Getting the Poor to Work: Three Welfare-Increasing Reforms for a Busy Germany

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Received 23 November 2015; in revised form 29 July 2016; accepted 15 August 2016

We study three budget-neutral reforms of the German tax and transfer system designed to improve work incentives for people with low incomes: a feasible flat tax reform that provides a basic income equal to the current level of the means-tested unemployment benefit, and two alternative reforms that involve employment subsidies to stimulate participation and full-time work, respectively. We estimate labor supply reactions and welfare effects using a microsimulation model based on household data from the Socio-Economic Panel and a structural labor supply model. We find that all three reforms increase labor supply in the first decile of the income distribution. The flat tax scenario reduces overall labor supply by about 5%; the reform designed to increase participation reduces labor supply by 1%; the reform that provides incentives to work full-time has negligible effects on overall labor supply. With equal welfare weights, aggregate welfare gains are realizable under all three reforms.

Keywords: flat tax, basic income, work incentives, poverty, microsimulation

JEL classification: H 31, I 38, J 22

1. Introduction

Countries that provide transfers to the unemployed face the problem well known as the equity-efficiency trade-off in the public-economics literature. For instance, in Germany transfers are relatively generous (Franz et al., 2012), while withdrawal rates are very high and in some cases exceed 100%. This implies strong disincentives to work for people with low earning prospects. One frequently discussed way to improve these incentives is a flat tax scheme

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ISSN 0015-2218
doi: 10.1628/001522117X14864674910065

that implies lower withdrawal rates than in the *status quo*. For Germany, a flat tax proposed in Kirchhof (2003) and in Kirchhof (2011) was part of the conservative election campaign in 2005. Such a flat tax is often coupled with some kind of basic income (Friedman, 2002, among others).[1] The notion of basic income has become increasingly popular; for example, Atkinson (2005) argues that the introduction of an unconditional basic income would eliminate the perverse disincentives brought about by social security benefits in combination with high transfer withdrawal rates. In addition, Colombino (2009) points out that an unconditional basic income could be advantageous from the perspective of redistribution and cost-effectiveness.[2] We analyze how such a reform scenario fares compared to two alternative scenarios that aim to improve work incentives for the poor. In contrast to other studies that investigate basic income schemes, we study a financially feasible scenario that we calibrate to be budget-neutral. We use the microsimulation model STSM for household data from the Socio-Economic Panel (SOEP) and estimate a structural labor supply model to calculate labor supply and welfare effects.

We contrast a flat-tax-basic-income reform (*Flat Tax*) with two alternative reform scenarios that aim to improve incentives by directly subsidizing employment exceeding specific thresholds of weekly working hours of people with low labor incomes – 10 hours for the first reform (*Employment*) and 30 hours for the second reform (*Full-Time*). The first reform is financed by increasing marginal tax rates and abolishing social security exemptions for marginal employment, while the second reform is financed only through the abolition of social security exemptions and increased marginal transfer withdrawal rates. The third reform (*Flat Tax*) is a flat tax with marginal transfer withdrawal rates equal to the marginal tax rate and an unconditional basic income equal to the current subsistence level guaranteed through the means-tested unemployment benefit (Unemployment Benefit II) and social assistance.[3]

1 In Germany, such a basic income would only be in accordance with the constitution if it were at least as high as the subsistence level.

2 Some examples of how basic income works in practice are experiments from the U.S. in New Jersey and Pennsylvania from 1968 to 1972, in Iowa and North Carolina from 1969 to 1973, in Gary, Indiana, between 1971 and 1974, and in Seattle and Denver from 1971 to 1982 (Munnell, 1987), as well as in the Canadian city Dauphin from 1974 to 1978 (Prescott et al., 1986). Although in June 2016 Switzerland's voters rejected a proposal to introduce basic income in a referendum, a similar experiment providing a basic income of around 900 euros per month is planned in Utrecht, set to begin in January 2017. In Finland, the government is considering a trial to give a basic income of around 800 euros per month to more than 8,000 people from different income groups in 2017 and 2018.

