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A new targeting - a new take-up?

Non-take-up of social assistance in Germany after social policy reforms

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Abstract

We present first estimates of rates of non-take-up for social assistance in Germany after the implementation of major social policy reforms in 2005. The analysis is based on a microsimulation model, which includes a detailed description of the German social assistance programme. Our findings suggest a moderate decrease in non-take-up compared to estimates before the reform. In order to identify the determinants of claiming social assistance, we estimate a model of take-up behaviour which considers potential endogeneity of the benefit level. The estimations reveal that the degree of needs, measured as the social assistance benefit level a household is eligible for, and the expected duration of eligibility are the key determinants of the take-up decision, while costs of claiming seem to play a minor role.

Zusammenfassung

Diese Studie liefert erste Schätzungen für Quoten der Nicht-Inanspruchnahme für Leistungen der Grundsicherung nach SGB II und SGB XII. Die Analyse basiert auf einem Mikrosimulationsmodell, welches eine detaillierte Abbildung der deutschen Sozialgesetzgebung erlaubt. Unsere Ergebnisse deuten darauf hin, dass sich die Nicht-Inanspruchnahme im Vergleich zur Situation vor der Hartz-IV-Reform verringert hat. Um die Determinanten der Inanspruchnahme zu bestimmen, schätzen wir ein Modell des Inanspruchnahmeverhaltens. Die Schätzungen zeigen, dass die Höhe des Anspruchs sowie die erwartete Bezugsdauer die entscheidenden Einflussfaktoren darstellen, während die Kosten der Inanspruchnahme eine untergeordnete Rolle spielen.

JEL classification: I38, H31, C15

Keywords: Non-Take-Up; Social Assistance; Microsimulation

1 Introduction

Arguably the most important goal of means-tested social benefits is to ensure a minimum standard of living for every member of society. However, all studies on means-tested social benefits have noted that take-up of benefits by those eligible is considerably lower than 100%. Non-take-up can be seen as a failure of the welfare state to provide the needy population with the minimum necessary resources. Take-up behaviour may also have fiscal implications. If the take-up rate is positively related to the level of entitlements, an increase in the general benefit level will also increase the take-up rate and consequently the fiscal costs of the benefit hike. At first glance, non-take-up of social benefits seems to be at odds with standard economic theory of rational, utility-maximising individuals. Possible explanations put forward are the idea of stigma or disutility associated with claiming the benefit (Moffitt, 1983). Additionally, non-take-up may simply reflect a lack of awareness about the availability of the programme or a potential claimer's expectation that the cost of applying for the benefit would exceed the benefit available.

In 2005 major social policy reforms were implemented in Germany. The reform of the social assistance system was preceded by intense public debate and increased the public awareness about entitlements. Besides lower information costs, other aspects of the reform, like new administrative arrangements and more generous entitlement rules, might also have increased the take-up of social assistance (SA) after the reform. All available studies on non-take-up in Germany are based on data collected before 2005. They show high rates of non-take-up (RNTs), ranging from 43% (Wilde/Kubis, 2005) to 67% (Frick/Groh-Samberg, 2007).[1]

Our paper contributes to the existing literature by providing first estimates of non-take-up under the new social policy regime. First, we present results on RNTs based on panel data for the years 2005 to 2007. The availability of three years of data allows us to analyse a possible trend in the take-up rate since introduction of the new policy. Second, we estimate a model of take-up behaviour in order to identify the determinants of social benefit take-up after the reform. The model takes into account the potential endogeneity of the level of social assistance benefits. Our results indicate a decrease in the RNT compared to previous studies, especially for the years 2006 and 2007. The decline proves to be robust to different simulation approaches. Additionally, our model of take-up behaviour highlights the role of the degree of needs for the take-up decision, measured as the benefit level households are entitled to and other proxy variables.

The structure of the paper is as follows: In section 2 we first report pre-reform results on take-up behaviour for Germany, which provide a point of reference for our post-reform analysis. Then we give a short overview of the social policy reform enacted in 2005, highlighting important changes to the former policy. Section 3 explains the data and microsimulation model and presents results on RNTs. In Section 4, we augment our

[1] See Frick/Groh-Samberg (2007) for an overview of empirical results on RNTs in Germany for the period 1963 to 2003. For a review of the international literature on take-up behaviour, see van Oorschot (1991).

analysis by estimating a model of take-up behaviour which accounts for the potential endogeneity of benefits in the take-up decision. The estimation allows us to investigate determinants of claiming social benefits. Conclusions are set out in Section 5.

2 Social assistance in Germany

2.1 Non-take-up of social assistance before 2005

A number of studies provide empirical evidence on the magnitude and determinants of non-take-up of SA in Germany (Riphahn, 2001; Kayser/Frick, 2001; Becker/Hauser, 2005; Wilde/Kubis, 2005; Frick/Groh-Samberg, 2007). The results on non-take-up and claiming behaviour these studies reveal refer to the former SA system, which included benefits for employable persons as well as for older or unemployable people and they are based on survey data collected before 2005.[2] Table 1 summarises the results of the latest studies on non-take-up.

Table 1: Latest studies on non-take-up in Germany

	Riphahn (2001)	Kayser and Frick (2001)	Becker and Hauser (2005)	Wilde and Kubis (2005)	Frick and Groh-Samberg (2007)
RNT	0.63	0.63	0.46-0.60	0.43	0.67
Period	1993	1996	1998/1999	1999	2002
Data	EVS	GSOEP	EVS/NIEP/ GSOEP	NIEP	GSOEP

Note: RNTs are defined by the ratio of eligible households that do not take up their benefits and the total number of eligible households.

All studies make use of representative data sets to calculate the RNT and employ regression analyses to explain the take-up of SA. Although the comparability of these studies is limited due to different data sets and simulation approaches, two main findings can be summarised: First, the share of eligible households which did not take up their entitlements was persistently high in the past, ranging from 43% in 1993 to 67% in 2002. Second, the results obtained by regression analyses show that the expected utility of the entitlements as well as information costs and stigmatisation play a significant role in explaining take-up behaviour.

[2] The data sets used are the German Socio-Economic Panel (GSOEP), the German Income and Expenditure Survey (EVS) and the German Low Income Panel (NIEP).

2.2 General features and social policy reform

2.2.1 The reform process

From 2002 until 2005 the German means-tested benefit system was reorganised through a package of social and labour market reforms.[3] Until 2005 the long-term unemployed were eligible to means-tested SA or unemployment assistance (UA). The eligibility for UA depended on a worker's employment history.[4] The benefit level was a function of previous earnings net of taxes and mandatory contributions to social insurance. Although tax financed, the former UA was regarded as an insurance system. The former SA, on the other hand, was the basic safety net and provided a guaranteed income for all households in need, independent of their employability.

With the implementation of the so-called *Hartz IV reform* in 2005 a new SA legislation came into force in Germany. The former systems of UA and SA were combined to form the new means-tested SA for the long-term unemployed, contained in Book II of the Social Code (SGB II). The Hartz IV reform is based on a consensus that the former SA generated low incentives for long-term unemployed to take up low-paid work.[5] Another purpose of Hartz IV was to make all long-term unemployed individuals subject to the same programme and the same measures of active labour market policies.[6]

The SGB II is targeted at employable persons younger than 65. For persons aged 65 and older and for unemployable persons a separate means-tested SA programme exists, which is codified in Book XII of the Social Code (SGB XII). Since 2005 SGB II and SGB XII form the new SA system. With more than 7 million recipients in 2005, SGB II is by far the most important benefit system.[7] SGB II and SGB XII benefits include benefits for living and housing costs. Other means-tested benefits in Germany, which play a minor role, are housing benefits and the enhanced child benefit. They are prioritised[8] over SA and cannot be claimed simultaneously with SA.[9]

[3] Figure 1 in Appendix A gives an overview of the evolution of the most important means-tested programmes during this period.

[4] Workers were eligible to UA, if they were a) unemployed and looking for a job, b) not eligible to unemployment benefits (UB) and c) had claimed UB for at least one day during the year before they filed for UA. Eligibility to UB, on the other hand, required a) being unemployed and looking for a job and b) having been employed subject to social security contributions for at least 360 days during a period of three years before filing for unemployment benefits.

[5] The Hartz IV reform is the last part of a series of labour market reforms subsequently implemented during 2003-2005. Jacobi/Kluve (2007) give a good overview of the aims and core elements of the Hartz reforms.

[6] Although SGB II grants income support for the long-term unemployed, the receipt of benefits does not depend on labour market status. It also provides a basic safety net for families with working members, whose combined income is too low to meet the legally defined household's needs.

[7] Only about 0.7 million. people received SGB XII in 2005.

[8] Housing benefits and enhanced child benefits are prioritised over SA in the sense that a household is legally obligated to claim them instead of SA, if the (combined) level of prioritised entitlements increases the household's income to at least the minimum level guaranteed by SA.

[9] We provide more information on the reform process and the reorganisation of the means-tested benefit system in Germany in Appendix A. Furthermore, Table 5 in Appendix A presents the numbers of individuals receiving SGB II and SGB XII during the years 2005 to 2008.

2.2.2 The old and the new SA system compared

In 2005 former employable recipients of SA and of UA were transferred to the SGB II. For former recipients of SA (2004) the means test in the new SGB II system is much more generous with respect to the allowable maximum wealth and earnings disregards. Table 6 in Appendix A shows the key features of the old UA and SA of the year 2004 as well as of the SA for employable (SGB II) and older or unemployable individuals (SGB XII) introduced in 2005, including a comparison of the rules that determine the maximum wealth and the earnings disregards between the systems. One aim of the old SA system as well as of SGB II is to supplement families' income up to the guaranteed income. Under the old SA system, the level of the standard benefit of SA intended to cover basic needs of living was established at the level of the 16 German states and amounted to 295 EUR per month on average in 2004. Under the new SGB II system a national standard benefit of 345 EUR was introduced.[10] Recipients of SA who were not employable were transferred to SGB XII in 2005. The means tests of SGB XII and SA of 2004 are almost identical. The maximum allowable wealth of a household increased only slightly compared to the former system. Also, earnings disregards are only slightly more generous in SGB XII compared to former SA. Therefore, unemployable recipients of old SA did not experience a significant change in entitlements. In summary, it can be stated that the means test of the former SA was stricter than in the SGB II and it was similar to the means test in SGB XII.

