Journal of Contextual Economics, 142 (2022) 2: 159 – 206
https://doi.org/10.3790/schm.2024.372970

Universal, Targeted or Both: Effects of Different Child Support Policies on Labour Supply and Poverty: A Simulation Study*

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Abstract

We study a set of hypothetical reforms of child benefits in Germany using a static tax-benefit microsimulation model augmented with endogenous labour supply and take-up choices. We distinguish between a reform of the universal non-means-tested child benefit, a reform of the means-tested child benefit under the minimum income scheme, and a combination of both. The model simulates the impacts of the reforms on household income, poverty and labour supply. We find that improvements in the means-tested child benefit are well-targeted: They provide a high level of poverty reduction with a low fiscal impact at the cost of reduced labour supply incentives for low-income families. When unconditional benefits are increased, the effect on overall income inequality is more pronounced at the cost of reduced labour supply incentives for middle- and high-income families. Finally, when combined, the two approaches show synergies, particularly in the form of improved poverty reduction.

JEL Codes: C15, D31, H53

Keywords: Child Benefits, Inequality, Labour Supply, Microsimulation

1. Introduction

Recent reform proposals in the European Union (EU) have advanced the idea of a new "child guarantee." In 2015 the European Parliament asked the European Commission to "introduce a Child Guarantee so that every child in poverty can have access to free healthcare, free education, free childcare, decent housing and adequate nutrition" (Frazer *et al.* 2020). Recently, the Employment, Social Policy, Health and Consumer Affairs Council has adopted the proposal on establishing a European Child

* We thank participants of the following conferences for their insight and feedback: EASP-FISS Conference (2021) in Hong Kong, the European Meeting of the International Microsimulation Association (2022) in Nuremberg, the Annual IIPF Congress (2022) in Linz, the ESPAnet Conference (2022) in Vienna, and the EcoMod (2023) in Prague.

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Guarantee.[1] However, while the basic child guarantee emphasises the goal of guaranteeing access for children to key services, policy approaches to combatting child poverty and social exclusion are broad and can take different forms. Among various approaches, child-related income support payments to families represent the classic policy to addressing financial poverty and material deprivation among children (Daly 2020).

Within the EU, children in Germany have a moderate risk of poverty (Bruckmayer *et al.* 2020; Frazer *et al.* 2020).[2] Several political parties in Germany, however, denounced that the current minimum income scheme would leave many children out of adequate protection. On top of the insufficient benefit level, the current system is also seen as too complex, which is reflected in low benefit take-up rates (Bruckmeier and Wiemers 2012; Bruckmeier and Wiemers 2018), meaning that many households who are entitled to a means-tested child benefit do not claim it. Also, the combined and cumulated effects of the COVID-19 pandemic and of surging prices for food and other basic goods are having an impact on low-income families relying on social benefits. It is therefore not surprising that the idea of a "child guarantee" has also found its way into the German political debate. In its coalition agreement, the German government elected in 2021 sets out the introduction of a basic child allowance to protect children from poverty.

In this article we examine the effects of increasing the level of two existing child-related benefits to families on income distribution and child poverty in Germany. We distinguish between reforming universal, non-means-tested child benefits, reforming means-tested child benefits included in the minimum income scheme, and a combination of both. These stylised reform scenarios mimic important characteristics of actual proposals in the current political debate in Germany. In addition to changes in income, we report the fiscal costs of the reforms and present reform effects with and without refinancing in a robustness check in Appendix C. Assessing the fiscal impact of potential benefit reforms may become more important given the new fiscal pressures caused by the COVID crisis in many countries.

Our analysis employs the microsimulation model of the Institute for Employment Research, IAB-MSM, to simulate changes in the benefit system. IAB-MSM provides a detailed implementation of the German tax and benefit system and is based on rich survey data from the German Socio-Economic Panel (GSOEP). The GSOEP allows for a characterisation of each individual household (and of its individual members) that includes demographic information, employment status, current and past worked hours, different sources of income, housing conditions and region of residence.

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[1] See Council of the EU Press release, 14 June 2021, https://www.consilium.europa.eu/en/press/press- releases/2021/06/14/access-to-key-services-for-children-in-need-council-agrees-european-child- guarantee/.

[2] According to the most recently published OECD data for the years 2019 – 2021 (we employ here the most recent year waves available), the poverty rate for children defined as individuals in the 0 – 17 age bracket was 0.117 in Germany in 2019, slightly larger than the poverty rate for the entire resident population (0.109), the mean value across European countries (0.113) and Eurozone countries (0.111), but smaller than the mean value across non-European countries (0.169) for which data are available from the OECD database.

Since children in most cases do not earn their own income, their economic situation is determined by the household to which they belong. Moreover, eligibility for means-tested child benefit policies also depends on the household's economic situation. This close link between the overall economic situation of a household and child benefit policies also implies that the latter may distort the behaviour of other members of the household. The way means testing, the marginal benefit reduction rate for earned income, and interactions with other social policies are designed may affect parents' labour supply or consumption patterns in non-trivial ways. Therefore, our approach takes into account potential labour supply effects of increasing child benefits. The IAB-MSM simulates changes in labour supply due to a policy reform based on econometrically estimated labour supply models. Our model also allows us to take into account and endogenise benefit non-take-up, which is especially important for assessing the effects of an increase in means-tested benefits.

Our article contributes to the literature in several ways. First and foremost, we extend the relatively small amount of research on this topic for Germany and relate it to the most recent reform proposals. In a broader perspective, our article is also related to studies that focus on the effectiveness of the design of social benefits in reducing poverty, as we provide an in-depth analysis of the two components of a basic child income (unconditional and means-tested benefits) and the different outcomes obtained in terms of income distribution, poverty risk and labour supply. In contrast to many microsimulation studies, we explicitly include labour supply effects in our analysis and thus also contribute to the literature examining the relationship between welfare benefits for children and the labour supply of their parents. Our article is structured as follows: Section 2 presents an overview of the institutional background and the previous research on child benefits. Section 3 describes the IAB-MSM model and the database. Section 4 introduces the current German policy context, which provides our baseline scenario, and details the three reform scenarios that we simulate in IAB-MSM. Section 5 discusses the main results from our simulations and provides guidance for policymakers. Section 6 concludes.

2. Institutional Background and Related Literature

In the context of a continental welfare regime, the family policy approach in Germany is classified as traditional, with a focus on generous cash benefits rather than on promoting the (equal) labour force integration of parents. However, in recent decades, family policy has moved towards a dual-earner model, especially by increasing spending on public child care (Ferragina and Seeleib-Kaiser 2014). The German tax and benefit system includes several policies that, either directly or indirectly, address children. We focus on the two quantitatively most important financial benefits available for children: the universal, unconditional child benefit (*Kindergeld*) and the means-tested benefit for children included in the basic income system (*Kinderregelbedarf*).

Kindergeld is granted as an unconditional standard child benefit. Its level depends on the number of children living in the household. As there is no means test, the benefit purely redistributes income from childless families to families with children. In 2021 *Kindergeld* amounted to €219 for the first and second child, €225 for the third child

and €250 for each additional child. Typically, the standard benefit is paid out to each entitled household on a monthly basis. All parents with children under 18 years old are eligible, and under certain conditions, *Kindergeld* can also be received for children between the ages 18 to 24. In 2020, standard child benefits were paid out for 16.3 million children. The *Kindergeld* is linked to the child allowance in the income tax system (*Kinderfreibetrag*). As part of the yearly household's tax return, the tax office checks whether the tax saving from the *Kinderfreibetrag* exceeds the *Kindergeld.* In this case, the household's tax liability is reduced by the difference between the tax saving from the *Kinderfreibetrag* and the (already paid out) *Kindergeld.* As long as the tax saving due to the income tax child allowance remains below the *Kindergeld*, the household receives the *Kindergeld* only. This applies to the majority of households, especially those who pay little or no income tax, such as the unemployed and low-income earners. Thus, the *Kindergeld* provides a lower limit for the child benefit granted through the *Kinderfreibetrag.* It is noteworthy that proponents of a reform of child benefits criticise that this benefit is not well targeted as richer households benefit more from the *Kinderfreibetrag* per child than low-income households from *Kindergeld.*

Among the means-tested benefits available in Germany, the child-related benefits that cover the regular living costs of children (*Kinderregelbedarf*) are the most important. The *Kinderregelbedarf* is included in the social assistance schemes for elderly people (SGB XII) and for the working-age population (SGB II, which we refer to in the following as ALG2). The ALG2 regime is a means-tested benefit aimed at guaranteeing a household's minimum income to cover basic existential, housing and heating needs, also for households without any children. Housing and heating costs are proportionally assigned to the children living in the household. ALG2 is defined by the needs of the core family (including children) and is reduced by the incomes of all family members. Almost all kind of incomes are considered, and for earned income a certain amount is exempted from the means test. In 2020, about 1.85 million minor children lived in households receiving ALG2. The monthly benefit covering children's living costs is age-dependent and is between €283 and €373 for minor children in 2021. Hence the means-tested child benefit is above the *Kindergeld*, but *Kindergeld* is fully taken into account in the means test. Additionally, ALG2 is also wealth-tested.[3] The level of the minimum income is often criticised as insufficient to ensure above all the social participation of the beneficiaries. In terms of relative poverty, a study by Lietzmann and Wenzig (2020) shows that about 70 percent of children below the age of 15 living in ALG2 households are at risk of poverty (this is the case when household income is below 60 percent of the national median income).

Our analysis is related to several strands of the literature. First, we contribute to studies that, based on microsimulation methods, examine (ex-ante) the effect of the tax benefit system or of more specific child-related transfers on income and poverty of children either by analysing benefit incidence or reform outcomes (Christl *et al.* 2022; Urban and Pezer 2018; Popova 2016; Levy *et al.* 2013; Salanauskaite and Verbist 2013; Figari *et al.* 2011). The use of microsimulation techniques is necessary in order to be able to properly account for the preexisting heterogeneity in the econom-

[3] Moreover, another supplementary child allowance (*Kinderzuschlag*) is available for those indigent households who are not entitled to SGB XII and/or SGB II benefits.

ic condition of a household in terms of demographic composition, employment status of its members, and situation with respect to other policies (*i. e.*, the entire tax and benefit system including health care, pensions, unemployment benefits and social benefits). Microsimulation techniques can therefore be used to simulate reform scenarios and the corresponding interactions between the various parts of the tax and benefit system. Our study extends the few studies available on this topic for Germany to date and relates to the current reform discussion (Blömer *et al.* 2021; Bonin *et al.* 2016; Rainer *et al.* 2013; Becker and Hauser 2012). Bonin *et al.* (2016) employ a dynamic microsimulation model, calibrated using the 2009 wave of the GSOEP data, to compute the actualised monetary value of family benefits in Germany over the life cycle. One key finding is that transfers to households increase significantly on average as a function of the number of children and decrease with the duration of single parenthood. About half of the average benefit is due to child benefits or, in a few cases, income tax child allowances. These results not only stress the importance of child benefits and income tax child allowances for the overall poverty relief policy in Germany, but also the relevance of sole parenthood in affecting the economic conditions of households with children. Two recent reports, Blömer *et al.* (2021) and Blömer (2022), present the effects of implementing a proposal by the currently co-governing party "*Bündnis 90/Die Grünen*" and the "*Bertelsmann Stiftung*" foundation to introduce a basic child benefit in Germany. They find a significant reduction in poverty, high reform costs, and negative labour supply effects for both reform proposals. In contrast to our study, they do not elaborate on the impact of different components of a basic child benefit (unconditional and means-tested benefit), but only examine the impact of the reform proposal as a whole. Another added value of our study in contrast to Blömer *et al.* (2021) and Blömer (2022) is that we also simulate different refinancing scenarios in a robustness check, which is an important aspect of the policy as child benefit reforms entail significant fiscal costs.

Most of the microsimulation studies are static in the sense that they do not take into account behavioural adjustments, *e. g.*, in terms of labour supply. By explicitly including possible labour supply effects of benefit reforms in our analysis, we also contribute to the literature examining the relationship between child-related welfare benefits and parents' labour supply. Such behavioural effects due to changes in labour supply can significantly change the distributional and poverty impact of a reform of child benefits, as found in other studies using microsimulation techniques (*e. g.*, Christl *et al.* 2022). The empirical literature provides ex-post evidence on the impact of child-related benefits on labour supply, often focusing on female labour supply (Wang 2021; Magda *et al.* 2020; Schirle 2020; Hener 2016). By exploiting changes in the benefit system within a difference-in-differences framework, these studies suggest that more generous child-related benefits negatively affect women's labour force participation. Our results confirm this relationship in general, although we find heterogeneous effects for different household types and income groups depending on the particular benefit examined. In contrast to many other studies, we examine the effects of increased child benefits on child poverty both before and after potential adjustments in parents' labour supply. The observed negative correlation between public spending on transfer programmes and the poverty rate suggests a poverty-reducing effect of in-

creasing benefit levels (Nygård *et al.* 2019; Chzhen 2017). Nevertheless, the poverty-reducing effect could be significantly reduced by adverse labour supply responses.