3 Unemployment Benefit I is insurance-based and available to short-term unemployed people (less than 12 to 24 months, depending on age), Unemployment Benefit II is means-tested (income and wealth) and available to unemployed people not entitled to

Our study adds to the literature on empirical optimal taxation, focusing on revenue-neutral basic income systems financed through flat taxation. Fabre et al. (2014) and Lopez-Daneri (2015) are recent examples that study the effects of this kind of policies in dynamic stochastic general-equilibrium (DSGE) frameworks. Among the few microsimulation studies comparable to ours, Colombino et al. (2010), Colombino and Narazani (2013), and Colombino (2015) find in many of their simulations that unconditional transfers in combination with wage subsidies are optimal. Our choice to study a basic income that is financed through a flat tax is motivated by the finding of Aaberge et al. (2000), who report positive welfare effects from introducing proportional taxation, in particular for the rich.

We add to the few previous studies for Germany on flat tax and basic income systems in several important ways:[4] Our paper is the first to analyze a basic income financed by a tax that is flat over the entire range of taxable income for Germany. Other papers study concepts with withdrawal rates differing from the marginal tax rate (Fuest and Peichl, 2008; Fuest et al., 2007) or several tax brackets (Neumann et al., 2009). As the basic income concepts studied in the former two papers include a so-called health premium (Gesundheitsprämie) of 200 euros per month that is directly deducted from the basic income, these reform scenarios involve substantially lower net basic incomes than the one studied in our contribution: 600 euros per month in the case of Fuest et al. (2007), 500 in the case of Fuest and Peichl (2008), and 662 in the case of Neumann et al. (2009). In contrast, we study a basic income of 800 euros per month that is about as generous as the current unemployment benefit II. Fuest et al. (2008) study flat tax reforms that do not contain basic income components.

We also provide an extensive welfare analysis that complements Fuest and Peichl (2008). Further, our paper comprehensively describes the incentives of the German tax and transfer system in detail. In particular, we calculate marginal tax and withdrawal rates and participation tax rates, and show budget constraints of different types of households. This discussion extends Fuest and Peichl (2008) by providing comprehensive insight into the incentives of workers and unemployed in Germany.

Moreover, labor supply effects are often calculated after implementing an *ex ante* revenue-neutral reform. In contrast, we show reform alternatives that are *ex post* (i.e., after behavioral labor supply adjustments) revenue-

Unemployment Benefit I, and social assistance refers to benefits for households that are not in the labor force.

4 See, e.g., Fuest et al. (2007), Colombo et al. (2008), Fuest et al. (2008), Academic Advisory Board of the German Federal Ministry of Finance (2008), Straubhaar (2008), Neumann et al. (2009), Horstschräer et al. (2010).

neutral. This allows us to find reforms with parameters that may actually be implemented.

Our main results from the empirical optimal-taxation analysis are that all three reforms increase labor supply in the first decile of the income distribution. The flat tax scenario reduces overall labor supply by 4.9%, the *Employment* reform reduces it by 1%, and the *Full-Time* reform has a negligible effect on overall labor supply. With equal welfare weights, aggregate welfare gains are realizable under all three reforms. The stronger the redistributive preference, the higher are the welfare gains of the flat tax reform.

The next section presents the reform scenarios in detail and contrasts them with the current tax-and-transfer system. Section 3 presents the budget constraints as well as participation tax rates imposed by the reform scenarios. Section 4 describes our empirical approach, section 5 presents estimated labor supply and welfare effects, and section 6 concludes.

2. The Reform Scenarios

Several kinds of employment subsidies have been discussed in the literature and among practitioners. Subsidies to social security contributions (SSCs) for workers who work at least a specific number of hours per week have been in place in Belgium (*Bonus a l'emploi*, an employment subsidy for full-time workers with low labor income). A similar subsidy has recently been discussed for Germany (see Bargain et al., 2010). Another form of hours conditions is tax credits for individuals who work at least a specific number of hours per week, as in the United Kingdom. Blundell and Shephard (2012) show that such an hours-contingent payment may be optimal as a full-time bonus, which is in line with our *Full-Time* scenario.[5] In contrast to the social security subsidies or tax credits analyzed in the aforementioned articles, we analyze direct employment subsidies that are withdrawn only at relatively high levels of labor income. These are very similar to the ones proposed by Keane (1995), who finds that for the United States such hours subsidies are a cost-effective way of improving work incentives for single parents living on low income.

