled persons (Section 236a SGB VI)

(3) Old age pension for women (Section 237 SGB VI)

(4) Old age pension for the unemployed or under a progressive retirement plan (Section 237a SGB VI)

People who are eligible for early retirement (before the NRA) can claim their pension at the ERA (*Regelgrenze der vorzeitigen Inanspruchnahme*) according to their pension type. In all types of old age pension, early retirement is associated with pension deductions of 0.3% for each month of retirement before the NRA (3.6% per year) (Section 77, 2a SGB VI) (Rüb &

[19] Pfister et al. (2018) provide an extensive description of the calculation of pension benefits.

[20] Conventional administrative datasets of the Federal Employment Agency do not generally include the relevant information to identify the four alternative pensions provided by the German statutory pension insurance scheme: (1) special benefits for miners (*Altersrente für langjährig unter Tage beschäftigte Bergleute* (Section 40 SGB VI) and *Rente für Bergleute* (Section 45 SGB VI)), (2) pensions for reduced earning capacity (*Rente wegen Erwerbsminderung* (Section 43 SGB VI)), (3) pensions payable on account of the insured person´s death (*Rente an Hinterbliebene* (Section Section 46, 47, 48 & 49 SGB VI) and (4) survivors' benefits. Miners can be excluded from the SIAB due to the variable 'occupation'. The imposition of specific sample restrictions excludes people who receive survivor benefits or pensions for reduced earning capacity. In 2016, 388,029 people drew a pension payable on account of the insured person´s death (Deutsche Rentenversicherung, 2017a). This pension type is therefore negligible in our investigations.

[21] The old age pension for persons with an exceptionally long insurance record (*Altersrente für besonders langjährig Versicherte* (Section 236b SGB VI) is not considered in this report. This pension type has been offered since 01.01.2012 on the basis of the 2007 pension reform (*Gesetz zur Anpassung der Regelaltersgrenze an die demographische Entwicklung zur Stärkung der Finanzierungsgrundlagen der gesetzlichen Rentenversicherung (RV-Altersgrenzenanpassungsreport)*" (BGB I 554) from 30.04.2007). In our sample, the 1947 and 1948 birth cohorts are affected by this reform. For these cohorts, the NRA for both pension types—the old age pension for persons with an exceptionally long-term insurance record and the old age pension for persons with a long insurance record—is 65. However, eligibility for the old age pension for persons with a long insurance record requires just 35 contribution years, while eligibility for the old age pension for persons with an exceptionally long insurance record requires 45 contribution years. Therefore, the old age pension for persons with a long insurance record is the preferred option and the pension for persons with an exceptionally long-term insurance record is irrelevant. On 01.07.2014, the NRA for the old age pension for persons with an exceptionally long insurance record was adjusted to 63 years of age (*Gesetz über Leistungsverbesserungen in der gesetzlichen Rentenversicherung (RV-Leistungsverbesserungsgesetz)* (BGB I 27 from 26.06.2014). This change only concerns people born after 31.06.1951 and is therefore beyond the scope of our report. Börsch-Supan et al. (2014) provide an extensive overview of the possibilities for retirement at the age of 63.

Lamping, 2010; Deutsche Rentenversicherung, 2014, Seibold, 2017).[22] At the NRA, they start to receive their full retirement entitlement; their so-called age factor is one (Seibold, 2017). Dependent on the individual's pension type and date of birth, early retirement is possible up to 60 months before the NRA, compare Table 1. Therefore, the maximum deduction induced by early retirement is 18% (Arent & Nagl, 2010). Conversely, those who retire after the NRA receive a 0.5% per month increase, amounting to a supplement of 6% per year (Section 77(2) No.2b SGB VI).[23] Pfister et al. (2018) describe a method for calculating retirement entitlements in labour market history datasets based on our identification strategy of the individual statutory retirement dates, ERA and NRA that includes these deductions and supplements.

2.1 Old age pension types and their legislative changes

To calculate the statutory retirement dates in administrative individual labour market data, we need to understand the legal requirements of the German pension types and their changes over time. The following descriptions refer to the legislative changes in the statutory retirement dates for the 1936–1948 birth cohorts. Figure 1 illustrates the gradual adjustments of the NRA according to the legislative changes in 1957–2007 for each old age pension type.

The 1957 pension reform (*Arbeiterrenten- und Angestelltenversicherungs-Neuregelungsgesetz* (BGB I 45, 88) from 26.02.1957) set the NRA to receive old age benefits (*Altersruhegeld*) at 65 years of age for both men and women.

The pension reform in 1972 (*Rentenreformgesetz* (BGB I 1956) from 16.10.1972) introduced the old age pension for persons with a long insurance record and the old age pension for severely disabled persons. This legislative change led to a complex legal system, with the standard old age pension and the four old age pension types mentioned in the previous section and their respective mandatory retirement ages. Moreover, older disabled workers with a limited earning capacity were given the opportunity to retire at the age of 62 (old age pension for severely disabled persons)[24], and after 1978 (*Fünftes Rentenänderungs-Versicherungsgesetz* (BGB I 1710) from 06.11.1978), the NRA for severely disabled persons was reduced to 60 in two steps (Börsch-Supan & Wilke, 2004; Deutsche Rentenversicherung, 2014; Börsch-Supan et al., 2015).[25]

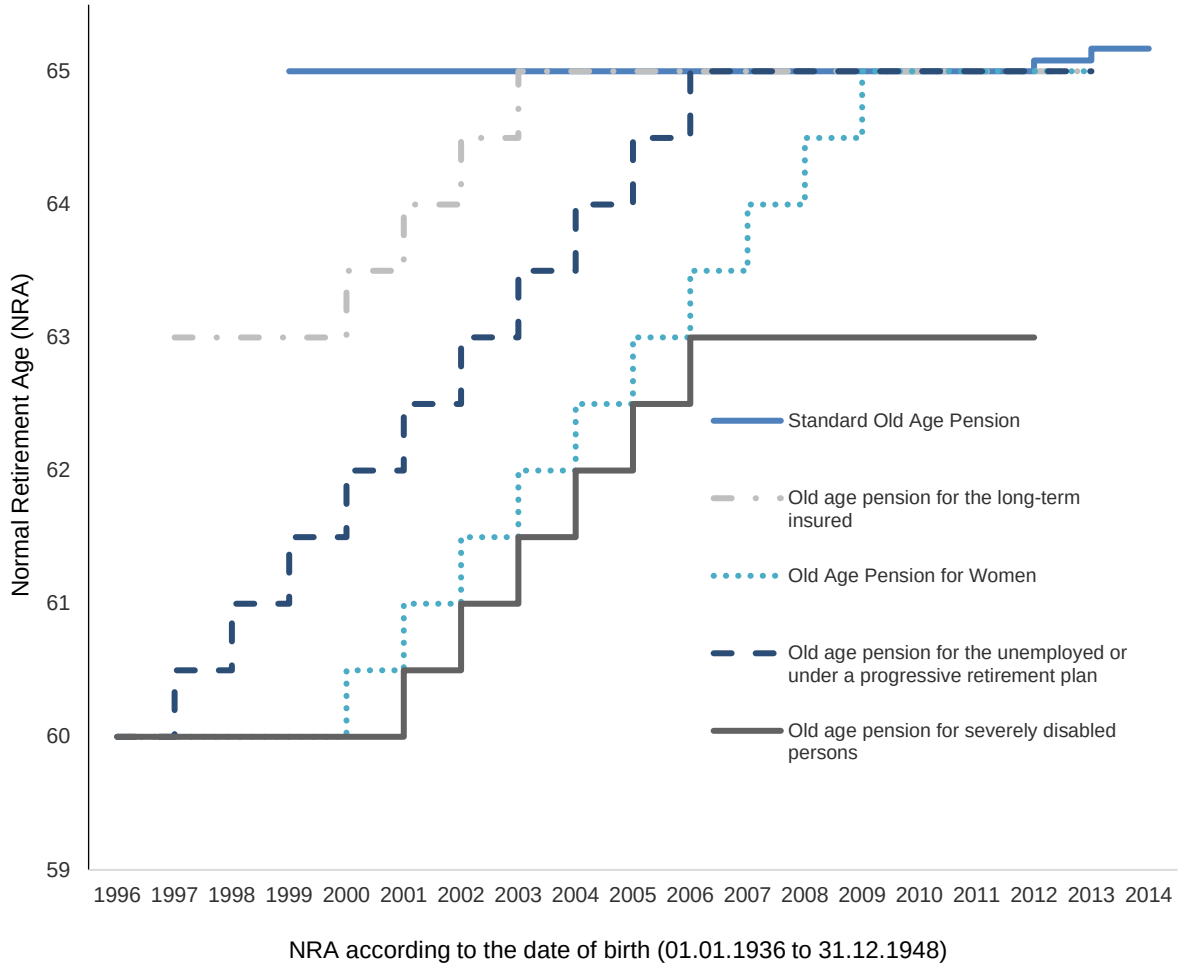
[22] Deductions for an early retirement have existed since the pension reform in 1992, but apply to all birth cohorts observed in this report.

[23] In addition to the supplements, pension benefits increase through the current payment of statutory public pension insurance premiums (Deutsche Rentenversicherung, 2017d).

[24] Börsch-Supan and Wilke (2004) and Riphahn (1999) describe the regulation for old age disability benefits in detail.

[25] Old age benefits were received from 01.01.1979 for those aged 61 and from 01.01.1980 for those aged 60 (*Fünftes Rentenänderungs-Versicherungsgesetz* (BGB I 1710) from 06.11.1978).

Figure 1: Normal Retirement Age (Legislative changes 1957–2007)



Source: own illustration based on the respective BGB

The major motivation for the pension reforms of 1992, 1999 and 2004 was to improve the financial sustainability of the pay-as-you-go schemes (OECD, 2007, 2015; European Commission, 2010). The 1992 pension reform act (*Rentenreformgesetz 1992* (BGB I 2261) from 28.12.1989) was enacted as a response to the rising life expectancy, low fertility rates and shrinking labour force in Germany (Deutsche Rentenversicherung, 2014; Geyer & Steiner, 2014). With the codification of the pension regulations in the social code, the government started to gradually raise the NRA to 65 years, depending on the date of birth, for three types of old age pension (old age pension for persons with a long insurance record, old age pension for women and old age pension for the unemployed or under a progressive retirement plan). The NRA of the old age pension for persons with a long insurance record increased monthly from 63 to 65 for the 1937 and 1938 birth cohorts (Appendix 19 SGB VI). For the old age pension for women, the NRA was adjusted to 65 for the 1940 to 1944 birth cohorts (Appendix 20 SGB VI). The postponement of the NRA for the old age pension for the unemployed or

those under a progressive retirement plan was introduced for the 1937 to 1941 birth cohorts (Appendix 21 SGB VI).[26]

The 1999 reform (*Rentenreformgesetz 1999* (BGB I 2998) from 16.12.1997) abolished the old age pensions for women, unemployed and persons under a progressive retirement plan for those born after 31.12.1951. With the simplification of the pension system, important options for exiting the labour market before age 65 were scrapped (Berkel & Börsch-Supan, 2004). In addition, in the 1999 reform the ERA for the long-term insured was reduced from the age of 63 to 62 in two-month steps for the 1948 and 1949 cohorts. Thus, deductions of up to 10.8% were possible for the old age pension for persons with a long insurance record. Similarly, the pension reform postponed the NRA for severely disabled people in monthly steps from 60 to 63 (cohorts 1941–1943). However, the ERA of 60 remained unchanged for this old age pension type.

In 2004 (*RV-Nachhaltigkeitsgesetz* (BGB I 1791) from 26.07.2004), the government increased the ERA stepwise from 60 to 63 years for the old age pension for the unemployed and those under a progressive retirement plan. Consequently, with every additional birth month, the ERA increased in monthly increments for the 1946–1948 cohorts. The 2007 pension reform (*RV-Altersgrenzenanpassungsgesetz* (BGB I 554) 20.04.2007) postponed the NRA from 65 to 67 for the standard old age pension, starting in 2012 for the 1947 cohort until 2029 for the 1963 cohort.[27] Table 1 summarises the adjustments of the NRA and ERA for each type of old age pension by date of birth for the 1936–1948 cohorts.

Table 1: The normal (NRA) and early (ERA) retirement age according to pension type and date of birth

Date of birth		Standard old age pension				Old age pension for severely disabled persons				Old age pension for persons with a long insurance record				Old age pension for Women				Old age pension for the unemployed or under a progressive retirement plan			
		Section 235 SGB VI				Section 236a SGB VI				Section 236 SGB VI				Section 237a SBG VI				Section 237 SGB VI			
		NRA		ERA		NRA		ERA		NRA		ERA		NRA		ERA		NRA		ERA	
		Y	M	Y	M	Y	M	Y	M	Y	M	Y	M	Y	M	Y	M	Y	M	Y	M
1936		65		65		60		60		63		63		60		60		60		60	
1937	J	65		65		60		60		63	1	63		60		60		60	1	60	
1937	F	65		65		60		60		63	2	63		60		60		60	2	60	
1937	MAR	65		65		60		60		63	3	63		60		60		60	3	60	
1937	A	65		65		60		60		63	4	63		60		60		60	4	60	
1937	MY	65		65		60		60		63	5	63		60		60		60	5	60	
1937	JUN	65		65		60		60		63	6	63		60		60		60	6	60	
1937	JLY	65		65		60		60		63	7	63		60		60		60	7	60	
1937	AUG	65		65		60		60		63	8	63		60		60		60	8	60	

[26] The adjustments of the NRA were enacted on 25.09.1996 ("*Wachstums – und Beschäftigungsförderungsgesetz*" (BGB I 1461)).

[27] The 2007 reform increased the NRA for the long-term insured to 67 starting with the 1949 birth cohort. Moreover, for the old age pension for severely disabled persons, the NRA increased to 65 and the ERA to 62 from 2015. In addition, the old age pension for persons with an exceptionally long insurance record (at least 45 years of pensionable periods) was introduced for individuals born after 31.12.1946.