Former recipients of UA were reassigned to SGB II in 2005. For this subgroup, the calculation of the entitlement level has changed substantially. The level of UA benefits depended on previous earnings because UA aimed at preserving the unemployed's living standard. The replacement rate was 53%, and 57% for the unemployed with children. Standard benefits are defined identically for SGB II and SGB XII as the families' housing and living costs. The reform effects on the entitlement level of former recipients of UA is unclear. Usually UA benefits were higher than the guaranteed income. Nevertheless, unemployed persons with very low previous earnings could receive UA below the minimum income. Consequently, it was possible for former recipients of UA to claim UA and SA benefits simultaneously. Additionally, the earnings disregards in SGB II are more strict while the rules that define the maximum allowable wealth remained constant. Simulation studies (Schulte, 2004; Blos/Rudolph, 2005; Becker/Hauser, 2006) on the effects of the Hartz IV reform on the income of former recipients of UA showed that more than 60% of them faced income losses or even lost their entitlements, while the benefit level of former SA recipients was not affected. Hence, it was expected that former recipients of UA would suffer from income losses through the Hartz IV reform. On the other hand, almost 40% of the recipients of UA would have potential income gains through the implementation of the new eligibility conditions. This means that the income of these recipients was below the minimum income and they did not take

[10] The two benefit levels cannot be directly compared, since the old SA system allowed for "one-time benefits" used to cover atypical needs of a household. These payments were abolished under the SGB II. Instead, the average amount of the one-time benefits was included as a lump sum payment in the new standard benefit. Thus, if one-time benefits are taken into account, the standard benefit effectively did not change under the new SA.

up their additional SA entitlements in 2004. Hence, the results revealed a significant non-take-up of additional SA entitlements among former recipients of UA. Between 2005 and 2007 only minor changes in the rules determining eligibility in SGB II and SGB XII occurred, see Appendix A.

2.2.3 Expected reform effects on the rate of non-take-up

Against the background of the far-reaching SA reforms described above and high RNTs during the years prior to the reforms, several arguments point to a decline in the RNT of SA (SGB II and SGB XII) after 2004.

First, the implementation of the reform was preceded by an intense public debate about claiming conditions and means-testing as well as information campaigns by the public labour agencies and other institutions like unions. This should have increased the awareness about the programme and eligibility and thus take-up of SA. Second, the reforms should have reduced stigmatisation of SA recipients, since the structure of the population eligible for SA changed substantially. Prior to the reform, a typical person eligible to SA either never participated in the labour market or was only marginally employed in the past. Hence, the old SA was widely regarded as a basic safety net for a fringe group of society and dependency on SA was perceived as stigmatising (Becker/Hauser, 2005: p. 175ff). Since 2005, all workers whose UB entitlements are exhausted can become dependent on SA, even if they look back on a work history of many years of full-time employment. This may have led to a shift in the public attitude towards SA after the reform, i.e. the perception that anyone can become dependent on SA should have reduced stigmatisation and therefore increased the take-up of SA. Third, take-up of former UA recipients with an additional SA entitlement may have increased. On the one hand, as argued above, claiming SA was stigmatised in the old system, while UA was regarded as an unemployment insurance system and consequently had relatively low stigma costs. Accordingly, former UA recipients had a strong incentive to make ends meet with only claiming UA, despite the fact that household income was below the guaranteed level of SA. On the other hand, since UA was abolished with the 2005 reform, a previous UA recipient who does not claim SA under the new system would typically suffer a substantial decrease in disposable income. Finally, under the old administrative arrangements, some households had to apply for three benefits simultaneously (UA, housing benefits and SA) in three different (non-cooperating) benefit agencies to reach the guaranteed income level. After 2005, the process of applying for benefits was simplified significantly, since most households only had to apply for one type of benefit (typically SA), which should increase take-up of SA.[11]

[11] If a household applies for SA under the new system, a standard administrative check is performed, whether the household is eligible to prioritised benefits (housing benefits and enhanced child benefit). If this is the case and the prioritised benefit entitlements exceed the SA benefit, the household is referred to the prioritised benefit agencies.

Nonetheless, the effects of the reform on the RNT are not as clear-cut as the discussion above suggests, since there are also arguments for an adverse reform effect on the RNT. For example, given the complex and far-reaching nature of the reforms, it seems plausible that – at least initially – there was a high level of uncertainty about the new eligibility conditions and claiming procedures, which might have increased the RNT. Furthermore, previous UA recipients who are now eligible to SGB II benefits arguably have a stronger attachment to the labour market and possibly also a higher aversion to claim SA than persons eligible to SA under the old system. Thus, the overall reform effect on the RNT is theoretically ambiguous and has to be determined empirically.

3 Non-take-up 2005-2007

3.1 Measuring non-take-up

In order to determine the non-take-up of eligible households we first have to simulate eligibility. For this purpose we employ the IAB-STSM microsimulation model. The model allows us to simulate household-specific net incomes, including tax burdens and transfers given information on household characteristics, gross labour income, pensions, rental and capital income taken from the data. The model includes eligibility tests for the most important means-tested benefits in Germany, i.e. housing benefits, enhanced child benefits and SA for employable and non-employable persons.[12] In contrast to our approach, most empirical studies on non-take-up do not simulate net income using a microsimulation model of the whole tax and transfer system. Instead, these studies simply take reported net income from the data and deduct the reported SA payments to obtain net income excluding SA transfers (see e.g. Riphahn, 2001; Wilde/Kubis, 2005; Frick/Groh-Samberg, 2007). An important advantage of using a microsimulation model is that we can simulate transfers prioritised over means-tested SA, i.e. housing benefits and enhanced child benefits. This makes our simulation of non-take-up of SA more precise because some non-take-up households may be eligible for these prioritised transfers.[13] In order to conform to previous studies and to make our findings comparable to results obtained before 2005 we will focus on both programmes – SA for the long-term unemployed (SGB II) and for older or unemployable people (SGB XII). Eligibility to SA is given if the household's total needs exceed the allowable income and the household's wealth remains below the household-specific maximum.

The IAB-STSM is based on the German Socio-Economic Panel data set (GSOEP). GSOEP is a representative panel data set of private households in Germany.[14] One advantage of the GSOEP for this study is that it contains detailed information on households' income and wealth. Households report their monthly net income at the

[12] For an overview of the basic features of the microsimulation model and a description of the eligibility simulation within the model, see Appendix B and Steiner et al. (2008).

[13] Figure 2 in Appendix B describes the algorithm for determining eligibility for the relevant transfers (housing benefits, enhanced child benefits and SA for employable and non-employable persons) in the IAB-STSM.

[14] A documentation of the GSOEP can be found in Haisken-DeNew/Frick (2005).

time of the interview as well as retrospective information on the incomes received during the last year. The GSOEP contains information for the incomes received in every month of the last year. Similarly, receipt of SA is reported for the month of the interview and for every month of the year before the interview. This allows us to determine non-take-up of SA over two different periods (monthly and annual non-take-up). Non-take-up based on monthly incomes describes households which are eligible in the month of the interview and do not claim their entitlement in this month. This measure neglects the duration of non-take-up, but encompasses short periods of non-take-up as well as households which suffer from long-lasting periods of poverty and do not claim their entitlements. Furthermore, households could be considered eligible based on their annual average income.[15] We refer to these two measures as *temporary* non-take-up, if based on monthly data and *persistent* non-take-up, if based on a household's annual income.

In our analysis, a household has to pass two thresholds to be regarded as a persistent non-take-up household. First, our microsimulation model has to classify the household as eligible for SA. We choose annual average retrospective incomes to calculate eligibility. Conditional on being eligible, a household is classified as a persistent take-up household, if it claims SA for more than six months, otherwise it is a non-take-up household. This definition of persistent non-take-up follows international standards of assessing the working poor where the most frequent activity status during one year and annual income are used, see e.g. Peña-Casas/Latta (2004).[16]

From a social policy perspective, temporary non-take-up may be seen as a less severe problem than non-take-up over a longer time period, especially if temporary non-take-up households move between different income states, e.g. because they find a new job and suffer from non-take-up for only a short period of time. Nevertheless, non-take-up of SA over shorter periods than a year is also relevant to social policy. Studies on poverty dynamics in Germany show that poverty persistence in Germany is relatively low within the OECD-17 (Valletta, 2006; Oxley/Dang/Antolín, 2000). The analysis of Biewen (2006) suggests that about one third of cross-section poverty in Germany is chronic. For these reasons, and also to assess the sensitivity of our results to our specification of non-take-up, we report results on RNTs for both measures.

3.2 Simulating eligibility

Our analysis is based on annual data for the years 2005 to 2007 collected in the three survey years 2006 to 2008. In 2006 (2007, 2008), the GSOEP contained information on 11,440 (12,499, 11,689) households. Certain limitations apply to the data set, such as missing information on income variables, housing costs or receipt of SA. A description of the selection mechanism is given in Appendix B. We end up with a simulation sample of 8,685 (8,981, 8,408) households for the year 2005 (2006, 2007).

[15] Eligibility in this sense only implies that households are eligible on average over the year. Thus, it does not necessarily imply that a household is eligible in each month of the year.

[16] Appendix C examines the sensitivity of non-take-up to the specification of the claiming threshold.

The information on the household structure available in the GSOEP only allows us to measure the income and needs of the household, whereas SGB II as well as SGB XII refer to the *household community*. The household community is defined by the core family of the head of the household, her spouse and children under 25 years of age. Since the core family is typically identical with the household we do not expect that this assumption has a strong effect on our results.

SA in our analysis includes SA for the long-term unemployed (SGB II) and for older or unemployable people (SGB XII). Since the eligibility requirements of SGB II and SGB XII are similar, the following description refers to both programmes.