A large body of literature has focused on the Earned Income Tax Credit (EITC) in the United States and, in particular, on its effects on labour supply. The EITC is a temporary earnings subsidy for low- to moderate-income households, whose amount is also a function of the number of eligible children in the household. A majority of this literature points to a large rise in the employment of single mothers due to the EITC (see, *e. g.*, Meyer and Rosenbaum 2001) and to a reduction in the labour supply of secondary earners (Haan and Wrohlich 2011).[4] The reform scenarios we simulate for Germany are not directly comparable to the EITC. Nevertheless, the results obtained for the EITC are suggestive of a large elasticity on the extensive margin for single-parent households, which we also detect in our simulated scenarios. In addition to analysing benefit or spending levels, design features of benefit programmes are in the focus of research, either by analysing the correlation between the institutional setting and poverty outcomes or by simulations studies. One aspect of the design of transfer programmes is whether child-related benefits are granted universally or targeted to specific subgroups based on the income or personal characteristics of the parents or the child. Which design of the benefit system is more effective in reducing or avoiding poverty cannot be answered in general terms, as this also depends on country-specific features of family policies and the interaction with the whole tax and benefit system. A comparative analysis of different design features of child benefit systems in several EU countries by van Lancker and van Mechelen (2015) reveals that in general universal benefit systems combined with a targeting towards low-income groups are associated with lower child poverty levels. Making use of policy swaps, Popova (2016) simulates which benefit policy approaches would achieve the highest poverty reduction under a fixed budget compared to the status quo in Russia. She concludes that a policy mix of means-tested and universal benefits would be the most effective. Analysing these two types of transfers separately allows us to isolate the influence of the different design features of the benefit programmes. As for poverty reduction, our simulation confirms Popova's (2016) result by finding the highest poverty-reducing effect – with and without various forms of budget-balancing – for the combination of an increase in both the universal and means-tested benefits. Moreover, we find that negative labour supply effects of increasing the means-tested child benefit on low-income households are counteracted by positive incentive effects of increasing the unconditional benefit.

3. Methodology and Data

We employ the tax-benefit microsimulation model of the Institute for Employment Research (IAB-MSM). The IAB-MSM is based on the *Steuer-Transfer-Mikrosimulationsmodell* (documented in Jacobebbinghaus and Steiner 2003) of the Centre for Eu-

[4] Although more recent evidence (*i. e.*, Kleven 2019) casts doubts on the latter result and suggests instead that the empirical findings from 1990 data were mostly due to confounding factors. Therefore, the link between the EITC and the observed increase of labour supply for single mothers would be, at best, much smaller than previously thought.

ropean Economic Research (ZEW) and is calibrated using data from the German Socio-Economic Panel (GSOEP). In this section we summarise the main characteristics of IAB-MSM, leaving more detailed descriptions to the technical documentation of the model and previous papers which are also based on its use (Arntz *et al.* 2007; Blos *et al.* 2007; Wiemers and Bruckmeier 2009; Bruckmeier and Wiemers 2012; Bruckmeier and Wiemers 2018).

IAB-MSM is a tax and benefit microsimulation model for German households. Households' gross income is taken from the data and, starting from it, the model computes taxes, deductions and transfers based on the legal regulations in the status quo or in the simulated reform scenario. Income is differentiated between earnings from employment, self-employment, capital, rents and pensions. The model then calculates social security contributions, tax liabilities, various benefits (for children, unemployment, housing, social purposes), and then the algebraic sum provides net disposable income. In particular, IAB-MSM takes into account the complex decision tree that determines eligibility for a number of social benefits in Germany, namely social assistance for older and not employable persons (SGB XII), social assistance for employable persons between 15 and 64 years (ALG2), housing allowance (Wohngeld), the supplementary child allowance (Kinderzuschlag).[5] When simulating the entitlements to the various means-tested benefits, the statutory wealth limits are also taken into account, with the wealth information coming from the GSOEP. The model allows us to simulate the most beneficial policy to which a household is eligible and to simulate non-take-up of potential claimants. For this study, we use the German tax and benefit rules for the year 2021, on the basis of which the baseline scenario is created with the IAB-MSM.

The households in the IAB-MSM come from the GSOEP, a representative annual household panel study in Germany (see Haisken-DeNew and Frick 2005 and Wagner *et al.* 2007 for the documentation). In order to be able to calculate benefit entitlements, the model requires a large variety of data on the demographic and economic composition of the households. The GSOEP includes the required demographic variables, information on the various income sources of both persons and households. In this article we use GSOEP v37. After sample selection and cleaning of the raw data, approximately 10,300 households remain for use with the IAB-MSM. We calibrate the weights supplied with the GSOEP to account for the households excluded from our sample and to match aggregate statistics on total spending and revenues for individual taxes or policies in 2021. Prices and wages are extrapolated from 2018 to 2021 using appropriate inflation rates. Given the focus of the present paper it is worth mentioning that although children below the age of 17 are not directly interviewed in the GSOEP, they are nevertheless visible: from the answers of other members of the households, their number, age and other relevant characteristics become known.

The IAB-MSM also includes an empirically estimated discrete-choice labour supply model based on van Soest (1995). The seven categories of the response variable are defined based on the number of hours worked in a week (rounding figures to the nearest observed value): 0, 10, 15, 20, 30, 40 or 50 hours. For singles it is assumed

[5] See Bruckmeier and Wiemers (2018) for a more detailed account of the interdependencies of means-tested benefits in Germany.

that they can choose between these seven categories, for couples 49 joint weekly working hour combinations are possible. The econometric specification relies on a standard neoclassical labour supply model with leisure and consumption (net income) determining the utility function. The utility function is bounded by the budget constraint given by net income, which is calculated for each working hour category with the respective gross labour income and the tax-benefit-calculator of the IAB-MSM. Additionally, the model controls for various individual and household characteristics as well as fixed costs of part-time and full-time work. The model is estimated separately for single men, single women, single parents, and couples.

It is well documented in the literature that not all eligible households actually receive the benefits (Eurofound 2015). This is especially true for means-tested benefits such as ALG2 (Bruckmeier and Wiemers 2012; Bruckmeier and Wiemers 2018). To model a more realistic picture, we present simulation results that take into account non-take-up of ALG2 benefits. We control for the interaction between benefit take-up and labour supply by introducing a random parameter into the household's utility function that accounts for unobserved heterogeneity in the take-up costs in line with Brewer *et al.* (2006). However, since it is also a declared goal of the government to increase the take-up of ALG2 and the reformed means-tested benefits to children, results based on the assumption of full ALG2 take-up are additionally shown in Appendix B.2. Under the full take-up assumption, all eligible households are assumed to always receive the most monetarily advantageous combination of benefits to which they are entitled. The theoretical derivation of the labour supply model that accounts for benefit take-up and the estimation results are presented in Appendix A.

The analysis offered in the literature so far has ignored the possibility of a rise in taxation in order to finance the reforms. Therefore, as a robustness check, we consider additional scenarios that enforce a balanced budget either by increasing the progressivity of the income tax schedule or the consumption tax. These results are presented in Appendix C.

4. Policy Scenarios

In recent years, various parties and organisations have put forward proposals for the introduction of a basic child allowance in Germany. Most of the proposals include the following basic features:

- A means-tested component, the level of which is higher than the current level in the basic income system (ALG2).
- An unconditional component, the level of which is equal to the maximum of tax savings due to the income tax child allowance.

The first point is obviously aimed at combating child poverty, while the second aims at eliminating disparities in child benefits and income tax child allowance between high- and low-income earners, which are often perceived as unfair. Other features of a basic child benefit that are addressed in many proposals are the take-up of the benefits, the treatment of parents' earned income, and the integration of the basic child allowance into a system of family support, thus removing it from the basic income sys-

tem. However, in the absence of a detailed government proposal for the exact design at the time of writing, we analyse the two benefit components based on the existing system: the unconditional standard child benefit and the means-tested child benefit included in ALG2. The standard unconditional child benefit is not means-tested and the amount does not vary with the age of the children. The means-tested child benefit is part of the ALG2 and is both income- and asset-tested based on family income. The benefit level depends on the age of the children and is intended to cover the children's living expenses.

Our reform scenario (1) increases the unconditional child benefit to €315 for each child, regardless of the number of children in the household and their age. This amount equals the benefit obtained from the income tax child allowance by a household paying the maximum marginal income tax rate in 2021. Hence, reform scenario (1) effectively substitutes the income tax child allowance for all households with the increased unconditional child benefit.[6] The unequal treatment of high- and low-income households is thus abolished in this reform scenario, which is one of the core elements of current reform proposals.

Our reform scenario (2) addresses political demands to increase the minimum income and simulates an increase in the means-tested child benefit. Because the calculation of the benefits is based on a statistical model using the national income and expenditure survey, the calculation method would have to be changed to increase the benefit. We rely on a recalculation of the benefit level for children for the year 2021 by Becker and Held (2021), which is supported by several social welfare associations in Germany. According to this calculation, the ALG2 benefit for children below 6 years would stay constant. Since the goal of improving income for poor families would not be achieved, we increase the amount for children in this age group by the amount that would be achieved with the increased child benefit, which corresponds to €315. For the other age groups we follow Becker and Held and simulate an increase to €385 for children between 6 and 13 (up from €309 in 2021), and to €444 for children between 14 and 17 (up from €373 in 2021) (*ibid.*). Therefore, contrary to reform scenario (1) where the unconditional child benefit provides a fixed amount per child, the benefit in scenario (2) is age-dependent. In this reform scenario, the income tax child allowance is raised in line with the increase in means-tested child benefits. Raising the income tax child allowance is constitutionally required in order to avoid taxing the (now higher) subsistence minimum for children.

Finally, reform scenario (3) combines the effects of both previous scenarios (1) and (2). Thus, all households receive an increased unconditional child benefit and, moreover, households under the ALG2 regime benefit from increased child-related grants. With the increase in the means-tested child benefit, the income tax child allowance also increases automatically, as it is derived from the minimum income for children. The maximum tax saving from the increased income tax child allowance according to

[6] It should be noted that in scenario (1) the income tax child allowance is not abolished, as this would not be compatible with the German constitution. Instead, the increase in the unconditional child benefit has the effect of rendering the income tax child allowance ineffective. As a result, the unconditional child benefit in scenario (1) is at least as high as the tax saving due to the income tax child allowance in the baseline scenario for all households.

the 2021 tax schedule is €341. Since the effective unconditional child allowance should be independent of the level of household income, just as in scenario (1), we increase the unconditional child allowance to €341 in scenario (3).

The combination of scenario (1) and (2) corresponds to the potential income effects of the proposed basic child allowance: Low-income households with children without further (earned) income are financially better off compared to the status quo. As earned income increases, ALG2 benefits are reduced until the household receives only the unconditional child benefit. Table 1 summarises the values used for the unconditional and the means-tested child benefit per child in the household in the baseline (status quo) and the three reform scenarios.

Table 1: Summary of the Baseline and Simulated Reform Scenarios

		Reform scenario		
	Baseline	**(1)**	**(2)**	**(3)**
Unconditional child benefit per child	Eur 219 – 250 (based on #children)	Eur 315	Eur 219 – 250 (based on #children)	Eur 341
Means-tested child benefit per child	Eur 283 – 373 (based on age)	Eur 283 – 373 (based on age)	Eur 315 – 444 (based on age)	Eur 315 – 444 (based on age)

Source: Own representation.

In Germany, there are two other means-tested benefits that take precedence over ALG2. These benefits offer an allowance for living costs (*Wohngeld*) and a supplementary child allowance (*Kinderzuschlag*). A household cannot claim ALG2 if the combined entitlements from housing benefits and supplementary child allowance exceed the entitlement from ALG2. While our reform scenarios do not change the latter two policies in a direct way, it is important to stress that several interactions happen anyway. For instance, the law considers the unconditional child benefit as part of the income calculated for the means testing of the ALG2, which means that increasing the unconditional child benefit (as in our reform scenarios (1) and (3)) also reduces the number of households eligible for ALG2 and may push some households into the *Wohngeld* + *Kinderzuschlag* regime. The latter change happens in scenario (1) even though, contrary to scenarios (2) and (3), it does not reform ALG2 at all.

5. Results

In this section, we present our simulation results. All the results in Sections 5.1 – 5.3 do not compensate for the budgetary costs of the simulated reforms. Furthermore, the results in all tables and figures in this section are simulated under the assumption of partial benefit take-up, using the method described in section 3 and Appendix A. Selected results under the assumption of full take-up are reported in Appendix B.2 to allow for

comparison. Results obtained by reform scenarios that include compensatory tax measures to obtain budget parity are discussed in Appendix C.

5.1 Labour Supply Responses

Table 2 shows the simulated changes in labour supply for the three reform scenarios. The changes are further disaggregated by weekly working hours and family status. For the increase in the unconditional benefit in scenario (1), we find very different effects between men and women in couple households. For women, we observe a shift towards part-time work, *i.e.*, hours categories below 40 hours, resulting in an overall negative effect on labour supply of 28,000 persons working full-time.[7] These results are in line with an ex-ante study of a strong increase in the regular child benefit in Germany in 1996 based on individual survey data by Hener (2016). He finds a strong negative effect on the intensive margin of mothers' labour supply and estimates that a reallocation towards more part-time work leads to a reduction in mothers' weekly working hours by 2.3 hours. In Haan and Wrohlich (2011) the authors employ GSOEP data and find that an increase in unconditional child benefits would bear a reduction in (working) women's labour supply.