The German progressive income tax system is characterized by a basic allowance and two *progressive zones* with increasing marginal tax rates and a constant marginal tax rate in the two *linear zones*. For married-couple households joint filing is the rule,[6] and the interaction with means-tested social transfers complicates the tax-benefit system greatly. Social security

5 Similar concepts are the earned income tax credit (Hotz and Scholz, 2003; Immervoll et al., 2007) and employer-oriented marginal subsidies Knabe et al. (2006).

6 Married couples may choose to be taxed jointly and make use of income splitting. This implies that the income tax of a married couple is calculated by applying the tax func-

receipts derived from previous contributions to the public pension, unemployment, and health insurance funds are not directly taxed, but may affect the marginal tax rate. The means-tested Unemployment Benefit II provides the subsistence level for the long-term unemployed and for children. The subsistence level differs by region due to different costs of living, but a typical single household receives about 800 euros per month of Unemployment Benefit II (see Appendix for 28 Sozialgesetzbuch (SGB) XII and housing costs). Social Assistance or Unemployment Benefit II for the first child in a household is 380 euros per month (ibid.).[7] For couple households and families with children the subsistence level for each member is adjusted relative to the one of the household head and differs by the number and age of children living in the household.

The main components of the current system (*Status Quo 2015*)[8] and their changes under the alternative reform scenarios are summarized in table 1. The *Employment* scenario stipulates increases in marginal tax rates by raising the starting marginal tax rate of the progressive zones. The *Full-Time* reform scenario does not involve changes in the tax schedule.

To increase incentives to take up work, the *Employment* and *Full-Time* reform scenarios involve tax-free employment subsidies, which are withdrawn at a rate of 0.19 when individual labor incomes exceed a specific threshold. The *Employment* scenario stipulates a subsidy of 130 euros a month, which amounts to about 12.5% of monthly per capita net income, for people who work at least 10 hours per week.[9] It is withdrawn at a rate of 0.19 starting at individual labor incomes of 28,250 per year. As a further work incentive for people with low incomes, marginal transfer withdrawal rates are reduced from virtually 100% to 60% up to monthly incomes of 1,200 euros (1,500 euros for people with children). As the scenario includes subsidization even of jobs with few weekly working hours and thereby aims to increase employment in general, it is called *Employment* in the following.

The *Full-Time* reform scenario involves a subsidy of the same amount for full-time jobs only (at least 30 hours per week). It is withdrawn starting at individual labor incomes of 27,150 euros.

tion to half of the sum of taxable incomes of the spouses, and the resulting amount is then doubled to determine the tax liability of the couple.

7 More precisely, the standard rates are 364, 328, 287, 251, and 215 euros for singles, partners, and each child of age 15 to 18, 7 to 14, and 0 to 6, respectively. Moreover, appropriate costs of lodging and heating are covered.

8 For the simulations we use parameters and data of the most recent year implemented in the STSM (2011).

9 We assume that the government is able to observe hours correctly. If this assumption is relaxed, the welfare effects depend on misreporting costs (Blundell and Shephard 2012).

Table 1

Current System and Changes under Alternative Reform Scenarios.