Total needs are determined by the legally defined regular needs of the members of the household, additional needs and housing costs. We use the national standardised regular benefits for the head of the household, her partner and children to calculate regular needs of the household. Furthermore, we consider national standardised benefits for additional needs of single parents and disabled people. For single parents, the additional benefits are calculated as a function of the number and age of the children. The data also contains information on the degree of disability for the head of the household. We use this information to calculate disability benefits for those with a degree of disability of more than 30%. Other additional benefits are provided, if the recipient is pregnant or in need of special nutrition for health reasons. We have no information in the GSOEP to consider these two additional benefits. However, the take-up of these additional benefits is very low and we believe that disregarding them will not alter our results distinctly.[17] For tenants, housing costs are the monthly rent and the heating costs of the household. Both are reported in the GSOEP and can be taken from the data. Housing costs for home-owners consist of interest payments for home ownership and ancillary costs as reported by the head of the household.

Household income consists of all individual incomes of the household members, including earned income, self-employed income, capital income, rental income and pensions. From these incomes, social security contributions and income taxes are deducted. We also calculate benefits prioritised over SA, in particular unemployment benefits, child benefits, as well as housing and children's allowance. The calculation of the SA entitlement accounts for income exemptions according to the legal definition.[18]

Previous studies have shown that considering wealth can have a strong impact on RNT simulations (Whelan, 2010; Frick/Groh-Samberg, 2007; Becker/Hauser, 2005). Unfortunately, detailed wealth data in the GSOEP have only been collected for the survey years 2002 and 2007. The missing information for the years 2005 and 2006 is replaced by linear interpolations using the data from the years 2002 and 2007. We calculate households' total wealth as the sum of the individual assets and compare it to the household-specific allowable maximum wealth. This wealth exemption refers to the financial wealth only and is clearly defined by SGB II and SGB XII (see Table 6

[17] In 2007 about 2.3% of all SA-recipients received additional benefits for a special nutrition and about 0.9% for pregnancy (Bundesagentur für Arbeit, 2008).
[18] See Appendix A for a discussion of the exemption rules.

in Appendix A). In our analysis we neglect special exemptions for old-age-provision, because the available information on the household's assets does not allow us to distinguish clearly between assets serving only old-age provision and other assets. If the household's assets exceed the household-specific maximum wealth, the household is not eligible for SA. Since we include all financial assets reported in the sample but disregard exemptions for old-age-provision, our wealth check is too restrictive. For this reason we also provide results on non-take-up without considering a wealth check.

3.3 Empirical evidence on non-take-up after 2004

The above description of the eligibility simulation shows that identifying SA eligibility as well as non-take-up requires many assumptions. Available studies on non-take-up differ not only in the data set used: since there is no "correct" set of assumption, previous studies also differ in the particular choice of assumptions made for determining eligibility and take-up. Results on non-take-up from different studies are therefore only broadly comparable. Additionally, most of the previous studies focus on non-take-up in one particular year only. This and the lack of comparability between different studies makes it difficult to determine time trends on non-take-up.

In contrast, our analysis reveals results on the development of non-take-up over a period of three years, since we calculate take-up by homogenous procedures for the GSOEP data sets of every year. Since the SGB II and SGB XII rules that determine eligibility hardly changed between 2005 and 2007, the results are not biased by applying different simulation procedures every year. The resulting RNTs for our two alternative measures of non-take-up for the period between 2005 and 2007 are shown in Table 2. The RNT is defined by the ratio of all eligible households that do not take up their benefits to the total number of eligible households.

Table 2: Rates of persistent and temporary non-take-up of social assistance 2005-2007

Year	**2005**	**2006**	**2007**
Non-take-up rate (persistent)	48.85	41.73	41.31
C. I.	[44.40 - 53.29]	[37.67 - 45.77]	[37.72 - 45.37]
Non-take-up rate (temporary)	58.41	47.91	45.80
C. I.	[53.87 - 62.95]	[43.35 - 52.47]	[41.65 - 49.95]

Note: Non-take-up rates in per cent. C. I.: Bootstrapped 95%-confidence intervals.
Source: GSOEP years 2005-2007, IAB-STSM.

Our results based on annual (monthly) incomes indicate that about 49% (58%) of eligible households did not claim their entitlements in 2005. The RNT declines to 42% (48%) in 2006 and 41% (46%) in 2007. Thus, the drop in the RNT in 2006 is robust to our choice of take-up measure.[19] Also, regardless of whether we use our temporary or

[19] We checked whether the drop in the take-up rate could simply reflect a change in the structure of the underlying population of eligible households between 2005 and 2006. Table 14 in Appendix D

permanent concept of non-take-up, the results of both measures are low compared to previous studies, even for the year 2005. The latest pre-reform study on non-take-up of SA reported a RNT of 67% for the year 2003 (Frick/Groh-Samberg, 2007).

Table 2 also shows that the temporary RNTs are approximately 10 percentage points higher than the respective persistent RNTs. Intuitively, the temporary measure of non-take-up captures more households which are only eligible for a short period of time than the permanent measure. These households will typically have better (earned) income expectations and hence a higher RNT than households which suffer from long-lasting periods of income below the guaranteed level.

Since the literature on take-up behaviour shows that RNTs can vary substantially when alternative assumptions about assets are made (Frick/Groh-Samberg, 2007; Whelan, 2010), we checked the sensitivity of our results to important assumptions of our eligibility simulation and the selection of our model sample. The results of the sensitivity analysis are provided in Appendix C. They reveal that our main results, a low RNT relative to previous studies and a drop after 2005, are robust to various alternative assumptions.

Summing up, the simulations suggest that RNTs have declined after 2004 as a result of the reform. Furthermore, the drop of the RNT from 2005 to 2006 cannot be explained by changes in the composition of the eligible population. Given a constant composition of the eligible households, this drop may be explained by a change in the take-up behaviour between 2005 and 2006. We return to this point in the next section in which we estimate an empirical model of take-up behaviour.

4 Regression analysis of non-take-up of social assistance

4.1 A model of take-up

The previous section shows that RNTs of SA have declined but are still substantially high since the introduction of Hartz IV. In this section we extend the analysis of non-take-up to a multivariate framework in order to test hypotheses on claiming behaviour. In general, the decision by an eligible household not to take up a benefit can be interpreted as an indication that the costs of claiming outweigh the utility from the additional income for that particular household. Discussion of the costs of claiming SA often hinges on factors which are unobservable and in most cases only loosely defined. For example, the lack of knowledge of the benefits available, insufficient knowledge about the claiming process, fear of stigmatisation or shame associated with claiming a benefit, or attitudes towards dependency on society are put forward as potential cost factors (van Oorschot, 1991). Thus, in order to be able to model take-up, an analysis

shows that the structure of the households eligible to SA (SGB II and SGB XII) – measured by the means of possible determinants of take-up – does not vary substantially across the years. Thus, we find no evidence for changes in the composition of the eligible population that might explain a lower non-take-up rate in 2006.

of the (observable) factors likely to affect both the costs and the benefits involved in the decision of taking up SA is required.

In line with Moffitt (1983), recent studies on non-take-up typically model the claiming behaviour in a discrete choice framework (see e.g. Blundell/Fry/Walker, 1988; Riphahn, 2001; Wilde/Kubis, 2005; Frick/Groh-Samberg, 2007; Whelan, 2010). In this framework, take-up ($P = 1$) will be observed if the net level of utility from claiming the benefit exceeds the utility from not claiming the benefit, i.e.

$$P = \mathbf{I}\left(U\left(y + b\left(y, \mathbf{x}^*\right), \mathbf{x}\right) - C\left(\mathbf{x}\right) > U\left(y, \mathbf{x}\right)\right), \tag{1}$$

where $\mathbf{I}(\cdot)$ designates the indicator function. $U(\cdot)$ denotes utility, y is net income (excluding the benefit), $b \equiv b\left(y, \mathbf{x}^*\right) = \overline{b}\left(\mathbf{x}^*\right) - t_y - y$ is the benefit entitlement depending on household characteristics $\mathbf{x}^*$, the maximum level of benefits $\overline{b}\left(\mathbf{x}^*\right)$ and household transfers prioritised over means-tested SA, t_y. The disutility from claiming, $C\left(\mathbf{x}\right)$, depends on net income and the characteristics $\mathbf{x}$ determining take-up. In addition to the observed characteristics, there are likely to be unobserved characteristics affecting take-up. Assuming linear forms for $U(\cdot)$ and $C\left(\mathbf{x}\right)$, we have

$$\begin{aligned} U\left(y + b\left(y, \mathbf{x}^*\right), \mathbf{x}\right) &= \alpha_0 + \alpha_1\left(y + b\right) + \boldsymbol{\alpha}_2'\mathbf{x} + \varepsilon_T \equiv U_T, \\ U\left(y, \mathbf{x}\right) &= \alpha_0 + \alpha_1 y + \boldsymbol{\alpha}_2'\mathbf{x} + \varepsilon_0 \equiv U_0, \\ -C\left(\mathbf{x}\right) &= \beta_0 + \boldsymbol{\beta}_2'\mathbf{x} + \epsilon, \end{aligned} \tag{2}$$

where ε_T, ε_0, ϵ denote the household-specific unobservables and $\boldsymbol{\alpha} = (\alpha_0, \alpha_1, \boldsymbol{\alpha}_2)$, $\boldsymbol{\beta} = (\beta_0, \boldsymbol{\beta}_2)$ are coefficient vectors. From (1), it follows that

$$P = \mathbf{I}\left(\beta_0 + \alpha_1 b + \boldsymbol{\beta}_2'\mathbf{x} + \upsilon > 0\right), \tag{3}$$

with $\upsilon \equiv \varepsilon_T - \varepsilon_0 + \epsilon$. Thus, the probability of observing take-up is given by

$$\begin{aligned} \Pr\left(P = 1\right) &= \Pr\left(\upsilon > -\left(\beta_0 + \alpha_1 b + \boldsymbol{\beta}_2'\mathbf{x}\right)\right) \\ &= 1 - F\left(-\left(\beta_0 + \alpha_1 b + \boldsymbol{\beta}_2'\mathbf{x}\right)\right), \end{aligned} \tag{4}$$

with $F(\cdot)$ the cumulative distribution function of υ.