Table 1: The normal (NRA) and early (ERA) retirement age according to pension type and date of birth

1937	SEP	65		65		60		60		63	9	63		60		60		60	9	60	
1937	OCT	65		65		60		60		63	10	63		60		60		60	10	60	
1937	NOV	65		65		60		60		63	11	63		60		60		60	11	60	
1937	DEC	65		65		60		60		64		63		60		60		61		60	
1938	J	65		65		60		60		64	1	63		60		60		61	1	60	
1938	F	65		65		60		60		64	2	63		60		60		61	2	60	
1938	MAR	65		65		60		60		64	3	63		60		60		61	3	60	
1938	A	65		65		60		60		64	4	63		60		60		61	4	60	
1938	MY	65		65		60		60		64	5	63		60		60		61	5	60	
1938	JUN	65		65		60		60		64	6	63		60		60		61	6	60	
1938	JLY	65		65		60		60		64	7	63		60		60		61	7	60	
1938	AUG	65		65		60		60		64	8	63		60		60		61	8	60	
1938	SEP	65		65		60		60		64	9	63		60		60		61	9	60	
1938	OCT	65		65		60		60		64	10	63		60		60		61	10	60	
1938	NOV	65		65		60		60		64	11	63		60		60		61	11	60	
1938	DEC	65		65		60		60		65		63		60		60		62		60	
1939	J	65		65		60		60		65		63		60		60		62	1	60	
1939	F	65		65		60		60		65		63		60		60		62	2	60	
1939	MAR	65		65		60		60		65		63		60		60		62	3	60	
1939	A	65		65		60		60		65		63		60		60		62	4	60	
1939	MY	65		65		60		60		65		63		60		60		62	5	60	
1939	JUN	65		65		60		60		65		63		60		60		62	6	60	
1939	JLY	65		65		60		60		65		63		60		60		62	7	60	
1939	AUG	65		65		60		60		65		63		60		60		62	8	60	
1939	SEP	65		65		60		60		65		63		60		60		62	9	60	
1939	OCT	65		65		60		60		65		63		60		60		62	10	60	
1939	NOV	65		65		60		60		65		63		60		60		62	11	60	
1939	DEC	65		65		60		60		65		63		60		60		63		60	
1940	J	65		65		60		60		65		63		60	1	60		63	1	60	
1940	F	65		65		60		60		65		63		60	2	60		63	2	60	
1940	MAR	65		65		60		60		65		63		60	3	60		63	3	60	
1940	A	65		65		60		60		65		63		60	4	60		63	4	60	
1940	MY	65		65		60		60		65		63		60	5	60		63	5	60	
1940	JUN	65		65		60		60		65		63		60	6	60		63	6	60	
1940	JLY	65		65		60		60		65		63		60	7	60		63	7	60	
1940	AUG	65		65		60		60		65		63		60	8	60		63	8	60	
1940	SEP	65		65		60		60		65		63		60	9	60		63	9	60	
1940	OCT	65		65		60		60		65		63		60	10	60		63	10	60	
1940	NOV	65		65		60		60		65		63		60	11	60		63	11	60	
1940	DEC	65		65		60		60		65		63		61		60		64		60	
1941	J	65		65		60	1	60		65		63		61	1	60		64	1	60	
1941	F	65		65		60	2	60		65		63		61	2	60		64	2	60	
1941	MAR	65		65		60	3	60		65		63		61	3	60		64	3	60	
1941	A	65		65		60	4	60		65		63		61	4	60		64	4	60	
1941	MY	65		65		60	5	60		65		63		61	5	60		64	5	60	
1941	JUN	65		65		60	6	60		65		63		61	6	60		64	6	60	
1941	JLY	65		65		60	7	60		65		63		61	7	60		64	7	60	
1941	AUG	65		65		60	8	60		65		63		61	8	60		64	8	60	
1941	SEP	65		65		60	9	60		65		63		61	9	60		64	9	60	
1941	OCT	65		65		60	10	60		65		63		61	10	60		64	10	60	
1941	NOV	65		65		60	11	60		65		63		61	11	60		64	11	60	
1941	DEC	65		65		61		60		65		63		62		60		65		60	

Table 1: The normal (NRA) and early (ERA) retirement age according to pension type and date of birth

1942	J	65		65		61	1	60		65		63		62	1	60		65		60	
1942	F	65		65		61	2	60		65		63		62	2	60		65		60	
1942	MAR	65		65		61	3	60		65		63		62	3	60		65		60	
1942	A	65		65		61	4	60		65		63		62	4	60		65		60	
1942	MY	65		65		61	5	60		65		63		62	5	60		65		60	
1942	JUN	65		65		61	6	60		65		63		62	6	60		65		60	
1942	JLY	65		65		61	7	60		65		63		62	7	60		65		60	
1942	AUG	65		65		61	8	60		65		63		62	8	60		65		60	
1942	SEP	65		65		61	9	60		65		63		62	9	60		65		60	
1942	OCT	65		65		61	10	60		65		63		62	10	60		65		60	
1942	NOV	65		65		61	11	60		65		63		62	11	60		65		60	
1942	DEC	65		65		62		60		65		63		63		60		65		60	
1943	J	65		65		62	1	60		65		63		63	1	60		65		60	
1943	F	65		65		62	2	60		65		63		63	2	60		65		60	
1943	MAR	65		65		62	3	60		65		63		63	3	60		65		60	
1943	A	65		65		62	4	60		65		63		63	4	60		65		60	
1943	MY	65		65		62	5	60		65		63		63	5	60		65		60	
1943	JUN	65		65		62	6	60		65		63		63	6	60		65		60	
1943	JLY	65		65		62	7	60		65		63		63	7	60		65		60	
1943	AUG	65		65		62	8	60		65		63		63	8	60		65		60	
1943	SEP	65		65		62	9	60		65		63		63	9	60		65		60	
1943	OCT	65		65		62	10	60		65		63		63	10	60		65		60	
1943	NOV	65		65		62	11	60		65		63		63	11	60		65		60	
1943	DEC	65		65		63		60		65		63		64		60		65		60	
1944	J	65		65		63		60		65		63		64	1	60		65		60	
1944	F	65		65		63		60		65		63		64	2	60		65		60	
1944	MAR	65		65		63		60		65		63		64	3	60		65		60	
1944	A	65		65		63		60		65		63		64	4	60		65		60	
1944	MY	65		65		63		60		65		63		64	5	60		65		60	
1944	JUN	65		65		63		60		65		63		64	6	60		65		60	
1944	JLY	65		65		63		60		65		63		64	7	60		65		60	
1944	AUG	65		65		63		60		65		63		64	8	60		65		60	
1944	SEP	65		65		63		60		65		63		64	9	60		65		60	
1944	OCT	65		65		63		60		65		63		64	10	60		65		60	
1944	NOV	65		65		63		60		65		63		64	11	60		65		60	
1944	DEC	65		65		63		60		65		63		65		60		65		60	
1945		65		65		63		60		65		63		65		60		65		60	
1946	J	65		65		63		60		65		63		65		60		65		60	1
1946	F	65		65		63		60		65		63		65		60		65		60	2
1946	MAR	65		65		63		60		65		63		65		60		65		60	3
1946	A	65		65		63		60		65		63		65		60		65		60	4
1946	MY	65		65		63		60		65		63		65		60		65		60	5
1946	JUN	65		65		63		60		65		63		65		60		65		60	6
1946	JLY	65		65		63		60		65		63		65		60		65		60	7
1946	AUG	65		65		63		60		65		63		65		60		65		60	8
1946	SEP	65		65		63		60		65		63		65		60		65		60	9
1946	OCT	65		65		63		60		65		63		65		60		65		60	10
1946	NOV	65		65		63		60		65		63		65		60		65		60	11
1946	DEC	65		65		63		60		65		63		65		60		65		61	
1947	J	65	1	65	1	63		60		65		63		65		60		65		61	1
1947	F	65	1	65	1	63		60		65		63		65		60		65		61	2
1947	MAR	65	1	65	1	63		60		65		63		65		60		65		61	3
1947	A	65	1	65	1	63		60		65		63		65		60		65		61	4

Table 1: The normal (NRA) and early (ERA) retirement age according to pension type and date of birth

1947	MY	65	1	65	1	63		60		65		63		65		60		65		61	5
1947	JUN	65	1	65	1	63		60		65		63		65		60		65		61	6
1947	JLY	65	1	65	1	63		60		65		63		65		60		65		61	7
1947	AUG	65	1	65	1	63		60		65		63		65		60		65		61	8
1947	SEP	65	1	65	1	63		60		65		63		65		60		65		61	9
1947	OCT	65	1	65	1	63		60		65		63		65		60		65		61	10
1947	NOV	65	1	65	1	63		60		65		63		65		60		65		61	11
1947	DEC	65	1	65	1	63		60		65		63		65		60		65		62	
1948	J	65	2	65	2	63		60		65		62	11	65		60		65		62	1
1948	F	65	2	65	2	63		60		65		62	11	65		60		65		62	2
1948	MAR	65	2	65	2	63		60		65		62	10	65		60		65		62	3
1948	A	65	2	65	2	63		60		65		62	10	65		60		65		62	4
1948	MY	65	2	65	2	63		60		65		62	9	65		60		65		62	5
1948	JUN	65	2	65	2	63		60		65		62	9	65		60		65		62	6
1948	JLY	65	2	65	2	63		60		65		62	8	65		60		65		62	7
1948	AUG	65	2	65	2	63		60		65		62	8	65		60		65		62	8
1948	SEP	65	2	65	2	63		60		65		62	7	65		60		65		62	9
1948	OCT	65	2	65	2	63		60		65		62	7	65		60		65		62	10
1948	NOV	65	2	65	2	63		60		65		62	6	65		60		65		62	11
1948	DEC	65	2	65	2	63		60		65		62	6	65		60		65		63	

(Notes: The legitimate expectations (*Vertrauensschutz*) for old age pensions are considered. The exact statutory retirement dates can be found in Appendix A).

Source: own illustration based on the respective BGB and Deutsche Rentenversicherung, 2015.

As can been seen in Table 2, at least five contribution years are required to qualify for the standard old age pension (*Wartezeit*) (Section 235 SGB VI). At least 35 years are needed to qualify for the old age pension for persons with a long insurance record (Section 236 SGB VI). Women must have completed 15 contribution years during their entire career and more than 10 years of compulsory contribution periods (*Pflichtbeiträge*) after their fortieth birthday to be eligible for the old age pension for women (Section 237a SGB VI). The old age pension for severely disabled persons is available to those with at least 50% disability (Section 2, (2) SGV IX) or those who are occupationally disabled (*berufsunfähig*) or incapable of pursuing employment (*erwerbsunfähig*) at the beginning of retirement (*Gesetz zur Reform der Renten wegen verminderter Erwerbsfähigkeit* (BGB I 1827) from 20.12.2001). The minimum qualifying period for the old age pension for severely disabled persons is 35 years (Section 236a SGB VI).

In addition to the statutory retirement ages, the eligibility conditions for the old age pension for the unemployed or persons under a progressive retirement plan have changed for the 1936–1948 birth cohorts. On 01.08.1996 (*Gesetz zur Förderung eines gleitenden Übergangs in den Ruhestand* (BGB I 1078) from 23.07.1996), the rules for the old age pension for the unemployed were extended to partial retirement for older employees according to the law on part-time employment for older employees (*Altersteilzeitgesetz, (AtG)* Section 2(1) No.1 and 3(1) No. 1). People could receive both pension types if they were unemployed for at least 52 weeks in the 1.5 years before their NRA or had performed at least 24 weeks of employment under a German progressive retirement plan after reaching the age of 55. Moreover, they had to have made at least 15 years of contributions overall and 8 years of compulsory contributions in the 10 years before retirement (Section 237 SGB VI). Since 01.01.2000, they must have been unemployed for at least 52 weeks in total after reaching the age of 58 years and 6 months (*Rentenreformgesetz 1999* (BGB I 2998) from 16.12.1997).

Table 2: Qualifying periods and additional conditions to be eligible for old age pension types

Pension Type	Paragraph	Qualifying periods in years	Additional conditions		
Standard old age pension	Section 235	5			
Old age pension for severely disabled person	Section 236a	35	disability degree of at least 50% (Section 2, (2) SGV IX) or occupationally disabled or incapable of employment pursuant to applicable law from 31.12.2000		
Old age pension for the long-term insured	Section 236	35			
Old age pension for women	Section 237a	15	completed at least 121 months of compulsory contribution periods after reaching the age of 40		
			Legislative changes		
			Until 31.07.1996[28]	Until 31.12.1999[29]	Since 01.01.2000[30]
Old age pension for unemployed or persons under a progressive retirement plan	Section 38 or 237	15	(1) unemployed at the starting point of retirement and at least 52 weeks of unemployment 1.5 years before retiring (2) in the last 10 years before retirement at least 8 years of compulsory contributions periods	(1a) unemployed at the starting point of retirement and at least 52 weeks of unemployment 1.5 years before retiring or (1b) at least two years of partial retirement after reaching the age of 55 (2) in the last 10 years before retirement at least 8 years of compulsory contributions periods	(1a) unemployed at the starting point of retirement and at least 52 weeks unemployed after reaching the age of 58 and 6 months, or (1b) at least two years of partial retirement after reaching the age of 55 (2) in the last 10 years before retirement at least 8 years of compulsory contributions periods

Source: own illustration based on the respective German Civil Code (*BGB*) and Deutsche Rentenversicherung (2015) according to Börsch-Supan et al. (2004).

[28] *Rentenreformgesetz 1992* (BGB I 2261) from 28.12.1989.
[29] *Gesetz zur Förderung eines gleitenden Übergangs in den Ruhestand* (BGB I 1078) from 23.07.1996.
[30] *Rentenreformgesetz 1999* (BGB I 2998) from 16.12.1997.

2.2 Possible patterns of labour market exit and the role of statutory retirement ages

To investigate the patterns of older employees' labour market behaviour in the administrative data, we need to focus on the date of labour market exit rather than the start of pension receipt because we do not have the information on the actual retirement date. There are various transition possibilities from the labour market into retirement. People not only differ in terms of their pension type, but also with respect to their labour market status before retirement (Rasner & Etgeton, 2014). Labour market exit can follow a spell of unemployment or partial retirement. A substantial proportion of older employees are active in the labour market after their last employment before retirement age (Brussig, 2015).These transition patterns are in principle independent of the eligibility for an old age pension type, although the financial consequences of each pattern do depend on eligibility. For instance, women who are eligible for an old age pension for women can nevertheless exit the labour market through unemployment. We identify the most attractive pension option in Section 4 depending on whether the employee fulfils the eligibility rules. The identification is based entirely on the financial incentives of the social security system characterised by the ERA and NRA, as well as the pension entitlements associated with each pension type.

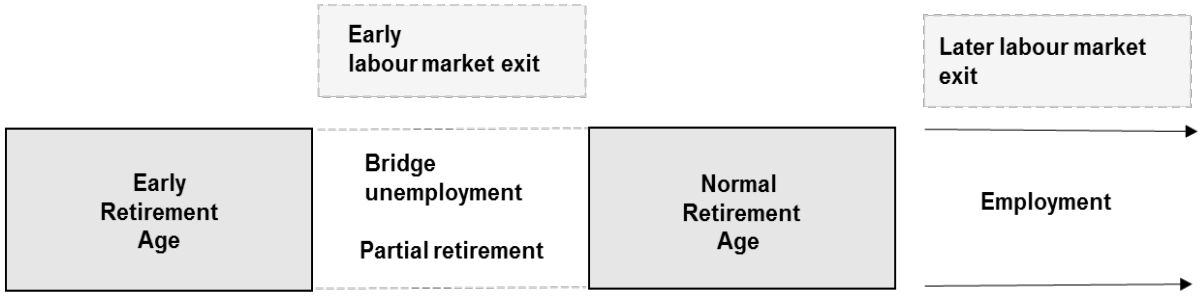
Partial retirement is strictly regulated by law and is also identifiable in administrative labour market history data.[31] In 1996 (*Gesetz zur Förderung eines gleitenden Übergangs in den Ruhestand* (BGB I 1078) from 23.07.1996), a partial retirement option was introduced under the partial retirement act (*Altersteilzeitgesetz AtG)*. The idea of partial retirement is to allow older employees to gradually step into retirement by reducing their weekly working hours by 50% (Section 2(1) AtG). If employers allow it, individuals can claim partial retirement from the age of 55, if they have been employed and subject to social insurance for at least 1,080 days during the previous 5 years (Section 2 (1) AtG).[32] Partial retirement was subsidised by the Federal Employment Agency[33], when (part-time) jobs that became vacant as a result of the partial retirement arrangements were filled by an unemployed person or an apprentice (*Wiederbesetzungspflicht* (Section 3(1) No. 2 AtG) (Bundesagentur für Arbeit, 2012; 2015). The 1999 pension reform (*Gesetz zur Fortentwicklung der Altersteilzeit* (BGB I 2494) from 27.12.1999) also gave part-time workers the opportunity to take advantage of partial retirement. The second reform of the partial retirement plans in 2000 (*Zweites Gesetz zur Fortentwicklung der Altersteilzeit* (BGB I 910) 27.06.2000) extended the funding period for partial retirement by the Federal Employment Agency from 31.12.2004 until 31.12.2009. This extension meant that partial retirement was only funded for employees who reduced their working hours from the age of 55 by 31 December 2009 at the latest (Section 1(2) AtG). Moreover, the maximum funding period increased from 5 to 6 years (Section 4(1) AtG). However, the partial retirement act did not lose its validity at the end of 2009 and part-time work is still possible with small modifications (Bundesagentur für Arbeit, 2015). Individuals can choose between the so-called 'continuity model', in which their working hours are reduced (e.g., working half-days) during the entire partial retirement period, or the so-called 'block model'. The block model is characterised by two periods of equal length: in the first half, the employee works full-time and

[31] The value of the variable *erwstat* for partial retirement is 103 in SIAB.
[32] Gasche and Krolage (2012) provide an extensive overview of the partial retirement regulation.
[33] The subsidised services from the Federal Employment Agency are regulated in Section 4 AtG.

in the second half, the employee is completely released from work (*Freistellungsphase)* (Kirchner & Mittelhamm, 2010; Bundesagentur für Arbeit, 2015; Huber et al., 2013). The maximum period of partial retirement in the block model without collective agreement is 3 years (1.5 years of work, followed by 1.5 years of no work) (Section 2(1) No.1 AtG). The period can be longer than 3 years if such a distribution of working time is permitted by a collective agreement on partial retirement (Section 2(1) No.2 AtG) (Bundesagentur für Arbeit, 2015). The block model can therefore be seen as another early retirement scheme. It proved to be much more popular than the 'true' partial retirement model (Brussig et al., 2009) with a share of about 90% in both partial retirement schemes.

