

Bruckmeier, Kerstin; Dummert, Sandra; Grunau, Philipp; Hohmeyer, Katrin;
Lietzmann, Torsten

Article

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ORIGINAL ARTICLE

Open Access



New administrative data on welfare dynamics in Germany: the Sample of Integrated Welfare Benefit Biographies (SIG)

Kerstin Bruckmeier^{*} , Sandra Dummert, Philipp Grunau, Katrin Hohmeyer and Torsten Lietzmann

Abstract

The Sample of Integrated Welfare Benefit Biographies (SIG) is a new administrative longitudinal microdata set representative of recipients of Germany's main welfare programme, the Unemployment Benefit II (UB II, *Arbeitslosengeld II*). The data set contains detailed longitudinal information on welfare receipt and labour market activities, and hence enables researchers to analyse the dynamics of benefit receipt, income and employment. A distinct feature of the SIG is that it provides information not only for individual benefit recipients but also for family members, including children and partners. This is possible because eligibility for UB II benefits depends on the household structure, and it is means-tested on household income. In addition to socio-demographic and regional information, the SIG contains extensive information on the employment biographies of benefit recipients and their household members from the Integrated Employment Biographies (IEB) of the Institute for Employment Research (IAB). This allows researchers to examine the interaction between labour market participation and benefit receipt. The SIG is available to researchers at the Research Data Centre (FDZ) of the Federal Employment Agency (BA) at the IAB.

JEL codes: C81, I32, I38, H55

Keywords: Administrative data, Unemployment benefit II, Welfare benefit, Welfare dynamics

1 Introduction

Research on the welfare dependence requires a dynamic perspective on welfare benefit receipt. Since the pioneering work of Bane and Ellwood (1994, 1986), time has been a central dimension in analyses of both welfare dependence and poverty. The distinction between temporary and chronic welfare receipt or the trap of moving in and out of welfare provides an analytical framework to explain welfare dependence. Many studies have analysed the dynamic patterns of welfare dependence in the US (Hoynes 2000; Nam 2005) and Europe (Andr n and Gustafsson 2004; Carpentier et al. 2014; Dahl and Lorentzen 2003a; Gustafsson et al. 2002; Mood 2013). In addition to factors explaining (long-term) benefit receipt, a number

of studies have focused on the occurrence and explanation of re-entries to the welfare system (e.g. Carpentier et al. 2017b; Hansen 2009; Nam 2005). The analysis of re-entry into the welfare system is likely to gain importance, as many countries have reformed their welfare states following work-first policies. Although labour market integration can increase exits from welfare and reduce welfare dependence, job instability and low-wage work may prevent a long-term exit from welfare benefits. Hence, labour force participation and the role of labour market conditions come to the fore of welfare analysis in post-industrial labour markets and countries that have recently reformed their welfare system.

In view of changing social and economic conditions, welfare institutions have been subject to reforms in many countries in recent decades (Clasen and Clegg 2011). In Germany, several reforms between 2002 and 2005 have resulted in major changes in the labour market and

*Correspondence: Kerstin.Bruckmeier@iab.de
Institute for Employment Research (IAB), Regensburger Strasse 104,
90478 Nuremberg, Germany

welfare institutions. With the implementation of the latest reform package (“*Hartz IV*”) in 2005, the former unemployment assistance (“*Arbeitslosenhilfe*”) and social assistance (“*Sozialhilfe*”) were combined to form the new Unemployment Benefit II (“*Arbeitslosengeld II*”, UB II). UB II is a means-tested basic income benefit for persons capable of working and their families, whose household income is below the legally defined minimum income. Therefore, both the family and the household context have special relevance for the analysis of welfare receipt. UB II has become the most important means-tested benefit system in Germany. In 2018, nine per cent of the population under the age of 66 and almost two-thirds of the registered unemployed received UB II (Department for Statistics of the Federal Employment Agency 2019a, b). Most recipients receive benefits for many years, even though the paths through the benefit system are very heterogeneous (Bruckmeier et al. 2020).

Although the dynamic view on benefit receipt is important, prior to the Hartz reforms empirical evidence on the dynamic aspects of welfare dependence for Germany has been scarce due to a lack of appropriate microdata. The exceptions are a few studies that had access to regional administrative data of social assistance recipients (Buhr et al. 2010; Gangl 1998; Gustafsson et al. 2002; Leisering and Leibfried 1999). The reorganisation of the benefit system and changes in administrative responsibilities have enhanced the provision of administrative research data. Since its research on UB II is based on a legal mandate, the Institute for Employment Research (IAB) of the Federal Employment Agency (BA) has prepared and used administrative data on UB II originally collected by local administrative authorities.

In this article, we present a new administrative microdata set on recipients of UB II and their families that has recently been made available for researchers by the IAB and the Research Data Centre (FDZ) of the BA at the IAB in an anonymised form. This new data set, called the Sample of Integrated Welfare Benefit Biographies (SIG), is representative of the whole population of UB II recipients. Large-scale, individual longitudinal administrative data on welfare receipt such as the SIG offer specific advantages over survey data for the empirical analysis of welfare receipt, such as a detailed, continuous measurement of welfare receipt over time, high case numbers and no panel mortality. This provides a wide range of possibilities for analysing the dynamic aspects of benefit receipt. The SIG also contains extensive information on the employment biography of benefit recipients and their family members before, during and after benefit receipt. This allows researchers to examine the interaction between labour market participation of the household members and benefit receipt. Since the SIG includes

labour market biographies of all family members, the intra-household division of labour among couples and gender-specific benefit and employment trajectories can be analysed. Furthermore, detailed financial information on welfare receipt from the UB II Income and Benefit Statistics (LST-S) at the benefit unit level can be merged. This offers the opportunity to study benefit amount and income at the benefit unit level. Another interesting opportunity is to analyse the intergenerational correlations in welfare participation. Since the SIG includes all family members receiving UB II and follows them over time, persons who grew up as children in receipt of benefits can be identified. The SIG is accessible to the research community via the FDZ and will be updated in due course to cover a longer period.