Status Quo (2015)	Employment	Full-Time	Flat Tax
Marginal Tax Rates (MTRs)			
Basic allowance of 8,354 euros	No Change	No Change	–
1st progressive zone: increasing MTR from 0.14	increasing MTR from 0.21	No Change	–
2nd progressive zone: increasing MTR from 0.24 from 13,470 euros	increasing MTR from 0.245 from 13,470 euros	No Change	–
1st linear zone: MTR of 0.42 from 52,882 euros	No Change	No Change	MTR of 0.6885
2nd linear zone: MTR of 0.45 from 250,731 euros	No Change	No Change	–
Transfers and Marginal Withdrawal Rates (MWRs)			
about 800 euros/month for first adult	No Change	No Change	Basic income of 800 euros/month
380 euros/month for first child	No Change	No Change	380 euros/month for children
Allowance of 100 euros/month	–	–	–
MWR of 0.8 up to monthly income of 1,000 euros	MWR of 0.6 up to income of 1,200 euros (1,500 euros with children in household)		MWR of 0.6885
MWR of 0.9 up to monthly income of 1,200 euros (1,500 euros with children in household)			
MWR of 1 afterwards	MWR of 1 afterwards	MWR of 1	(All other transfers for people under 65 are abolished)
Employment Subsidy			
–	Subsidy of 1,560 euros/year for people working at least 10 h/week Withdrawn at rate of 0.19 from 28,250 euros/year	Subsidy of 1,560 euros/year for people working at least 30 h/week Withdrawn at rate of 0.19 from 27,150 euros/year	–
Social Security Contributions (SSCs) and Mini-Jobs			
Mini Jobs (up to 450 euros/month) are exempted from income tax and SSCs Midi Jobs (up to 850 euros/month) Marginal SSC of 0.27 Afterwards marginal SSC of 0.19	Mini and Midi Job rules abolished	Mini and Midi Job rules abolished	Mini and Midi Jobs abolished SSCs are contained in flat tax

Note: SSCs include unemployment insurance, old age insurance, health insurance, and long-term care insurance. Marginal SSCs are up to specific income levels for different SSC components. For all reform scenarios the employer's contribution remains unchanged.

In order to further improve incentives to work full-time, transfers are withdrawn at a rate of 100%, making part-time employment for transfer recipients less attractive.

Under the *status quo*, transfer recipients can earn 100 euros per month without any withdrawal, but from this point onwards, marginal withdrawal rates are high. The *Employment* reform scenario stipulates a reduction of marginal withdrawal rates to 60% up to monthly incomes of 1,200 euros (1,500 euros for households with children). The *Full-Time* reform scenario imposes marginal withdrawal rates of 100%. The employment subsidies are financed by abolishing tax and social security exemptions for marginal employment ("Mini Jobs" and "Midi Jobs"). This is done because these exemptions create strong disincentives for secondary earners to work more than the marginal employment threshold (450 euros). This disincentive is illustrated in the next section (figure 3a). The employment subsidies of the reform scenarios *Employment* and *Full-Time* are alternative ways to subsidize employment of low-wage workers.

In the *Flat Tax* reform the basic income is set at a similar amount to that under the current subsistence level guaranteed through Unemployment Benefit II and Social Assistance. This amounts to 800 euros per month for adults and 380 for each child below the age of 18 years living in the household.[10] In contrast to the current transfer system, the basic income level does not differentiate by the number and age of children, and the transfer is not means-tested. The rate of the flat tax, which includes social security contributions, necessary to finance this basic income scheme is about 69%, and the basic income is withdrawn at the same rate. In all three reform scenarios the pension system remains unchanged; therefore transfers change only for people up to 65 years of age.

3. Incentives and Budget Constraints

Figure 1a shows the overall marginal tax rate for a single household without children earning an hourly wage of 20 euros in the *status quo* and for each of our reform scenarios, *Full-Time*, *Employment*, and *Flat Tax*. We show these figures for hourly wages of 10 and 20 euros (see appendix), because our main focus is on incentives for poor households. 10 euros is close to the minimum wage of 8.50 euros in effect in Germany since 2015. This choice makes it also convenient to roughly read the incentives of a household earning, e.g., 5 euros per hour from the same figure. However, the incentives of house-

10 Note that in all scenarios except for *Flat Tax*, there is an in-work tax credit for families ("Kinderzuschlag"), granted to parents whose income is sufficient to sustain themselves but not for the expenses for their children.

holds with these wages are largely driven by the transfer withdrawal and do not show the region where the wage subsidies are withdrawn. Therefore, we show households with hourly wages of 20 euros as well.[11] We abstract from rounding rules in this presentation and use a resolution of 1 euro in all two-dimensional graphs. Overall marginal tax rates are defined on the basis of personal income taxes, social security contributions, and transfer payments. We censor marginal tax rates at −0.2 and 1.2 to increase the readability of the graphs. In the *status quo*, marginal tax rates are zero at very low monthly household gross labor income levels/working hours because of allowances and deductions regarding transfers. Then, the overall marginal tax rate increases to a level of 80% which is the transfer withdrawal rate. When labor income subject to transfer withdrawals exceeds 1,000 euros, the marginal withdrawal rate is increased to 90%. When it exceeds 1,200 euros, the MTR is 100%. At about 18 hours, the exemplary household does not receive any transfers anymore and pays social security and personal income taxes, which together amount to about 42%.