Taking into account the birth cohort-specific rules of the German public pension system, we can analyse the three main pathways of labour market exit illustrated in Figure 2. Labour market exit before the NRA determines the early retirement path. The regular retirement path is defined by the last labour market spell ending at the NRA. Work beyond the pensionable age is an indicator of employment beyond retirement (Eurofound, 2012). In Germany, it is mandatory for employers to offer a new contract for employees who choose to continue working after the NRA. This change in the labour contract is observable in the employment history of the administrative labour market data (Hochfellner & Burkert, 2016).[34]

Figure 2: Possible labour market exit pathways for older employees



Source: own illustration

2.3 Variables required to identify eligibility for old age pension types

First, we provide an overview of which labour market spells lead to pensionable periods. This information shows us which variables are necessary to identify eligibility for the five types of old age pension in the labour market history data. There are three types of pensionable periods: contribution periods (*Beitragszeiten*), non-contributory periods (*beitragsfreie Zeiten*) and consideration periods (*Berücksichtigungszeiten)* (Kreikebohm, 2003; Beye, 2009; Börsch-Supan et al., 2014). The non-contributory periods can be classified as credited points periods (*Anrechnungszeiten*) or substitute periods (*Ersatzzeiten*) (Section 54 SGB VI).[35] As shown in

[34] Without the information from the German public pension insurance accounts, we cannot observe the pathway of individuals who retire early and continue to work from the administrative labour market history data. Therefore, people can receive income from employment in addition to their pension benefits (*Vorgezogene Altersrente mit Hinzuverdienst*) (Deutsche Rentenversicherung, 2017d).

[35] Non-contributory periods also include non-contributory supplementary periods (*Zurechnungszeiten*) (Section 59 SGB VI). Non-contributory supplementary periods are added to the pension contribution periods for spells of reduced earnings capacity or if the pension is payable because of the insured person´s death. These periods have no effect on the qualifying periods.

Table 3, old age pensions differ with respect to which spell types are taken into account as pensionable periods. Contribution periods and substitute periods are considered for the 5-year (standard old age pension) and 15-year (old age pension for women and old age pension for the unemployed or under a progressive retirement plan) qualifying periods *(*Beye, 2009*).* For the 35-year qualifying period (old age pension for persons with a long insurance record), all spell types are considered as pensionable periods (contribution periods, non-contributory periods and consideration periods) (Section 51(3) SGB VI).

Table 3: Pensionable Periods

	Contribution periods (*Beitrags-zeiten)*	**Consideration Periods** (*Berücksichtigungs-zeiten)*	**Non-contributory periods** (*Beitragsfreie Zeiten)*	
			Credited Periods (Anrechnungszeiten)	*Substitute periods (Ersatzzeiten)*
	Section 55	**Section 57, 249b**	**Section 58, 252, 252a, 253**	**Section 250, 251**
Qualifying periods of 5 years	X			X
Qualifying periods of 15 years	X			X
Qualifying periods of 35 years	X	X	X	X

Source: own illustration

Contribution periods are periods during which contributions to the statutory pension insurance are paid (Section 55 SGB VI).[36] Examples are contributions on the basis of employment subject to social security or contributions on the basis of the receipt of social benefits.[37] These periods include calendar months during which no compulsory contributions are paid, but during which there are publicly financed supplements for certain reasons (Section 3 or Section 4 SGB VI). In particular, public supplements are paid during periods of child-rearing in the first three

[36] A distinction is made between full value (*Vollwertige Beitragszeiten*) and reduced value (*Beitragsgeminderte Zeiten*) contribution periods (Section 54(1) SGB VI). Full value contribution periods are calendar months with compulsory or voluntary contributions. Reduced contribution periods are calendar months that include compulsory or voluntary contributions as well as non-contributory periods (Beye, 2009).

[37] Unemployment benefit periods (periods of unemployment benefit (*ALGI* or ALG II), unemployment assistance (*ALH*) and maintenance allowance (*Unterhaltsgeld)* were compulsory contribution periods from 01.07.1978 to 31.12.1982 (Section 247(2) SGB VI) and since 01.01.1991. Unemployment benefits II (*Hartz IV*) replaced unemployment assistance in 2005. Since 01.01.2011, recipients of unemployment benefit II are no longer subject to compulsory statutory retirement insurance (*Haushaltsbegleitgesetz 2011* (BGB I 1885) from 09.12.2010). Therefore, these periods are no longer counted as compulsory contribution periods but as credited periods (Kubon & Kattenbach, 2011).

years after giving birth (Section 56(1) SGB VI), periods of non-profit caregiving for a person in need of care and periods of military service (Section 248(1) SGB VI) (Kreikebohm, 2003: 285–286).[38] Contribution periods are also considered for simultaneous periods of child-rearing of several children or periods of non-profit caregiving (until the age of 18) during which earnings points are credited (55 (1) SGB VI).[39] **Consideration periods** are periods of parenting until the child is years old 10 (Section 57 SGB VI). Between 01.01.1992 and 31.03.1995, periods of non-profit caregiving for a person in need of care were also counted as consideration periods (Section 249b SGB VI).[40] **Credited periods** are periods during which individuals are unable to pay contributions for personal reasons (Börsch-Supan et al. 2014). These reasons include, for example, periods of illness, pregnancy, maternity leave, unemployment, school-based training and rehabilitation (Beye, 2009).[41] **Substitute periods** are periods during which individuals cannot pay contributions because of captivity due to war, abduction, detention, persecution or displacement (Section 250 SGB VI). Substitute periods are also considered for insured craftsmen who are registered in the skilled trades register (*Handwerksrolle*) and who have not paid compulsory pension contributions (Section 251(1) SGB VI).

Table 4 illustrates which variables are required to identify eligibility for the different types of old age pension, based on the legal regulations of the German statutory retirement system. In principle, the exact birth date is needed for the identification of the statutory retirement dates. Individuals born between the second and thirty-first day of a month are retired on the first day of the following month when they reach the NRA. However, if a person is born on the first of a month, he or she retires in the same month in which he or she reaches the NRA. If we have just the date of birth on a monthly basis, we cannot consider the regulation affecting those born on the first of a month. Thus, the assigned NRA and ERA would be distorted by one month for these persons. The date of birth on a monthly basis is also relevant for the stepwise adjustment of the NRA and ERA (protection of legitimate expectation of the pension rules: *Vertrauenschutzregeln*) on the basis of the legislative changes described in Section 2.1. Personal information (gender, degree of disability, employment incapacity, miners) is mainly required for the assignment of pension type (old age pension for severely disabled persons, old age pension for women, pension for reduced earning capacity, special benefits for miners). Information about craftsman status is needed to identify the substitute periods for craftsmen (Section 251 § SGB VI). Identification of the employment history states listed in Table 4 is essential for determining the eligibility criteria and qualifying periods. Employment status information should be available as spell data on a daily basis. In the following sections, we discuss in detail which restrictions need to be made if certain variables are not available in the labour market history dataset.

[38] Periods of non-profit caregiving for a person in need of care have been taken into account since 01.04.1995 (Kreikebohm, 2003).

[39] These periods are only contribution periods if there are no other parallel contributions periods and more than 25 years of pensionable periods exist. These regulations apply for periods after 1991 (Beye, 2009).

[40] Consideration periods due to maintenance were abolished because of the establishment of long-term care insurance in 1995 (Beye, 2009).

[41] See Beye (2009) for a detailed description of credited periods and their legislative changes.

Table 4: Variables necessary to identify the old age pension type

▪ exact date of birth	
▪ date of retirement or of labour market exit	
▪ person-related information	o gender o (occupational) disability degree o incapability of employment o miners, craftsperson, seaman
▪ employment status	o school education o military service o employment subject to social service o marginal employment o voluntary insured o unemployment benefits (ALG I / ALG II) o unemployment assistance (“ALH”) o maintenance allowance o unemployment benefits (only credited periods) o job-seeking o maternity-leave, child-rearing o reduced earning capacity / illness / rehabilitation o non-professional caregiving o partial retirement o captivity of war, abduction, detention, persecution, displacement etc.

(Note: Marginal employment (*geringfügige Beschäftigung*) is defined by a yearly income threshold; see Pfister et al. (2018: 45) for the relevant thresholds from 1951 to 2013). Source: own illustration

3 Data

Our report is based on two datasets, the **Sample of Integrated Labour Market Biographies 1975–2014** (SIAB 7514), and the **Biographical Data of Selected Social Security Agencies in Germany 1951–2009** (BASiD 5109). The SIAB 7514 contains a two percent sample of the Integrated Employment Biographies provided by the Institute for Employment Research (IAB). The dataset contains information about the employment, receipt of benefits according to German Social Books II and III, job seeking and active labour market measure or training. There is no information about the retirement age in the SIAB. Therefore, our analyses refer to the exit from the labour market, compare Brussig (2015). The SIAB covers employment histories between 1975 and 2014 (for East Germany since 1991). Therefore, for the 1936–1948 birth cohorts we can observe labour market exits at the normal retirement age depending on the type of old age pension in 1996–2014. A detailed description of the SIAB can be found in Antoni et al. (2016).

The BASiD 5109 links the **Sample of Insured Persons and their Insurance Accounts** (VSKT) of the German statutory pension insurance with selected individual-level data (employment status, receipt of benefits, location and place of employment) and employer-level data

provided by the Federal Employment Agency in Germany (*Bundesagentur für Arbeit*) (Hochfellner et al., 2011; Gürtzgen & Nolte, 2017).[42] The BASiD contains a one percent sample of all persons younger than 67 years of age with statutory pension insurance on 31 December 2007. The data include the old age pension type for identifying the statutory retirement dates and all of the necessary components to identify the pensionable periods, such as child-rearing periods and full-value contribution periods. The data contain longitudinal labour market information from 1951 to 2009 (Hochfellner et al., 2011; FDZ, 2017). The BASiD mainly provides the retirement behaviour of the 1940–1942 birth cohorts. These birth cohorts usually retired between 2000 and 2007. A detailed description of the dataset can be found in Hochfellner et al. (2011).

In co-operation with the FDZ, we have the opportunity to use enhanced versions of the SIAB and BASiD. Specifically, in connection with the CADAL[43] project, we can add the exact date of birth to the datasets.

3.1 Sample restrictions

To assess the quality of our identification of eligibility for old age pension types, Table 5 illustrates how we restrict the samples of both datasets. First, individuals are excluded from the sample if death is the reason for the termination of their last employment subject to social security. People who completed their last employment subject to social security contributions before reaching the age of 55 no longer have an option to retire early; therefore, in our sample, we only include people who completed their last labour market activity after the age of 59. Also unemployment or marginal employment are interpreted as labour market activity (Brussig, 2015). With the sampling restriction that we have to observe people from the age of 41 years, persons are excluded who were employed in Eastern Germany. Employment notifications in Eastern Germany have only been available since 01.01.1991 (Antoni et al., 2016; Hochfellner et al., 2011). This sampling restriction is necessary for calculating the eligibility requirement for the old age pension for women: Women must have completed at least 121 months of compulsory contribution periods after reaching the age of 40. To ensure that we only include persons in our dataset who meet the required minimum insurance period of 5 years for the regular old age pension, we delete those persons who have less than 5 years of employment subject to social security contributions. These persons include, for example, people who first worked as employees before being appointed civil servants (*Beamte*) or becoming self-employed. In addition, we reduce our sample to people who made compulsory pension contributions in the last 10 years before leaving the labour market and have labour market gaps of no longer than 5 years. Therefore, our sample only includes employees with a high labour market affinity and short gaps in their labour market histories. These employees are of interest for us because they have a real choice of whether to participate in the labour market in their older age. Dietz and Walwei (2011) showed that older unemployed people in Germany had a negligible chance of re-entering the workforce. They stressed that only 3.9% of unemployed workers aged 50 or

[42] The data used are the Integrated Employment Biographies 1975-2009 and the Establishment History Panel (Hochfellner et al., 2011).

[43] The Custom Shaped Administrative Data for the Analysis of Labour Market (CADAL) project provided customised data for participants of the DFG priority programme 1764.

above moved to unsubsidised employment in 2010, and this share was only 2.1% for unemployed aged 60 or above. We might assume that the long-term unemployed have an even lower chance of re-entering the labour market and, in particular, that those with long periods of no labour market attachment after the age of 55 have practically no real chance of re-entering the labour market (also see Heywood and Jirjahn, 2016). Seamen and miners are excluded from our dataset because they are subject to special regulations in pension law.[44]

The full BASiD sample contains 568,468 individuals and the full SIAB sample contains 1,757,925 individuals; after the sample restrictions, the BASiD contains 6,639 individuals (3,039 men, 3,600 women) and the SIAB contains 67,608 (45,005 men, 22,603 women).

Table 5: Sample restrictions

Individuals are deleted if they…	Cumulative reduction in observations			
	Obs.	%	Obs.	%
	BASiD		SIAB	
if they are not born between 1940 and 1942 in BASiD[45] or 1936 and 1948 in SIAB	552,003	97.10	1,483,645	84.40
have death as reason of termination of their last employment subject to social security	/[46]	/	6,326	2.31
complete their last employment subject to social security contributions before reaching the age of 55	6,170	37.48	115,229	43.00
have completed their last labour market activity before age 59	1,620	15.74	26,238	17.18
don't have a known labour market status before or at the age of 41	343	3.96	44,077	34.85
have been in employment subject to social insurance for less than 5 years	110	1.32	679	0.85
the status of compulsory contributions is not known in the last ten years before leaving the labour market	/[47]	/	362	0.44
have labour market gaps longer than 5 years	578	7.04	13,606	16.73
have the occupation miner or seaman	26	0.34	137	0.20

Source: own illustration

[44] For more information, see Deutsche Rentenversicherung Knappschaft-Bahn-See
[45] In BASiD, people are deleted if they do not exit the labour market until 2007.
[46] For data protection reasons, all values based on less than 20 observations are deleted (FDZ, 2017)
[47] For data protection reasons, all values based on less than 20 observations are deleted (FDZ, 2017)

Three problems may arise in the identification of eligibility for the old age pension types in the SIAB.