2 Institutional background

UB II is the most important means-tested benefit programme in Germany and acts as the last safety net to guarantee every recipient and his family a certain minimum income. UB II provides benefits to working-age individuals and their families that are both in economic need and capable of working for at least three hours per day under regular labour market conditions. Furthermore, UB II aims to reintegrate recipients into the labour market by activation policies. Additionally to UB II, an earnings-based unemployment insurance benefit (Unemployment Benefit I—UB I) is available for unemployed individuals. The maximum duration of UB I is 24 months. UB-I-receipt can be supplemented with UB II if its benefit amount does not meet the legally defined minimum income of the household according to UB II.

In the international context, the definition of capability of working is rather broad in Germany and includes individuals at the margin of the labour market (Konle-Seidl et al. 2014). In addition, the new benefit has also brought other groups (e.g. low-wage earners or single parents) into the focus of labour market policy, as UB II, unlike the former unemployment assistance, is not an individual but rather a household benefit. This “broadening of the concept of unemployment” (Clasen and Clegg 2011) means that, in principle, all household members who are capable of working are obliged to reduce neediness by taking up employment.

In addition to the capability of working of at least one family member, the neediness of the family is a central condition for receiving benefits. A household is in need if it does not meet the legally defined minimum income. The minimum income consists of a nationally uniform standard financial benefit for each household member to cover living costs and household-specific housing costs, including heating costs. In 2019, the standard benefit for the head of the household amounted to 424€ per month.

Supplementary benefits are paid to recipients in special circumstances (e.g. single parents). From the total minimum income, the incomes of the household members are deducted. Almost all kinds of incomes are considered in the means test, and only a small proportion of earned income is exempted. In addition to this income means test, UB II is also means-tested based on wealth. Consequently, households are eligible for UB II only up to a certain amount of wealth, which depends on the household size. The SIG research data set provides information on several income and benefit variables considered in the means test (see Sect. 3.3).

The means test considers all household members in the calculation of the household's minimum income who belong to the "community of needs" (*"Bedarfsgemeinschaft"*). According to the legal definition, a "community of needs" comprises only the core family as relevant benefit unit. The core family consists of individuals, their partner and their children up to age 24. Hence, the family relationships in the administrative SIG data refer to this concept, and the children of recipients living in the household are captured by the data up to the age of 24.¹

3 Data

In the following section, we describe the main features of the data set. A comprehensive and detailed description of the data set is given in the FDZ data report 02/2020 (Dummert et al. 2020).

3.1 Main information and sampling

The local welfare agencies that are responsible for the administration of UB II collect the data on UB II recipients and transmit them to the BA following well-defined reporting procedures. These data build the basis for the official aggregate statistics on UB II in Germany provided by the BA. However, during the first 2 years after the implementation of UB II, transferring and integrating data was not possible for all local authorities. Difficulties occurred in particular in several regions where municipalities and not job centres administered UB II. For this reason, the SIG includes data only from 2007 onwards.²

The data on UB II recipients are stored in the Unemployment Benefit II Recipient History (*"Leistungshistorik Grundsicherung—LHG"*) at the IAB (Antoni et al. 2019) (see Fig. 1). The LHG includes daily information about the recipients' socio-economic characteristics and core family members, such as the ability to work, the age of the youngest child, and each person's role within the benefit unit.

The LHG file is processed and anonymised at the IAB to make it available to the external research community via the FDZ, as the first purely administrative data set in the context of UB II, namely, the Sample of Integrated Welfare Benefit Biographies (SIG). The SIG 0717 consists of a 5 per cent random sample of persons who have been registered as a UB II recipient or as a member of the core family of a recipient (*"Bedarfsgemeinschaft"*) at least once for one or more months between 1 January 2007 and 31 December 2017 in the LHG file. This corresponds to 909,245 individuals being included in the sample.³ The sample is representative of the whole population of individual UB II recipients between 2007 and 2017.

The case numbers of the population can be estimated with a weighting factor of 20. This "ever-begun-sample" can be used to construct both stocks and flows of welfare recipients receiving benefits between January 2007 and December 2017. An important aspect in the analysis of welfare dynamics is the selection of the sample, since different samples per se lead to variation in the measured duration and incidence of benefit receipt (Bane and Ellwood 1994). Therefore, it is commonly distinguished between the stock of benefit recipients, who receive benefits at a certain point in time or during a time period, and the (in)flow of recipients, who start receiving benefits at a certain point in time (Dahl and Lorentzen 2003b). The sampling procedure of the SIG allows constructing both subsamples to analyse welfare dependence within different settings. First, one can consider point-in-time sub-samples between 2007 and 2017 for cross-sectional analysis. Second, the SIG also offers the opportunity to