The picture is the opposite for single parents, mainly women, compared to mothers living with a partner. Scenario (1) leads to a significant labour supply response for lone parents, in that both more mothers take up employment (participation effect) and work more (30 or 40 hours per week). For male partners in couples, we simulate that the increase in the unconditional child benefit leads to a positive effect on total labour supply, although the effect is small at only about 14,000 full-time equivalents. We also simulate a positive income effect, which leads to a decrease of work in the 50 hours category. However, this does not lead to more part-time work. Instead, the 40 hours category increases, which could indicate the strong preference of male partners for full-time work.

In scenario (2), in which the non-work income of ALG2 recipients increases, we find negative effects on individual labour supply for all family types. This general pattern of labour supply response to an increase in means-tested benefits was also found in Blömer (2022). The study finds that an increase in means-tested child benefits has a large negative effect on labour supply, which he explains with strong substitution effects that make non-work financially more attractive than work.

In scenario (3), which combines scenarios (1) and (2), the negative labour supply effects in scenario (2) outweigh the (overall) small positive effects in scenario (1). Thus, we determine an overall decrease in labour supply of 21,000 persons working full-time when both benefits are increased.

Looking at the results achieved with full take-up of means-tested benefits (see Table B5), it becomes clear that taking into account endogenous take-up significantly affects some results. In scenario (1), the positive labour supply effects are more pronounced for men in couples and single parents, whereas the negative effects for women in couple households are smaller under full take-up. Since the additional child benefit in sce-

[7] Working full-time is defined as 40 work hours per week.

nario (1) is counted against means-tested benefits the household would receive when not working, working more hours becomes more attractive than not working. Under reform scenario (2), on the other hand, the negative effects are amplified, as the increase in ALG2 benefits increases non-labour income for a larger number of households. This could explain the stronger negative labour supply effects that Blömer finds for an increase in means-tested benefits, as they assume full take-up of these benefits (*ibid.*). From an economic perspective, this suggests a conflict in terms of effective income support and minimising negative labour supply responses.

Table 2: Changes in Labour Supply, Unbalanced Budget, Partial Take-up

	Couples (men)	Couples (women)	Single parents	Total
	Scenario (1)			
Part. effect	12.8	-9.4	22.4	25.8
10 hours	-5.1	6.9	-3.6	-1.8
15 hours	-0.8	8.6	-0.7	7.1
20 hours	-2.9	14.5	4.7	16.3
30 hours	4.4	-0.8	11.9	15.5
40 hours	29.3	-34.5	9.7	4.6
50 hours	-12.2	-4.1	0.4	-15.9
Full-time equiv.	14.4	-28.1	20.3	6.6
	Scenario (2)			
Part. effect	-10.6	-11.3	-16.9	-38.9
10 hours	2.9	-3.4	2.2	1.8
15 hours	1.3	-4.5	-1.3	-4.5
20 hours	3.5	-6.9	-1.7	-5.0
30 hours	-0.0	-3.0	-8.0	-11.0
40 hours	-22.0	5.2	-7.7	-24.4
50 hours	3.7	1.2	-0.6	4.2
Full-time equiv.	-14.4	-1.5	-15.2	-31.1
	Scenario (3)			
Part. effect	8.2	-22.4	12.7	-1.5
10 hours	-0.8	6.1	-1.5	3.9
15 hours	-0.7	7.8	-2.7	4.4
20 hours	-2.8	13.7	2.9	13.9
30 hours	5.0	-3.6	7.9	9.3
40 hours	20.6	-41.9	5.8	-15.6
50 hours	-13.1	-4.6	0.3	-17.4

Table 2 *(Continued)*

	Couples (men)	Couples (women)	Single parents	Total
Full-time equiv.	6.1	-39.0	12.1	-20.8

Note: Changes in labour supply compared to the baseline. Numbers expressed in 1,000 persons. Part. effect = participation effect (negative change in the 0 hours category). Full-time equiv. = full-time equivalents (change in labour supply expressed in 1,000 persons with a 40 hour working week). Source: IAB-MSM.

Next, we look at the labour supply effects stratified by income deciles based on the baseline income distribution. This differentiation is particularly important with regard to the distributional and poverty effects of the reforms, which can be both amplified and reduced by labour supply reactions. Table 3 shows the participation effect in the upper part and the overall labour supply change in the lower part broken down by income deciles.

Scenario (1) has a positive and relevant effect on labour supply in the second decile, both on labour force participation and on the overall effect. For all other deciles (with the exception of the third decile) we find small negative labour supply responses due to an income effect. The first income decile is negatively affected by all three reform scenarios. Consequently, the rise in labour supply in the second decile accounts almost exclusively for the overall positive effect of scenario (1). Moreover, all positive labour supply reactions found for scenario (1) for men in couple households and single parents come from low-income households in the second decile. This contrasts with the findings from Haan and Wrohlich (2011), who report a negative effect of an increase in the regular child benefit on both employment and worked hours across the entire population. This discrepancy can be explained by the fact that our microsimulation model (in contrast to Haan and Wrohlich 2011) also takes into account that some households who were in the phase-out range of ALG2 entitlements (and who mostly fall into the second income decile), will be pushed out of ALG2 eligibility because the (increased) universal child benefit is completely deducted from entitlements. For households pushed out of ALG2, the increase in the unconditional child benefit acts like a reduction in the effective marginal tax rate. Studies on the previously mentioned EITC (Schanzenbach and Strain 2021), which provides a tax credit supplement to earnings, also found an increase in the labour supply of single mothers and of couples with children (especially couples with two or more children, due to the policy design being more generous for them than for single-child couples, see Kleven 2019).

For scenario (2) we find that the increased benefit obtained under ALG2 decreases labour supply for the beneficiaries (who mostly fall into the first and second income deciles). Furthermore, scenario (2) shows that the increased income tax child allowance for higher income deciles increases their labour supply slightly.

Table 3: Changes in Labour Supply by Income Decile, Unbalanced Budget, Partial Take-up

	Scenario (1)	Scenario (2)	Scenario (3)
Part. effect			
Decile 1	-10.1	-9.4	-12.8
Decile 2	49.9	-29.9	31.8
Decile 3	1.0	-2.1	-2.1
Decile 4	-3.8	-0.1	-5.0
Decile 5	-3.0	0.6	-3.7
Decile 6	-3.9	1.4	-4.6
Decile 7	-2.3	0.5	-2.7
Decile 8	-1.1	0.2	-1.2
Decile 9	-0.7	0.1	-0.9
Decile 10	-0.1	-0.0	-0.2
Total	25.8	-38.9	-1.5
Full-time equiv.			
Decile 1	-13.6	-8.0	-16.8
Decile 2	52.4	-31.0	35.1
Decile 3	0.4	-1.7	-3.0
Decile 4	-3.9	0.3	-5.0
Decile 5	-4.0	2.7	-4.4
Decile 6	-6.1	3.2	-7.1
Decile 7	-6.3	2.0	-6.7
Decile 8	-8.1	1.1	-8.4
Decile 9	-3.8	0.3	-4.0
Decile 10	-0.4	0.1	-0.5
Total	6.6	-31.1	-20.8

Note: Changes in labour supply (sum over all household types) by income deciles compared to the baseline. Numbers expressed in 1,000 persons. Deciles based on net equivalent income. Net equivalent income is calculated with the modified OECD scale. Part. effect = participation effect (negative change in the 0 hours category). Full-time equiv. = full-time equivalents (change in labour supply expressed in 1,000 persons with a 40-hour working week). Source: IAB-MSM.

5.2 Effects on Income Distribution and on Relative Poverty

In Figure 1 the bar graphs show the change in equivalised disposable household income before and after accounting for endogenous take-up and labour supply responses. Income changes are presented by income deciles measured for the affected population, *i. e.*, households with at least one child that is entitled to the unconditional child benefit.

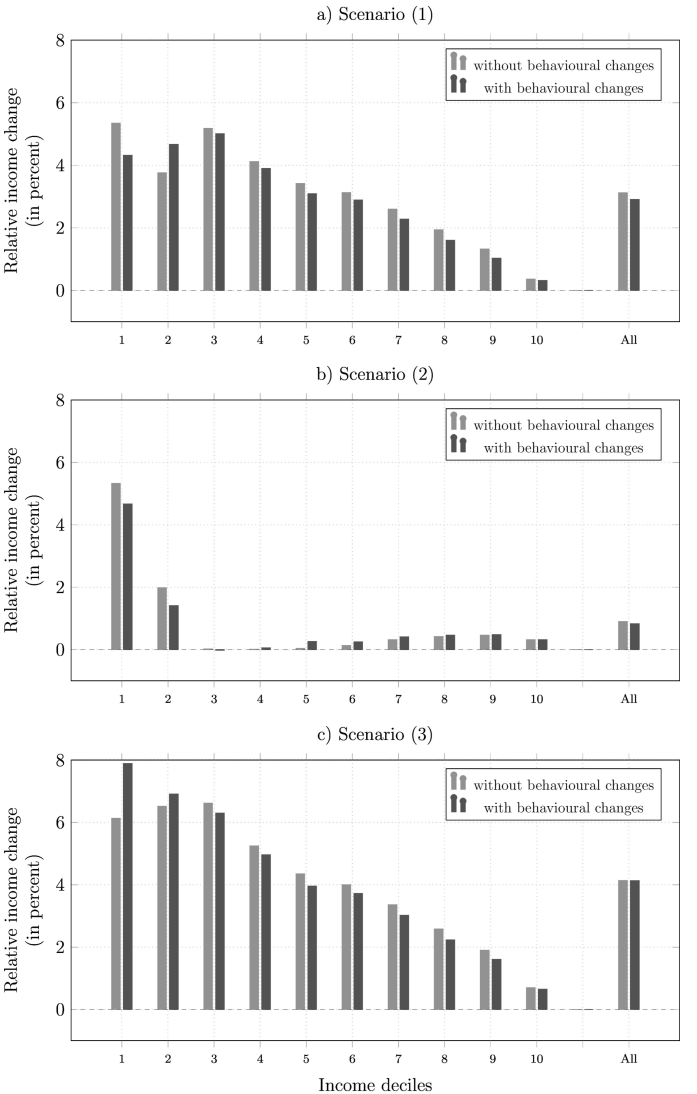
In reform scenario (1), households from the lower end of the income distribution benefit the most, and as household income increases, the relative income gain decreases. Figure B1 in Appendix B.1 shows the same results for the total population, *i. e.*, including households without children entitled to the unconditional child benefit. The results are comparable to those related to the total population. For lower income groups, the increase in the child benefit often reduces received means-tested benefits,

which dampens the income effect in these groups. As a household's taxable income rises, the gain in disposable income from the increase in unconditional child benefits converges to zero. Generally, the change in unconditional child benefit affects all income deciles, with the largest increase in disposable income in absolute terms happening for the middle income deciles. This holds at least up to the sixth decile, after which the changes start to decline (not shown). Scenario (1) aims at better positioning families with children who do not benefit maximally from the income tax child allowance due to their low tax burden, thus favouring middle income groups (in absolute values) and lower income groups (in relative values).

The changes induced by reform scenario (2) are more polarised at the extremes of the income distribution and concentrated on the lowest two deciles, as the benefit is targeted towards the poorest households. We also find small positive income effects for higher income households. The reason for the latter lies in the increased income tax child allowance, which is not means-tested and therefore also benefits the middle and especially the higher deciles.

Scenario (3) is found to always produce the largest change in disposable income, with highest income gains (after behavioural adjustments) in the first and smallest in the tenth decile. Note that this finding refers to the affected population. If we focus on the total population (see figure B1), the highest relative gains shift to the third decile. This happens because a disproportionately large number of single people live in the first two deciles and hence do not benefit from the reforms.

Figure 1: Relative Change in Equivalised Household Income by Income Deciles, Affected Population Only, Partial Take-up, Unbalanced Budget



Note: Relative change in mean household equivalent net income by income deciles compared to the baseline. The equivalent income is calculated based on the modified OECD scale. Results are calculated assuming partial take-up. Without behavioural change = working hours choice probabilities and the conditional take-up probabilities are fixed at their levels in the baseline scenario. With behavioural change = choice probabilities change according to the predictions of the labour supply model. All = Mean change over deciles. Results refer to the population living in households affected by the reform scenarios, *i. e.*, families having at least one child entitled to unconditional child benefit or ALG2. Source: IAB-MSM.

Behavioural changes, both due to changes in labour supply and take-up, have the strongest effects on the simulated income change in the first two deciles. As discussed in Section 5.1, labour supply changes are the strongest in the second decile in both reform scenarios (1) and (2) and they work in different directions, increasing household income in scenario (1) and decreasing it in scenario (2). For middle- and high-income groups, behavioural adjustments always reduce income gains, which are mainly generated by reform scenario (1).