First, the individual employment history can only be observed from 1975 onwards. Accordingly, we also restrict the BASiD to the observation window 1975–2007 in order to see whether this reduction reduces eligibility identification. The restricted observation period means that we cannot directly observe whether a person reached the eligibility condition of a qualifying period of 35 years for the old age pension for persons with a long insurance record.[48,49] In Section 5 we show that most employees in our BASiD sample fulfil the qualifying period of 35 years, and therefore identification errors for this eligibility rule are minimal.

Second, the SIAB does not contain direct information on the number and date of birth of children. Thus, we cannot take into account periods of maternity or parenting. This information cannot be identified for the majority of women, because we observe individuals at the age of 27 (1948 birth cohort) at the earliest. For the oldest birth cohort (1936), the observation window starts at age 37. Thus, we do not know whether women fulfil the 15-year qualifying period if they did not obtain eligibility during our observation period, but obtained sufficient qualifying periods either by working before the observation period or by obtaining insurance periods while raising children. We can however show whether women fulfilled the eligibility criteria for the old age pension for women (121 months of compulsory contribution periods after the age of 40). In Section 5, based on the information in the BASiD, we show that almost all of the women who are eligible for the old age pension for women also have a qualification period of 15 years. Information about raising children is therefore not necessary to determine pension type eligibility.

Moreover, the SIAB and BASiD do not contain any further information about the nature of the gaps in employment history. In the SIAB, these gaps could be a consequence of child rearing, illness or caregiving on a non-commercial basis, to mention just a few possibilities (Müller & Strauch, 2017). For women with large gaps in their employment biographies, it is difficult to identify the consequences for eligibility for the different types of old age pension. It is also not possible to identify periods in which people have voluntarily paid into the statutory pension insurance scheme. These payments seem to be made frequently by women who have employment gaps after the birth of their children, see Pfister et al. (2018). These voluntary payments were specifically made to fulfil the eligibility requirements for a certain pension and therefore potential sources of errors in identifying pension eligibility. We show, however, that our sample restrictions effectively reduce the share of women whose pension options cannot properly be assessed because of these information gaps, compare Section 5.

[48] The special regulation of so-called substitute periods for crafts persons cannot be identified in this dataset.

[49] For the 1936 cohort, the labour market biography can be considered for a maximum of 26 years for individuals who retired at the NRA and were employed subject to social security in 1975. We have an observation window of at least 35 years only for individuals born between 1945 and 1948 and who were employed subject to social security in 1975.

Finally, pensions for severely disabled people or for people with reduced earnings capacity cannot be identified in the SIAB.[50] Severely disabled people, however, represent only a small group of retirees (the share of the old age pension for the severely disabled of all insured pensions is approximately 8% according to the official reports of the German pension insurance for the periods under consideration in 2016). We can show that the proportion of people with a pension for people with reduced earnings capacity is also effectively reduced by our sample restrictions.[51]

4 Order of dominance of old age pension type eligibility

Individuals can fulfil the eligibility requirements for several types of pensions simultaneously. Following Seibold (2017), we argue that when individuals are eligible for more than one type of old age pension, they choose the type that offers the earliest retirement options with respect to the ERA and NRA. We can reduce the dominance order to ERA and NRA because the deductions for retirement before the individual's NRA are the same for all pension types. If the NRA is the same for several old age pensions, then the type of pension with the lowest ERA is dominant.

We show that many older employees do not leave the labour market at the earliest possible date. There might be many reasons for employees to retire later than at the dominant ERA. The old age pension under a progressive retirement plan, for example, must be offered by the employer on a case-by-case basis. Even if an employer offers progressive retirement in general, it can deny it to individual employees because, for instance, they are not easy to replace. Many employers do not offer progressive retirement at all (Leber et al., 2013). A small share of employees does not use the so-called *Blockmodell* that allows them to exit from the labour market half-way through the progressive retirement scheme, but reduce their working time for the entire time span and thus leave the labour market on the same date as they would without a progressive retirement plan. However, as the financial incentives of the pension system are not affected by the decision for or against the block model, we do not need to know which variant of progressive retirement an older employee chooses. Employees who are denied progressive retirement could opt for the old age pension for the unemployed instead. This pension type has the same eligibility rules and consequences for social retirement benefits received after retirement. Both types of pension are therefore treated as equal in our analysis. They might, however, have different financial consequences before retirement because progressive retirement is frequently subsidised by the state. Unemployment benefits and the voluntary contributions paid by the employer for employees taking the old age pension for the unemployed might be below the level of earnings during progressive retirement (Brussig et al., 2009). In addition, some employees who are eligible for the old age pension for the unemployed might shy away from the social stigma associated with being unemployed and therefore prefer another type of pension. Other reasons for not choosing the pension type that in principle offers the earliest exit option from the labour market might be the social contact and pleasure offered by the current job, joint retirement with a spouse or a higher target pension level than the level

[50] For the analysis in BASiD, we exclude all types of pensions that we do not analyse in this report: pension due to reduced earning capacity and old age pension for the severely disabled.
[51] Due to data protection reasons, observations under 20 are not displayed (FDZ, 2017).

implied by the earliest pension entry; also compare Stock and Wise (1990) and Börsch-Supan and Schnabel (1999).

According to our logic of concentrating on pension entitlements and the earliest age they become available, we assume that for men born between 1936 and August 1948 who are interested in early retirement and fulfil the conditions, the most advantageous pension type ('dominant option') is the old age pension for the unemployed or persons under a progressive retirement plan (using the *Blockmodell*). For men born in September 1948, there is no difference between the NRA and ERA of the pension for persons with long insurance record and the pension for the unemployed or under a progressive retirement plan. This means that neither of these two types is dominant. The old age pension for persons with a long insurance record is the most advantageous type for men born between October 1948 and December 1948 because the ERA for this type of pension is lower than that for the old age pension for the unemployed or under a progressive retirement plan.

The old age pension for women is always the most advantageous pension type for women because it offers the earliest option to obtain pension benefits. Based on our consideration of the dominance of pension types, we argue that the old age pension for persons with a long insurance record is never the dominant old age pension type for women, because women who are eligible for this type of pension are almost always eligible for the financially more attractive old age pension for women. Using our BASiD data, we show that less than 1% of women who achieve the 35-year qualification period do not fulfil the 15-year qualification period and complete at least 121 months of compulsory contributions after the age of 40, and thus do not fulfil the requirements of the old age pension for women.[52] According to the statistics of the German statutory pension insurance, on average, only 2.9% of women in the 1936–1947 cohorts retired with the old age pension for persons with a long insurance record (Deutsche Rentenversicherung, 2016). However, some of these few women might even have been eligible for the old age pension for women.[53] We therefore argue that identification of the 35-year pensionable periods for women (required for eligibility for old age pension for persons with a long insurance record) is unnecessary in this report.

The dominance order of the pension types and their explanations are given in Tables 6a (men) and 6b (women).

[52] In fact, we can only show this high overlap in eligibility for women in the 1940–1942 birth cohorts, but we see no reason why the share of women who are eligible for both types of old age pension should differ in other birth cohorts.

[53] The proportion choosing the old age pension for women is approximately 37% for the 1936–1948 cohorts, according to the statistics of the German pension insurance (Deutsche Rentenversicherung, 2016)

Table 6a: Order of dominance of old age pension types (men)

Cohort		Dominance order	Dominance order of old age pension		
1936 to 1938		NRAu < NRAl < NRAs ERAu < ERAl < ERAs	1. Old age pension for the unemployed or under a progressive retirement plan	2. Old age pension for persons with a long insurance record	3. Standard old age pension
1939 to 1942		NRAu < NRAl = NRAs ERAu < ERAl < ERAs	1. Old age pension for the unemployed or under a progressive retirement plan	2. Old age pension for persons with a long insurance record	3. Standard old age pension
1943 to 1946		NRAu = NRAl = NRAs ERAu < ERAl < ERAs	1. Old age pension for the unemployed or under a progressive retirement plan	2. Old age pension for persons with a long insurance record	3. Standard old age pension
1947		NRAu = NRAl < NRAs ERAu < ERAl < ERAs	1. Old age pension for the unemployed or under a progressive retirement plan	2. Old age pension for persons with a long insurance record	3. Standard old age pension
	Month				
1948	J to AUG	NRAu = NRAl < NRAs ERAu < ERAl < ERAs	1. Old age pension for the unemployed or under a progressive retirement plan	2. Old age pension for persons with a long insurance record	3. Standard old age pension
1948	SEP	NRAu = NRAl < NRAs ERAu = ERAl = ERAs	1. Old age pension for the unemployed or under a progressive retirement plan, Old age pension for persons with a long insurance record		2. Standard old age pension
1948	OCT to DEC	NRAu = NRAl < NRAs ERAu > ERAl < ERAs	1. Old age pension for persons with a long insurance record	2. Old age pension for the unemployed or under a progressive retirement plan	3. Standard old age pension

(Notes: NRAw (Normal retirement age of old pension for women); NRAu (Normal retirement age of the old age pension for the unemployed or under a progressive retirement plan); NRAI (Normal retirement age of the old age pension for persons with a long insurance record); NRAs (Normal retirement age of the standard old age pension); ERAw (Early retirement age of old age pension for women); ERAu (Early retirement age of the old age pension for the unemployed or under a progressive retirement plan); ERAI (Early retirement age of the old age pension for persons with a long insurance record); ERAs (Early retirement age of the standard old age pension)) Source: own illustration

Table 6b: Order of dominance of old age pension types (women)

Cohort		Dominance order	Dominance order of old age pension			
1936 to 1938		NRAw < NRAu < NRAl < NRAs ERAw < ERAu < ERAl < ERAs	1. Old age pension for women	2. Old age pension for the unemployed or under a progressive retirement plan	3. Old age pension for persons with a long insurance record	4. Standard old age pension
1939 to 1942		NRAw < NRAu < NRAl = NRAs ERAw < ERAu < ERAl < ERAs	1. Old age pension for women	2. Old age pension for the unemployed or under a progressive retirement plan	3. Old age pension for persons with a long insurance record	4. Standard old age pension
1943 to 1944		NRAw < NRAu = NRAl = NRAs ERAw < ERAu < ERAl < ERAs	1. Old age pension for women	2. Old age pension for the unemployed or under a progressive retirement plan	3. Old age pension for persons with a long insurance record	4. Standard old age pension
1944 to 1946		NRAw = NRAu = NRAl = NRAs ERAw < ERAu < ERAl < ERAs	1. Old age pension for women	2. Old age pension for the unemployed or under a progressive retirement plan	3. Old age pension for persons with a long insurance record	4. Standard old age pension
1947		NRAw = NRAu = NRAl < NRAs ERAw < ERAu < ERAl < ERAs	1. Old age pension for women	2. Old age pension for the unemployed or under a progressive retirement plan	3. Old age pension for persons with a long insurance record	4. Standard old age pension
	Month					
1948	J to AUG	NRAw = NRAu = NRAl < NRAs ERAw < ERAu < ERAl < ERAs	1. Old age pension for women	2. Old age pension for the unemployed or under a progressive retirement plan	3. Old age pension for persons with a long insurance record	4. Standard old age pension
1948	SEP	NRAw =NRAu = NRAl < NRAs ERAw < ERAu = ERAl = ERAs	1. Old age pension for women	2. Old age pension for the unemployed or under a progressive retirement plan, Old age pension for persons with a long insurance record		3. Standard old age pension
1948	OCT to DEC	NRAw = NRAu = NRAl < NRAs ERAw < ERAl < ERAu < ERAs	1. Old age pension for women	2. Old age pension for persons with a long insurance record	3. Old age pension for the unemployed or under a progressive retirement plan	4. Standard old age pension

(Notes: see Table 6A)

5 Calculation of pensionable periods using the BASiD

In this section, we present the results of the calculation of the pensionable periods using BASiD. We use the employment states and variables[54] from the VSKT dataset, which is only available in the BASiD, not the SIAB. We specifically show that there are large deviations in the calculation of the pensionable periods for the dominant old age pension types if the em-

[54] We use the following variables for the investigation in BASiD: KIND, BYVL_WEST and BYVL_OST, RTZTMO, zustand, BYAT_GR, BYAT.

ployment states of illness, maternity, caregiving on a non-commercial basis and voluntary insurance cannot be taken into account. Moreover, we use the information in BASiD to calculate the proportion of women in our sample who fulfil the 15-year qualifying period and the share of men who fulfil the 35-year qualification period, because we cannot calculate these periods using the SIAB.

First, we assess the quality of our calculation of the eligibility rule for the dominant old age pension option for men in the SIAB: the old age pension for the unemployed or under a progressive retirement plan. Table 7 shows the average deviations in the compulsory contribution periods in the last 10 years before retirement if we do not take into account the employment states that are only available from VSKT, but are not reported in the SIAB.[55] In our sample, the average deviation is 57.15 days for men and 80.10 days for women. The deviations in the compulsory contribution periods represent, on average, 2.53% of the total acquired period for women and 1.75% for men. The deviation for women is somewhat larger because maternity, parenting and caregiving on a non-commercial basis are more widespread among women. We also note that only 23.66% of men and 28.22% of women have spells that only occur in BASiD and not in SIAB. This means that 72% of women and 76% men have no errors in the calculation of the eligibility rule. Table 7 also shows that the median deviation is equal to 0 for men and women. Above the 75th percentile, the deviation is 0 for men and 27.5 days for women. Above the 99th percentile, the deviation for men is 890 days and for women 1,377.5 days. Obviously, only a few people have large deviations that might lead to the erroneous identification of their pension type eligibility. The cases with large deviations are mainly people with long periods of inactivity in their employment biography.[56]

The question arises as to how many people do not reach the threshold of 8 years of compulsory contributions in the last 10 years before retirement if we cannot take into account the employment states that are only available in the VSKT, not the SIAB. This threshold is necessary for the old age pension for unemployed or under a progressive retirement plan. Based on the information on pensionable periods in the BASiD, the eligibility condition is fulfilled by 86.74% of men and 80.17% of women. If we do not take into account the information about employment states from the VSKT, we fail to identify eligibility for 3.2% of men and 4.5% of women.[57] However, we can improve the quality of the eligibility calculation by restricting our sample to people with less than 365 days of labour market gaps in the last 10 years before leaving the labour market or before the age of 65. Employment spells that we cannot observe, such as periods

[55] As we cannot observe the retirement date, we impose the following limitation on the calculation of (compulsory) contribution periods: We calculate the (compulsory) contribution periods up to the day the person leaves the labour market. If the person remains in the labour market after the NRA for the cohort and the corresponding old age pension, the periods are only calculated up to the NRA for the cohort and the corresponding old age pension type.

[56] If we define as missing all of the employment spells from the VSKT data source that cannot be observed in the SIAB, the sample restriction that individuals must have fewer than 5 years of labour market gaps reduces the average deviations in the contribution period calculations. The average deviations are reduced by 28.57% for men and by 26.20% for women.