Up to this point, the model assumes the benefit entitlement b to be exogenous. This assumption is likely to be violated, since unobserved factors which influence the take-up decision are possibly correlated with earned income y and thus benefits $b\left(y, \mathbf{x}^*\right)$. For example, unobserved motivation to work or attitudes towards SA likely have an influence on programme take-up as well as earned income and therefore on the level of the benefit. This suggests an instrumental variable estimator to account for the potential endogeneity of b. Rewriting (3) and assuming the error terms to be distributed as jointly normal with correlation ρ between the error terms, the model can be expressed as

$$P = \mathbf{I}\left(\beta_0 + \alpha_1 b + \boldsymbol{\beta}_2'\mathbf{x} + \upsilon_1 > 0\right),$$

$$
\begin{aligned}
b &= \gamma_0 + \boldsymbol{\gamma}_1'\mathbf{x} + \boldsymbol{\gamma}_2'\mathbf{z} + \upsilon_2, \\
(\upsilon_1, \upsilon_2) &\sim N(\mathbf{0}, \boldsymbol{\Sigma}), \ \boldsymbol{\Sigma} = \begin{pmatrix} 1 & \rho \\ \rho & \sigma^2 \end{pmatrix},
\end{aligned} \tag{5}
$$

where we model the benefit as a linear function of $\mathbf{x}$ and additional instruments $\mathbf{z}$. We estimate model (5) using the maximum likelihood approach.[20] While most studies on take-up behaviour build on a similar theoretical setup, the potential endogeneity of b is seldom accounted for. Exceptions are Wilde/Kubis (2005), who estimate the take-up and the labour supply equation simultaneously, and Whelan (2010), who also uses the instrumental variable approach given in model (5).

4.2 Proxies for utility and costs of claiming social assistance

In order to estimate model (5), we first have to identify suitable proxies for the utility from and costs of claiming SA. The literature on take-up behaviour suggests that the utility from claiming SA depends positively on the amount of the SA entitlement of the household (see e.g. Moffitt, 1983; Blundell/Fry/Walker, 1988). In a dynamic perspective, utility from claiming SA also depends positively on the perceived duration of benefit receipt. One example is Anderson/Meyer (1997), where households claim UB if benefits exceed costs throughout the expected duration of unemployment. Costs, on the other hand, can be disaggregated into information costs (insufficient knowledge or false interpretation of entitlement rules, insufficient knowledge of the claiming process or of administrative procedures, difficulties in filling in forms or gathering the necessary information) and stigma costs (fear of stigmatisation, negative attitudes towards dependency on society), see van Oorschot (1991). Table 3 shows the proxies on utility and costs of claiming, where we build on existing literature in choosing the variables (see Riphahn, 2001; Becker/Hauser, 2005; Wilde/Kubis, 2005; Frick/Groh-Samberg, 2007).

We use the SA benefit available to the household as the most obvious proxy for utility from claiming SA. The available benefit is defined as the amount of SA the household is eligible for according to our microsimulation model. A number of additional household characteristics can be used to approximate the utility from claiming SA pertaining to the degree of needs. Both singles and households with children (single parents and couples) are assumed to be in more urgent need of help than couples without children, since, on the one hand, the absence of a partner removes a source of potential income for the household and, on the other hand, children represent dependants for whom the parents are responsible. This holds in particular if small children (aged three and below) are present in the household. On the other hand, older children (aged 15 and above) may reduce the degree of needs as well as the perceived duration of needs. A higher degree of needs is hypothesised for households with members in need of care, particularly if the head of the household is disabled. From a dynamic perspective, these household characteristics will also tend to increase the duration of needs, along with the variables “head of household retired”, “age” (where we also include squared age to

[20] See e.g. Wooldridge (2002) for details of the estimation of discrete choice models with continuous endogenous regressors.

Table 3: Proxy variables of utility and costs and their expected effect on the probability of claiming SA

	Utility from SA		Claiming costs		Effect
	Degree of needs	Duration of needs	Inform. costs	Stigma / fear	
Calculated monthly benefit (cont.)	+				+
Singles (ref.: couple without children)	+	+			+
Single parents (ref.: couple without children)	+	+		-	+
Families with children (ref.: couple without children)	+			+	?
Number of young children (age<=3years, cont.)	+	+			+
Number of older children (age>14years, cont.)	-	-			-
Head of HH retired		+	+	+	?
Disability of head of HH	+	+		-	+
High qualif. of head of HH (ref.: interm. qual.)		-	-		?
Low qualif. of head of HH (ref.: interm. qual.)		+	+		?
Age, age^2 (cont.)		+	+	+	?
Male head of HH				+	-
Foreign national head of HH			+	+	-
Rural area (ref.: interm. area)	+		+	+	?
Metropolitan area (ref.: interm. area)	-		-	-	?
Eastern Germany	+	+			+
Home owner household		-		+	-

Note: Column "effect" indicates the expected effect of the respective variable on the probability of claiming SA. A "+" sign in the utility columns corresponds to a positive expected effect on the probability of take-up, while a "+" sign in the cost columns has the opposite effect (vice versa for "-" signs). A "?" stands for an ambiguous overall effect. "HH" stands for household.

capture nonlinear effects of age) and "low qualified household" (relating to the head of the household, respectively), since these households are likely to have a lower chance of income increases from employment.

Note that according to Table 3 we assume many of the utility proxies to have an impact on the cost of take-up, too. In some cases (e.g. "single parents" or "disabled head of household") the assumed effect on information and/or stigma costs works in the same direction as the effects on utility. In the case of single parents we assume lower stigma costs, since single parents may perceive themselves as being more needy than couples, who can share the burden of work and childcare. For this reason we expect these variables to have an unambiguous impact on the likelihood of take-up. This is not the case for variables like "age" or "qualification", implying that we are agnostic about the sign of these coefficients. Additional variables, which should mainly be related to the costs of claiming SA, are "sex of the head of household" (higher social stigma for males), "area of living" (rural or metropolitan relative to intermediate area, where stigma in rural areas should be higher because of higher social control), a dummy for living in eastern Germany and for home owners. We hypothesise a positive relationship between living in eastern Germany and the degree and duration of needs, which should mainly reflect a worse labour market situation than in western Germany. Home owners, on the other hand, are likely to need SA for a shorter period than non-owners, if the earning

potential of owners is higher on average. At the same time, a home owner's fear of being forced to sell her home may detain her from claiming SA. The last column of Table 3 shows the expected effect of the variables on the probability of claiming SA.

4.3 Estimation results

In the following we apply the model of take-up behaviour to the persistent non-take-up measure.[21] The estimation of model (5) requires the choice of suitable instruments to take account of the potential endogeneity of the level of SA. We choose the level of household income independent of the current choice of labour supply (including pension, widow's pension, child benefits, maternity allowance and rental income) as well as the maximum level of benefits excluding housing costs. First, these instruments are determinants in the computation of the level of SA and thus satisfy the requirement of an instrument to be correlated with the endogenous variable. Second, both of these instruments are arguably not correlated with unobserved factors determining the take-up decision.

Both instruments turn out to be important determinants of the level of SA.[22] Since we have one instrument more than required to identify the first equation of (5), we also test the overidentifying restriction. The null of both instruments being uncorrelated with the error term v_1 in (5) cannot be rejected.[23]

The results of the instrumental variable (IV) probit estimation for the pooled data are given in Table 4 along with a probit estimation which does not correct for a potential endogeneity bias of the level of SA.[24] Consistent estimation of the IV probit model (5) requires joint normality and homoscedasticity of the residuals v_1 and v_2, which is difficult to test, since the residual v_1 is not operational. For this reason we also perform a 2SLS estimation of the model (also included in Table 4), which does not impose the normality or the homoscedasticity assumption on the error terms. For ease of interpretation we present the marginal effects of all specifications. The estimated correlation between the error terms v_1 and v_2 is $\rho = 0.24$ in the IV probit with a robust standard error of 0.11, suggesting a positive relation between the unobservable factors which determine the probability of claiming SA and the level of calculated benefits. The Wald test reported in Table 4 rejects the null hypothesis of exogeneity of the calculated SA benefits at the 10% level.[25]

[21] Appendix C presents results for the temporary measure of non-take-up. Both, persistent and temporary take-up, lead to similar results.

[22] A linear regression of the second equation of model (5) gives an R^2 of 0.30. Both instruments are highly significant ($p < 0.001$), where we compute heteroscedasticity-robust standard errors. A test of both instruments being jointly zero is strongly rejected ($F(2, 2552) = 71.48$, $p < 0.0001$).

[23] The Amemiya-Lee-Newey minimum χ^2 statistic (Lee, 1992) is $\chi^2(1) = 0.04$, which corresponds with a p-value of 0.95. Additionally, Wooldridge's (1995) robust score test of overidentifying restrictions gives $\chi^2(1) = .059$ ($p = 0.81$) for the 2SLS estimation. Note that tests on overidentifying restrictions simultaneously test the null hypothesis of a correctly specified model. Thus, the tests cannot reject the validity of the instruments as well as the specification of the structural equation.

[24] Mean values of the covariates used in the regression are given in Table 13 in Appendix D.

[25] For the 2SLS estimation, Wooldridge's (1995) robust score test also rejects the null hypothesis of exogeneity of the calculated SA benefits ($\chi^2(1) = 5.55$, $p = 0.018$).