Looking at the effects of the reforms on relative poverty, Table 4 reports a set of indicators measuring income inequality for the affected population. These are the Gini coefficient and the poverty rates measured as percentage of households below 60 percent and below 50 percent of the median income (poverty lines), with the corresponding change compared to the baseline. To isolate the effect on the poverty rates, we fix the poverty lines to the median income observed in the baseline. Again, the results refer to the affected population only. Results are obtained after accounting for labour supply changes induced by the respective reform scenario.

Taken together, these indicators suggest that all reforms scenarios simulated here are capable of reducing inequality, but they do so in different ways. Compared with scenario (2), reform scenario (1) leads to a greater reduction in inequality, as measured by the Gini coefficient, and to a greater reduction in poverty when defined relative to 60 percent of the median income. This is due to the non-targeted design of scenario (1): All income deciles are affected by the reform, but especially middle incomes, as shown in the previous Section 5.2.

Interestingly, the poverty rate in reform scenario (1) is almost unaffected when using a narrower definition of relative poverty based on 50 percent of median income. Because the poverty line remains unchanged in all reform scenarios, this cannot be explained by an increase in median income through scenario (1). The explanation for this result is found in a simulated change in the take-up of means-tested benefits after an increase in the unconditional child benefit. If the unconditional child benefit increases, the simulated entitlements from other benefit systems, foremost the basic income system for children and their parents, ALG2, are reduced to the same extent. Therefore, some households with low entitlements to ALG2 may choose not to claim these benefits after the reform. Receiving ALG2 includes not only monetary costs but also non-monetary costs which may arise, for example due to social stigma. Our model of ALG2 take-up assumes that, for each possible choice of weekly hours of work at which the household is eligible for ALG2, the household compares the net utility of claiming ALG2 (*i. e.*, taking into account the cost of take-up) with the utility in the case of non-take-up, and chooses the take-up option that yields the highest utility. In some cases, scenario (1) leads to households foregoing their ALG2 entitlement, even though this results in a worse monetary position than when receiving the benefit.

This explanation is supported by the fact that, when assuming full take-up of means-tested benefits in our model, we find a relatively strong decrease in the 50 percent poverty rate, whereas absolute poverty rates are already significantly lower in the baseline. This result points to a trade-off in terms of poverty reduction when an unconditional benefit does not cover the minimum needs and households have to apply for additional means-tested benefits.

The effect of both reform stages, shown by reform scenario (3), on the 60 percent poverty rate is strong, with a decrease of 15.6 percent or 2.5 percentage points. The poverty-reducing effects of both scenarios (1) and (2) are amplified to a small extent when combined, which could also be due to the different labour supply responses to scenarios (1) and (2). It is also to note that although reforms (1) and (2) both achieve a reduction in poverty rates (as said, when looking at rates based on 60 percent of median income), scenario (1) is much more costly for the public budget. As shown in the next section, the revenue cost of reform scenario (1) is indeed almost four times larger than scenario (2).

Again, if we focus on the entire income distribution including households without children, the poverty-reducing effects of the reform scenarios are less pronounced. For example, reform (3) simulates a decline in the 60 percent poverty rate of families of only 5.2 percent (see Table B1) instead of 15.6 percent for the affected population.

Table 4: Inequality and Poverty Indicators, Affected Population Only, Partial Take-up

		Reform scenarios		
	Baseline	**(1)**	**(2)**	**(3)**
Gini coefficient				
Level (in percent)	28.29	27.50	28.12	27.21
Abs. diff (in pp)	.	-0.80	-0.17	-1.08
Rel. diff (in percent)	.	-2.82	-0.61	-3.83
Poverty rate (60%)				
Level (in percent)	16.05	14.39	15.28	13.55
Abs. diff (in pp)	.	-1.65	-0.77	-2.50
Rel. diff (in percent)	.	-10.29	-4.80	-15.57
Poverty rate (50%)				
Level (in percent)	8.91	8.84	8.38	7.96
Abs. diff (in pp)	.	-0.07	-0.53	-0.95
Rel. diff (in percent)	.	-0.82	-5.98	-10.70

Note: Absolute and relative differences in Gini coefficient and poverty rates compared to the baseline. Poverty rates are relative to 60% and 50% of median net equivalent income. The net equivalent income is calculated based on the modified OECD scale. pp = percentage points. Results refer to the population living in households affected by the reform scenarios, *i. e.*, families having at least one child entitled to unconditional child benefit or ALG2. Source: IAB-MSM.

5.3 Revenue Impact

Table 5 reports the changes for the government budget, broken down in such a way that the first set of rows (Panel A) reports changes compared to baseline values without taking behavioural effects into account. The second set of rows (Panel B) also takes behavioural effects into account, and the third set of rows (Panel C) shows the difference between the previous two panels, therefore representing the part of the overall change that is only due to behavioural effects. Finally, Panel D shows the overall revenue effects, again broken down into an effect without behavioural adjustment and the

behavioural effect. We present the results for the fiscal change in ALG2 (for which funds to cover housing and heating costs are shown separately), housing allowance (*Wohngeld*), social assistance for older people and the non-working population, supplementary child allowance (*Kinderzuschlag*) and the unconditional child benefit. In addition, the change in tax liability and in social security contributions by employees and employers, which include all branches of social security (pension, health insurance, care insurance, and unemployment insurance). The latter are primarily affected by the changes in labour supply induced by the respective reform scenario.

The results show that total costs for scenario (1) by far exceed the costs for scenario (2). The total costs after taking into account behavioural responses amount to around €13.5 billion for scenario (1), almost four times higher than the total costs for scenario (2) (€3.7 billion). Recalling the results on the poverty reducing effects of both reforms, it becomes clear that the increase in means-tested child benefits is a much more efficient instrument for poverty reduction expressed in monetary costs. However, the decrease in ALG2 expenditure shows that some households can reduce their dependency on basic income support through scenario (1), which could also be a policy objective. The high costs of scenario (1) are predominantly due to the increased regular child benefit.

Labour supply effects simulated for scenario (2) have a strong impact on ALG2 expenditure: They amount to €1.2 billion without behavioural adjustments, and the behavioural effect almost doubles ALG2 expenditure to €2.3 billion (costs for standard requirements and accommodation). Due to the high ALG2 benefit reduction rates, decreases in earned income after negative labour supply responses are almost fully reflected in an increase in benefits.

Table B2 reports the changes in the number of households receiving different social benefits. As anticipated given the design of our reform scenarios, under scenario (1) because the number of beneficiaries of the unconditional child benefit increases, 37,000 households leave the ALG2 regime, most of them receiving the housing allowance and supplementary child benefits (*Kinderzuschlag*).[8] The opposite happens under scenario (2) where the increased minimum income brings more households into ALG2. Focusing on the reform effects on children in different benefit systems (Table B3), we find that 85,000 children leave ALG2 after scenario (1). The positive labour supply effect amplifies this result significantly to 302,000. Under reform 2, however, a maximum of 254,000 more children receive ALG2. Due to the positive labour supply effects of scenario (1) in the second income decile, the increase in both benefits in scenario (3) still leads to a reduction of children receiving ALG2 by 182,000.

The comparison of table 5 and table B7 in Appendix B.2 suggests that the cost of the reforms (2) would be larger in case of a full take-up. The reason is that, assuming full take-up, more households benefit from the reform and the negative labour supply responses are larger. In contrast, the simulated total costs for scenario (1) under full take-up are lower.

[8] Because own income of a household is primarily deducted from ALG2 covering living costs, the change in the number of households receiving ALG2 accommodation costs is the relevant figure for the change in ALG2 recipient households.

Table 5: Fiscal Effect (in Million Euro), Unbalanced Budget, Partial Take-up

	Reform scenarios		
	(1)	(2)	(3)
(A) Changes before labour supply effects			
Expenditures			
ALG2 (living costs)	-1,331	890	-905
ALG2 (accommodation costs)	-392	309	-286
Housing benefits	15	-157	-60
Social assistance	-23	131	101
Supplementary child allowance	208	-172	124
Unconditional child benefit	17,724	0	22,566
Revenues			
Income taxes	2,235	-1,335	2,234
SSC employees	0	0	0
SSC employers	0	0	0
(B) Changes after labour supply effects			
Expenditures			
ALG2 (living costs)	-1,950	1,519	-1,485
ALG2 (accommodation costs)	-1,217	822	-1,008
Housing benefits	70	-184	-28
Social assistance	-73	216	121
Supplementary child allowance	276	-231	152
Unconditional child benefit	17,724	-0	22,566
Revenues			
Income taxes	1,611	-1,272	1,521
SSC employees	-124	-130	-281
SSC employers	-142	-123	-294
(C) Labour supply effect (B) – (A)			
Expenditures			
ALG2 (living costs)	-618	630	-581
ALG2 (accommodation costs)	-825	512	-722
Housing benefits	55	-27	33
Social assistance	-49	85	21
Supplementary child allowance	68	-58	29
Unconditional child benefit	-0	-0	-0
Revenues			
Income taxes	-623	63	-713
SSC employees	-124	-130	-281
SSC employers	-142	-123	-294
(D) Totals (expenditures – revenues)			
Sum (excl. labour supply) (A)	13,966	2,336	19,306
+ Labour supply effect (C)	-480	1,332	68
= Sum (incl. labour supply) (B)	13,486	3,668	19,374

Note: Differences in fiscal revenues/expenditures (in million Euro) compared to the baseline. ALG2 = unemployment benefit II (SGB II). Social assistance = social assistance scheme for pensioners. SSC = social security contributions. Source: IAB-MSM.

6. Conclusion

In this article we study three hypothetical reforms of poverty-relief policies to support children in Germany. These three scenarios are designed to capture salient characteristics of reform proposals currently debated in the political arena, with the aim to study their distributional impact and efficacy in better supporting children compared to the status quo. We employ a behavioural microsimulation model to simultaneously account for labour supply effects, endogenous take-up of social benefits, budgetary effects, and distributional impacts of the three policies.

In order to draw general conclusions, some results are worth stressing. First, to the extent that such proposals are meant mainly as a poverty-relief instrument, we find that improvements in the means-tested components related to children are high-powered and well-targeted. They manage to reach significant reductions in poverty rates even though their budgetary impact is relatively small. When unconditional benefits are increased, the effect on overall income inequality is more pronounced. However, with significantly higher fiscal costs, a clear poverty-reducing effect can be achieved as well.

Concerning non-take-up of means-tested benefits, the results point to a trade-off in terms of poverty reduction when an unconditional, non-means-tested benefit does not cover the minimum needs and households have to apply for additional means-tested benefits. After increasing unconditional benefits, some households may choose not to claim additional means-tested benefits, although they would lose income. One approach to avoid this would be to simultaneously take measures to increase the use of means-tested benefits.

As far as labour supply effects are concerned (which may be a major concern, to the extent that entry into the labour force implies long-term improvements in the conditions of poorer households), our findings suggest that raising the unconditional child benefit would improve labour force participation among low-income households, especially among single parents, while having a negative impact on labour supply for middle- and high-income households. On the contrary, we find that reforms based on means-tested benefits tend to depress labour supply for the lowest two income deciles. The negative effects are amplified when full take-up of means-tested benefits is assumed, indicating a conflict in terms of effectiveness of income support through low non-take-up and minimising negative labour supply responses.

Interestingly a combination of increases in the universal and means-tested child benefits shows synergies in the form of a lower negative impact on labour supply and improved poverty reduction. Non-means-tested benefits then have the same effect as a reduction in the effective marginal tax rates for recipients of means-tested benefits, as non-means-tested benefits are considered in the means test. This result suggests that a more efficient policy design might combine a reform of both, means-tested and non-means-tested benefits for children, in order to achieve minimal labour supply reductions and more targeted poverty relief. Alternatively, an increase in means-tested benefits could be combined with a reduction in the transfer withdrawal rate. With respect to a non-means-tested benefit equal to the subsistence level of children (univer-

sal minimum income), our results indicate that this would be associated with very high costs, strong negative labour supply effects, but also significant poverty reduction.

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A Appendix: Labour Supply Model

A.1 A Structural Model of Labour Supply and Welfare Participation

The joint econometric model of labour supply and benefit take-up follows a standard neoclassical labour supply framework. Utility increases in its arguments leisure and consumption, bounded by the budget constraint. Since the complexity of the German tax and transfer system results in kinks and jumps as well as convex and non-convex ranges in the budget sets, in particular for couple households, we follow the recent literature and model the labour supply decision as a choice from a discrete set of working hours. In highly regulated labour markets as in Germany, with strong concentration around full-time work and non-participation for men and, in addition, some concentration on part-time work for women, the discretised decision model is fairly appropriate (van Soest 1995).

We include fixed costs of work and allow them to vary between part-time and full-time work. Van Soest (1995) argues that full-time work concurs with lower fixed costs due to higher availability, and therefore lower search costs, compared to other jobs. To estimate labour supply and welfare participation simultaneously, we follow Brewer *et al.* (2006) and introduce a term that accounts for potential stigma of welfare participation.