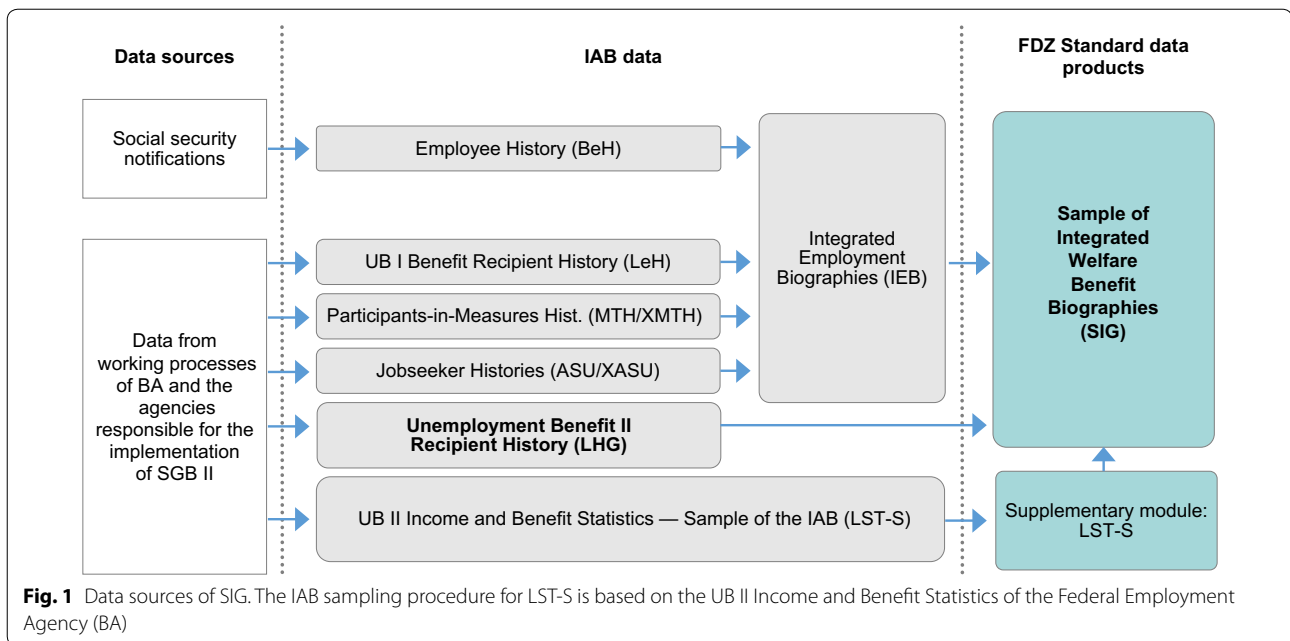
¹ Older children aged 25 years or above or other household members can be included in the SIG as their own benefit unit if they also receive UB II. Further household members outside the community of needs who do not receive UB II are not captured by the data.

² With the reform of the old social assistance and the former unemployment assistance in 2005, the responsibilities for the administration of UB II are organised in two different types of welfare agencies. First, in "job centres", municipalities together with the employment services of the BA are in charge of administering UB II. Second, 69 municipalities (*"zugelassene kommunale Träger"*) completely took over the responsibility for UB II in 2005 (Konle-Seidl 2008). The second type of welfare agency has become more important and since 2018, 110 municipalities have been responsible for the administration of UB II on their own. Between January 2007 and April 2019, 63 local authorities still failed to transfer complete data to the BA for

Footnote 2 (continued)

104 time spans. In 84 per cent of these time spans, incomplete data was reported in only 1 month. The maximum time span of implausible reporting amounts to 5 months. Indicator variables in the SIG indicate whether there was a problem with transferring and integrating data before or at the end of a benefit spell and the start or end date may be incorrect (see Dummert et al. 2020).

³ This corresponds for example to a number of about 212 thousand observed UB II recipients capable of working in December 2015. Compared to survey data like the Panel Study Labour Market and Social Security (PASS, about 3700 respondents living in UB II households in 2015) or the German Socio Economic Panel (SOEP, about 2500 respondents living in UBII households in 2015), this is a relatively large number of observations which increases the statistical power and the possibility to measure effects or carry out analysis for specific subgroups.



focus on entries into benefit receipt. Since benefit spells beginning in January 2007 can be left-censored, inflow spells can start only after January 2007. Due to the technical problems in 2005 and 2006 after the introduction of the new benefit mentioned above, it cannot be ensured, that persons whose first observed benefit spell starts after January 2007 in the SIG are first-time claimants. Instead, these persons may have already received UB II benefits in 2005 or 2006, which cannot be observed in the SIG. Additionally, individuals may also have received means-tested social assistance before 2005, which is also not captured in the data. To analyse benefit inflows, considering persons who have not received benefits for a longer period of time since January 2007 is therefore advisable. An example for results based on this approach is shown in Sect. 4.

The five percent sample is enriched by various individual data from other administrative data sources available at the IAB. The majority of these individual data stems from the Integrated Employment Biographies (IEB) of the IAB, which combine data from different data sources covering the employment biographies of the sample persons and their family members, including times of UB I receipt, registered unemployment, job searches, participation in labour market policy measures and employment. Within the scope of data preparation and for reasons of anonymity, minor changes and corrections of the underlying raw information were necessary. These changes were kept to a minimum and are described in detail in the data manual (Dummert et al. 2020).

Financial information on welfare receipt from the UB II Income and Benefit Statistics—Sample of the IAB (LST-S) can also be merged to the SIG data.⁴ The LST-S provides monthly information on the benefit amount, income and sanctions of persons receiving benefits and other persons within the benefit unit. For the SIG, the data are aggregated from the individual level to the benefit unit level. In addition, the information of several consecutive months is summed up whenever all the selected financial information of these months is identical. Furthermore, information on additional requirements (due to pregnancy, disability or special and costly nutrition due to medical necessity (see §21 SGB II)) is provided in dichotomous form.

3.2 Data structure

To save storage space, the SIG data are structured in modules and stored in several files (see Fig. 2). The *SIG core* contains the following information for sampled individuals: person and benefit unit identifiers, individual characteristics, information on times of benefit receipt, registered unemployment, job searches, participation in active labour market policy measures, employment, and characteristics on the place of residence of the sample persons as well as technical variables. The corresponding information on the benefit unit members is stored

⁴ The primary reason why the different data are organized in separate datasets is that the financial information contained in the LST-S is considered sensitive in its entirety, so that access is granted only upon reasoned request, which is much easier to handle by means of a separate data file.