Table 4: Marginal effects on persistent take-up decision

	Probit	IV Probit	2SLS	RE
Calculated monthly benefit (in 100 €)	.07597***	.05790***	.05987***	.04762***
Single	.03060	.01886	.03624	.01148
Single parent	.00905	.05312	.07363*	.06022
Family with children	-.00858	.03466	.02647	.03640
Number of young children (age<=3 years)	.09307***	.11080***	.09538***	.06593**
Number of older children (age>14 years)	-.05880***	-.04962**	-.06978***	-.04977***
Head of HH retired	-.06134*	-.13985**	-.14988***	-.11485**
Disability of head of HH	-.02636	-.03437	-.02574	.00016
High qual. head of HH (ref.: interm. qual.)	-.10925***	-.11653***	-.11557***	-.10540***
Low qual. head of HH (ref.: interm. qual.)	.01368	.03137	.02158	.04267
Age	.00370***	.00511***	.00510***	.00441***
Male head of HH	.04349**	.05708***	.05646***	.05759***
Foreign national head of HH	-.02842	-.01634	-.01004	-.00042
Rural area (ref.: interm. area)	.00568	.00275	.00569	.02518
Metropolitan area (ref.: interm. area)	-.04441**	-.04358**	-.04366**	-.02824
Eastern Germany	.13166***	.13999***	.14076***	.16341***
Home owner household	-.08054***	-.12156***	-.11510***	-.14964***
Dummy 2006	.05244***	.06131***	.04889**	.04612***
Dummy 2007	.05171***	.05451***	.04012**	.04008**
Observations	2573	2573	2573	2573
Wald test of exogeneity: $\chi^2(1)$		3.75*		
(Pseudo)R^2	0.307		0.405	0.327

Note: Pooled estimation using GSOEP years 2005 - 2007. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *"HH" stands for household.*

The main variable of interest is the effect of the calculated benefit on take-up behaviour, b. The marginal effect of b in the probit model implies that an increase of 100 € per month in SA increases the probability of take-up by 7.6 percentage points. Taking account of the endogeneity of calculated SA reduces the marginal effect by 1.8 percentage points relative to the simple probit model. The size of the estimated marginal effect is in line with the literature (see e.g. Frick/Groh-Samberg, 2007; Whelan, 2010). While the dummies on family status (singles, single parents, families) are insignificant in both (probit and IV probit) specifications, the number of infants in the household has – as expected – a strong positive impact on the probability of take-up, while the opposite holds for children older than 14 years. For retired heads of household we hypothesised that the impact on utility and costs work in the opposite direction. The estimation suggests that on average the presumed higher stigma costs for pensioners outweigh their higher duration of needs. We were also agnostic about the effect of qualification on take-up behaviour. It turns out that being highly qualified significantly (1% level) reduces the probability of take-up, while there is no difference between low qualified and intermediately qualified heads of household. For male heads of household we hypothesised higher stigma costs, since we assume higher social pressure for males to support themselves and the members of their family. Contrary to our expectations, we find a significantly positive effect of being a male head of household on the take-up

probability.[26] From the set of regional dummies, only the eastern Germany dummy is significant at the 1% level, with a remarkably high marginal effect on the take-up probability: living in eastern Germany increases the probability by almost 14 percentage points in the IV probit model. This finding does not necessarily imply a higher propensity to claim SA, but may simply reflect worse labour market conditions than in western Germany. Furthermore, the dummy for home owners shows an expected negative effect on the probability of claiming SA. Finally, the year dummies show that the probability of take-up was significantly higher in 2006 and 2007 than in the year when the Hartz IV reform was introduced.[27]

The marginal effects for the 2SLS estimation are reassuringly consistent with the IV probit estimates. The marginal effect of b is nearly identical to the effect in the IV probit estimation. The only deviation is the coefficient on single parents, which is significant in the 2SLS estimation but neither in the IV probit nor in the probit estimation.

The first three estimations presented in Table 4 are based on the pooled GSOEP years 2005 to 2007. Pooled estimation implicitly assumes independent cross-section samples. Since the GSOEP is a panel, this assumption seems highly unrealistic. Our $2,573$ pooled observations are formed by 320 households entering the estimation in all three years, 413 households which are eligible for SA in two waves and 787 households which are eligible only once. Therefore, as a final robustness check, we also estimate a linear random effects IV panel model for the take-up behaviour. For this purpose the first equation of model (5) is modified to

$$P_{it} = \mathbf{I}\left(\beta_0 + \alpha_1 b_{it} + \boldsymbol{\beta}_2' \mathbf{x}_t + \mu_i + \upsilon_{it}\right), \tag{6}$$

where P_{it} denotes the SA take-up dummy with household index i and time index t and μ_i is the household-specific residual. Again, the computed amount of SA benefit, b_{it}, is assumed to be endogenous. We choose the random effects (RE) model over the fixed effects (FE) model for the following reasons. First, and most importantly, most of our regressors show little to no variation over time, rendering the FE estimator inappropriate, since it analyses variation within households over time. Second, since the FE estimator uses time-demeaned data, all households eligible in only one period drop out of the analysis. Thus, not surprisingly, a linear FE panel model has very little explanatory power for our data. On the other hand, while consistent estimation of the FE model is possible for arbitrary correlation between the household-specific error term μ_i and all explanatory variables, the RE model requires μ_i to be uncorrelated with $\mathbf{x}_t$

[26] As opposed to the other coefficients, the effect of male head of household is not stable over time. Estimating the model for each of the three waves separately reveals that the positive coefficient on male head of household is highly significant in 2005 (1% level), significant at the 10% level in 2006 and insignificant in 2007.

[27] Estimating model (5) for each year of the period 2005 to 2007 separately reveals that the level and significance of the marginal effects are relatively stable over this time period. Alternatively, we interacted all covariates with the time dummies for 2006 and 2007. Only three interactions are significant on the 5% level (sex of head of household with 2006 dummy, low qualified and age with 2007 dummy). This suggests that take-up behaviour has been stable with respect to our proxy variables over our three-year period.

and $\mathbf{z}_t$, an assumption that is hard to justify in our application.[28] Nonetheless, column "RE" of Table 4 shows that the marginal effects in the random effects linear IV panel model are reasonably close to the effects in the pooled 2SLS as well as in the IV probit estimation, which suggests that the bias from ignoring the fixed effects μ_i is rather small.

Summing up, the regression results on the determinants of take-up in Table 4 reveal that the degree of needs, measured as the SA benefit level households are entitled to, the number of small children in the household as well as the expected duration of benefit receipt, expressed in proxy variables like qualification, living in eastern Germany, or age, are the key-determinants of the take-up decision. On the other hand, proxies which mainly measure stigmatisation and information costs only seem to play a minor role in the take-up decision. Furthermore, a simple probit estimation, which does not account for the potential endogeneity of the level of SA benefits available to eligible households, seems to overestimate the effect of the benefit level on the probability to take up SA. The estimation results are remarkably robust against different estimation approaches (nonlinear versus linear, pooled versus panel). Finally, the largest part of the drop in the RNT from 2005 to 2006 (or 2007, respectively) is explained by year dummies. Hence, our proxies do not capture a change in take-up behaviour after 2005 and we can only speculate on the cause of the drop in the RNT in 2006. One possible explanation for the drop is that SA-eligible households took about a year to familiarise themselves with the new policy regime.

5 Conclusion

In this paper we provide first results on rates of non-take-up (RNTs) of social assistance (SA) in Germany after major social policy reforms were implemented in 2005. We measure non-take-up using two concepts: *persistent* non-take-up, which focuses on households with an annual income below the guaranteed minimum income, and *temporary* non-take-up, which considers households eligible to SA in the month of the interview.

For 2005, the first post-reform year, we find that about 49% (58%) of all eligible households did not claim their SA entitlements persistently (temporarily). Our simulated temporary RNT is in the lower range of pre-reform results. For 2006 and 2007 we find significantly lower persistent (temporary) RNTs of about 41% (46%). Our findings provide prima facie evidence that the non-take-up of SA was significantly reduced by the 2005 reform of social assistance in Germany. The literature on SA non-take-up points out the sensitivity of simulated RNTs to several assumptions and data restrictions. Our RNTs turn out to be robust to sensitivity tests with respect to the wealth check, the data selection process and the definition of persistent take-up.

[28] A Hausman test cannot reject the hypothesis of equal coefficients in the RE and FE models, but this seems to be largely caused by the highly imprecise estimation of coefficients in the FE model and should not be taken as confirmation that the assumption $E(\mu_i|\mathbf{x}_t, \mathbf{z}_t) = 0$ is met in the data.

In addition, we estimate an empirical model to analyse the post-reform determinants of take-up behaviour. The estimations reveal that the degree of needs, measured as the SA benefit level households are entitled to and the expected duration of benefit receipt, expressed in proxy variables like qualification, residing in eastern Germany, or age, are the key determinants of the take-up decision. Furthermore, stigmatisation and information costs do not seem to play a decisive role in determining the decision to take up SA. These findings are in line with the previous literature. When we take into account the potential endogeneity of the level of SA benefits, the results of the instrumental variable regression analysis indicate that the positive effect of the benefit level on the probability of taking up SA is overestimated in a simple probit framework.

The estimations also show that the influence of the determinants of take-up as well as the composition of the eligible population is stable over the period 2005 to 2007 and thus cannot explain the drop in the RNT in 2006. Instead, the drop is mainly reflected in significant year dummies in the estimation and can therefore be interpreted as an (unobserved) higher propensity to take up SA after 2005. Thus, we can only speculate on the cause of the drop in the RNT in 2006. One possible explanation for the drop is that eligible households took about a year to adapt to the new policy in the form of higher take-up rates.