[57] The percentage of persons who do not reach the threshold of 8 years of compulsory contributions because we cannot take into account the information from the VSKT in BASiD could be lower in the SIAB sample. The time-sensitive variables of the type of contribution (“BYAT”/”BYAT_GR”) in the BASiD have many missing data on employment and unemployment spells (Hochfellner et al., 2011), but this information is rarely missing in the SIAB.

of illness, tend to appear in the employment biographies in the years before leaving the labour market. When we include this further sample restriction[58], the average deviations between actual and observed employment periods are further reduced to 16.72 days for men and 18.77 days for women.[59] For the smaller sample, less than one percent of men and women would not reach the 8-year compulsory contribution limit if VSKT employment spells were not taken into account. In summary, the share of observations with relevant deviations that could lead to the misclassifications of eligibility rules is negligible in our SIAB sample with only small labour market gaps. If we exclude those employees with more than 1 year of labour market gaps during the last 10 years before leaving the labour market or before the age of 65, in addition to the sample restrictions explained in Section 3.1, eligibility calculation errors virtually vanish.

Table 7: Deviations in the calculation of compulsory contribution periods in the last 10 years before retirement

Employment states in VSKT	Total	Men	Women
Average deviations of compulsory contributions in days	69.78	57.57	80.10
p25	0	0	0
p50	0	0	0
p75	8	0	27.5
p95	393	302	444
p99	1,246	890	1,377.5
Average percentage of deviations from total compulsory contribution periods	2.17	1.76	2.53
Percentage of people with employment states from VSKT	26.13%	23.66%	28.22%
N	6,639	3,039	3,600

Data: BASiD 5109

Moreover, we assess the quality of the calculation of the 15-year qualifying period for men. This qualification period is a further condition for the old age pension for the unemployed or under a progressive retirement plan. The qualifying period of 15 years includes not only contribution periods but also substitute periods that are only observable in the VSKT. The results in Table 8 are similar to those for the calculation of compulsory contribution periods in the last 10 years before retirement (Table 7). The average deviation in the calculation of the qualifying period of 15 years is 130.69 days for men. The VSKT reports that 75% of men have employment spells of less than 53 days. The most important result, however, is that 99.08% of men

[58] The additional sample restrictions reduce our sample size by 773 women and 347 men.
[59] Employment spells that are only available in the VSKT are defined as missing information.

in the BASiD sample reach the 15-year qualification period, despite the fact that VSKT employment spells are not taken into account.[60] As a consequence, the deviations are highly unlikely to lead to erroneous eligibility calculations, and furthermore, the large deviations affect only a very few small number of individuals.

Table 8: Deviations in the calculation of the 15-year qualifying period for men

Employment States in VSKT	Men
Average deviations of compulsory contributions in days	130.69
p25	0
p50	0
p75	53
p95	533
p99	2738
Average percentage of deviations from total compulsory contribution periods	1.29
Percentage of people with employment states from VSKT	32.68%
N	3,039

Data: BASiD 5109

Next, we report the results for the identification of the 35-year qualification period for men for the old age pension for people with a long insurance record (Table 9). Almost all men (93%) in our BASiD sample reach the qualification period of 35 years. Based on our consideration of the dominance of pension types, we argue that identification of the 35-year qualifying period is only necessary for men who do not fulfil the conditions for the old age pension for the unemployed or persons under a progressive retirement plan. Men who do not fulfil these eligibility rules might nevertheless fulfil the eligibility rules for the less attractive old age pension for people with a long insurance record. The eligibility conditions for the unemployed or under a progressive retirement are fulfilled by 86.70% of the men in our BASiD sample. Of the 13% of men who do not fulfil the eligibility for the old age pension for the unemployed or under a partial retirement plan, 89.60% qualify for the old age pension for people with a long insurance record. This means that only 1.38%[61] of men who are not entitled to an old age pension for the unemployed or under a progressive retirement plan do not fulfil the 35-year qualification period either. For these few cases, we cannot clearly classify the statutory retirement ages. We have

[60] We cannot observe the entire period of the individual employment biography, only the career information from 1975 onwards, in the SIAB and our BASiD observation period. We can therefore assume that the proportion of men who reach the qualification period of 15 years is even higher.

[61] Calculated on the basis of the total sample of men (n = 3,039).

to assume that they are entitled to the old age pension for persons with a long insurance record, even though they are only eligible for the standard old age pension. The identification error, however, is even lower because the NRA for the standard old age pension and the pension for persons with a long insurance record is the same for the 1939–1946 birth cohorts, and differs by a maximum of two months for the 1947 and 1948 cohorts. The NRAs for the two pension types differs by up to 2 years for the 1936 to 1938 birth cohorts only. The ERAs for both pension types also differ for all birth cohorts: if men do not fulfil the 35-year qualification period, their ERA is 65, not 63.

Table 9: Number of men who fulfil the 35-year qualification period

	Men	
	Frequence	**Percentage**
Qualifying periods smaller than 35 years	208	6.84
Qualifying periods larger or equal to 35 years	2831	93.19
	3,039	100,00

Data: BASiD 5109

Now we examine the errors implied when we calculate the eligibility rule for the old age pension for women if we cannot take into account employment spells that are only reported in the VSKT, not in the SIAB. The average deviations in the calculation of the compulsory contributions for women after reaching the age of 40 are shown in Table 10. In the BASiD sample, the average deviation is 106.1 days. The 75th percentile of deviation is equal to 53 days. Based on the observation window of at least 25 years for the 1940 to 1942 cohorts, these deviations are generally negligible for the calculation of this eligibility rule: the average share of the deviations in the compulsory contribution periods in the total acquired periods is 1.51%. The 99th percentile of deviation is equal to 1752 days. Therefore, only a few women have very large deviations. Overall, 99.2% of women completed at least 121 months of compulsory contributions after the age of 40 in the BASiD sample, even if the employment spells that are only available in VSKT are not taken into account. This means that using the SIAB, we underestimate the compulsory contribution periods of a negligibly small number of women to the extent that they do not reach the 10-year threshold of compulsory contributions.

Table 10: Deviations in the calculation of compulsory contribution periods after reaching the age of 40 for women

Employment States in VSKT	Women
Average deviations of compulsory contributions in days	106.10
p25	0
p50	0
p75	53
p95	520.5
p99	1752
Average percentage of deviations from total compulsory contribution periods	1.51
Percentage of people with employment states from VSKT	33.47%
N	3,600

Data: BASiD 5109

We cannot identify whether all women fulfil the 15-year (180 months) qualifying period because we do not have information about the number of children in the SIAB, and therefore cannot include the insurance periods granted for raising children. The 15-year qualification period is a prerequisite for the old age pension for women and the old age pension for the unemployed or under a progressive retirement plan. Table 11 shows that the average full-value contribution period is 408.5 months for women in our sample. Moreover, less than 1% of women have less than 214.5 months of full-value contributions without the additional qualifying periods granted for raising children. The variable about full-value contribution periods in BASiD data also do not include substitute periods and periods with reduced contributions, which also add to the 15-year qualification period. We can therefore conclude that the few women who do not fulfil the qualification period based on the full-value contribution periods might still qualify on the basis of the information that is not reported in the BASiD. Therefore the omission of some pensionable periods does not incur an error in the identification of eligibility for the old pension for women and old age pension for the unemployed or under a progressive retirement plan.

Table 11: Full-value contribution periods

	Women
Average of full value contribution periods in months	408.45
p1	214.5
p5	275
P25	367
p50	419.5
P99	524.5
N	3,600

Data: BASiD 5109

In summary, large deviations in the calculation of pensionable periods in our BASiD sample affect only a few people, and few of these large deviations potentially lead to a misclassification of pension eligibility. The deviations can be further reduced if we concentrate on employees with short gaps in their labour market history. An important reason for this result is that large deviations mainly occur for people with irregular employment biographies. We therefore exclude most of the problematic cases by limiting the sample to employees who have a real choice of whether to retire early or add another work spell because they have no long gaps in their labour market history and are still attached to the labour market at the age of 59.

The number of children is an important individual characteristic for the calculation of eligibility. We have shown that even though we cannot take into account periods of parenting and maternity in the SIAB, we have negligible measurement errors in calculating women's eligibility for the old age pension for women in the BASiD sample. In Table 12, we report the total number of children for the women in our sample. More than 87% of women have one or more children and less than 13% have none. This corresponds to the share of childless women in the 1937–1942 birth cohorts in West Germany, reported by the Federal Institute for Population Research on the basis of the German Microcensus (2012) (Bundesinstitut für Bevölkerungsforschung, 2017).[62] Thus, our sample is representative with respect to the share of women with and without children even though it mainly includes women who have no major career breaks after the birth of their children.

Table 12: Number of children per woman

	Women	
	Frequence	**Percentage**
no children	454	12.61
one child	1,021	28.36
two children	1,259	34.97
three children	557	15.47
more than three children	309	8.59
	3,600	100,00

Data: BASiD 5109

[62] The share of childless women in the 1937 to 1942 birth cohorts in West Germany is 11.8% (Bundesinstitut für Bevölkerungsforschung, 2017).

6 Descriptive statistics of the labour market behaviour of older employees across birth cohorts

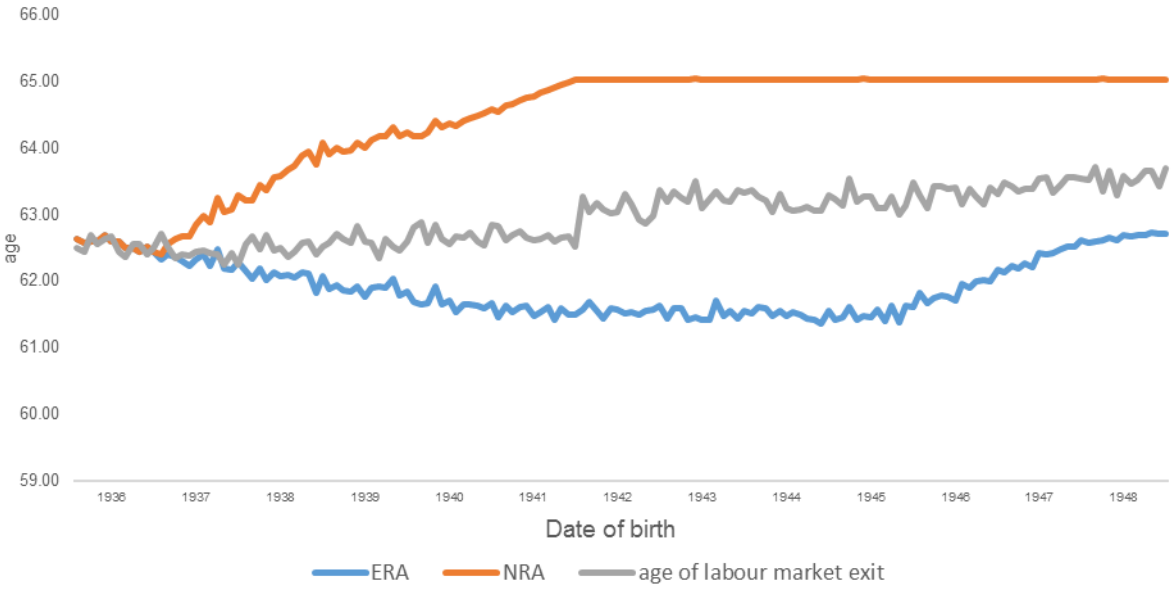
6.1 Actual statutory retirement dates and labour market exit age

In this section, we present the descriptive statistics of the statutory retirement dates calculated using the SIAB sample. We determine individual early and normal retirement dates in the dataset for each dominant pension type according to the method for identifying the eligibility rules, as described above. Figure 3 provides a detailed illustration of the average dominant NRA and ERA, and of the actual age of labour market exit for men for each birth cohort 1936–1948. The figure shows that the 1992 pension reform increased the actual NRA for all older employees because it gradually increased the NRA for the old age pension for the unemployed or under a progressive retirement plan and the old age pension for persons with a long insurance record. The decrease in the dominant ERA for the 1936–1939 birth cohorts is caused by an increase in the proportion of older male employees who were eligible for the old age pension for the unemployed or under a progressive retirement plan. An important reason for this shift in eligibility towards the more attractive old age pension type is that the Partial Retirement Act (*Altersteilzeitgesetz*) of 23.07.1996 extended the rules for the old age pension for the unemployed to older employees eligible for partial retirement. To fulfil the eligibility rule, employees must have had at least two years of partial retirement after the age of 55. This possibility of retirement can therefore only be used for cohorts from 1938 on. Moreover, we see a gradual increase in the dominant ERA of the old age pension for the unemployed or under a progressive retirement plan for the 1946–1948 cohorts according to the 2004 Pension Insurance Sustainability Act (*RV-Nachhaltigkeitsgesetz*). The small changes in the calculated average NRA and ERA from one cohort to the next are due to changes in the proportion of older male employees who are eligible for a dominant type of old age pension. It is interesting to see only a slight increase in the average age of actual exit from the labour market, even though the dominant NRA for the 1937–1941 cohorts rose from 60 to 65. A substantial jump in the average age of labour market exit from 62.52 to 63.28 is however observed between the 1941 and 1942 cohorts. An explanation for this jump might be that starting with the 1942 birth cohort, the pension reform of 1992 increased the NRA to 65 years for all men regardless of the type of pension.

Figure 4 illustrates the analogous development of the actual average ERA, NRA and age of labour market exit for women. We again see that the dominant NRA increases to age 65 for women born after 1940 on the basis of the 1992 pension reform. This stepwise increase in the dominant NRA took place in more recent cohorts for women than for men. Despite the increase in the dominant NRA, we again find only a slight increase in the average age of labour market exit for women. Figure 4 also shows that women born after 1941 start to use their early retirement option because their dominant NRA gradually increases, and thus they accept deductions in their pension entitlements. We take a closer look at this phenomenon in Section 6.1. We also see that the dominant average ERA is around 60 years for all birth cohorts because almost all women fulfil the eligibility rule for the old age pension for women. Engels et al. (2017) show that women who do not meet the requirements for the old age pension for women at the

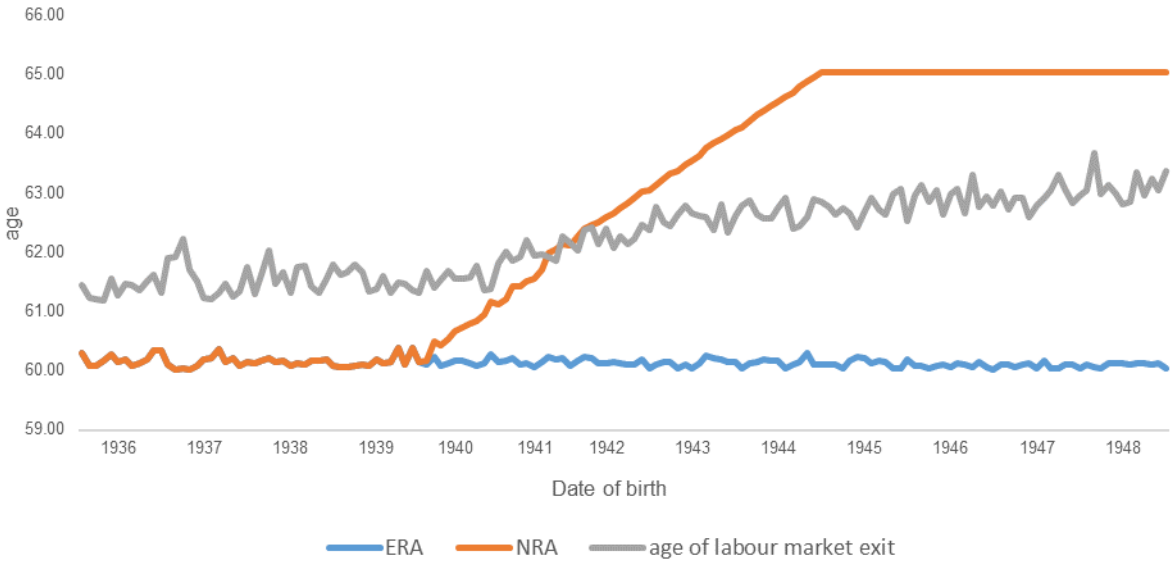
age of 60 are not usually employed at that age.[63] Our sample restrictions are therefore responsible for the high share of women eligible for the old age pension for women.