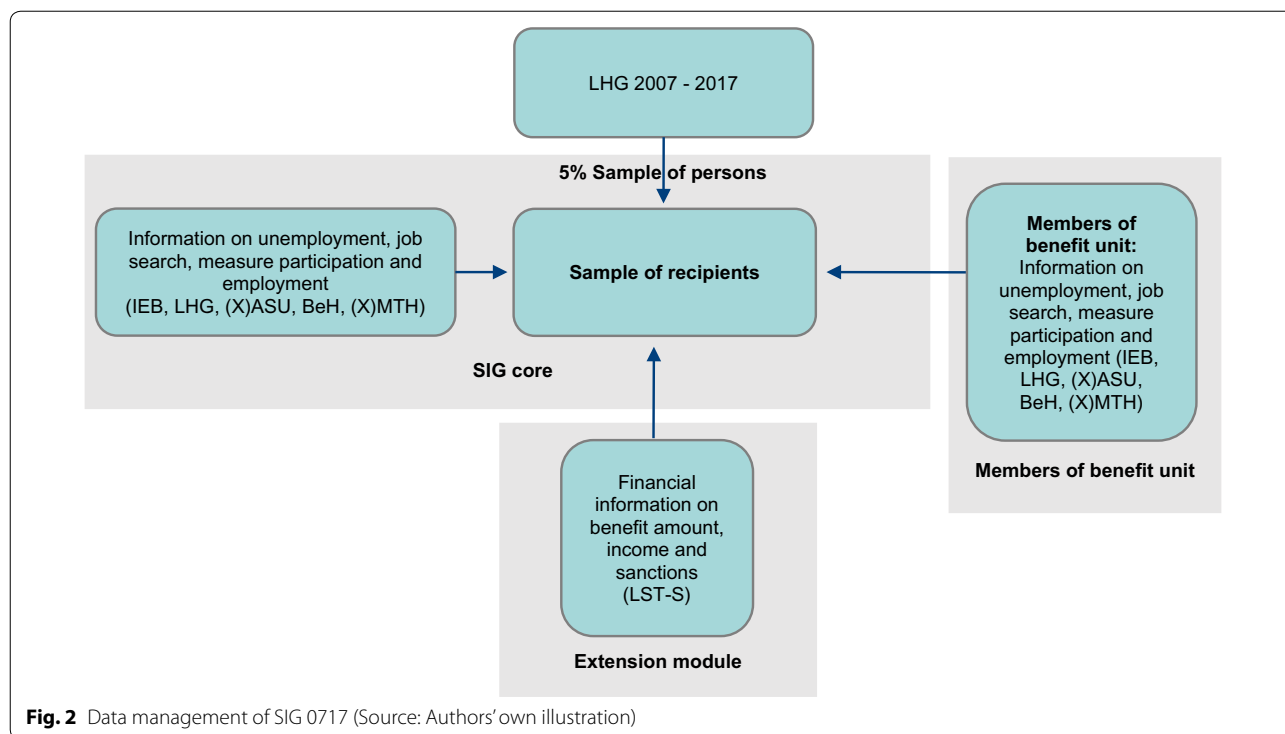


Fig. 2 Data management of SIG 0717 (Source: Authors' own illustration)

in a separate file (*benefit unit members*), which includes the benefit and employment biographies of individuals who have lived at least once within the benefit unit of a sampled person for the times before, during and/or after living in that benefit unit. The financial information on welfare receipt is also saved in a separate data set (*extension module*).

The information available in the SIG data, including the information added from other data sources, is organised in non-overlapping spells, which can cover varying periods (spell data). Within each episode, all the information is constant. If there are changes, e.g. in the composition of the household or in the household income, this triggers the formation of a new spell. Hence, for each individual, several non-overlapping observations (spells) exist.

3.3 Variables

The SIG contains daily information on UB II receipt. At the individual level, standard demographic variables (age, gender and nationality) are available. In addition, the SIG includes information on the highest educational and vocational qualifications (from their unemployment and/or employment⁵ records) and on the recipient's place of

residence measured at the level of the German districts (*Kreise und kreisfreie Städte*). This allows the researcher to add numerous regional variables from other data sources, such as the unemployment rate. All variables are also included for the family members of a benefit recipient. Additionally, at the household level, the type of the benefit unit and the number of children living in the family are included.

It is a main goal of the SIG to enable researchers to analyse the interaction between benefit receipt and labour market participation. Therefore, the SIG contains detailed information on the individuals' employment biographies before, during and after benefit receipt. This makes it possible to examine both, benefit receipt and labour market participation simultaneously over time. Data on employment biographies originate from the Integrated Employment Biographies (IEB) of the IAB (Antoni et al. 2019) and contain information about the time that individuals spent in different labour market states and some characteristics of these states.⁶

⁵ Since the information about the level of qualification is not mandatory in the employers' reports, a substantial share of employment observations from the BeH can either be assumed to be wrong or contain a missing value. To overcome this issue, several imputation approaches have been proposed (see, e.g. Thomsen et al. (2018), which is an update of Fitzenberger et al. (2005)),

Footnote 5 (continued)

which can—with some adaptations—be applied to employment spells in the SIG data.

⁶ Persons who are not part of the social security system are not included in the data (e.g. self-employed or students).

Table 1 Description of focal SIG variables. Source: SIG 0717. Unless stated otherwise, all listed variables have the observation period 2007 to 2017

Variable	Number of observations (Mio)	Features
Unit of measurement: Individual		
Employment status	10.4	Allows to differentiate between different groups of employees, e.g. regular workers liable to social security (> 60% of all employment observations), marginal workers and trainees
Job search status	15.9	Allows differentiating between different groups of registered job seekers, mainly between unemployed and employed job seekers
Ability to work	11.8	If someone is at least 15 years old, has not yet reached retirement age, and is able to work for at least 3 h per day
Daily wage	13.1	Daily wages from dependent employment (i.e. no self-employment)
Start date left-censored unemployment spell (1997–2006)	0.5	Since the SIG starts January 1, 2007, the dataset also entails several “handover” variables that provide information on how long a certain state already lasts at this date
Start date left-censored job search spell (1997–2006)	0.7	
Days since last employment (1993–2006)	9.2	This variable indicates the amount of time elapsed since the end of the last registered employment episode of a person (up to 1 January 2007)
Unit of measurement: Benefit unit		
Type of benefit unit	13.7	Allows to differentiate between several types, e.g. between singles and couples (each with and without children)
Pecuniary claim from long-term UB (ALG II)	10.8	Available on the benefit unit level and on a monthly basis via a separate file
Total amount of sanctions	5.1	

For a better overview, instead of the number of actual spells as available in the data, we here report observation numbers that are limited to one observation per year and person or benefit unit. The actual spell numbers are therefore always significantly higher

- employment, e.g. type of employment, occupation, industry, wage;
- registered unemployment or job search, e.g. occupation of last employment and occupation searched for, availability for activation;
- receipt of unemployment insurance benefits; and
- active labour market policies: broad categories of the type of programmes.