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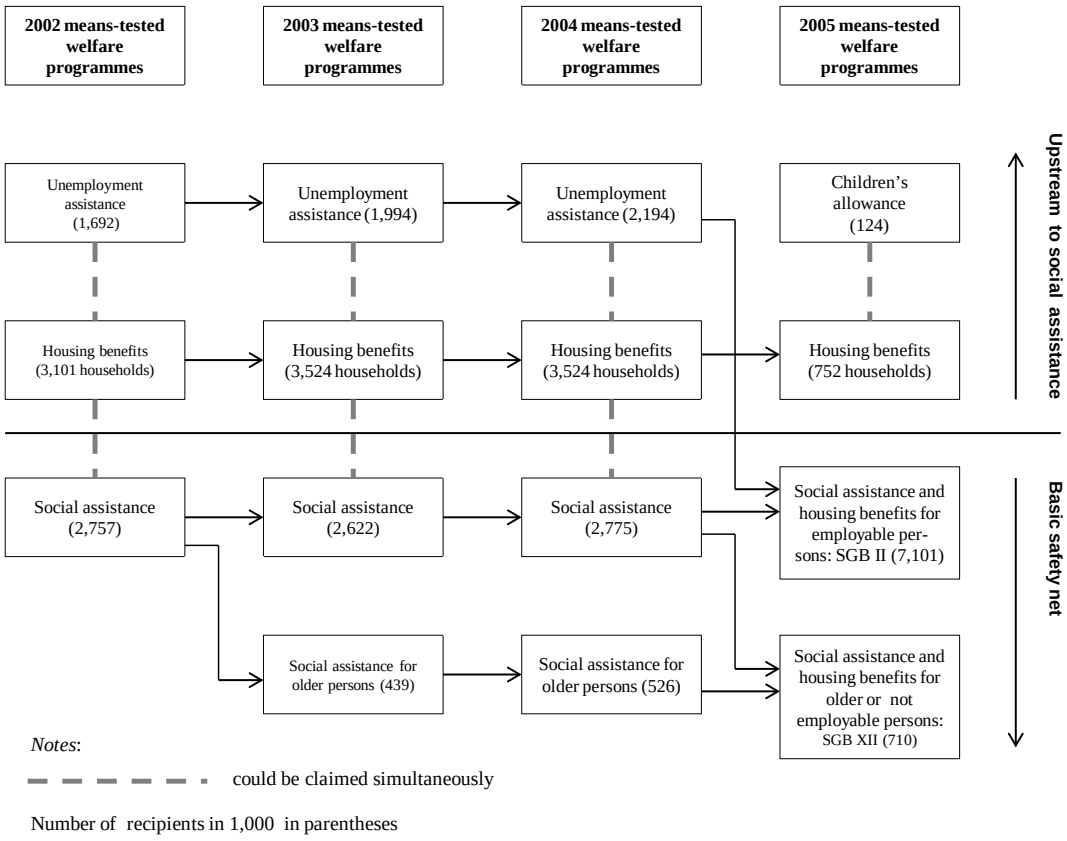
Appendices

A Reorganisation of the means-tested benefit system in Germany

During the years 2002 and 2005 the German government implemented a package of comprehensive social and labour market reforms. The most far-reaching reforms were the so called “Hartz” reforms, implemented in the years 2003-2005. They aimed at activating the long-term unemployed by increasing work incentives and employment in the low-wage sector. Other goals of the reform were the improvement of active labour market policies and an increasing effectiveness and efficiency of labour market

services. In the course of the reform process, the whole system of means-tested benefits in Germany was reorganised. Figure 1 describes the changes in the social system, while Table 6 gives an overview of important features of the old and new systems.

Figure 1: Recent social policy reforms in Germany



In 2002 three major systems of social assistance (SA) existed beside the system of social insurance in Germany. The social insurance system includes the federal pension and health insurance as well as the federal unemployment insurance. Eligibility to unemployment insurance benefits depends on the number of months of employment subject to social security contributions the unemployed person accumulates during the qualifying period, which is usually the last 3 years (2 years since 2004) before unemployment. Claimants have to accumulate a minimum of 12 months of insurable employment to be entitled to receive benefits. Typically unemployment insurance benefits are paid for a period of 12 months.

Until 2004 unemployment assistance (UA) benefits were available if unemployment insurance benefits had been exhausted. UA benefits were prioritised over SA. Since the benefit level was calculated as a percentage of previous earnings, recipients could receive UA below the guaranteed income level. Thus, it was possible to claim UA,

housing benefits and/or social assistance simultaneously. Housing benefits were available for anyone with low income and high costs of housing. In 2002 SA was the basic safety net for all poor households. A large share of recipients were the long-term unemployed, single parents, or the only partially employable. UA, housing benefits and SA were administered by different federal agencies. While UA was granted by the federal employment agencies, housing benefits were administered by special offices at the level of the 16 German states. SA could be claimed at SA offices, which acted on behalf of the German municipalities. One major goal of the reforms was to make all of the long-term unemployed subject to the same law. Accordingly, the former UA and SA were combined to the new SA for needy employable people (SGB II) in 2005.

The new SA benefit system only distinguishes between employable and non-employable persons. The former are subject to Book II (SGB II), the latter to Book XII of the Social Code (SGB XII). SGB II and SGB XII include benefits for living as well as housing costs. For this reason the receipt of SA and housing benefits cannot coincide after 2005, and housing benefits are prioritised over SGB II and SGB XII. The means tests in both systems are similar. With more than 7 million recipients during the year 2005 the SGB II is the most important benefit system (see Table 5). A new enhanced child benefit for low-income families was also implemented in 2005. The enhanced child benefit and housing benefits can be claimed simultaneously.

Table 5: Recipients of social assistance for the long-term unemployed (SGB II) and older or unemployable persons (SGB XII) 2005-2008

	SGB II	SGB XII
2005	7,101	710
2006	7,284	764
2007	7,020	821
2008	6,610	860

Note: Number of recipients in 1,000 at the end of the respective year.

Changes in eligibility conditions between 2005 and 2007 Between 2005 and 2007 some minor changes in the rules determining eligibility and the benefit level were implemented. For example, in 2006 the standard benefit level for individuals living in eastern Germany was adjusted to the level of the standard benefit level of western Germany. The level of the new national standard benefit in SGB II and SGB XII increased slightly from 345 € to 347 € in 2007. We believe that these minor changes had no significant effect on the take-up of entitlements. An important exception was the reform of the SGB II earned income exemption in October 2005. When the SGB II was introduced in 2005, the rules that defined the earned income exemptions were complex and they increased the incentives to take up low-paid jobs only slightly compared to the

former SA. The new income exemptions rules led to substantially higher net incomes of working SGB II households.[29]

B Description of the microsimulation model

This appendix gives a concise overview of the main features of the employed microsimulation model, the IAB-STSM. The acronym stands for "Tax-Transfer Microsimulation Model of the Institute for Employment Research (IAB) of the German Federal Employment Agency". The IAB-STSM is based on the *Steuer-Transfer-Mikrosimulationsmodell* (STSM) of the Centre for European Economic Research (ZEW) (see Jacobebbinghaus/Steiner (2003) for a documentation of the STSM). The IAB-STSM is a static microsimulation model which consists of a detailed implementation of the German tax and transfer system as well as an econometrically estimated labour supply model. It is used to analyse the effects of taxes, social contributions and transfers on income and labour supply of private households in Germany. In recent years the main field of application of the IAB-STSM was the ex ante evaluation of social policy reforms directed at low-income households in Germany (Arntz et al., 2007; Wiemers/Bruckmeier, 2009).

Data The model is based on micro data of the German Socio-Economic Panel (GSOEP)[30]. The current version of the IAB-STSM employs GSOEP wave 2008, which gives information on 11,000 households with more than 21,000 persons aged 17 and older. The GSOEP includes the required demographic variables, information on incomes of persons and households (e.g. earned income, pensions, capital income, etc.) as well as information on current and past worked hours. In each wave of the GSOEP, about 80 % of the households are interviewed in the first four months of a year (Steiner/Haan/Wrohlich, 2005). As a consequence, the tax-transfer module of the IAB-STSM computes net household income based on retrospective information on the previous year, which also implies that the tax and transfer regulations of the previous year are used. Thus, e.g., the simulation year 2007 is based on the GSOEP wave 2008.

[29] For the first nine months of 2005 the following regulation for determining monthly income exemptions (IE) was in place:

$$IE = \begin{cases} y & \text{if } 0 \leq y < d \\ d + 0.15\ q(y)\,(y-d) & \text{if } d \leq y < 400 \\ d + 53.2\ q(y) + 0.3\ q(y)\,(y-400) & \text{if } 400 \leq y < 900 \\ d + 203.2\ q(y) + 0.15\ q(y)\,(y-900) & \text{if } 900 \leq y < 1500 \\ d + 293.2\ q(y) & \text{if } 1500 \leq y \end{cases},$$

where y is gross monthly income in Euro and d are flat income-related expenses of 45.33 € per month. The function $q(y) = (y - d - T(y))/y$ gives the net income to gross income ratio, where $T(y)$ is the sum of social security contributions and income taxes. We use this regulation for determining eligibility in 2005. Since October 2005 recipients can earn a gross income of 100 € per month before their welfare benefits are reduced. For earnings above 100 € per month the benefit reduction rate amounts to 80%. Above 800 € per month it is increased to 90%. Earnings above a threshold of 1,200 € (1,500 € for recipients with children) per month reduce the benefits at a rate of 100%. For example, an SGB II recipient with monthly earned income of 400 € has income exemptions of 160 € under the new rule, while the exemptions amounted to only 92.50 € under the old rule.

[30] See Haisken-DeNew/Frick (2005) and Wagner/Frick/Schupp (2007) for documentation of the GSOEP.

Table 6: Key features of social assistance programmes in Germany before and after social policy reforms in 2005

	Unemployment assistance 2004	Social assistance 2004	Social assistance (SGB II) 2005	Social assistance (SGB XII) 2005
Target group	needy long-term unemployed individuals	households in need	household of employable individuals in need	households of unemployable individuals in need
Objective	preservation of living standards	guaranteeing a minimum income	guaranteeing a minimum income	guaranteeing a minimum income
Calculation of benefit	53% of previous net earnings (57% for workers with children)	regionally differing standard benefits + additional benefits due to special needs + single payments for variable costs + housing costs	nationally standardised regular benefits + additional benefits due to special needs + housing costs	
Basic benefit, head of the household (HH)		295 € per month (national average)	345 € (331 €) per month western (eastern) Germany	
Basic benefit for household members (in per cent of basic benefit for the HH)		spouse: 80%, children aged < 7 (15, 18): 50% (65%, 90%)	spouse: 80%, children aged <14 (>13): 60% (80%)	
Incomes in the means-test	income of recipient and spouse	all household incomes	all household incomes	all household incomes
Earnings disregards	10.6% (11.4% for HH w. child) of previous net earnings + 53% (57% for HH w. child) of spouse's net earnings, minimum: 165 €	minimum: 74 €, maximum: 148 €	see Footnote 29	30% of net earnings, maximum: 173 €
Maximum wealth	200 € per year of life (recipient and partner), minimum: 4,100 €, maximum: 13,000 €	recipient aged >59 years: 1,279 € (2,301 €), spouse: 614 €, 256 € per child	200 € per year of life , children: 4,100 €; old-age provision	recipient aged >59 years: 1,600 € (2,600 €) , spouse: 614 €, 256 € per child

Household selection In order to estimate our model of take-up behaviour in Section 4 we look at the first three years after the introduction of the Hartz IV reform, i.e. 2005, 2006 and 2007. Since we use retrospective information, GSOEP waves 2006-2008 are employed. Missing information on certain household and personal variables prevents us from using all households in the simulation sample. Table 7 gives an overview of the initial number of private households in GSOEP waves 2005 to 2007 along with the selection steps leading to the simulation sample.