Figure 3: The average dominant ERA, NRA and age of labour market exit for men



(Note: The observations are limited to age 66 for the comparison of the average age of labour market exit)). Data: SIAB7514

Figure 4: The average dominant ERA, NRA and age of labour market exit for women



(Note: The observations are limited to age 66 for the comparison of the average age of labour market exit). Data: SIAB7514

[63] According to Engels et al. (2017) and Geyer and Welteke (2017), around 60% of women are entitled to an old age pension for women on the basis of the VSKT.

6.2 Actual paths out of the labour market

In this section, we describe the proportion of employees who take different paths out of the labour market before retirement and the changes in these shares over birth cohorts. We use the dominant ERA and NRA for each individual to identify the chosen exit path. Table 12 shows the labour market exit shares for the entire sample in the SIAB. In Figures 5 and 6, the labour market exit shares are presented for each birth cohort. Our descriptive statistics complement the results of the retirement paths presented by calendar year (Brussig, 2015). The birth cohort perspective seems better able to capture the consequences of changes in the financial incentives of the pension system, which usually affect birth cohorts differently.

Table 12 shows that roughly 60% of men and 41% of women in the sample leave the labour market before their earliest possible NRA. These people therefore accept pension deductions. Men have a higher probability of leaving the labour market before the NRA because for women, the NRA is equal to the ERA until the 1940 birth cohort. Women born before that year therefore had no early retirement option. According to our dominance analysis, many older employees use unemployment and partial retirement as bridge options to retirement (Rasner & Etgeton, 2014; Gasche & Krolage, 2012). However, fewer women than men take advantage of the possibility of partial retirement as a bridge to retirement at the NRA. The Partial Retirement Act of 1996 provided the option of partial retirement as a bridge to retirement starting with the 1938 birth cohort for men, but only from the 1940 birth cohort for women, compare Figures 5b and 6b. Note that we can identify partial retirement spells from the employment status variable in the SIAB. We do not, however, know the date of the labour market exit because in the block model, the SIAB reports the fictitious end of the labour market spell instead of the de-facto labour market exit date when the working hours are reduced to zero half-way through the partial retirement period. We however know for example from Brussig et al. (2009) that the overwhelming majority of employees chose the block model that allows an early labour market exit.

We also see that the bridge paths (unemployment or partial retirement) play a major role in the transition out of the labour market. Of those who leave the labour market earlier than NRA, 53.87% of women and 63.18% of men opt to leave via unemployment or partial retirement. Furthermore, 34.34% of women and 47.48% of men who leave the labour market at the NRA use unemployment or partial retirement as a bridge to retirement.

It is interesting to note that fewer men than women are still active in the labour market after the NRA. One explanation is that for men, the NRAs for all types of old age pensions are closer to the age of 65, whereas for women in the 1936 to 1943 birth cohorts who retire via the old age pension for women, the NRA is between 60 and 64. This means that women can remain active in the labour market for up to 5 years after their NRA, until they reach the NRA of the standard old age pension. These women might remain active after their NRA in order to improve their pension entitlements or use the standard NRA of 65 years as a benchmark for their labour market decisions.

Table 12: Descriptive statistics of the patterns of labour market exit

	W	M
Paths to retirement		
Share of bridge paths in %	30.89	43.88
Share of Early Retirement in %	41.38	60.27
through unemployment in %	28.42	37.60
through partial retirement in %	25.45	25.58
Share of Normal Retirement in %	25.03	12.23
through unemployment in %	21.83	22.88
through partial retirement in %	12.51	24.60
Share of employment after the NRA in %	25.37	19.11
N	22,603	45,005

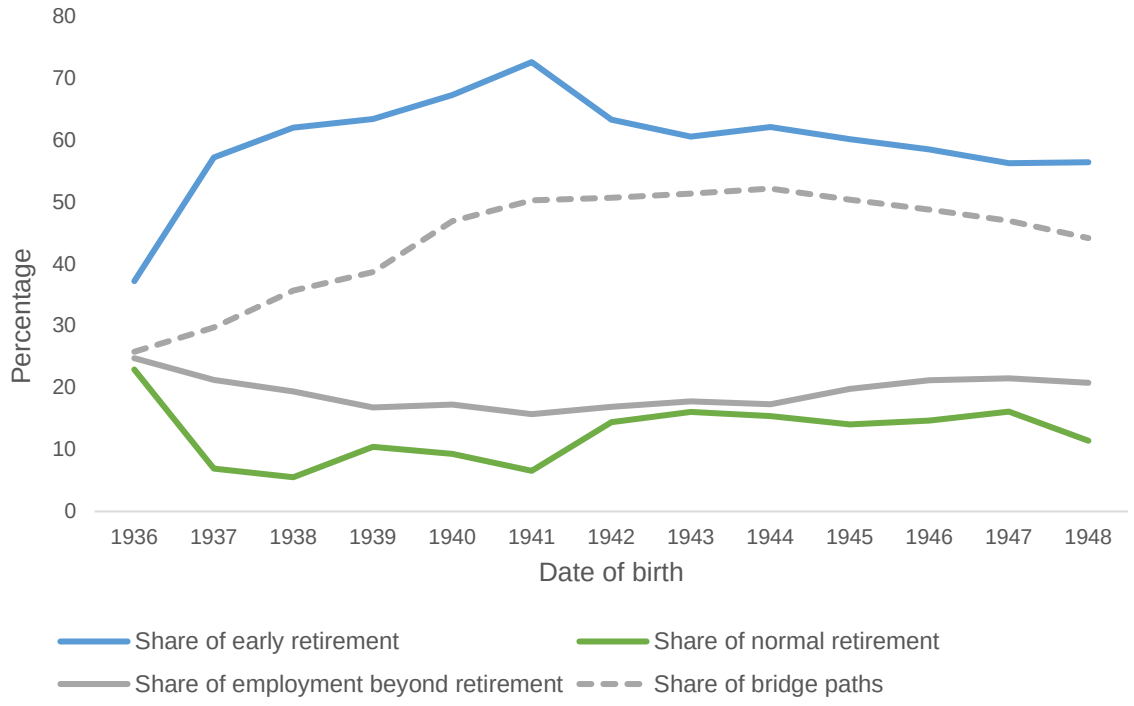
(Note: Baseline sample). Data: SIAB7514

Next, we show the patterns of labour market exit for each observed birth cohort in Figure 5a for men and Figure 6a for women. As already mentioned, very few women born between 1936 and 1939 took early retirement because their NRA was equal to their ERA and for younger birth cohorts the difference between the ERA and NRA increased gradually. For women in the 1936-1939 birth cohorts, therefore, the proportion of those who took normal retirement was more than 50% because most of them had the opportunity to retire without deductions at age 60. Women did not change their labour market behaviour decisively when the NRA further increased, as shown in Figure 4. From the 1944 cohort onwards, the proportion of women taking early retirement was higher than the proportion of men taking early retirement.

Men show similar patterns of labour market exit. We can see that men born in 1936 were more likely to take normal retirement than the younger cohorts. A reason for this development is that from the 1937 cohort onwards, the NRA increased stepwise to the age of 65 for the old age pension for the unemployed or under a progressive retirement plan and the pension for people with long insurance record. The actual retirement age did not keep up with these increases in the NRA. Moreover, we see a slight decrease in the share of employment beyond retirement for women from the cohorts 1938 on and for men until the 1942 cohort. From the 1945 cohort onwards, the share of employment beyond retirement is slightly higher for men than for women. Furthermore, the figures show that the share of bridge paths substantially increases across the birth cohorts for men and women

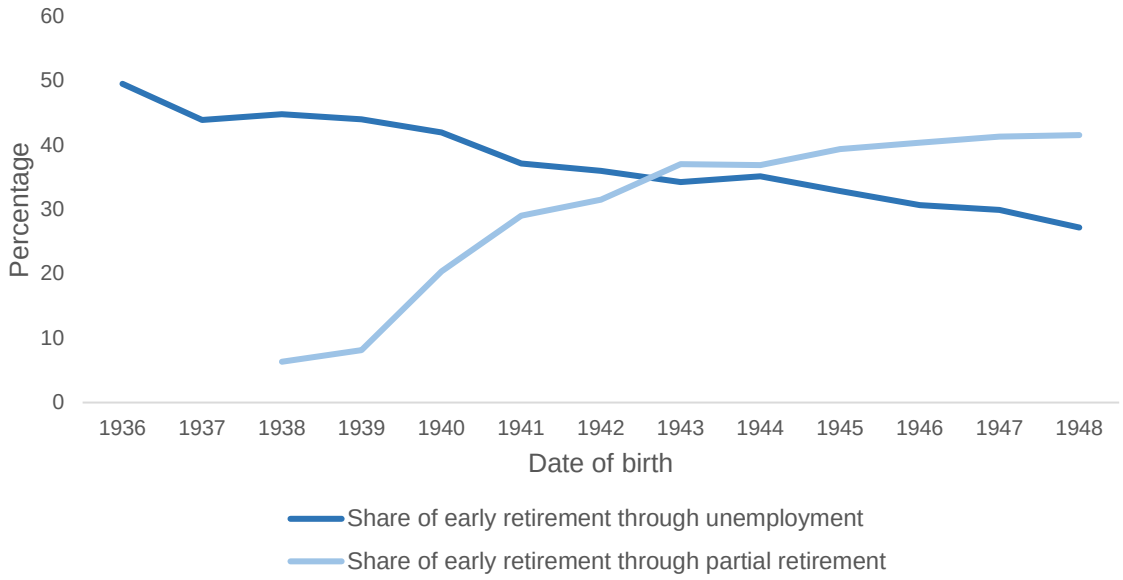
The proportion of the 1936–1948 cohorts taking the transition paths to early and normal retirement are shown in Figures 5b and 6b and Figures 5c and 6c, respectively. Starting with the 1938 birth cohort for men and the 1939 cohort for women, partial retirement was used as a bridge option as early as it was allowed by law (also see Brussig et al., 2009). The share of older employees using unemployment as a bridge out of the labour market is relatively high and decreases across the observed cohorts. Thus, we see that the share of employees using partial retirement as a bridge into retirement increases across the cohorts.

Figure 5a: Patterns of labour market exit for men in the 1936–1948 cohorts



Data: SIAB7514

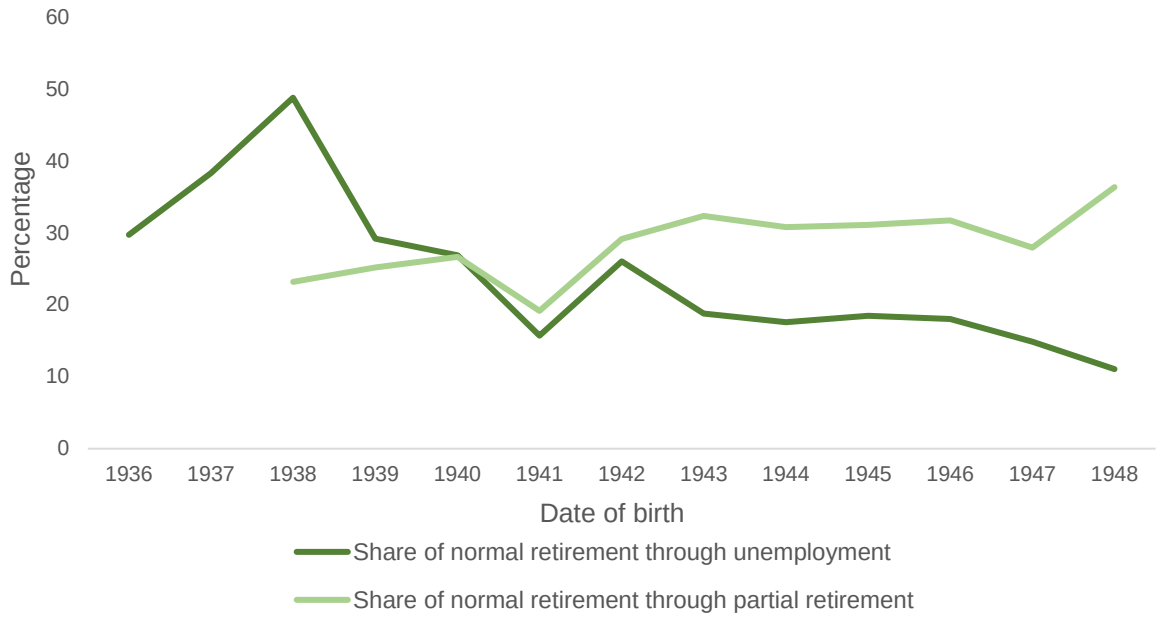
Figure 5b: Shares of men in the 1936–1948 cohort taking early retirement through unemployment and partial retirement[64]



Data: SIAB7514

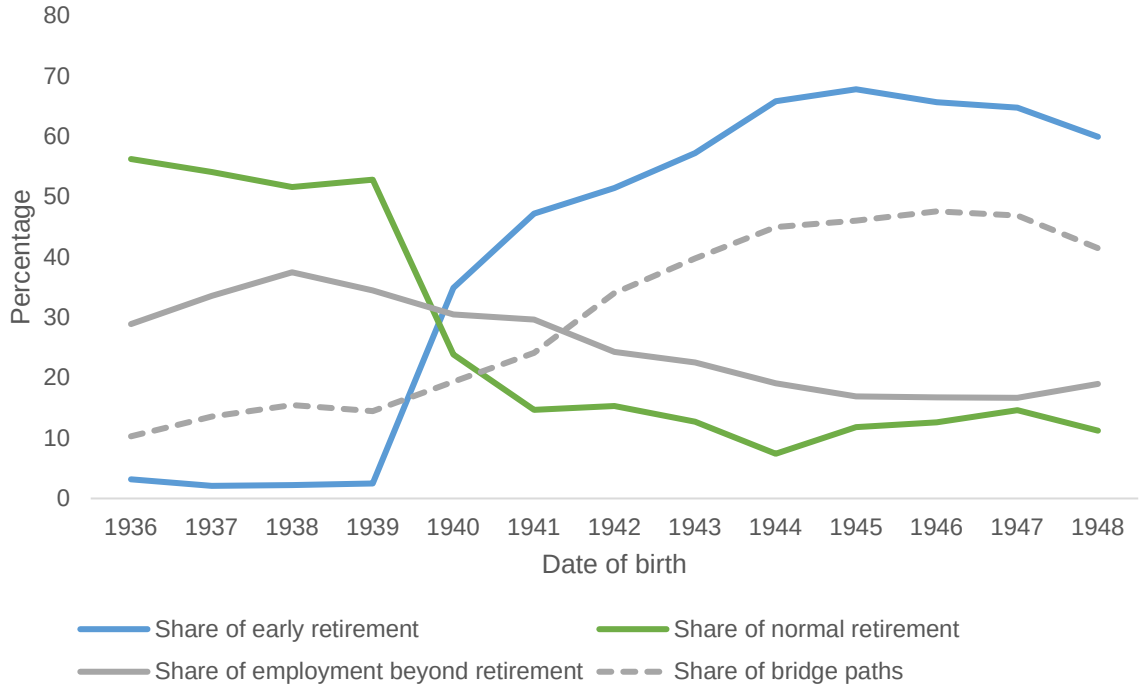
[64] For data protection reasons, all values based on less than 20 observations are deleted (FDZ, 2017). Therefore, for the cohorts 1936 and 1937 the share of normal retirement through partial retirement cannot be shown.