Members of the same benefit unit can be identified via a unique benefit unit number. Several variables, such as the type of the benefit unit (single, partnered, with or without children) and the number of children under 15, enable analyses at the household level.

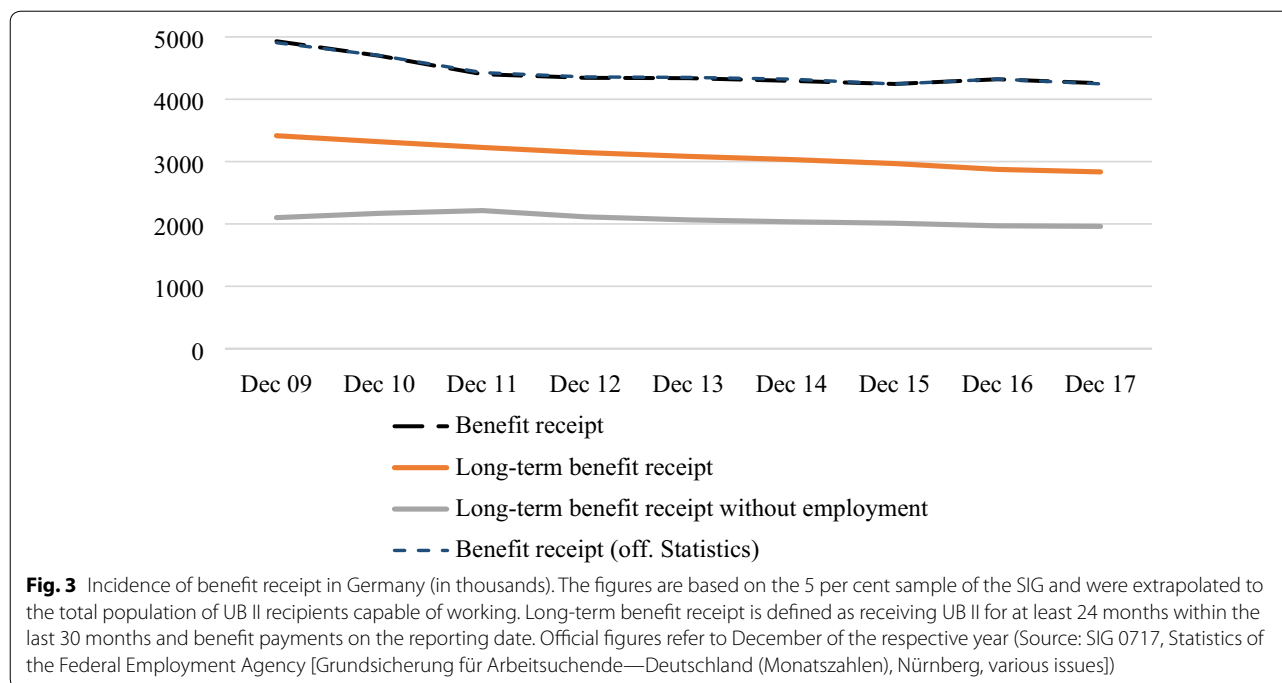
Another feature of the SIG is the possibility of merging detailed financial information on welfare receipt from the UB II Income and Benefit Statistics—Sample of the IAB (LST-S). In addition to basic financial information on the (legally defined) level of needs and sanctions, the data of the LST-S contain detailed information both, on total available income and on its components, such as available income from dependent employment, from self-employment or from child allowance payments. The data also provide detailed

information on UB II claims, e.g. for basic maintenance, expenditures on accommodation, or special needs.

Table 1 displays a selection of key characteristics entailed in the SIG data. Its purpose is to demonstrate both, the comprehensiveness, and the heterogeneity of the included variables. It is important to note that while the majority of characteristics refers to the individual level, financial information is measured at the level of the benefit unit. Moreover, the information stems from different sources which are available for individuals depending on their status according to benefit receipt, unemployment, employment or participation in ALMPs. For example, wages are only available for those that are employed whereas the family type of the benefit unit is only recorded for those that receive UB II. And while most of the information is included for the time period from 2007 through 2017, some variables cover the time leading up to 2007 (e.g. the number of days since the end of the last employment spell prior to 1 January 2007).

4 Descriptive insights

For a brief illustration of the SIG data, we present some descriptive statistics, which reflect different perspectives on the longitudinal development of UB II receipt.