The discrete set of working hours categories is given by $\mathcal{H}_s$.[9] We assume that a single person can choose between $J = 7$ categories of weekly working hours, $h_{j_s} \in \mathcal{H}_s = \{0, 10, 15, 20, 30, 40, 50\}$ with $j_s = 1, 2, \ldots, J$. The hours choices of couples are given by $(h_{j_f}, h_{j_m}) \in \mathcal{H}_c = \mathcal{H}_s \times \mathcal{H}_s$, where $j := (j_f, \ j_m) \in \mathcal{J}$ denotes the tuple of the couple's hours category indices and $\mathcal{J} := \{1, 2, \ldots, J\} \times \{1, 2, \ldots, J\}$ is the set of the available hours tuples. Thus, couples choose from $J_c = J^2 = 49$ different combinations of working hours. In the following, we present the model for the more general case of a couple household. The model for the single earner household can be derived analogously.

Welfare participation is indicated by $p \in \{0, 1\} =: \mathcal{P}$. A couple's joint decision in working hours and benefit participation is given by the tuple (h_{j_f}, h_{j_m}, p), which results in a maximum number of choices of $|\mathcal{H}_c \times \mathcal{P}| = 98$.[10] However, the actual number of available choices is generally lower and household specific, since eligibility at any given hours choice (h_{j_f}, h_{j_m}) depends on wages and other household characteristics, and a household will typically not be eligible for social benefits at all available hours choices. Eligibility at some hours choice (h_{j_f}, h_{j_m}) is indicated by $e_j \in \{0, 1\}$, where the set of hours indices j that are associated with eligibility is denoted $\mathcal{E} = \{j | j \in \mathcal{J} \wedge e_j = 1\} \subseteq \mathcal{J}$. The overall choice set of a couple household is therefore given by

$$\mathcal{C}_c := \left\{ \left(h_{j_f}, h_{j_m}, 0 \right) \forall j \in \mathcal{J} \ \setminus \ \mathcal{E} \right\} \cup \left\{ \left(h_{j_f}, h_{j_m}, p \right) \forall j \in \mathcal{E} \right\}. \tag{1}$$

[9] To simplify the notation, we generally omit the household index and introduce it only when required.

[10] The maximum number of choices in the case of a single earner household is thus $|\mathcal{H}_s \times \mathcal{P}| = 14$.

Each available alternative $(h_{j_f}, h_{j_m}, p) \in \mathcal{C}_c$ is associated with a specific net income $C_{j,p}$, depending on the following: the gross wage rate of the two partners, w^f and w^m; the households' characteristics X, including non-labour income and other characteristics that are relevant to the tax and benefit system (*e. g.*, number and ages of all household members, marital status, housing costs, savings); and the take-up decision. We assume that a person's gross wage does not vary across the alternatives and can be calculated from the wage and working time observed in the GSOEP. For individuals who are not working, the hourly gross wage rates are imputed using the Heckman correction of selection bias (Heckman 1979).

The household opts to maximise its utility from consumption $C_{j,p}$ and leisure of the male and female partner, $L_{j_m} = T - h_{j_m}$ and $L_{j_f} = T - h_{j_f}$, in which the total time endowment T for each individual is set to 80 hours per week:

$$\max_{\left(h_{j_f}, h_{j_m}, p\right) \in \mathcal{C}_c} U\left(C_{j,p}, L_{j_m}, L_{j_f}, p, Z, \varepsilon_{j,p}\right) \tag{2}$$

subject to the budget restriction

$$C_{j,p} = C(w^m h_{j_m}, w^f h_{j_f}, X, p), \tag{3}$$

where Z denotes observed taste shifters (*e. g.*, age, education, presence of children in the household) that shape preferences on consumption and leisure. Unobserved preference components of a household towards specific hour alternatives are captured by $\varepsilon_{j,p}$.

We use a trans-logistic specification of the utility function as in van Soest (1995):

$$\begin{aligned} U\left(C_{j,p}, L_{j_m}, L_{j_f}, p, Z, \varepsilon_{j,p}\right) &= \beta_1 \ln\left(C_{j,p}\right) + \beta_2' z^f \ln\left(L_{j_f}\right) \\ &+ \beta_3' z^m \ln(L_{j_m}) + \beta_4 \ln(C_{j,p}))^2 \\ &+ \beta_5 \ln(L_{j_f}))^2 + \beta_6 \ln(Lj_m))^2 + \beta_7 \ln(C_{j,p}) \ln(L_{j_f}) \\ &+ \beta_8 \ln(C_{j,p}) \ln(L_{j_m}) + \beta_9 \ln(L_{j_f}) \ln(L_{j_m}) - \gamma' z^\gamma - \varphi e_j p + \varepsilon_{j,p} \\ &=: u_{j,p} - \varphi e_j p + \varepsilon_{j,p}, \end{aligned} \tag{4}$$

where the vectors of taste shifters z^f and z^m allow for observed heterogeneity in preferences for leisure. The parameter φ accounts for the disutility of welfare participation. The parameter vector γ captures fixed costs of labour market participation and full time work, whereas the characteristics z^γ allow for heterogeneity in search costs between individuals and households. The regional unemployment rate, the presence of children in the household and individual education may affect the fixed costs of work. In the static framework of our model, consumption is equal to disposable household income. We use the IAB-MSM to compute the disposable income at all available choices for each household.

Following Brewer *et al.* (2006), we assume that

$$\varepsilon_{j,0} = \varepsilon_{j,1} =: \varepsilon_j \tag{5}$$

holds for the unobserved preference terms, where the ε_j follow an i.i.d. type I extreme value distribution. Thus, we assume that the unobserved preference terms vary across the hours choices but not across the take-up choice within the hours categories. Given this assumption, rationalising the observed take-up choice requires the take-up cost

parameter φ to be random, for which we assume $\varphi := \mu_\varphi + u_\varphi$ with $u_\varphi \sim N(0, \sigma^2_{u_\varphi})$. The parameter $\sigma^2_{u_\varphi}$ represents unobserved heterogeneity in take-up costs. If benefit take-up is observed at some supplied hours of work, $(h_{j_f}, h_{j_m}, p' = 1)$, rationality requires that take-up costs for the household must be strictly smaller than the utility gained from participating in the benefit programme at this hours choice. The opposite holds for the case of observed non-take-up. Both cases place a restriction on the allowable range of φ. If, however, a household was not eligible at its observed hours of work, no constraints are imposed on φ.

Given these assumptions, finding the household's optimal choice can be interpreted as a two-stage process. In the first stage, a household decides whether it would claim the benefit at each hours category in which the household is eligible given its (unobserved) take-up costs u_φ. In the second stage, the household is assumed to pick the hours choice that results in the highest utility over all available hours categories. The probability for choosing (h_{j_f}, h_{j_m}) conditional on the random take-up costs u_φ is given by

$$Pr\left(h_{j_f}, h_{j_m} | u_\varphi\right) = \frac{exp\left(u^*_{j|u_\varphi}\right)}{\sum_{j \in \mathcal{J}} exp\left(u^*_{j|u_\varphi}\right)} \forall j \in \mathcal{J}, \tag{6}$$

where $u^*_{j|u_\varphi} = max(u_{j,0|u_\varphi}, u_{j,1|u_\varphi})$ from the first stage. Since the random take-up term u_φ is not observed it needs to be integrated out of the likelihood for a sample of observed choices, $(h_{j^{n'}_f}, h_{j^{n'}_m}, p^{n'})$, $n = 1, 2, \ldots, N$. Thus, the overall likelihood of the empirical model is given by

$$L = \prod_{n=1}^{N} \begin{cases} \int_{u_\varphi < \Delta_{j^{n'}}} Pr\left(h_{j^{n'}_f}, h_{j^{n'}_m} | u_\varphi\right) \cdot \phi\left(u_\varphi / \sigma_{u_\varphi}\right) du_\varphi & if \quad p^{n'} = 1 \wedge j^{n'} \in \mathcal{E}^n, \\ \int_{u_\varphi \geq \Delta_{j^{n'}}} Pr\left(h_{j^{n'}_f}, h_{j^{n'}_m} | u_\varphi\right) \cdot \phi\left(u_\varphi / \sigma_{u_\varphi}\right) du_\varphi & if \quad p^{n'} = 0 \wedge j^{n'} \in \mathcal{E}^n, . \\ \int_{u_\varphi} Pr\left(h_{j^{n'}_f}, h_{j^{n'}_m} | u_\varphi\right) \cdot \phi\left(u_\varphi / \sigma_{u_\varphi}\right) du_\varphi & if \quad j^{n'} \in \mathcal{J}^n \setminus \mathcal{E}^n, \end{cases} \tag{7}$$

where $\Delta_{j^{n'}} := \left(u_{j^{n'},1} - e_{j^{n'}} \mu_\varphi\right) - u_{j^{n'},0}$ denotes the differences in utilities between benefit take-up and non-take-up at the observed hours choice, $\phi(\cdot)$ is the density of the standard normal distribution, and $\mathcal{J}^n, \mathcal{E}^n, n = 1, \ldots, N$ are household-specific index sets. Since there is no closed form solution of the integrals in (7), we estimate the model using a simulated maximum likelihood approach (see, *e.g.*, Train [2003] 2009).

A.2 Labour Supply Model Estimation Results

The estimation results for the labour supply model with partial take-up, as described in the previous section, are presented below.[11] We estimate the labour supply model separately for five different types of households: (1) flexible couples, (2) semi-flexible

[11] For space reasons, we do not report the estimation results for the models that assume full benefit take-up. The estimation results are available from the authors upon request.

couples, (3) single men, (4) single women, and (5) single parents. We denote couple households as semi-flexible if only one of the partners is assumed to be flexible in his or her labour supply. Inflexible partners are either not of working age or they are self-employed, in apprenticeship training or on maternity leave. The labour supply of inflexible individuals is fixed to their observed working hours.

The trans-logistic utility function does not automatically guarantee quasi-concavity of the estimated utility function. The estimated parameters are, however, broadly consistent with utility maximising behaviour. For single parents, semi-flexible couples, and flexible couples, approximately 99 percent of the households have a positive marginal utility of net income at the observed state. The respective share for single men (single women) is 96 (97) percent. A verification of the second-order conditions for the quasi- concavity of utility (van Soest 1995) reveals that quasi-concavity is satisfied at the observed state for more than 99 percent of flexible couples and more than 98 percent of semi-flexible couples and single parents. Regarding households of single men (women), almost 96 (97) percent of the observations are consistent with utility-maximising behaviour.

The estimated coefficients of income and leisure, as well as those of the taste shifters, are in line with theoretical expectations. Fixed costs of work are highly significant for all household types. Regional unemployment tends to increase fixed costs of work. Young children, in particular children aged 3 and younger, increase the costs of work for women and are therefore important for women's decision to work via two channels: they increase women's preference for leisure and they also restrict the participation of mothers in the labour market. As expected, welfare participation is associated with positive take-up costs, and the unobserved heterogeneity in take-up costs is significant (at the level of 1 percent) for all household types.

Table A6: Mixed Logit Estimation, Couples (Two Flexible Partners), Partial Take-up

Dependent variable: Chosen hours category		
Cx		
Intercept	23.216	***
CxC		
Intercept	0.128	***
CxL1		
Intercept	-2.599	***
CxL2		
Intercept	-1.971	***
L1x		
Eastern Germany (ref. Western Germany)	-9.216	***
German nationality male	-0.379	
Leisure of female spouse * Eastern Germany	2.227	***
Leisure of female spouse * German citizen	0.025	
High-skilled male (ref: interm. skilled male)	0.747	**
Low skilled male (ref.: interm. skilled male)	1.339	***
Age male	-4.233	***
Age male squared	54.543	***
Refugee status male	6.827	***
Intercept	120.865	***
L1xL1		

(Continued)

Dependent variable: Chosen hours category		
Intercept	-13.612	***
L2x		
Eastern Germany (ref. Western Germany)	-10.739	***
German nationality female	-0.846	**
High-skilled female (ref: interm. skilled female)	-0.768	***
Low skilled female (ref.: interm. skilled female)	0.004	
Age female	-2.524	***
Age female squared	37.008	***
Children =3 in household	3.795	***
Children aged 4 to 6 in household	2.174	***
Children aged 7 to 16 in household	1.753	***
Children aged 17 and older in household	0.546	***
Refugee status female	4.288	*
Intercept	111.477	***
L2xL2		
Intercept	-12.625	***
L1xL2		
Intercept	-1.098	**
IND		
Fixed costs employment of male spouse	3.156	***
Fixed costs employment of female spouse	1.947	***
Fixed costs for full-time job male spouse	-2.886	***
Fixed costs for full-time job female spouse	-0.884	***
Fixed costs empl. * unemployment rate	0.208	***
Fixed costs empl. * unemployment rate	0.150	***
Fixed costs empl. * high-skilled (ref. med. skill)	0.195	
Fixed costs empl. * high-skilled (ref. med. skill)	0.280	
Fixed costs empl. * low-skilled (ref. med. skill)	0.175	
Fixed costs empl. * low-skilled (ref. med. skill)	0.644	***
Fixed costs empl. * children = 3	0.928	***
Fixed costs empl. * children aged 4 to 6	-0.078	
Fixed costs empl. * children = 16	-0.484	***
Fixed costs empl. * refugee status	-0.320	
Fixed costs empl. * refugee status	1.707	**
TUcons		
Intercept	1.454	***
sd 1		
Intercept	-1.401	***
sd 14		
Intercept	2.390	***
sd 27		
Intercept	-0.042	***
sd stigma		
Intercept	1.862	***

(Continued)

Dependent variable: Chosen hours category		
Log likelihood	-6965.11	
r2-p	0.39	
N	143815	

Note: ***p < 0.01, **p < 0.05, *p < 0.1. Cx = consumption interactions, CxC = consumption squared interactions, CxL1 = consumption*leisure male spouse interactions, CxL2 = consumption*leisure female spouse interactions, L1x = leisure male spouse interactions, L1xL1 = leisure male spouse squared interactions, L2x = leisure female spouse interactions, L2xL2 = leisure female spouse squared interactions, L1xL2 = leisure male*leisure female spouse interaction, IND = taste shifters. TUcons = random parameter for costs of benefit take-up. sd 1 = standard deviation of random parameter CxIntercept, sd 14 = standard deviation of random parameter L1xIntercept, sd 27 = standard deviation of random parameter L2xIntercept. sd stigma = standard deviation of cost of benefit take-up parameter. r2 p = pseudo-R^2, N = number of observations.
Source: IAB-MSM, SOEP v37.