Table 7: Household selection for the simulation years 2005-2007

Selection step	**2005**		**2006**		**2007**	
	N	Δ	N	Δ	N	Δ
Initial number of private households in GSOEP	11,440	(-)	12,499	(-)	11,689	(-)
Exclusion of households without interviewed head of HH and/or partner	11,359	81	12,413	86	11,618	71
Exclusion of couple households with survey non-response of partner	10,704	655	11,614	799	10,903	715
Households interviewed in the simulation year and the following year	9,509	1,195	10,217	1,397	9,629	1,274
Exclusion of households with missing information on worked hours, wages and other income variables	8,685	869	8,981	1,182	8,408	1,101
Households in simulation sample	**8,685**		**8,981**		**8,408**	

Note: N=remaining number of households, Δ=change in numbers of households in the respective selection step.
Source: Own computations based on GSOEP years 2005-2007.

In the first two steps we drop households in which either the head of the household or – in case of couple households – the partner of the head of household could not be interviewed. The quantitatively most important selection step results from the fact that we use retrospective information to compute net income, transfer eligibility and benefit take-up. Thus, all households which did not partake in the survey the year after the respective base year are dropped from the sample. Finally, we exclude households which stated having received earned income, income from self-employment, unemployment benefits, rental income or financial support from private persons not living within the household, but did not provide information on either the monthly amount and/or the number of months of receipt of the respective type of income.[31] When extrapolating model results to the whole population, we account for the dropped households by adjusting the households weights in such a way that the selected sample is still representative of all private households in Germany. This is done by grouping the data using all combinations of certain discrete household variables (e.g. type of family, sex, region, formal skill, age group, number of children) and then multiplying the original household weights with the inverse of the group specific rates of exclusion.

[31] Where possible, we impute missing retrospective information on incomes by using corresponding information from the month of interview. For example, if a household states that it received earned income for twelve months in the previous year but does not provide information on the monthly amount, we use monthly income from the month of interview.

Tax and transfer system The principal task of the IAB-STSM tax and transfer module is the computation of household net income under varying tax and transfer rules. If the labour supply reaction to a policy change is to be analysed, the tax and transfer module provides the households' budget restrictions which enter the labour supply model. Table 8 describes the incomes and contributions considered in the computation of net household income.

Table 8: Components of net household income

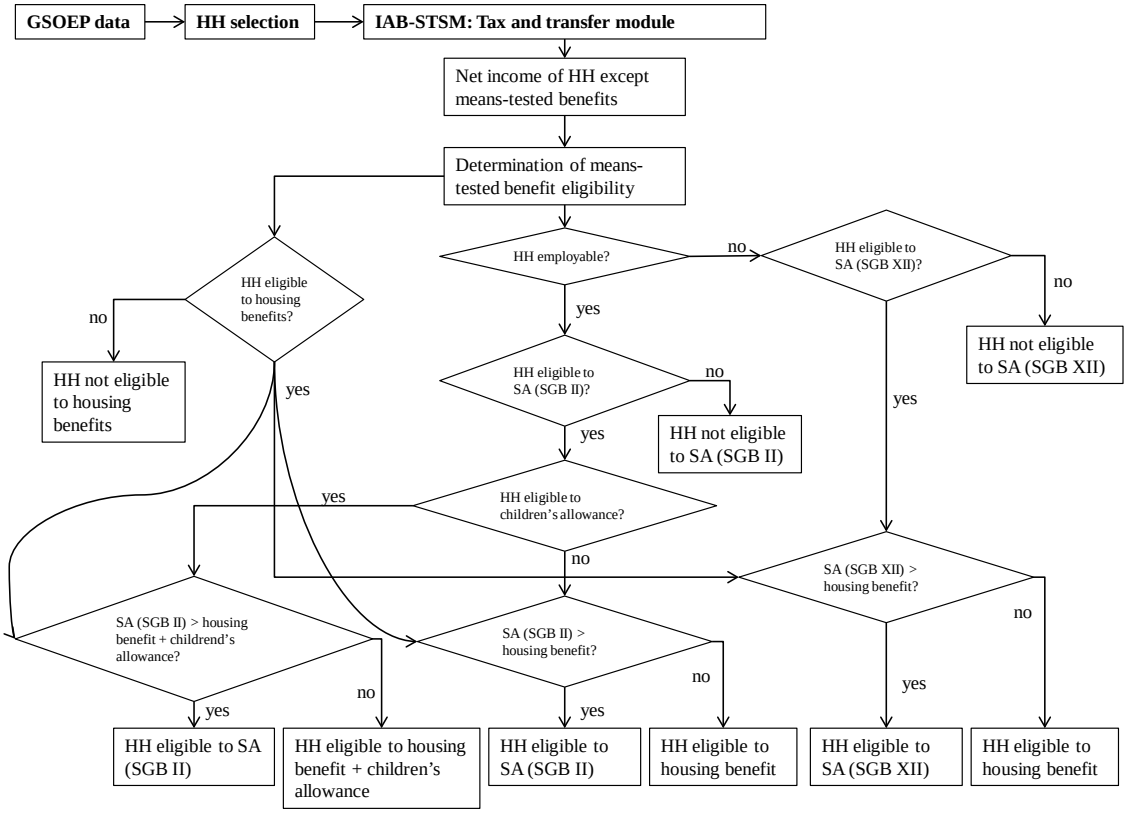
		Income components	Determined in tax and transfer module?
1		Earned income	no
	+	Self-employed income	no
	+	Capital income	no
	+	Rental income	no
	+	Other incomes (pensions)	no
2	-	Social security contributions	yes
	-	Income tax	yes
	-	Alimony payments	yes
3	+	Child benefit	yes
	+	Child-raising allowance	yes
	+	Unemployment benefits	yes[a]
	+	Federal student support, stipends, claims to maintenance, widow's allowance, maternity allowance, reduced hours compensation	no
4	+	Housing allowance	yes
	+	Children's allowance	yes
	+	Social assistance for employable persons (SGB II)	yes
	+	Social assistance for unemployable persons (SGB XII)	yes
	=	Net household income	yes

[a] *Endogenous if labour supply reactions are considered. Otherwise we use reported unemployment benefits.*

The table is divided in four parts, which give (1) the exogenous (gross) revenues of the household, (2) endogenous deductions (taxes and social security contributions), (3) non-means-tested benefits, which are only partly endogenous and (4) endogenous means-tested benefits. As described in Section 2.2, means-tested benefits are in general mutually exclusive since the introduction of SA reforms in Germany in 2005, i.e. a household can be eligible to only one means-tested benefit. The only exception is that housing allowance and children's allowance can be claimed simultaneously.

Determining eligibility to means-tested benefits Figure 2 describes the process of determining eligibility to means-tested benefits within the IAB-STSM.

Figure 2: Determining eligibility in the IAB-STSM



In order to determine eligibility to SA a person first has to be classified as either employable or not employable. For employable (unemployable) persons in the household, eligibility to SA for employable (unemployable) households is checked in the model. The legal framework for employable persons is given by the Book II of the Social Code (SGB II), while unemployable persons fall under the Book XII of the Social Code (SGB XII).[32] The legal definition of employability given in § 8(1) SGB II is rather vague.[33] Thus, employability in the sense of the SGB II cannot be precisely determined using information from the GSOEP. In the model, we categorise a person as employable, if he or she is aged between 15 and 64, does not work in a sheltered workshop and either has a degree of disability smaller than 80%[34] or receives earned income.

If a household is categorised as unemployable and passes the eligibility check for SGB XII benefits, the model compares the claim for SA to a possible claim for housing

[32] Note that in practice households can receive both, SGB II and SGB XII benefits. Take, for example, a household of an unemployable (in the sense of § 8 SGB II) single parent and an employable child. The former can only be eligible to SGB XII benefits, while the latter can only claim SGB II benefits. Although this case rarely occurs, Figure 2 gives a simplified picture of determining eligibility, since it suggests that a household can only claim one type of SA.

[33] § 8(1) SGB II loosely states that a person is employable, if illness or disability does not disable her for the forseeable future to work at least three hours a day under the regular conditions of the labour market. In practice, employability is determined by public health officers.

[34] A disability degree of 80% is chosen to approximately calibrate the relative number of SGB II to SGB XII recipients in the model to the official numbers on SGB II and SGB XII recipients.

benefits. The model assumes that the household will take up the higher benefit. If, on the other hand, the household is classified as employable and passes the eligibility check for SGB II benefits, the model also checks eligibility for the so called "children's allowance" (ACA). Households are eligible to ACA, if the parents income is high enough to cover their own basic needs (determined by the SGB II), but not the basic needs of children in the household. In the case of eligibility to ACA, the model compares the sum of ACA and a possible claim to housing benefits to the SGB II benefit and again assumes that the household claims the higher benefit.

C Sensitivity analysis

Sensitivity of RNTs with respect to the "take-up threshold" In our study a household is defined as a persistent take-up household, if a) it is eligible according to the IAB-STSM and b) if it claims SA for more than six months. Table 9 shows the sensitivity of the persistent RNT to the choice of this threshold. Thus, we vary the number of months x the household has to claim the benefit to be classified as a persistent take-up household in a particular year, $x \geq x_{\min}$, $x_{\min} = 1, 2, ..., 12$. Row $x \geq 7$ in Table 9 corresponds to the RNT reported in Table 2. Obviously, the RNTs are quite sensitive to the chosen threshold. The largest range of persistent RNTs occurs for the year 2007, where it amounts to 18 percentage points. Nonetheless, for all chosen thresholds we find a substantial drop in the RNT in 2006.