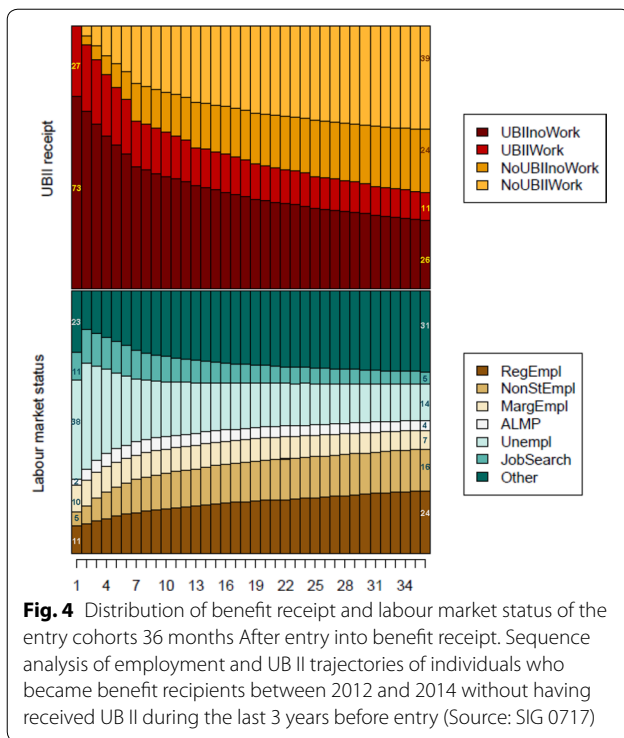
Therefore, we focus on the development of the stock of welfare recipients and individual trajectories of inflows into the welfare system.

Figure 3 shows the development of the stock of working-age UB II recipients capable of working between 2009 and 2017 extrapolated from the SIG and taken from the official statistics (dashed lines). First of all, it should be pointed out that the annual SIG figures are well in line with the official figures of the BA: despite a positive labour market development, the number of recipients has remained at a high level of approximately 4.3 million recipients since 2011, which confirms the continuing importance of UB II. According to the SIG, at the end of December 2017, 4.26 million people lived on UB II. Approximately two-thirds (67 per cent, or approximately 2.8 million individuals) of all recipients in December 2017 had received benefits for at least 24 months within the last 30 months (Fig. 3). The number of these long-term recipients has declined only slightly over recent years. Thus, long-term and structural unemployment, remains—despite the strong upswing during the recent decade—a problem of the German labour market (Weber 2015). The high proportion of long-term recipients has shifted the focus of policy during recent years towards groups who are at high risk of becoming long-term recipients, e.g., older recipients or recipients with work-limiting health conditions.

Since the SIG data include individual employment biographies, various concepts of unemployment or degrees of labour market exclusion can be measured. As one

example, Fig. 3 shows the development of long-term benefit receipt without employment, i.e. benefit recipients who have received benefits for at least 24 months within the last 30 months and who have not been in employment subject to social insurance contributions or in marginal employment (“*Minijob*”) for at least 24 months during the previous 30 months. Almost two million recipients fall into this category. This group obviously faces high risks of social exclusion and is much larger than those who are officially long-term unemployed.

The SIG allows one to expand analyses beyond the level of stocks and address individual trajectories and individual chances to end benefit receipt and engage in possible upward mobility. One perspective is that of looking at holistic trajectories in a sequence analysis framework. In Fig. 4, we report individual trajectories for two different dimensions: The first dimension, “benefit receipt”, distinguishes between months in which the individuals receive UB II benefits and those in which they do not. For both of these categories it is additionally differentiated by whether the individual is employed or not in the given month. This provides a first impression of the importance of employment for receiving or exiting from benefit receipt. The second dimension differentiates between individuals’ different labour market states in a given month. It distinguishes employment according to its intensity and quality from regular dependent employment subject to social insurance contributions to marginal employment. Within dependent employment, we can identify some forms of non-standard or



atypical employment: employment with a fixed-term contract or employment that is temporary agency work are grouped together. For those not in employment the data allow to differentiate between those who are registered as unemployed or as jobseekers or are participating in active labour market programmes. The individuals that are not categorised into one of the aforementioned states are grouped together in the category “other”, which comprises states not observed in the data: self-employment, inactivity due to care and family responsibilities or regular education (school, university).

Figure 4 displays the aggregate state distribution at any point in time (chronograms) of the entry cohorts 2012–2014 for the two dimensions of benefit receipt and labour market status for 36 months after entry into benefit receipt. In both chronograms, one can see substantial heterogeneity among the recipients concerning their labour market activities. In spite of the name UB II, the figures show that not all individuals receiving benefits are unemployed; more than one-fourth of the recipients are employed when entering benefit receipt. For them, benefit receipt supplements insufficient labour income. After 36 months, almost two-thirds have left benefit receipt, forty per cent by taking up their own employment. Twenty-four per cent have left benefit receipt without own employment but due to other income or the employment of a family member (see upper panel in Fig. 4). From this perspective of entry cohorts the share

Table 2 Number of transitions between different labour market states and phases of UB-II-Receipt. Source: SIG 0717

No. of transitions	UB-II receipt	Labour market status
Shares in %		
0	12.4	10.5
1	22.3	15.0
2	18.5	15.9
3	13.4	14.0
4	10.8	11.9
5 or more	22.7	32.8
Mean	3.0	3.7
N	86,318	86,318