Table A7: Mixed Logit Estimation, Couples (One Flexible Partner), Partial Take-up

Dependent variable: Chosen hours category		
Cx		
Intercept	13.978	***
CxC		
Intercept	0.392	*
CxL1		
Intercept	-2.027	***
L1x		
Woman (ref: man)	5.755	***
Leisure of inflexible spouse (Log)	0.899	***
High-skilled female (ref: interm. skilled female)	-0.448	
High-skilled male (ref: interm. skilled male)	0.626	
Low skilled female (ref.: interm. skilled female)	-0.041	
Low skilled male (ref.: interm. skilled male)	0.957	
Age	-3.601	**
Age squared	57.195	***
Eastern Germany (ref. Western Germany)	0.087	
Eastern Germany * female	-1.795	**
German nationality	-1.023	
Children =3 in household	1.475	**
Children aged 4 to 6 in household	1.310	**
Children aged 7 to 16 in household	1.178	***
Children aged 17 and older in household	0.568	
Refugee status	-1.364	
Intercept	99.293	***
L1xL1		
Intercept	-12.531	***
IND		
Fixed costs employment	3.460	***

(Continued)

Dependent variable: Chosen hours category		
Fixed costs for full-time job	-1.385	***
Dummy for employment * dummy female	-0.838	*
Fixed costs empl. * children = 3	2.672	***
Fixed costs empl. * children aged 4 to 6	-0.032	
Fixed costs empl. * children = 16	-0.161	
Fixed costs empl. * unemployment rate	0.031	
Fixed costs empl. * high-skilled (ref. med. skill)	-0.202	
Fixed costs empl. * low-skilled (ref. med. skill)	0.257	
Fixed costs empl. * refugee status	1.368	
TUcons		
Intercept	2.388	***
sd 1		
Intercept	-2.773	***
sd 20		
Intercept	-0.065	
sd stigma		
Intercept	3.734	***
Log likelihood	-1424.73	
r2 p	0.27	
N	6993	

Note: ***p < .01, **p < .05, *p < .1. Cx = consumption interactions, CxC = consumption squared interactions, CxL1 = consumption*leisure interactions, L1x = leisure flexible spouse interactions, L1xL1 = leisure of flexible spouse squared interactions, IND = taste shifters. TUcons = random parameter for costs of benefit take-up. sd 1 = standard deviation of random parameter CxIntercept, sd 20 = standard deviation of random parameter LxIntercept. sd stigma = standard deviation of cost of benefit take-up parameter. r2 p = pseudo-R^2, N = number of observations.
Source: IAB-MSM, SOEP v37.

Table A8: Mixed Logit Estimation, Single Men, Partial Take-up

Dependent variable: Chosen hours category		
Cx		
Intercept	9.724	***
CxC		
Intercept	0.108	***
CxL1		
Intercept	-2.015	***
L1x		
High-skilled male (ref: interm. skilled male)	-0.844	
Low skilled male (ref.: interm. skilled male)	0.348	
Eastern Germany (ref. Western Germany)	-0.242	
German nationality	-0.611	
Age	0.042	
Age squared	4.469	
Refugee status	1.792	***

(Continued)

Dependent variable: Chosen hours category		
Intercept	74.230	***
L1xL1		
Intercept	-9.199	***
IND		
Fixed costs employment	2.849	***
Fixed costs for full-time job	-3.050	***
Fixed costs empl. * unemployment rate	0.064	*
Dependent variable: Chosen hours category		
Fixed costs empl. * low-skilled (ref. med. skill)	0.019	
Fixed costs empl. * high-skilled (ref. med. skill)	0.676	
Fixed costs empl. * refugee status	0.219	
TUcons		
Intercept	0.483	***
sd stigma		
Intercept	0.744	***
Log likelihood	-1479.54	
r2 p	0.31	
N	7742	

Note: *** p < .01, ** p < .05, * p < .1. Cx = consumption interactions, CxC = consumption squared interactions, CxL1 = consumption*leisure interactions, L1x = leisure interactions, L1xL1 = leisure squared interactions, IND = taste shifters. TUcons = random parameter for costs of benefit take-up. sd stigma = standard deviation of cost of benefit take-up parameter. r2 p = pseudo-R^2, N = number of observations.
Source: IAB-MSM, SOEP v37.

Table A9: Mixed Logit Estimation, Single Women, Partial Take-up

Dependent variable: Chosen hours category		
Cx		
Intercept	14.047	***
CxC		
Intercept	0.170	***
CxL1		
Intercept	-2.879	***
L1x		
Eastern Germany (ref. Western Germany)	-0.458	
German nationality	-0.690	
High-skilled female (ref: interm. skilled female)	-0.041	
Low skilled female (ref.: interm. skilled female)	-0.061	
Age	-1.873	*
Age squared	33.439	***
Refugee status	4.887	***
Intercept	109.373	***
L1xL1		
Intercept	-13.500	***

(Continued)

Dependent variable: Chosen hours category		
IND		
Fixed costs employment	2.314	***
Fixed costs for full-time job	-1.179	***
Fixed costs empl. * unemployment rate	0.126	**
Fixed costs empl. * low-skilled (ref. med. skill)	0.870	**
Fixed costs empl. * high-skilled (ref. med. skill)	0.594	
Fixed costs empl. * refugee status	0.759	
TUcons		
Intercept	0.982	***
sd stigma		
Intercept	1.078	***
Log likelihood	-1410.68	
r2 p	0.25	
N	6783	

Note: *** p < .01, ** p < .05, * p < .1. Cx = consumption interactions, CxC = consumption squared interactions, CxL1 = consumption*leisure interactions, L1x = leisure interactions, L1xL1 = leisure squared interactions, IND = taste shifters. TUcons = random parameter for costs of benefit take-up. sd stigma = standard deviation of cost of benefit take-up parameter. r2 p = pseudo-Rˆ2, N = number of observations.
Source: IAB-MSM, SOEP v37

Table A10: Mixed Logit Estimation, Single Parents, Partial Take-up

Dependent variable: Chosen hours category		
Cx		
Intercept	11.725	***
CxC		
Intercept	0.114	
CxL1		
Intercept	-2.290	***
L1x		
Eastern Germany (ref. Western Germany)	-1.428	***
German nationality	-1.503	*
High-skilled single parent (ref. interm. skill)	-1.491	**
Low-skilled single parent (ref. interm. skill)	-1.363	*
Age	-7.315	***
Age squared	86.844	***
Children =3 in household	4.666	***
Children aged 4 to 6 in household	1.653	**
Children aged 7 to 16 in household	1.237	***
Children aged 17 and older in household	0.249	
Refugee status	3.382	
Intercept	131.703	***
L1xL1		
Intercept	-14.685	***

(Continued)

Dependent variable: Chosen hours category		
IND		
Fixed costs employment	2.546	***
Fixed costs for full-time job	-0.274	
Fixed costs empl. * unemployment rate	0.150	**
Fixed costs empl. * low-skilled (ref. med. skill)	1.182	***
Fixed costs empl. * high-skilled (ref. med. skill)	0.416	
Fixed costs empl. * children = 3	0.445	
Fixed costs empl. * children aged 4 to 6	-0.177	
Fixed costs empl. * refugee status	1.578	
TUcons		
Intercept	0.523	**
sd 1		
Intercept	0.926	***
sd 15		
Intercept	0.606	
sd stigma		
Intercept	1.222	
Log likelihood	-962,58	
R2p	0.16	
N	4144	

Note: *** p < .01, ** p < .05, * p < .1. Cx = consumption interactions, CxC = consumption squared interactions, CxL1 = consumption*leisure interactions, L1x = leisure interactions, L1xL1 = leisure squared interactions, IND = taste shifters. TUcons = random parameter for costs of benefit take-up. sd 1 = standard deviation of random parameter CxIntercept, sd 15 = standard deviation of random parameter Lx- Intercept. sd stigma = standard deviation of cost of benefit take-up parameter. r2 p = pseudo-R^2, N = number of observations.
Source: IAB-MSM, SOEP v37.

B Appendix: Additional Tables and Figures

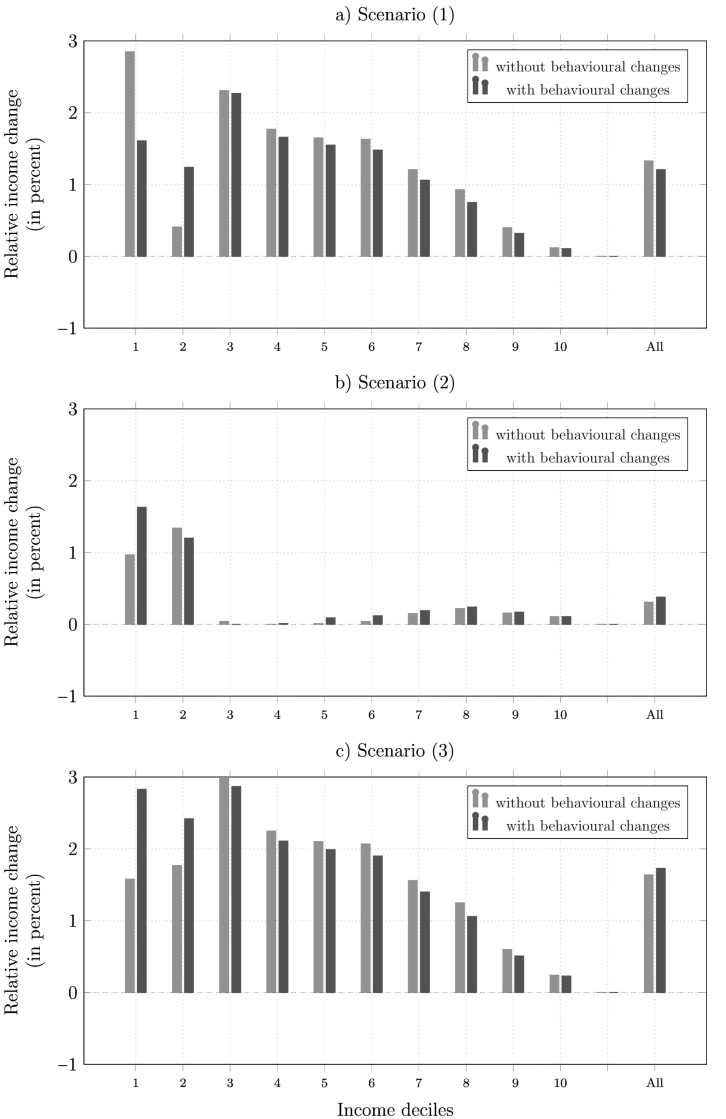
B.1 Additional Tables and Figures for Simulation Results Under Partial Take- up

Table B1: Inequality and Poverty Indicators, Total Population, Partial Take-up

		Reform scenarios		
	Baseline	**(1)**	**(2)**	**(3)**
Gini coefficient				
Level (in percent)	30.35	30.04	30.27	29.92
Abs. diff (in pp)	.	-0.31	-0.08	-0.43
Rel. diff (in percent)	.	-1.01	-0.27	-1.41
Poverty rate (60 %)				
Level (in percent)	19.74	19.07	19.43	18.72
Abs. diff (in pp)	.	-0.67	-0.31	-1.02
Rel. diff (in percent)	.	-3.42	-1.59	-5.17
Poverty rate (50 %)				
Level (in percent)	13.52	13.49	13.29	13.12
Abs. diff (in pp)	.	-0.03	-0.23	-0.41
Rel. diff (in percent)	.	-0.22	-1.74	-3.01

Note: Absolute and relative differences in Gini coefficient and poverty rates compared to the baseline. Poverty rates are relative to 60 % and 50 % of median net equivalent income. The net equivalent income is calculated based on the modified OECD scale. pp = percentage points. Results refer to the total population. Source: IAB-MSM.