Table 9: Sensitivity analysis: rates of persistent non-take-up of social assistance 2005-2007

	Rates of non-take-up		
No. of claiming months $x \geq$	**2005**	**2006**	**2007**
1	42.43	37.12	34.59
2	42.87	37.19	34.88
3	43.37	37.77	35.96
4	44.34	38.96	37.54
5	45.28	39.82	38.84
6	46.80	40.39	39.57
7	48.85	41.73	41.31
8	49.62	42.07	42.04
9	51.09	43.07	43.21
10	54.33	45.25	44.14
11	56.17	50.81	51.10
12	56.53	51.58	52.59

Note: Non-take-up rates in per cent.
Source: GSOEP, IAB-STSM.

Sensitivity of RNTs with respect to the wealth test Furthermore, many recent studies stress the importance of whether and how wealth is taken into account when determining eligibility of a household (Riphahn, 2001; Wilde/Kubis, 2005; Frick/Groh-Samberg, 2007). Table 10 presents simulated RNTs without considering wealth and

assets, leading to increases in the RNTs between 6% and 14%, which is in line with previous results. A comparison with Table 2 reveals that all RNTs are 3.5 to 7 percentage points higher if the wealth test is ignored. These increases in the rates are in line with Frick/Groh-Samberg (2007), who simulate the effects of a wealth check on non-take-up rates for the pre-reform SA in Germany. This suggests that RNTs are not very sensitive to wealth considerations and that the impact of the wealth check has not changed substantially after the SA reform in 2005.

Table 10: Rates of persistent and temporary non-take-up of social assistance excluding wealth check 2005-2007

Year	**2005**	**2006**	**2007**
Non-take-up rate (persistent)	55.76	46.49	45.97
C. I.	[51.30 - 60.21]	[42.31 - 50.67]	[41.40 - 50.53]
Non-take-up rate (temporary)	61.93	53.28	49.94
C. I.	[58.00 - 65.86]	[49.17 - 57.40]	[45.79 - 54.09]

Note: Non-take-up rates in per cent. C. I.: Bootstrapped 95%-confidence intervals.
Source: GSOEP, IAB-STSM.

Sensitivity of RNTs with respect to the sample selection The temporary RNTs in Table 2 are based on the same sample as the persistent RNTs. Differences between the RNTs in a given year are therefore based only on the respective concept of take-up. Equalising the samples for both concepts necessitates dropping households which did not participate in the survey the year after the respective simulation year for both concepts of take-up (see Table 7 in Appendix B), although our temporary concept of take-up does not require retrospective information. For this reason we simulate the temporary RNT without excluding households which did not participate in the year after the respective simulation year. Results are given in Table 11. While using the larger sample has no effect on the temporary RNT in 2005, the drop in 2006 is markedly smaller (but still significant at the 10% level).

Table 11: Rates of temporary non-take-up of social assistance including households which did not participate in the survey the year after the respective year of simulation

Year	**2005**	**2006**	**2007**
Non-take-up rate (temporary)	58.75	51.91	50.38
C. I.	[54.51 - 63.01]	[47.76 - 56.07]	[46.35 - 54.41]

Note: Non-take-up rates in per cent. C. I.: Bootstrapped 95%-confidence intervals.
Source: GSOEP, IAB-STSM.

Table 12 presents estimation results for the model of take-up using the temporary measure of non-take-up. Comparison with Table 4 shows that the results for both measures are largely in line. The marginal effects have the same size and significance for most of the variables. Notable exceptions are the single household dummy, which is positively significant for the temporary take-up measure, but not for persistent take-up.

The opposite holds for the male head of household dummy. Also, the year dummies are still positive, but smaller in size, which is consistent with the relatively smaller drop of the RNT in 2006 observed for the temporary take-up measure.

D Means of covariates used in the regression

Table 13 present the means of the employed covariates in our sample of households eligible for SA in the pooled sample for the years 2005 to 2007.[35]

As expected, the mean calculated monthly benefit is considerably higher (666 € per month versus 296 € per month) for the group of SA recipients than for the group of non-recipients. Also consistent with our hypotheses on the take-up effect of the used covariates, we find significantly higher shares for single parents and families with children, as well as a higher mean of infants in the take-up group. The share of retired heads of household is nearly three times as large in the non-take-up group, which suggests that for these households the information and stigma costs of claiming outweigh the utility from claiming in many cases. Regarding the qualification dummies, the share

Table 12: Marginal effects on temporary take-up decision

	Probit	IV Probit	2SLS	RE
Calculated monthly benefit (in 100 €)	.04983***	.06731***	.07817***	.06992***
Single	.05328**	.06981***	.08663***	.07550**
Single parent	.09625***	.05530	.08081**	.07140*
Family with children	.01578	-.03589	-.03029	-.03741
Number of young children (age<=3 years)	.11426***	.09769***	.11061***	.09469***
Number of older children (age>14 years)	-.08778***	-.09183***	-.10594***	-.08948***
Head of HH retired	-.28906***	-.18122***	-.19875***	-.19498***
Disability of head of HH	-.15610**	-.12316**	-.12884**	-.12377**
High qual. head of HH (ref.: interm. qual.)	-.10522***	-.09222***	-.11439***	-.12448***
Low qual. head of HH (ref.: interm. qual.)	.04390**	.02845	.02571	.04107*
Age	.00583***	.00402***	.00473***	.00438***
Male head of HH	.02797	.01515	.02379	.02431
Foreign national head of HH	.05719**	.04952**	.05126*	.06051*
Rural area (ref.: interm. area)	.02638	.02575	.02735	.02802
Metropolitan area (ref.: interm. area)	-.00398	-.00468	-.00871	.00487
Eastern Germany	.17308***	.16489***	.18622***	.19608***
Home owner household	-.15085***	-.10670***	-.12059***	-.15003***
Dummy 2006	.03703*	.02357	.02743	.03325*
Dummy 2007	.04819**	.03655*	.03940*	.04024**
Observations	2726	2726	2726	2726
Wald test of exogeneity: $\chi^2(1)$		5.45**		
(Pseudo)R^2	0.234		0.429	0.275

Note: Pooled estimation using GSOEP years 2005 - 2007. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

[35] We show the means for the pooled sample, since the estimation also pools data for the three years 2005 to 2007. Since most of the variables are household characteristics, the mean values do not vary substantially over the three waves.

Table 13: Means of covariates used in the regression: SA eligible households, pooled sample 2005 - 2007

	Non-take-up	Take-up	Full sample
Calculated monthly benefit (in 100 €)	2.90***	6.62	4.95
Singles	0.53***	0.39	0.45
Single parents	0.14***	0.22	0.19
Family with children	0.12***	0.20	0.17
Number of young children (age<=3years)	0.07***	0.16	0.12
Number of older children (age>14years, cont.)	0.21***	0.28	0.25
Head of HH retired	0.18***	0.06	0.11
Disability of head of HH	0.03**	0.02	0.02
High qualif. of head of HH (ref.: interm. qual.)	0.15***	0.08	0.11
Low qualif. of head of HH (ref.: interm. qual.)	0.28	0.30	0.29
Age	43.48	43.12	43.28
Male head of HH	0.40*	0.44	0.42
Foreign national head of HH	0.12	0.12	0.12
Rural area (ref.: interm. area)	0.15*	0.17	0.16
Metropolitan area (ref.: interm. area)	0.49**	0.44	0.46
Eastern Germany	0.30***	0.42	0.37
Home owner household	0.14***	0.08	0.11
Dummy 2006	0.34**	0.38	0.36
Dummy 2007	0.35	0.34	0.34
Sample size	1152	1421	2573

Source: GSOEP, authors' own computations based on IAB-STSM. Stars denote rejection of the t-test on equal means in the take-up and non-take-up groups on the significance levels * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

of highly qualified heads of household is – as expected – significantly lower in the take-up group, while there is no statistical difference in the shares of the low-qualified heads of household. For the regional dummies, we find a lower share of metropolitan area residents in take-up households and a slightly (although not significantly) higher share in rural areas. This may simply reflect that the effect of worse labour market conditions in rural areas compared to metropolitan areas overcompensates for the assumed lower stigma costs in metropolitan areas. Worse labour market conditions should also explain the significantly higher share of take-up households in eastern Germany. Consistent with our hypotheses, the share of home owners in the non-take-up group is twice as large as in the take-up group. Finally, Table 14 presents the means of the covariates for households eligible to SA (SGB II and SGB XII) for each year. Obviously, the means do not vary substantially across the years. This suggests that the composition of the eligible population did not change significantly over time.

Table 14: Means of covariates used in the regression: SA eligible households, 2005 - 2007

	2005	2006	2007
Calculated monthly benefit (in 100 €)	4.99	5.08	4.78
Singles	0.42	0.45	0.46
Single parents	0.19	0.19	0.17
Family with children	0.18	0.15	0.16
Number of young children (age<=3years)	0.11	0.12	0.12
Number of older children (age>14years, cont.)	0.29	0.23	0.21
Head of HH retired	0.11	0.10	0.11
Disability of head of HH	0.01	0.02	0.02
High qualif. of head of HH (ref.: interm. qual.)	0.10	0.11	0.11
Low qualif. of head of HH (ref.: interm. qual.)	0.29	0.29	0.28
Age	43.47	43.14	43.25
Male head of HH	0.42	0.44	0.39
Foreign national head of HH	0.13	0.11	0.10
Rural area (ref.: interm. area)	0.14	0.17	0.16
Metropolitan area (ref.: interm. area)	0.46	0.42	0.49
Eastern Germany	0.36	0.36	0.37
Home owner household	0.11	0.10	0.09
Sample size	763	923	887

*S*ource: GSOEP, authors' own computations based on IAB-STSM.

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