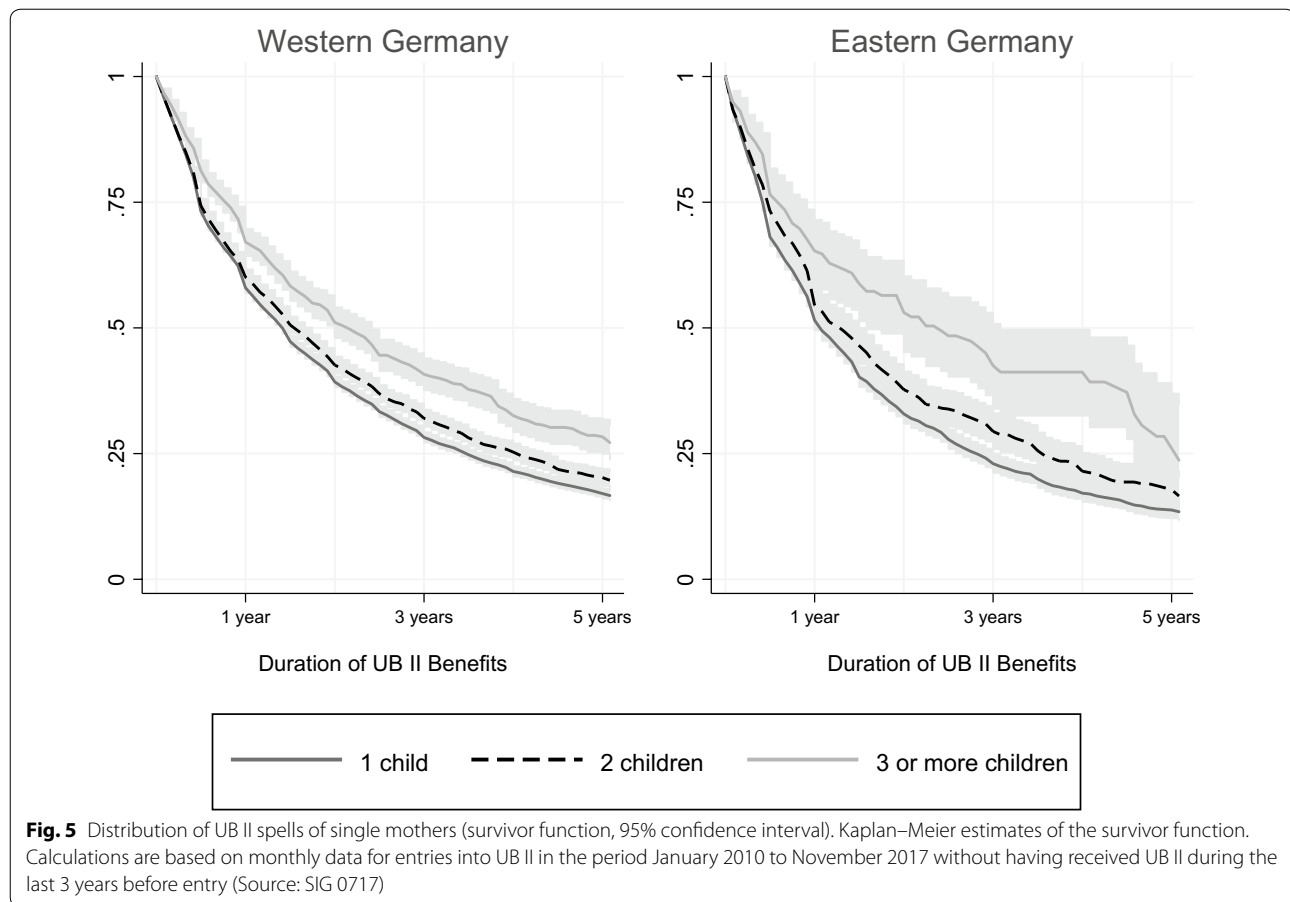
Sequence analysis of employment and UB II trajectories of individuals who became benefit recipients between 2012 and 2014 without having received UB II during the last 3 years before entry

Example: For 18.5 per cent of individuals two transitions between the four states according to benefit receipt and employment can be observed in the first 36 months after entry into benefit receipt. On average, the individuals realise 3.0 transitions in this time-span

of long-term recipients is considerably smaller than in the analysis of stocks in Fig. 3. This is a fact that is well established in the literature and is due to the high probability of long-term recipients to appear in a point-in-time sample (i.e., Dahl and Lorentzen 2003b).

Among those who are employed during the observation window, a substantial number are employed in atypical employment relationships (see lower panel in Fig. 4). After 36 months, seven per cent work in marginal employment, and 16 per cent are in non-standard employment relationships, such as temporary agency or fixed-term jobs. Furthermore, Fig. 4 shows that employment becomes more frequent with the time since entry into benefit receipt, while registered unemployment or job search becomes less important.

In addition to this heterogeneity between individuals, we observe sizeable dynamics within individual trajectories. Table 2 displays the number of transitions that individual benefit recipients realise in the 36 months according to the two dimensions of the trajectories, that is, transitions between the four states according to benefit receipt and the seven states according to labour market status, respectively. Individuals realise on average three transitions in the dimension of benefit receipt and almost four in the dimension of labour market status within 3 years. About 12 per cent do not realise any transition between benefit receipt and non-receipt and therefore remain in benefit receipt for all of the 36 months. On the other end of the distribution, there is a considerable dynamic with almost one third realising four or more



transitions. Within the dimension of labour market status, individual dynamics is even higher: one third realises five or more transitions within the observation period.

From another analytical perspective, these transitions can be used as dependent variables in an event history analysis. In the following, we apply this method for a group, for whom labour market integration and leaving benefit receipt is a major challenge: single mothers. Factors that have a high impact on benefit dependence and benefit duration for this group include the employment history before motherhood, the age of the youngest child and the number of children. Additionally, regional differences in maternal labour market participation as well as the local provision of childcare facilities play a role (Lietzmann 2014; Zabel 2016). The high number of observations in the SIG administrative data compared to the survey data enables differentiated analyses, e.g. regarding the number of children, regional conditions and employment history. Figure 5 shows separate survivor functions for single mothers living in western and eastern Germany (including Berlin) by the number of children below 15 years of age for a sample of inflows into UB II. The figure shows that more than half of all single mothers who

enter UB II receipt have benefit spells of at least 1 year, with mothers from western Germany remaining in the UB II system longer than mothers from eastern Germany. On average, approximately 30 per cent of single mothers in western Germany and 26 per cent of single mothers in eastern Germany are still receiving benefits after 3 years. As expected, the duration of benefit receipt increases with the number of children in both regions. In particular, if three or more children live in the household, the duration of benefits increases significantly.

5 Research opportunities and studies using the SIG

As part of its statutory mandate, the Institute of Employment Research (IAB) conducts research on UB II since 2005. Several empirical studies of UB II in Germany have emerged in recent years at the IAB, which make use of former versions of the SIG and are related to further existing literature. This section provides examples of the strands of research the SIG is particularly suited for.