Figure 5c: Shares of men in the 1936–1948 cohorts taking normal retirement through unemployment and partial retirement[65]



Data: SIAB7514

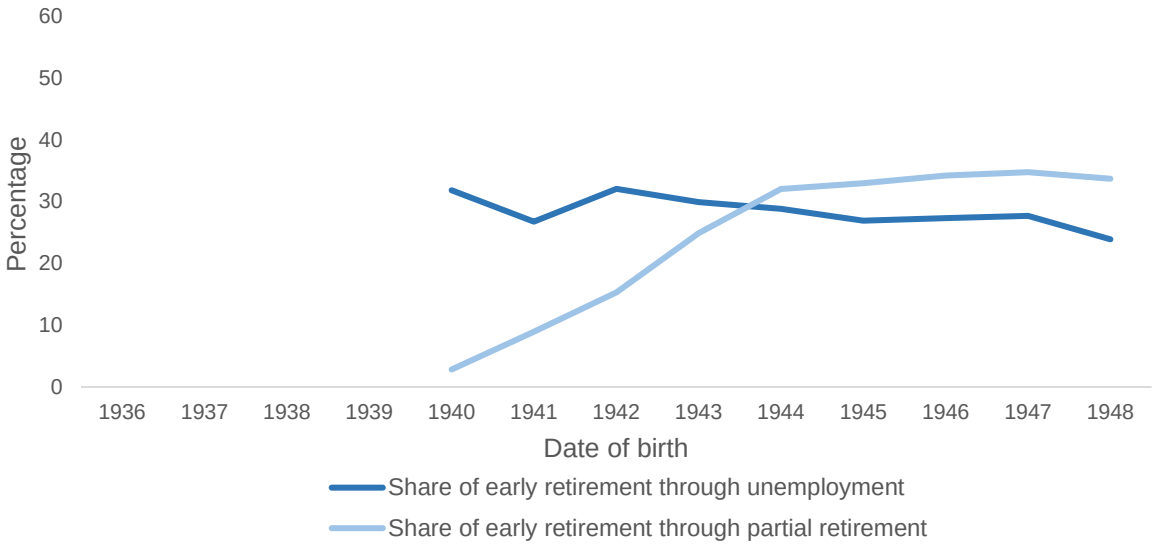
Figure 6a: Patterns of labour market exit for women in the 1936–1948 cohorts



Data: SIAB7514

[65] For data protection reasons, all values based on less than 20 observations are deleted (FDZ, 2017). Therefore, for the cohorts 1936 and 1937 the share of normal retirement through partial retirement cannot be shown.

Figure 6b: Shares of women in the 1936–1948 cohorts taking early retirement through unemployment and partial retirement[66]



Data: SIAB7514

Figure 6c: Shares of women in the 1936–1948 cohorts taking normal retirement through unemployment and partial retirement[67]

Data: SIAB7514

[66] For data protection reasons, all values based on less than 20 observations are deleted (FDZ, 2017). Therefore, for the cohorts 1936 to 1939 the shares cannot be shown.

[67] For data protection reasons, all values based on less than 20 observations are deleted (FDZ, 2017). Therefore, for the cohort 1944 the share of normal retirement through unemployment cannot be shown.

7 Discussion and Conclusion

We concentrate on the individual financial incentives of the pension system and their changes for several birth cohorts as well as the eligibility rules for the different pension options. We reduce the complexity of the financial incentives by determining the most attractive ('dominant') pension type for each birth cohort; i.e., the pension type that grants the earliest NRA and ERA. This reduction in complexity is possible because the deductions and supplements for retirement before and after the NRA are equal for all pension types. We therefore calculate the individually dominant NRA and ERA, the actual labour market exit age, and show the shares of employees who exit the labour market at the earliest possible ERA (or between then and the NRA) and incur deductions, leave the labour market at the NRA without deductions or even work after the NRA and enjoy supplements on the pension entitlements earned during their careers.

To identify the eligibility requirements of the dominant pension types needed for the identification of the NRA and ERA for each individual, we mainly use general information drawn from an individual's employment history, gender and birth date. Most administrative, longitudinal, individual labour market history data such as those provided by the German Federal Employment Agency however do not contain all of the information needed to take into account the rules for the different types of pension or choice of statutory retirement insurance. The only large German panel data set with individual labour market history that includes all relevant information to calculate pension type eligibility is the BASiD. It only reports the retirement decisions of three birth cohorts (1940–1942) and therefore the results might not be robust when an analysis of the labour market behaviour of old employees requires legal changes to the pension benefit rules. We therefore use the information on employment state and the aggregated individual pension-relevant and full-value contribution periods, which are only provided in the BASiD, to identify the errors in our calculation of the eligibility rules for the old age pension types in a large administrative data set that covers the labour market history of birth cohorts 1936–1948, the SIAB. We show that we can reduce the errors in determining eligibility for a pension type to an almost negligible amount when we restrict our sample to employees with relatively short labour market gaps during their careers and with a close labour market attachment at old age. We argue that this sample of people is relevant for the analysis of the labour market behaviour of older employees because members of the sample have a realistic choice between work and retirement when they reach the ERA. Employees with long unemployment spells have few opportunities to return to work in Germany, and employees with long spells of inactivity during their careers also have a low labour market attachment in old age. In addition, we show that our sample is not biased with respect to the share of women with and without children, and that we can accurately identify the dominant old age pension for practically all women in our sample without taking into account the additional pension entitlements implied by having children.

Overall, we find that the SIAB is well suited to determining the individual dominant ERA and NRA and comparing the retirement ages with the actual labour market exit age. Measurement errors occur in the calculation of eligibility for certain old age pension types because we cannot take into account employment states based on voluntary insurance, illness, inability to work, maternity, parenting or caregiving on a non-commercial basis. Therefore, the calculation of

contribution periods can lead to a slight underestimation of the qualifying period.[68] For women in our BASiD sample, we can calculate eligibility for the old age pension for women based on the rule of at least 10 years of compulsory contributions after the age of 40 with very few errors. We also show that women who are eligible on this basis almost always fulfil the second eligibility criterion of a 15-year qualification period during their entire career. We find that voluntary pension insurance contributions do not cause errors in identifying eligibility for old age pension types because these contributions are mainly paid during long periods of parenting or unemployment (Pfister et al., 2018). There is only a very small proportion of such people in our sample, however.

Because the SIAB only provides individual employment histories from 1975 onwards, only the 1945 to 1948 cohorts have an observation window of at least 35 years. Therefore, we cannot directly observe whether most of the men in our SIAB sample achieve the 35-year qualification period required for the old age pension with a long insurance record. We show in our BASiD sample, however, that only 1.38%[69] of men who do not fulfil the eligibility requirements for the dominant old age pension for the unemployed or under a progressive retirement plan do not meet the 35-year qualification period (for the old age pension for persons with a long insurance record). We therefore assume that all men who are not eligible for the dominant old age pension are eligible for the old age pension with a long insurance record.

Unfortunately, identification of the old age pension for the severely disabled is not possible because the SIAB does not contain information on the degree of disability and we cannot exclude these persons through our sample restrictions. Consequently, we assign the wrong ERA and NRA to these persons. However, the NRA of the pension for the severely disabled is lower than that of all other pension options for men. The NRA for the old age pension for women and the old age pension for the severely disabled is only equal for the 1936–1939 cohorts. We might therefore make errors in determining the financial consequences of labour market exit decisions because we cannot identify those who are eligible for the pension for the severely disabled. However, we should emphasise that the proportion of people who choose the old age pension for the severely disabled is low, according to the official reports of the German statutory retirement insurance (Deutsche Rentenversicherung, 2016).

In summary, in this report we describe the information that is necessary to identify individual eligibility for the different types of old age pension and the legal changes to the NRA and ERA that must be considered. We use this information to present a method for calculating the earliest statutory retirement dates for all employees in the SIAB. Our assessment of the accuracy of our method using the BASiD shows that it is possible to calculate the dominant NRA and ERA with few errors when we impose some sample restrictions. Therefore, conventional administrative labour history datasets that do not contain direct retirement information, or infor-

[68] It should also be noted that in the SIAB, we cannot observe whether persons with marginal employment have paid voluntary contributions to supplement their statutory retirement insurance. Therefore, the calculation of (compulsory) contribution periods can lead to a slight overestimation of the qualifying period.

[69] Calculated on the basis of the total sample of men (n = 3,039).

mation such as all employment states relevant for pensionable periods or the number of children, are a valuable alternative for analysing the financial incentive effects of the pension system and their effects on the labour market behaviour of older employees.

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Appendix

A. Statutory retirement dates for the standard old age pension and old age pension with long insurance record depending on the date of birth

Birth Date		Standard old age pension				Old age pension for persons with long insurance record			
		Section 235				Section 236			
		NRA		ERA		NRA		ERA	
		Date		Date		Date		Date	
1936		2001		2001		1999		1999	
1937	J	2002		2002		01.02.2000	01.03.2000	2000	
1937	F	2002		2002		01.04.2000	01.05.2000	2000	
1937	MAR	2002		2002		01.06.2000	01.07.2000	2000	
1937	A	2002		2002		01.08.2000	01.09.2000	2000	
1937	MY	2002		2002		01.10.2000	01.11.2000	2000	
1937	JUN	2002		2002		01.12.2000	01.01.2001	2000	
1937	JLY	2002		2002		01.02.2001	01.03.2001	2000	
1937	AUG	2002		2002		01.04.2001	01.05.2001	2000	
1937	SEP	2002		2002		01.06.2001	01.07.2001	2000	
1937	OCT	2002		2002		01.08.2001	01.09.2001	2000	
1937	NOV	2002		2002		01.10.2001	01.11.2001	2000	
1937	DEC	01.12.2002	01.01.2003	01.12.2002	01.01.2003	01.12.2001	01.01.2002	01.12.2000	01.01.2001
1938	J	2003		2003		01.02.2002	01.03.2002	2001	
1938	F	2003		2003		01.04.2002	01.05.2002	2001	
1938	MAR	2003		2003		01.06.2002	01.07.2002	2001	
1938	A	2003		2003		01.08.2002	01.09.2002	2001	
1938	MY	2003		2003		01.10.2002	01.11.2002	2001	
1938	JUN	2003		2003		01.12.2002	01.01.2003	2001	
1938	JLY	2003		2003		01.02.2003	01.03.2003	2001	
1938	AUG	2003		2003		01.04.2003	01.05.2003	2001	
1938	SEP	2003		2003		01.06.2003	01.07.2003	2001	
1938	OCT	2003		2003		01.08.2003	01.09.2003	2001	
1938	NOV	2003		2003		01.10.2003	01.11.2003	2001	
1938	DEC	01.12.2003	01.01.2004	01.12.2003	01.01.2004	01.12.2002	01.01.2003	01.12.2001	01.01.2002
1939	J	2004		2004		2004		2002	
1939	F	2004		2004		2004		2002	
1939	MAR	2004		2004		2004		2002	
1939	A	2004		2004		2004		2002	
1939	MY	2004		2004		2004		2002	
1939	JUN	2004		2004		2004		2002	
1939	JLY	2004		2004		2004		2002	
1939	AUG	2004		2004		2004		2002	
1939	SEP	2004		2004		2004		2002	
1939	OCT	2004		2004		2004		2002	
1939	NOV	2004		2004		2004		2002	

1939	DEC	01.12.2004	01.01.2005	01.12.2004	01.01.2005	01.12.2004	01.01.2005	01.12.2002	01.01.2003
1940	J	2005		2005		2005		2003	
1940	F	2005		2005		2005		2003	
1940	MAR	2005		2005		2005		2003	
1940	A	2005		2005		2005		2003	
1940	MY	2005		2005		2005		2003	
1940	JUN	2005		2005		2005		2003	
1940	JLY	2005		2005		2005		2003	
1940	AUG	2005		2005		2005		2003	
1940	SEP	2005		2005		2005		2003	
1940	OCT	2005		2005		2005		2003	
1940	NOV	2005		2005		2005		2003	
1940	DEC	01.12.2005	01.01.2006	01.12.2005	01.01.2006	01.12.2005	01.01.2006	01.12.2003	01.01.2004
1941	J	2006		2006		2006		2004	
1941	F	2006		2006		2006		2004	
1941	MAR	2006		2006		2006		2004	
1941	A	2006		2006		2006		2004	
1941	MY	2006		2006		2006		2004	
1941	JUN	2006		2006		2006		2004	
1941	JLY	2006		2006		2006		2004	
1941	AUG	2006		2006		2006		2004	
1941	SEP	2006		2006		2006		2004	
1941	OCT	2006		2006		2006		2004	
1941	NOV	2006		2006		2006		2004	
1941	DEC	01.12.2006	01.01.2007	01.12.2006	01.01.2007	01.12.2006	01.01.2007	01.12.2004	01.01.2005
1942	J	2007		2007		2007		2005	
1942	F	2007		2007		2007		2005	
1942	MAR	2007		2007		2007		2005	
1942	A	2007		2007		2007		2005	
1942	MY	2007		2007		2007		2005	
1942	JUN	2007		2007		2007		2005	
1942	JLY	2007		2007		2007		2005	
1942	AUG	2007		2007		2007		2005	
1942	SEP	2007		2007		2007		2005	
1942	OCT	2007		2007		2007		2005	
1942	NOV	2007		2007		2007		2005	
1942	DEC	01.12.2007	01.01.2008	01.12.2007	01.01.2008	01.12.2007	01.01.2008	01.12.2005	01.01.2006
1943	J	2008		2008		2008		2006	
1943	F	2008		2008		2008		2006	
1943	MAR	2008		2008		2008		2006	
1943	A	2008		2008		2008		2006	
1943	MY	2008		2008		2008		2006	
1943	JUN	2008		2008		2008		2006	
1943	JLY	2008		2008		2008		2006	