The *Full-Time* reform starts with a marginal social security contribution of 20%, as the social security exemption (Mini Jobs) is abolished in this scenario. When labor income exceeds lump-sum allowances for expenses, the overall marginal tax rate, including the transfer withdrawal, increases to 100%. When transfers are completely withdrawn, in our example at about 12 working hours, the household pays social security contributions and personal income taxes similar to the *status quo*. At 30 hours the household receives the employment subsidy, a discontinuity that is represented by a spike. Right from the beginning and up to about 35 hours, the subsidy is withdrawn at a marginal rate of 19%. The overall marginal tax rate under this reform scenario therefore exceeds the one under the *status quo* from 0 to 12 and from 30 to 34 hours and attains the same level as under the *status quo* for longer working hours. Social security exemptions for low-wage earners are also abolished in the *Employment* scenario, but due to the smaller marginal transfer withdrawal rate of 60% and the lower threshold of working hours, for this exemplary household the overall marginal tax rate up to 14 working hours is considerably lower under this scenario than under the *Full-Time* reform scenario. Due to the absence of the means test, the overall marginal tax rate under the *Flat Tax* reform scenario is below that under the *status quo* for levels of household labor income below about 1,500 euros per month, and exceeds that rate for incomes above that level. Marginal tax rates under the *Flat Tax* reform scenario are also markedly lower than under the *Full-Time* scenario for relatively low earnings and small working hours,

11 Continuously moving from a 10-euro to a 20-euro hourly wage would compress the figure for the 10-euro hourly wage (figure 6a) horizontally. This is clear, for instance, from figure 6 in the appendix.

whereas marginal tax rates under the *Employment* scenario are high relative to the *Flat Tax* scenario between 14 and 24 working hours for this exemplary household.

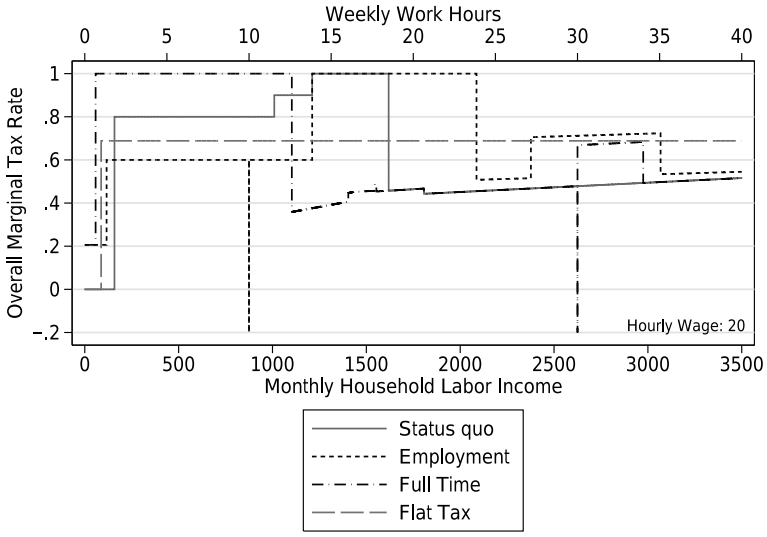
Figure 2a shows the budget constraints for the same exemplary household under the *status quo* and the three reform scenarios. Clearly, in the *Full-Time* scenario the household is worse off at low incomes. Once transfers are completely withdrawn, net income is identical under *Full-Time* and the *status quo*. At 30 hours, when the employment subsidy is received, the household's net income exceeds that under the *status quo* until the subsidy is fully withdrawn at about 35 hours. In contrast, under the *Employment* scenario, due to the employment subsidy already paid at 10 working hours, the household's net income is initially substantially increased over that in the *status quo*, but subsequently increases little with higher earnings while the employment subsidy is being withdrawn. Due to the higher marginal tax rates on higher incomes required to balance the budget under this scenario, the exemplary household becomes worse off than under the *status quo* at earnings of about 2,500 euros per month. Under the *Flat Tax* for labor incomes between about 500 and 2,600 euros the household's net income would increase, but would decrease relative to the *status quo* for higher earnings levels.