Duration analyses examine to what extent exit rates from welfare can be explained by the observed and unobserved heterogeneity of the recipients and by a genuine

effect of the duration of benefit receipt. A large part of the international literature investigates the issue of negative duration or state dependence (Bäckman and Bergmark 2011; Barrett 2000; Bhuller et al. 2016; Blank 1989; Carpentier et al. 2017a; Dahl and Lorentzen 2003a; Hohmeyer and Lietzmann 2020; Mood 2013). Using SIG data, Hohmeyer and Lietzmann (2020) construct UB II entry cohorts and observe them over time. They use the detailed information that the SIG contains about time spent on benefits to examine the persistence in welfare receipt and unemployment. The results of different models for leaving unemployment and leaving welfare receipt show that both processes differ considerably with respect to the evolution of exit rates and the influence of household composition and labour market resources. Besides phases of benefit receipt and unemployment, the SIG provides a particular opportunity to examine the labour market participation of recipients in detail and the role of employment for ending benefit receipt. Lietzmann (2014, 2017) makes use of the large sample size of the SIG and focuses on the subgroup of mothers in the UB II system. With the combined information on benefit receipt and labour market participation provided in the SIG, he investigates the determinants of mothers' success in entering the labour market and how the individual employment of mothers contributes to ending benefit receipt. The data also allows to investigate the relevance of different forms of employment for ending benefit receipt. Lietzmann et al. (2017) analyse whether the take-up of marginal employment of UB II recipients increases the subsequent probability of regular employment. By restricting their sample to a homogenous group of recipients searching for full-time employment, they try to identify the causal effect of marginal employment as far as possible by a dynamic evaluation approach. According to their findings, marginal employment does increase the likelihood of regular employment but only for those unemployed UB II recipients who take up marginal employment not at the beginning of their UB II spell.

Furthermore, the large sample sizes and the longitudinal data structure of the SIG offers the option to investigate welfare receipt as a life-course phenomenon. In this context, welfare institutions interact with critical life events, which trigger entry into poverty or benefit receipt, as well as with poverty and benefit trajectories (Vandecasteele 2011). In addition to social life course risk, e.g. divorce and changes in family structures, combined administrative data allow us to address labour market risks such as repeated unemployment, unstable employment and low-wage work. With methods of sequence analysis a few studies have analysed the trajectories of benefit recipients. For example, Ilmakunnas and Moisis (2019) investigate the different paths of benefit

dependence of young adults in Finland, and Hümbelin and Fritschi (2018) analyse the employment-benefit trajectories of welfare recipients in Switzerland. In both studies, a large share of recipients successfully integrate into the labour market over time (Hümbelin and Fritschi 2018) or receive benefits only temporarily (Ilmakunnas and Moisis 2019). However, both studies identify groups that are prone to become long-term dependent on benefits, e.g. low-educated persons and recipients with a low social background in terms of their pre-benefit income or the status of their parents. Using SIG data, Bruckmeier et al. (2020) provide a differentiated picture of employment and benefit trajectories by methods of sequence and cluster analysis. They find a polarisation between long-term recipients and those with an early exit from benefit receipt via full-time employment. Between these two poles, various other paths through the benefit system exist.

6 Data access

The weakly anonymous SIG data may only be analysed via on-site use and subsequent remote data access. For this purpose, the Research Data Centre (FDZ) at the Institute for Employment Research (IAB) provides separate workplaces for guest researchers at different locations in Germany, France, the UK, Canada and the US.⁷ Subsequent remote data access is conducted via the Job Submission Application "JoSuA". Data users can upload their scripts in the JoSuA, and they obtain access to their approved results after verification of compliance with data protection legislation. Artificial test data are available on the FDZ website to develop the scripts before the initial on-site access. Additionally, the data are provided with rich documentation material, including the FDZ data report 02/2020 (Dummert et al. 2020) and frequency summaries of the data.

To get data access, researchers have to apply at the FDZ.⁸ The data application must describe the research project, explain its relation to scientific labour market research and demonstrate the necessity of the data for achieving the research objective. The FDZ decides on the approval of the research project on behalf of and, if necessary, in coordination with the Federal Ministry of Labour and Social Affairs (Bundesministerium für Arbeit und Soziales). The financial information entailed in the LST-S module will only be made available upon a detailed and well-reasoned request. The use of this module must be essential for achieving the research goal. In general, data

⁷ https://fdz.iab.de/en/FDZ_Data_Access/FDZ_On-Site_Use/Standorte.aspx.

⁸ https://fdz.iab.de/en/FDZ_Data_Access/FDZ_On-Site_Use.aspx.

access can only be granted for non-commercial empirical research in the fields of social security and employment. When an application has been approved, a data use agreement is concluded with the researcher's scientific institution.

If the data is used in the UK, the US or Canada, an additional anonymisation of the data is required, due to data protection regulations. This anonymisation takes place in consultation between the FDZ staff and the data user.

Abbreviations

BA: Federal Employment Agency; BeH: Employee history; FDZ: Research Data Centre; IAB: Institute for Employment Research; IEB: Integrated employment biographies; JoSuA: Job Submission Application; LHG: Leistungshistorik Grundsicherung; LST-S: UB II Income and Benefit Statistics—Sample of the IAB; SGB II: Second Book of the German Code of Social Law; SIG: Integrated Welfare Benefit Biographies; UB I: Unemployment benefit I; UB II: Unemployment benefit II; UK: United Kingdom.

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Authors' contributions

All authors have contributed to the scientific work and therefore share collective responsibility and accountability for the results. All authors read and approved the final manuscript.

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Availability of data and materials

The dataset presented in this paper are not publicly available due to security regulations for social data. The data are, however, available to researchers from the Research Data Centre (FDZ) of the Federal Employment Agency (BA) at the Institute for Employment Research (IAB) upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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