Figure B1: Relative Change in Equivalised Household Income by Income Deciles, Total Population, Partial Take-up, Unbalanced Budget



Note: Relative change in mean household equivalent net income by income deciles compared to the baseline. Equivalent income is calculated based on the modified OECD scale. Results are calculated assuming partial take-up. Without behavioural change = working hours choice probabilities and the conditional take-up probabilities are fixed at their levels in the baseline scenario. With behavioural change = choice probabilities change according to the predictions of the labour supply model. All = Mean change over deciles. Results refer to the total population. Source: IAB-MSM.

Table B2: Change in Number of Households (in 1,000), Unbalanced Budget, Partial Take-up

	Reform scenarios		
	(1)	(2)	(3)
(A) Changes before labour supply effects			
ALG2 (living costs)	-55	23	-28
ALG2 (accommodation costs)	-37	45	-47
Housing benefits	9	-37	-9
Supplementary child allowance	36	-42	23
(B) Changes after labour supply effects			
ALG2 (living costs)	-173	97	-131
ALG2 (accommodation costs)	-165	116	-162
Housing benefits	30	-48	4
Supplementary child allowance	62	-58	35
(C) Labour supply effect (B) – (A)			
ALG2 (living costs)	-118	74	-104
ALG2 (accommodation costs)	-129	71	-115
Housing benefits	21	-11	13
Supplementary child allowance	25	-16	12

Note: Differences in households (in 1.000) receiving a positive amount of each item in the table compared to the baseline. ALG2 = unemployment benefit II (SGB II). Source: IAB-MSM.

Table B3: Change in Number of Children (in 1,000), Unbalanced Budget, Partial Take-up

	Reform scenarios		
	(1)	(2)	(3)
(A) Changes before labour supply effects			
ALG2 (living costs)	-102	52	-59
ALG2 (accommodation costs)	-85	99	-49
Housing benefits	11	-80	-33
Supplementary child allowance	85	-96	49
(B) Changes after labour supply effects			
ALG2 (living costs)	-304	213	-225
ALG2 (accommodation costs)	-302	254	-231
Housing benefits	40	-100	-18
Supplementary child allowance	126	-132	61
(C) Labour supply effect (B) – (A)			
ALG2 (living costs)	-202	160	-167
ALG2 (accommodation costs)	-217	155	-182
Housing benefits	29	-20	15
Supplementary child allowance	42	-36	12

Note: Differences in children (in 1.000) who live in households which receive a positive amount of each item in the table compared to the baseline. ALG2 = unemployment benefit II (SGB II). Source: IAB-MSM.

B.2 Additional Tables and Figures for Simulation Results Under Full Take-up

Table B4: Inequality and Poverty Indicators, Total Population, Full Take-up

	Baseline	Reform scenarios (1)	(2)	(3)
Gini coefficient				
Level (in percent)	29.17	28.83	29.10	28.70
Abs. diff (in pp)	.	-0.35	-0.07	-0.47
Rel. diff (in percent)	.	-1.19	-0.24	-1.62
Poverty rate (60 %)				
Level (in percent)	18.55	17.48	18.17	17.02
Abs. diff (in pp)	.	-1.07	-0.37	-1.53
Rel. diff (in percent)	.	-5.78	-2.02	-8.25
Poverty rate (50 %)				
Level (in percent)	11.67	10.87	11.00	10.36
Abs. diff (in pp)	.	-0.81	-0.68	-1.32
Rel. diff (in percent)	.	-6.92	-5.79	-11.29

Note: Absolute and relative differences in Gini coefficient and poverty rates compared to the baseline. Poverty rates are relative to 60 % and 50 % of median net equivalent income. The net equivalent income is calculated based on the modified OECD scale. pp = percentage points. Results refer to the total population. Source: IAB-MSM.

Table B5: Changes in Labour Supply, Unbalanced Budget, Full Take-Up

	Couples (men)	Couples (women)	Single parents	Total
	Scenario (1)			
Part. effect	26.3	-1.5	34.7	59.5
10 hours	-5.7	0.3	-6.9	-12.3
15 hours	-0.8	11.2	-0.7	9.6
20 hours	-5.5	10.8	6.7	12.0
30 hours	5.1	4.2	18.8	28.1
40 hours	51.4	-23.9	17.0	44.5
50 hours	-18.2	-4.1	-0.2	-22.5
Full-time equiv.	28.0	-16.2	32.2	44.0
	Scenario (2)			
Part. effect	-19.4	-9.7	-19.3	-48.4
10 hours	3.6	-1.8	3.1	4.9
15 hours	1.7	-4.0	-0.6	-2.9
20 hours	7.5	-8.6	-1.7	-2.7
30 hours	-1.0	0.0	-9.2	-10.1
40 hours	-31.8	4.3	-10.1	-37.6
50 hours	0.5	0.4	-0.9	0.0

(Continued)

	Couples (men)	Couples (women)	Single parents	Total
Full-time equiv.	-26.6	-1.4	-18.4	-46.4
	Scenario (3)			
Part. effect	21.1	-23.5	21.8	19.4
10 hours	-0.8	1.2	-6.1	-5.6
15 hours	-0.6	9.7	-2.3	6.7
20 hours	-2.7	11.4	5.5	14.2
30 hours	7.2	-7.0	13.7	13.8
40 hours	39.1	-34.3	11.6	16.4
50 hours	-21.0	-4.5	-0.5	-26.1
Full-time equiv.	16.4	-35.5	21.5	2.4

Note. — Changes in labour supply compared to the baseline. Numbers expressed in 1,000 persons. Part. effect = participation effect (negative change in the 0 hours category). Full-time equiv. = full-time equivalents (change in labour supply expressed in 1,000 persons with a 40-hour working week). Source: IAB-MSM.

Table B6: Changes in Labour Supply by Income Decile, Unbalanced Budget, Full Take-Up

	Scenario (1)	Scenario (2)	Scenario (3)
Part. effect			
Decile 1	26.4	-13.9	15.6
Decile 2	51.5	-34.0	28.5
Decile 3	1.2	-2.8	-0.9
Decile 4	-4.7	0.3	-5.9
Decile 5	-4.1	0.5	-5.3
Decile 6	-4.0	1.0	-4.8
Decile 7	-2.4	0.6	-2.7
Decile 8	-2.7	-0.1	-2.8
Decile 9	-1.3	0.0	-1.9
Decile 10	-0.4	0.0	-0.4
Total	59.5	-48.4	19.4
Full-time equiv.			
Decile 1	23.1	-13.0	12.6
Decile 2	60.4	-39.9	37.4
Decile 3	0.7	-2.4	-1.7
Decile 4	-5.9	0.5	-7.3
Decile 5	-5.8	2.2	-7.3
Decile 6	-7.2	3.0	-8.2
Decile 7	-6.6	2.4	-7.3
Decile 8	-9.7	0.7	-10.1
Decile 9	-4.0	0.1	-4.6
Decile 10	-0.9	-0.0	-1.1

(Continued)

	Scenario (1)	Scenario (2)	Scenario (3)
Total	44.0	-46.4	2.4

Note. Changes in labour supply (sum over all household types) by income deciles compared to the baseline. Numbers expressed in 1,000 persons. Deciles based on net equivalent income. Net equivalent income is calculated with the modified OECD scale. Part. effect = participation effect (negative change in the 0 hours category). Full-time equiv. = full-time equivalents (change in labour supply expressed in 1,000 persons with a 40-hour working week). Source: IAB-MSM.

Table B7: Fiscal Effect (in Million Euro), Unbalanced Budget, Full Take-up

	Reform scenarios		
	(1)	(2)	(3)
(A) Changes before labour supply effects			
Expenditures			
ALG2 (living costs)	-2,079	1,488	-1,398
ALG2 (accommodation costs)	-538	682	-224
Housing benefits	18	-284	-157
Social assistance	-59	334	258
Supplementary child allowance	278	-450	-1
Unconditional child benefit	17,722	0	22,564
Revenues			
Income taxes	2,218	-1,329	2,218
SSC employees	0	0	0
SSC employers	0	0	0
(B) Changes after labour supply effects			
Expenditures			
ALG2 (living costs)	-2,567	1,948	-1,702
ALG2 (accommodation costs)	-1,200	1,064	-644
Housing benefits	163	-333	-65
Social assistance	-61	338	259
Supplementary child allowance	569	-582	167
Unconditional child benefit	17,722	-0	22,564
Revenues			
Income taxes	1,617	-1,330	1,492
SSC employees	96	-228	-137
SSC employers	53	-218	-172
(C) Labour supply effect (B) – (A)			
Expenditures			
ALG2 (living costs)	-489	460	-304
ALG2 (accommodation costs)	-662	382	-420
Housing benefits	144	-49	92
Social assistance	-2	4	1
Supplementary child allowance	291	-132	168
Unconditional child benefit	0	-0	0
Revenues			

(Continued)

	Reform scenarios		
	(1)	**(2)**	**(3)**
Income taxes	-601	-1	-726
SSC employees	96	-228	-137
SSC employers	53	-218	-172
(D) Totals (expenditures – revenues)			
Sum (excl. labour supply) (A)	13,125	3,099	18,823
+ Labour supply effect (C)	-265	1,112	572
= Sum (incl. labour supply) (B)	12,860	4,211	19,396

Note: Differences in fiscal revenues/expenditures (in million Euro) compared to the baseline. ALG2 = unemployment benefit II (SGB II). Social assistance = social assistance scheme for pensioners. SSC = social security contributions. Source: IAB-MSM.

Table B8: Change in Number of Households (in 1,000), Unbalanced Budget, Full Take-up

	Reform scenarios		
	(1)	**(2)**	**(3)**
(A) Changes before labour supply effects			
ALG2 (living costs)	-70	62	-32
ALG2 (accommodation costs)	-65	99	-41
Housing benefits	10	-80	-42
Supplementary child allowance	63	-96	16
(B) Changes after labour supply effects			
ALG2 (living costs)	-161	118	-85
ALG2 (accommodation costs)	-165	154	-106
Housing benefits	65	-101	-5
Supplementary child allowance	145	-137	70
(C) Labour supply effect (B) – (A)			
ALG2 (living costs)	-91	57	-52
ALG2 (accommodation costs)	-100	55	-65
Housing benefits	55	-21	37
Supplementary child allowance	82	-41	54

Note: Differences in households (in 1.000) receiving a positive amount of each item in the table compared to the baseline. ALG2 = unemployment benefit II (SGB II). Source: IAB-MSM.

Table B9: Change in Number of Children (in 1,000), Unbalanced Budget, Full Take-up

	Reform scenarios		
	(1)	(2)	(3)
(A) Changes before labour supply effects			
ALG2 (living costs)	-139	152	-65
ALG2 (accommodation costs)	-134	230	-3
Housing benefits	13	-182	-122
Supplementary child allowance	128	-226	2
(B) Changes after labour supply effects			
ALG2 (living costs)	-306	272	-153
ALG2 (accommodation costs)	-314	341	-112
Housing benefits	105	-219	-70
Supplementary child allowance	290	-317	96
(C) Labour supply effect (B) – (A)			
ALG2 (living costs)	-167	120	-87
ALG2 (accommodation costs)	-180	111	-109
Housing benefits	92	-37	51
Supplementary child allowance	162	-91	93

Note: Differences in children (in 1.000) who live in households which receive a positive amount of each item in the table compared to the baseline. ALG2 = unemployment benefit II (SGB II). Source: IAB-MSM.

Table B10: Inequality and Poverty Indicators, Affected Population Only, Full Take-up

		Reform scenarios		
	Baseline	(1)	(2)	(3)
Gini coefficient				
Level (in percent)	26.94	26.04	26.81	25.75
Abs. diff (in pp)	.	-0.90	-0.13	-1.19
Rel. diff (in percent)	.	-3.34	-0.47	-4.40
Poverty rate (60 %)				
Level (in percent)	14.96	12.33	14.04	11.21
Abs. diff (in pp)	.	-2.63	-0.92	-3.74
Rel. diff (in percent)	.	-17.55	-6.12	-25.04
Poverty rate (50 %)				
Level (in percent)	5.92	3.94	4.39	2.82
Abs. diff (in pp)	.	-1.98	-1.52	-3.09
Rel. diff (in percent)	.	-33.45	-25.74	-52.31

Note: Absolute and relative differences in Gini coefficient and poverty rates compared to the baseline. Poverty rates are relative to 60 % and 50 % of median net equivalent income. The net equivalent income is calculated based on the modified OECD scale. pp = percentage points. Results refer to the population living in households affected by the reform scenarios, *i. e.*, families having at least one child entitled to unconditional child benefit or ALG2. Source: IAB-MSM.

C Appendix: Reform Effects Under a Balanced Budget

Since the budget implications of the three simulated scenarios strongly differ, for added robustness, we additionally consider the effects of the three reforms while preserving budget parity. In the following, we present results obtained when the reform costs are offset by an increase in the income tax (BBI) or by an increase in consumption taxes (BBC). The first closure (BBI) increases the income tax burden by a factor equal for all households to compensate for revenue losses.[12] It can be therefore thought of as a leftist complementary policy which is meant to further aim at a more equal income distribution.[13] The second closure (BBC) generates a balanced budget by raising the consumption tax.[14] The BBC reform is therefore closer to proposals from right wing parties aiming at minimising distortions caused by the tax system on individual choices.