Figure 1b illustrates how the marginal tax rates change for a married couple with two children. We vary the level of labor income of the primary earner, while holding the labor income of the secondary earner constant at 20,000 euros per year. Under the current transfer system, the subsistence level of a couple with two children exceeds that amount, and the exemplary household would therefore be eligible for Unemployment Benefit II if the primary worker did not work. Marginal tax rates for couples follow a similar pattern to that for single households in the *status quo* and in all reform alternatives. In the *Full-Time* scenario, the household receives transfers only for a relatively small income range of the primary earner. Note the striking difference between scenarios in figure 2b, which shows that for all income levels of the primary earner, the *Flat Tax* leads to higher net income than all other reform scenarios and the *status quo*. This is due to the fact that the basic income does not depend on household size in the *Flat Tax* scenario.

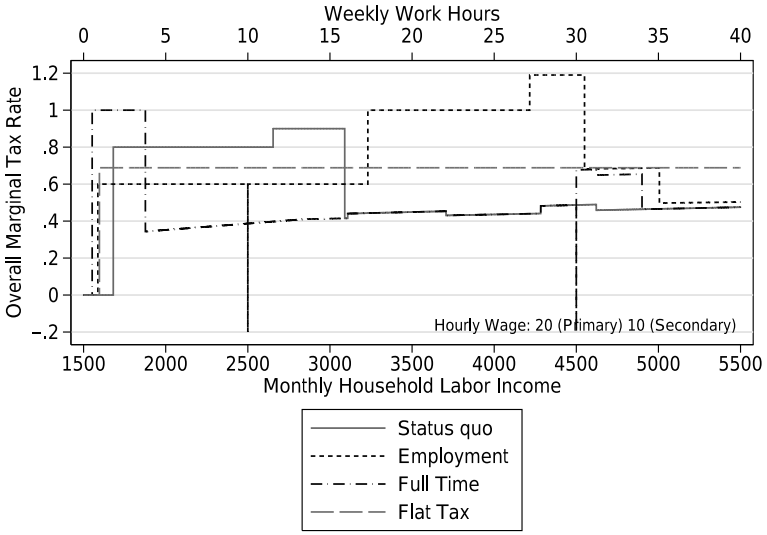
In the appendix, figures 6 and 8 present the overall marginal tax rates, and figures 7 and 9 the budget constraints for households with different characteristics. In particular, we vary the number of children and the hourly wage. Figure 10 shows both the marginal tax rates and the budget constraints that the two households presented in figures 1 and 2 would have if all members earned 10 euros per hour each. These figures show that with more children the marginal tax rate is very high, even with relatively high labor income. This brings about strong disincentives for parents to work.

Figure 1

Marginal Tax Rates by Monthly Household Gross Labor Income and Weekly Working Hours in Germany, 2011