1943	AUG	2008		2008		2008		2006	
1943	SEP	2008		2008		2008		2006	
1943	OCT	2008		2008		2008		2006	
1943	NOV	2008		2008		2008		2006	
1943	DEC	01.12.2008	01.01.2009	01.12.2008	01.01.2009	01.12.2008	01.01.2009	01.12.2006	01.01.2007
1944	J	2009		2009		2009		2007	
1944	F	2009		2009		2009		2007	
1944	MAR	2009		2009		2009		2007	
1944	A	2009		2009		2009		2007	
1944	MY	2009		2009		2009		2007	
1944	JUN	2009		2009		2009		2007	
1944	JLY	2009		2009		2009		2007	
1944	AUG	2009		2009		2009		2007	
1944	SEP	2009		2009		2009		2007	
1944	OCT	2009		2009		2009		2007	
1944	NOV	2009		2009		2009		2007	
1944	DEC	01.12.2009	01.01.2010	01.12.2009	01.01.2010	01.12.2009	01.01.2010	01.12.2007	01.01.2008
1945		2010		2010		2010		2008	
1946	J	2011		2011		2011		2009	
1946	F	2011		2011		2011		2009	
1946	MAR	2011		2011		2011		2009	
1946	A	2011		2011		2011		2009	
1946	MY	2011		2011		2011		2009	
1946	JUN	2011		2011		2011		2009	
1946	JLY	2011		2011		2011		2009	
1946	AUG	2011		2011		2011		2009	
1946	SEP	2011		2011		2011		2009	
1946	OCT	2011		2011		2011		2009	
1946	NOV	2011		2011		2011		2009	
1946	DEC	01.12.2011	01.01.2012	01.12.2011	01.01.2012	01.12.2011	01.01.2012	01.12.2009	01.01.2010
1947	J	01.02.2012	01.03.2012	01.02.2012	01.03.2012	2012		2010	
1947	F	01.03.2012	01.04.2012	01.03.2012	01.04.2012	2012		2010	
1947	MAR	01.04.2012	01.05.2012	01.04.2012	01.05.2012	2012		2010	
1947	A	01.05.2012	01.06.2012	01.05.2012	01.06.2012	2012		2010	
1947	MY	01.06.2012	01.07.2012	01.06.2012	01.07.2012	2012		2010	
1947	JUN	01.07.2012	01.08.2012	01.07.2012	01.08.2012	2012		2010	
1947	JLY	01.08.2012	01.09.2012	01.08.2012	01.09.2012	2012		2010	
1947	AUG	01.09.2012	01.10.2012	01.09.2012	01.10.2012	2012		2010	
1947	SEP	01.10.2012	01.11.2012	01.10.2012	01.11.2012	2012		2010	
1947	OCT	01.11.2012	01.12.2012	01.11.2012	01.12.2012	2012		2010	
1947	NOV	01.12.2012	01.01.2013	01.12.2012	01.01.2013	2012		2010	
1947	DEC	01.01.2013	01.02.2013	01.01.2013	01.02.2013	01.12.2012	01.01.2013	01.12.2010	01.01.2011
1948	J	01.03.2013	01.04.2013	01.03.2013	01.04.2013	2013		01.12.2010	01.01.2011
1948	F	01.04.2013	01.05.2013	01.04.2013	01.05.2013	2013		01.01.2011	01.02.2011

1948	MAR	01.05.2013	01.06.2013	01.05.2013	01.06.2013	2013		01.01.2011	01.02.2011
1948	A	01.06.2013	01.07.2013	01.06.2013	01.07.2013	2013		01.02.2011	01.03.2011
1948	MY	01.07.2013	01.08.2013	01.07.2013	01.08.2013	2013		01.02.2011	01.03.2011
1948	JUN	01.08.2013	01.09.2013	01.08.2013	01.09.2013	2013		01.03.2011	01.03.2011
1948	JLY	01.09.2013	01.10.2013	01.09.2013	01.10.2013	2013		01.03.2011	01.03.2011
1948	AUG	01.10.2013	01.11.2013	01.10.2013	01.11.2013	2013		01.04.2011	01.05.2011
1948	SEP	01.11.2013	01.12.2013	01.11.2013	01.12.2013	2013		01.04.2011	01.05.2011
1948	OCT	01.12.2013	01.01.2014	01.12.2013	01.01.2014	2013		01.05.2011	01.06.2011
1948	NOV	01.01.2014	01.02.2014	01.01.2014	01.02.2014	2013		01.05.2011	01.06.2011
1948	DEC	01.02.2014	01.03.2014	01.02.2014	01.03.2014	01.12.2013	01.01.2014	01.06.2011	01.07.2011

(Notes: The legitimate expectations (*Vertrauensschutz*) for old age pensions are considered.)
Source: own illustration based on the respective BGB and Deutsche Rentenversicherung, 2015.

B. Statutory retirement dates for the old age pension for women and old age pension for unemployed or under a progressive retirement plan depending on the date of birth

Birth Date		**Old age pension for women**				**Old age pension for unemployed or under a progressive retirement plan**			
		Section 237a				**Section 237a**			
		NRA		ERA		NRA		ERA	
		Date		Date		Date		Date	
1936		1996		1996		1996		1996	
1937	J	1997		1997		01.02.1997	01.03.1997	1997	
1937	F	1997		1997		01.04.1997	01.05.1997	1997	
1937	MAR	1997		1997		01.06.1997	01.07.1997	1997	
1937	A	1997		1997		01.08.1997	01.09.1997	1997	
1937	MY	1997		1997		01.10.1997	01.11.1997	1997	
1937	JUN	1997		1997		01.12.1997	01.01.1998	1997	
1937	JLY	1997		1997		01.02.1998	01.03.1998	1997	
1937	AUG	1997		1997		01.04.1998	01.05.1998	1997	
1937	SEP	1997		1997		01.06.1998	01.07.1998	1997	
1937	OCT	1997		1997		01.08.1998	01.09.1998	1997	
1937	NOV	1997		1997		01.10.1998	01.11.1998	1997	
1937	DEC	01.12.1997	01.01.1998	01.12.1997	01.01.1998	01.12.1998	01.01.1999	01.12.1997	01.01.1998
1938	J	1998		1998		01.02.1999	01.03.1999	1998	
1938	F	1998		1998		01.04.1999	01.05.1999	1998	
1938	MAR	1998		1998		01.06.1999	01.07.1999	1998	
1938	A	1998		1998		01.08.1999	01.09.1999	1998	
1938	MY	1998		1998		01.10.1999	01.11.1999	1998	
1938	JUN	1998		1998		01.12.1999	01.01.2000	1998	
1938	JLY	1998		1998		01.02.2000	01.03.2000	1998	
1938	AUG	1998		1998		01.04.2000	01.05.2000	1998	
1938	SEP	1998		1998		01.06.2000	01.07.2000	1998	
1938	OCT	1998		1998		01.08.2000	01.09.2000	1998	
1938	NOV	1998		1998		01.10.2000	01.11.2000	1998	
1938	DEC	01.12.1998	01.01.1999	01.12.1998	01.01.1999	01.12.2000	01.01.2001	01.12.1998	01.01.1999

1939	J	1999		1999		01.02.2001	01.03.2001	1999	
1939	F	1999		1999		01.04.2001	01.05.2001	1999	
1939	MAR	1999		1999		01.06.2001	01.07.2001	1999	
1939	A	1999		1999		01.08.2001	01.09.2001	1999	
1939	MY	1999		1999		01.10.2001	01.11.2001	1999	
1939	JUN	1999		1999		01.12.2001	01.01.2002	1999	
1939	JLY	1999		1999		01.02.2002	01.03.2002	1999	
1939	AUG	1999		1999		01.04.2002	01.05.2002	1999	
1939	SEP	1999		1999		01.06.2002	01.07.2002	1999	
1939	OCT	1999		1999		01.08.2002	01.09.2002	1999	
1939	NOV	1999		1999		01.10.2002	01.11.2002	1999	
1939	DEC	01.12.1999	01.01.2000	01.12.1999	01.01.2000	01.12.2002	01.01.2003	01.12.1999	01.01.2000
1940	J	01.02.2000	01.03.2000	2000		01.02.2003	01.03.2003	2000	
1940	F	01.04.2000	01.05.2000	2000		01.04.2003	01.05.2003	2000	
1940	MAR	01.06.2000	01.07.2000	2000		01.06.2003	01.07.2003	2000	
1940	A	01.08.2000	01.09.2000	2000		01.08.2003	01.09.2003	2000	
1940	MY	01.10.2000	01.11.2000	2000		01.10.2003	01.11.2003	2000	
1940	JUN	01.12.2000	01.01.2001	2000		01.12.2003	01.01.2004	2000	
1940	JLY	01.02.2001	01.03.2001	2000		01.02.2004	01.03.2004	2000	
1940	AUG	01.04.2001	01.05.2001	2000		01.04.2004	01.05.2004	2000	
1940	SEP	01.06.2001	01.07.2001	2000		01.06.2004	01.07.2004	2000	
1940	OCT	01.08.2001	01.09.2001	2000		01.08.2004	01.09.2004	2000	
1940	NOV	01.10.2001	01.11.2001	2000		01.10.2004	01.11.2004	2000	
1940	DEC	01.12.2001	01.01.2002	01.12.2000	01.01.2001	01.12.2004	01.01.2005	01.12.2000	01.01.2001
1941	J	01.02.2002	01.03.2002	2001		01.02.2005	01.03.2005	2001	
1941	F	01.04.2002	01.05.2002	2001		01.04.2005	01.05.2005	2001	
1941	MAR	01.06.2002	01.07.2002	2001		01.06.2005	01.07.2005	2001	
1941	A	01.08.2002	01.09.2002	2001		01.08.2005	01.09.2005	2001	
1941	MY	01.10.2002	01.11.2002	2001		01.10.2005	01.11.2005	2001	
1941	JUN	01.12.2002	01.01.2003	2001		01.12.2005	01.01.2006	2001	
1941	JLY	01.02.2003	01.03.2003	2001		01.02.2006	01.03.2006	2001	
1941	AUG	01.04.2003	01.05.2003	2001		01.04.2006	01.05.2006	2001	
1941	SEP	01.06.2003	01.07.2003	2001		01.06.2006	01.07.2006	2001	
1941	OCT	01.08.2003	01.09.2003	2001		01.08.2006	01.09.2006	2001	
1941	NOV	01.10.2003	01.11.2003	2001		01.10.2006	01.11.2006	2001	
1941	DEC	01.12.2003	01.01.2004	01.12.2001	01.01.2002	01.12.2006	01.01.2007	01.12.2001	01.01.2002
1942	J	01.02.2004	01.03.2004	2002		2007		2002	
1942	F	01.04.2004	01.05.2004	2002		2007		2002	
1942	MAR	01.06.2004	01.07.2004	2002		2007		2002	
1942	A	01.08.2004	01.09.2004	2002		2007		2002	
1942	MY	01.10.2004	01.11.2004	2002		2007		2002	
1942	JUN	01.12.2004	01.01.2005	2002		2007		2002	
1942	JLY	01.02.2005	01.03.2005	2002		2007		2002	
1942	AUG	01.04.2005	01.05.2005	2002		2007		2002	

1942	SEP	01.06.2005	01.07.2005	2002		2007		2002	
1942	OCT	01.08.2005	01.09.2005	2002		2007		2002	
1942	NOV	01.10.2005	01.11.2005	2002		2007		2002	
1942	DEC	01.12.2005	01.01.2006	01.12.2002	01.01.2003	01.12.2007	01.01.2008	01.12.2002	01.01.2003
1943	J	01.02.2006	01.03.2006	2003		2008		2003	
1943	F	01.04.2006	01.05.2006	2003		2008		2003	
1943	MAR	01.06.2006	01.07.2006	2003		2008		2003	
1943	A	01.08.2006	01.09.2006	2003		2008		2003	
1943	MY	01.10.2006	01.11.2006	2003		2008		2003	
1943	JUN	01.12.2006	01.01.2007	2003		2008		2003	
1943	JLY	01.02.2007	01.03.2007	2003		2008		2003	
1943	AUG	01.04.2007	01.05.2007	2003		2008		2003	
1943	SEP	01.06.2007	01.07.2007	2003		2008		2003	
1943	OCT	01.08.2007	01.09.2007	2003		2008		2003	
1943	NOV	01.10.2007	01.11.2007	2003		2008		2003	
1943	DEC	01.12.2007	01.01.2008	01.12.2003	01.01.2004	01.12.2008	01.01.2009	01.12.2003	01.01.2004
1944	J	01.02.2008	01.03.2008	2004		2009		2004	
1944	F	01.04.2008	01.05.2008	2004		2009		2004	
1944	MAR	01.06.2008	01.07.2008	2004		2009		2004	
1944	A	01.08.2008	01.09.2008	2004		2009		2004	
1944	MY	01.10.2008	01.11.2008	2004		2009		2004	
1944	JUN	01.12.2008	01.01.2009	2004		2009		2004	
1944	JLY	01.02.2009	01.03.2009	2004		2009		2004	
1944	AUG	01.04.2009	01.05.2009	2004		2009		2004	
1944	SEP	01.06.2009	01.07.2009	2004		2009		2004	
1944	OCT	01.08.2009	01.09.2009	2004		2009		2004	
1944	NOV	01.10.2009	01.11.2009	2004		2009		2004	
1944	DEC	01.12.2009	01.01.2010	01.12.2004	01.01.2005	01.12.2009	01.01.2010	01.12.2004	01.01.2005
1945		2010		2005		2010		2005	
1946	J	2011		2006		2011		01.02.2006	01.03.2006
1946	F	2011		2006		2011		01.04.2006	01.05.2006
1946	MAR	2011		2006		2011		01.06.2006	01.07.2006
1946	A	2011		2006		2011		01.08.2006	01.09.2006
1946	MY	2011		2006		2011		01.10.2006	01.11.2006
1946	JUN	2011		2006		2011		01.12.2006	01.01.2007
1946	JLY	2011		2006		2011		01.02.2007	01.03.2007
1946	AUG	2011		2006		2011		01.04.2007	01.05.2007
1946	SEP	2011		2006		2011		01.06.2007	01.07.2007
1946	OCT	2011		2006		2011		01.08.2007	01.09.2007
1946	NOV	2011		2006		2011		01.10.2007	01.11.2007
1946	DEC	01.12.2011	01.01.2012	01.12.2006	01.01.2007	01.12.2011	01.01.2012	01.12.2007	01.01.2008
1947	J	2012		2007		2012		01.02.2008	01.03.2008
1947	F	2012		2007		2012		01.04.2008	01.05.2008
1947	MAR	2012		2007		2012		01.06.2008	01.07.2008

1947	A	2012		2007		2012		01.08.2008	01.09.2008
1947	MY	2012		2007		2012		01.10.2008	01.11.2008
1947	JUN	2012		2007		2012		01.12.2008	01.01.2009
1947	JLY	2012		2007		2012		01.02.2009	01.03.2009
1947	AUG	2012		2007		2012		01.04.2009	01.05.2009
1947	SEP	2012		2007		2012		01.06.2009	01.07.2009
1947	OCT	2012		2007		2012		01.08.2009	01.09.2009
1947	NOV	2012		2007		2012		01.10.2009	01.11.2009
1947	DEC	01.12.2012	01.01.2013	01.12.2007	01.01.2008	01.12.2012	01.01.2013	01.12.2009	01.01.2010
1948	J	2013		2008		2013		01.02.2010	01.03.2010
1948	F	2013		2008		2013		01.04.2010	01.05.2010
1948	MAR	2013		2008		2013		01.06.2010	01.07.2010
1948	A	2013		2008		2013		01.08.2010	01.09.2010
1948	MY	2013		2008		2013		01.10.2010	01.11.2010
1948	JUN	2013		2008		2013		01.12.2010	01.01.2011
1948	JLY	2013		2008		2013		01.02.2011	01.03.2011
1948	AUG	2013		2008		2013		01.04.2011	01.05.2011
1948	SEP	2013		2008		2013		01.06.2011	01.07.2011
1948	OCT	2013		2008		2013		01.08.2011	01.09.2011
1948	NOV	2013		2008		2013		01.10.2011	01.11.2011
1948	DEC	01.12.2013	01.01.2014	01.12.2008	01.01.2009	01.12.2013	01.01.2014	01.12.2011	01.01.2012

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Corresponding author:
Svenja Lorenz
University of Würzburg
Sanderring 2 - 97070 Würzburg
Email: svenja.lorenz@uni-wuerzburg.de

Mona Pfister
University of Würzburg
Sanderring 2 - 97070 Würzburg
Email: mona.pfister@uni-wuerzburg.de