Table C11 reports fiscal effects for each reform scenario and closure type, where total costs are (approximately) balanced after taking into account the behavioural adjustments. The effects on the Gini coefficient and the poverty rates under BBI and BBC are reported in Table C12. In addition, the table also shows the results under an unbalanced budget (UB) for comparability. As expected, refinancing through the income tax, due to its progressive design, amplifies the negative effect on income inequality, which is reflected in a stronger decline of the Gini coefficient under BBI compared to UB. This applies to both scenario (1) and scenario (2). By contrast, refinancing via a consumption tax slightly weakens the reducing effect on the Gini coefficient in scenario (1).

Adjusting the income tax has only a minor impact on the poverty rates compared to the results obtained without refinancing (UB): The 60 percent poverty rate increases by a maximum of 0.18 under BBI (scenario 3) and the 50 percent poverty rate increases by at most 0.14 percentage points (scenario 1). Not surprisingly, refinancing via a consumption tax (BBC) has a higher impact on poverty rates than refinancing via BBI: With the former, the effect on the 60 percent poverty rate increases by 0.37 percentage points compared to the UB results in scenario (3). Refinancing with either BBI or BBC has the smallest impact compared to UB in scenario (2), which reflects the relatively low fiscal costs of scenario (2).

Interestingly, even after compensating to reach budget neutral reforms, reform scenario (3) outperforms the scenarios (1) and (2) in terms of its ability to reduce inequality and poverty rates based on 60 percent of median income, both under BBI and BBC.

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[12] This factor varies over the policy scenarios and is found by iteratively recalculating the households' budget constraint and the labour supply response.

[13] Since an income tax in Germany is only paid if the taxable income exceeds an allowance for the household and the income tax rate is piecewise quadratic in a large range of taxable income, the BBI closure has a progressive effect.

[14] As consumption is not modelled directly in the IAB-MSM, the increase in consumption tax is approximated by multiplying disposable income by a factor that is constant for all households. Again, the factor varies over scenarios and is found by iteratively solving the IAB-MSM. In our static labour supply model, there is no saving motive, and thus disposable income equals consumption. Therefore, our BBC closure has a proportional effect on households' income, whereas a "real" consumption tax would have a regressive effect.

Table C11: Fiscal Effect (in Million Euro) Under Different Balanced Budget Assumptions, Partial Take-up

	Reform scenarios								
	(1)			(2)			(3)		
	UB	BBI	BBC	UB	BBI	BBC	UB	BBI	BBC
(A) Changes before labour supply effects									
Expenditures									
ALG2 (living costs)	-1,331	-1,331	-1,331	890	890	890	-905	-904	-905
ALG2 (accommodation costs)	-392	-390	-392	309	310	309	-286	-271	-286
Housing benefits	15	15	15	-157	-157	-157	-60	-60	-60
Social assistance	-23	-23	-23	131	131	131	101	101	101
Supplementary child allowance	208	218	208	-172	-170	-172	124	125	124
Unconditional child benefit	17,724	17,724	17,724	0	0	0	22,566	22,566	22,566
Revenues									
Income taxes	2,235	18,551	2,235	-1,335	3,116	1,335	2,234	25,948	2,234
SSC employees	0	0	0	0	0	0	0	0	0
SSC employers	0	0	0	0	0	0	0	0	0
Consumption tax	.	.	14,603	.	.	4,046	.	.	21,024
(B) Changes after labour supply effects									
Expenditures									
ALG2 (living costs)	-1,950	-1,874	-1,895	1,519	1,519	1,540	-1,485	-1,364	-1,393
ALG2 (accommodation costs)	-1,217	-1,155	-1,167	822	843	838	-1,008	-898	-930
Housing benefits	70	73	68	-184	-183	-184	-28	-23	-30
Social assistance	-73	-72	-71	216	216	216	121	123	123
Supplementary child allowance	276	290	272	-231	-227	-231	152	159	148
Unconditional child benefit	17,724	17,724	17,724	-0	-0	-0	22,566	22,566	22,566
Revenues									
Income taxes	1,611	16,608	1,244	-1,272	2,828	-1,403	1,521	23,223	1,003
SSC employees	-124	-800	-449	-130	-319	-230	-281	-1,322	-753
SSC employers	-142	-820	-463	-123	-313	-223	-294	-1,337	-763
Consumption tax	.	.	14,587	.	.	4,045	.	.	20,991
(C) Labour supply effect (B) – (A)									
Expenditures									
ALG2 (living costs)	-618	-543	-564	630	657	650	-581	-460	-488
ALG2 (accommodation costs)	-825	-764	-775	512	533	528	-722	-628	-644

(Continued)

	Reform scenarios								
	(1)			(2)			(3)		
	UB	**BBI**	**BBC**	**UB**	**BBI**	**BBC**	**UB**	**BBI**	**BBC**
Housing benefits	55	58	53	-27	-26	-27	33	37	30
Social assistance	-49	-48	-48	85	85	85	21	22	23
Supplementary child allowance	68	72	64	-58	-58	-59	29	35	24
Unconditional child benefit	-0	0	-0	-0	-0	-0	-0	-0	0
Revenues									
Income taxes	-623	-1,942	-990	63	-288	-68	-713	-2,725	1,231
SSC employees	-124	-800	-449	-130	-319	-230	-281	-1,322	-753
SSC employers	-142	-820	-463	-123	-313	-223	-294	-1,337	-763
Consumption tax	.	.	-15	.	.	-1	.	.	-33
(D) Totals (expenditures – revenues)									
Sum (excl. labour supply) (A)	13,966	-2,339	-637	2,336	-2,111	-1,710	19,306	-4,392	-1,718
+ Labour supply effect (C)	-480	2,336	648	1,332	2,110	1,701	68	4,390	1,724
= Sum (incl. labour supply) (B)	13,486	-3	11	3,668	-1	-9	19,374	-1	6

Note: Differences in fiscal revenues/expenditures (in million Euro) compared to the baseline. UB = unbalanced budget. BBI = balanced budget by adjusting income tax. BBC = balanced budget by adjusting consumption tax. ALG2 = unemployment benefit II (SGB II). Social assistance = social assistance scheme for pensioners. SSC = social security contributions. Source: IAB-MSM.

When looking at the narrower poverty rates based on 50 percent of median income, however, reform scenario (2) outperforms the others under BBC.

Tables C13 and C14 report the same information as Table 3, which is the labour supply effect obtained by the three reforms, this time for the cases with balance budget closures. Although there are quantitative differences in the numbers reported throughout Tables 3, C13 andC14, they all show that scenario (1) increases labour supply significantly for the second decile while scenario (2) has the opposite effect. Both consumption tax and income tax financing reduce the positive labour supply effect found for scenario (1) in the second decile by about the same amount. The negative effect on the labour supply of low-income households in scenario (2) is also more pronounced in both forms of balanced budget financing. However, due to its progressive structure, financing via an income tax leads to significant negative effects on the labour supply of middle and high income groups via the substitution effect. For scenario (3), the total labour supply effect in full-time working persons thus changes from -21,000 without refinancing (UB) to -102,000 with consumption tax refinancing (BBC) and -171,000

Table C12: Inequality and Poverty Indicators Under Different Budget Regimes, Total Population, Partial Take-up

	Reform scenarios											
	Baseline			(1)			(2)			(3)		
	UB	BBI	BBC	UB	BBI	BBC	UB	BBI	BBC	UB	BBI	BBC
Gini coefficient												
Level (in percent)	30.35	30.35	30.35	30.04	29.75	30.07	30.27	30.19	30.28	29.92	29.50	29.96
Abs. diff (in pp)	.	.	.	-0.31	-0.60	-0.28	-0.08	-0.16	-0.07	-0.43	-0.85	-0.39
Rel. diff (in percent)	.	.	.	-1.01	-1.96	-0.92	-0.27	-0.52	-0.24	-1.41	-2.80	-1.27
Poverty rate (60%)												
Level (in percent)	19.74	19.74	19.74	19.07	19.21	19.43	19.43	19.45	19.44	18.72	18.90	19.09
Abs. diff (in pp)	.	.	.	-0.67	-0.53	-0.31	-0.31	-0.29	-0.30	-1.02	-0.84	-0.65
Rel. diff (in percent)	.	.	.	-3.42	-2.67	-1.55	-1.59	-1.48	-1.50	-5.17	-4.26	-3.31
Poverty rate (50%)												
Level (in percent)	13.52	13.52	13.52	13.49	13.63	13.96	13.29	13.31	13.34	13.12	13.25	13.61
Abs. diff (in pp)	.	.	.	-0.03	0.10	0.44	-0.23	-0.22	-0.18	-0.41	-0.27	0.09
Rel. diff (in percent)	.	.	.	-0.22	0.76	3.26	-1.74	-1.59	-1.34	-3.01	-1.98	0.66

Note: Absolute and relative differences in Gini coefficient and poverty rates compared to the baseline. Poverty rates are relative to 60% and 50% of median net equivalent income. UB = unbalanced budget, BBI = balanced budget by adjusting income tax, BBC = balanced budget by adjusting consumption tax. The net equivalent income is calculated based on the modified OECD scale. pp = percentage points. Results refer to the total population. Source: IAB-MSM.

with income tax refinancing (BBI). The negative labour supply effects of an increase in the non-means-tested benefit on labour supply are thus substantially amplified by the inclusion of refinancing.

Table C13: Changes in Labour Supply by Income Decile, Balanced Budget (Through Consumption Tax Adjustment), Partial Take-up

	Scenario (1)	**Scenario (2)**	**Scenario (3)**
Part. effect			
Decile 1	-27.3	-15.0	-38.2
Decile 2	38.2	-33.9	13.0
Decile 3	-1.6	-2.8	-6.0
Decile 4	-5.9	-0.4	-7.7
Decile 5	-4.6	0.3	-6.1
Decile 6	-5.9	1.1	-7.3
Decile 7	-3.5	0.1	-4.3
Decile 8	-1.8	-0.1	-2.5
Decile 9	-1.3	-0.1	-1.7
Decile 10	-0.6	-0.2	-0.8
Total	-14.3	-50.9	-61.6
Full-time equiv.			
Decile 1	-31.7	-13.8	-43.4
Decile 2	39.2	-35.3	14.2
Decile 3	-3.0	-2.7	-8.1
Decile 4	-8.5	-0.8	-10.7
Decile 5	-7.4	2.0	-9.6
Decile 6	-10.1	2.4	-12.1
Decile 7	-8.8	1.2	-10.5
Decile 8	-10.6	0.3	-12.1
Decile 9	-5.9	-1.0	-7.0
Decile 10	-2.2	-0.5	-3.1
Total	-49.1	-48.1	-102.3

Note: Changes in labour supply (sum over all household types) by income deciles compared to the baseline. Numbers expressed in 1,000 persons. Deciles based on net equivalent income. Net equivalent income is calculated with the modified OECD scale. Part. effect = participation effect (negative change in the 0 hours category). Full-time equiv. = full-time equivalents (change in labour supply expressed in 1,000 persons with a 40-hour working week). Source: IAB-MSM.

Table C14: Changes in Labour Supply by Income Decile, Balanced Budget (Through Income Tax Adjustment), Partial Take-up

	Scenario (1)	**Scenario (2)**	**Scenario (3)**
Part. effect			
Decile 1	-22.5	-13.7	-31.4
Decile 2	39.7	-33.9	15.0
Decile 3	-3.2	-3.1	-8.4
Decile 4	-10.6	-1.6	-13.6

(Continued)

	Scenario (1)	Scenario (2)	Scenario (3)
Decile 5	-6.3	-0.4	-8.1
Decile 6	-8.1	0.4	-11.7
Decile 7	-5.0	-0.2	-6.9
Decile 8	-3.6	-0.4	-5.4
Decile 9	-3.3	-0.3	-4.7
Decile 10	-2.1	-0.3	-5.7
Total	-25.1	-53.5	-81.0
Full-time equiv.			
Decile 1	-27.7	-12.7	-37.8
Decile 2	39.3	-35.9	13.5
Decile 3	-5.9	-3.2	-12.2
Decile 4	-14.5	-2.5	-19.4
Decile 5	-12.6	0.6	-16.4
Decile 6	-16.2	0.9	-22.5
Decile 7	-13.9	0.0	-18.0
Decile 8	-17.9	-1.9	-22.8
Decile 9	-12.3	-2.5	-16.6
Decile 10	-9.6	-1.9	-18.5
Total	-91.3	-59.0	-170.7

Note: Changes in labour supply (sum over all household types) by income deciles compared to the baseline. Numbers expressed in 1,000 persons. Deciles based on net equivalent income. Net equivalent income is calculated with the modified OECD scale. Part. effect = participation effect (negative change in the 0 hours category). Full-time equiv. = full-time equivalents (change in labour supply expressed in 1,000 persons with a 40-hour working week). Source: IAB-MSM.