(a) *Single Person without Children*

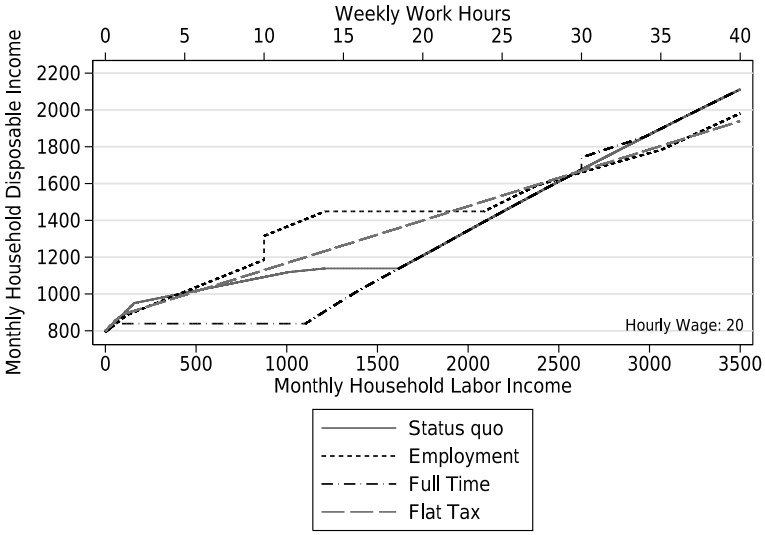


(b) *Married Couple with Two Children*

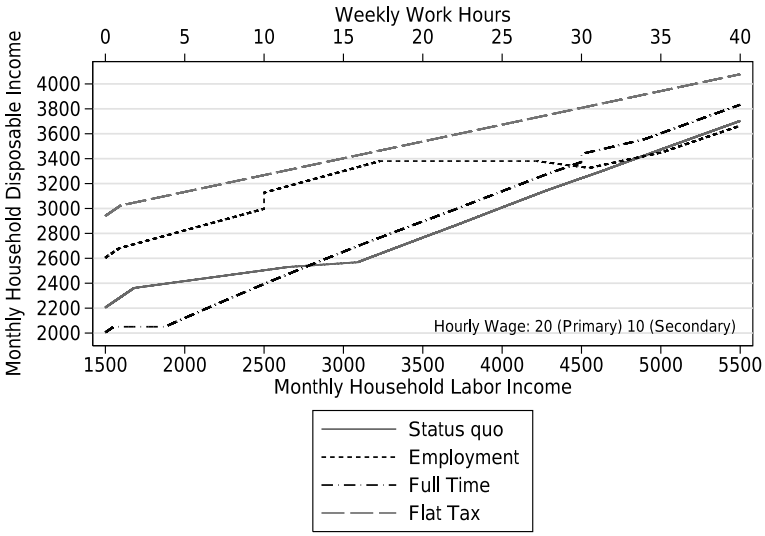
Note: Own calculations based on a modified version of the STSM.

Figure 2

Budget Constraints by Monthly Household Gross Labor Income and Weekly Working Hours in Germany, 2011



(a) *Single Person without Children*



(b) *Married Couple with Two Children*

Note: Own calculations based on a modified version of the STSM.

In the case of couple households it is instructive to consider the entire choice set of these households. For the *status quo* and the three alternative reform scenarios, figure 3 depicts the overall marginal tax rates of the primary earner for various labor income levels of the primary and the secondary earner for a couple household with two children where both spouses earn 10 euros per hour.[12] At three vertices of the cube, three numbers are reported. The first number shows the labor income of the secondary earner, the second the overall marginal tax rate, and the third the labor income of the primary earner. The labor income of the primary earner increases from left to right, and that of the secondary earner increases to the northeast, holding the primary earner's income constant. The vertical axis represents the overall marginal tax rate. All three-dimensional graphs abstract from rounding rules and are constructed in such a way that the horizontal distance between two points is 133 euros of monthly labor income. We indicate higher points in red (appearing as darker shading in monochrome) and lower points in light teal (lighter shading). Moreover, we use different markers to distinguish higher points from lower ones in the order circles (lowest), diamonds, squares, triangles (highest). As with the two-dimensional graphs, we cap marginal tax rates at −0.2 and 1.2.

Figure 3a shows that, due to joint taxation of couples, the MTR increases with increasing income of the other spouse as soon as the monthly labor income of the primary worker exceeds 400 euros, the amount exempted from taxation and social security contributions in 2011.[13] When monthly labor income exceeds 400 euros, the entire labor income becomes taxable. Thus, overall MTRs are quite high, cresting at euro-400 labor income of the primary earner. This adverse incentive is abolished in all reform scenarios that we analyze. The figure also shows the effect of the withdrawal of Unemployment Benefit II by stepwise increases of the MTR with increasing labor income of the secondary worker at low levels of the primary earner's labor income. Furthermore, the effect of joint taxation of couples on the MTR is clearly visible. The MTR of the primary earner depends on the labor income of the secondary earner, as is visible from the diagonals through the cube that correspond to points where the *sum* of labor income of both earners is the same. On these diagonals, the MTRs of the primary earner are constant under joint taxation but not under individual taxation. When comparing figure 3a and figure 10b, which represent the same household, note that the latter displays monthly household income on the horizontal axis.

12 Figures 3 and 4 are produced using the user-written Stata ado graph3D; see Jessen and Rostam-Afschar (2014).

13 Income form marginal employment that exceeds 100 euros per month is, however, not exempted from transfer withdrawal.

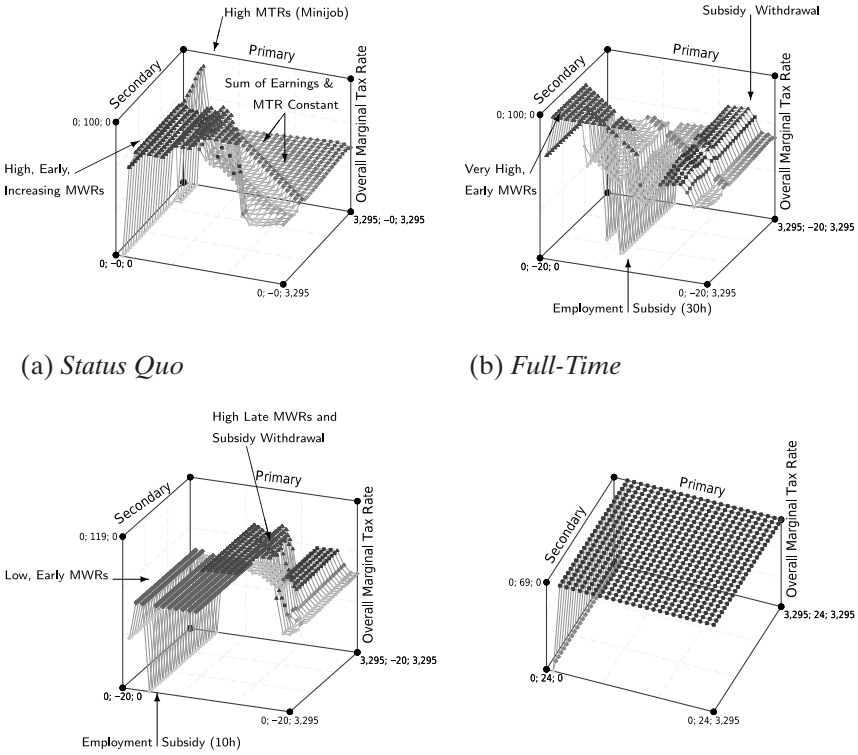
Figure 3b presents work incentives of the *Full-Time* scenario. Compared to the *status quo*, the MTR crest vanishes because tax exemptions for marginal employment are abolished under this alternative. Transfer withdrawal rates are higher and begin at lower income levels (more to the left). At an income of the primary earner of about 1,200 euros (30 hours), the employment subsidy causes a negative spike in the marginal tax rate. This lump-sum payment is withdrawn at higher earnings levels of the primary earner, thereby reducing incentives to increase working hours.

The *Employment* scenario, instead, improves incentives to work in two ways. First, marginal transfer withdrawal rates for labor incomes below 1,500 euros are reduced substantially. The effect of the employment subsidy on the MTR is again depicted as a downward spike at 400 euros for the primary earner. Second, transfers are withdrawn at a rate of 100% above this threshold, and, on top of this, the employment subsidy is withdrawn from labor incomes of about 2,200 euros on up. This leads to higher marginal withdrawal rates than in the *status quo* in this region. After all transfers are withdrawn, the marginal tax rates are similar to those of the *status quo* but slightly higher. In contrast to the *status quo* and the reform scenarios that involve specific employment subsidies, except for very low levels of primary earner's labor income the *Flat Tax* scenario provides the same incentives for all levels of income, irrespective of how earnings are distributed between the two spouses living in the same household.

To show how different combinations of primary and secondary labor incomes affect disposable income of the household, figure 4 presents three-dimensional budget graphs for the same household as above, which can be interpreted similarly to the graphs in figure 3. The only difference is that the vertical axis represents monthly disposable income. In figure 4a a bulge observable at lower household incomes represents transfer payments in the *status quo*. It is highest at the diagonal from zero to maximum household income. This is because transfers are paid allowing for additional earnings. At higher incomes, when the household is not eligible for transfers anymore, the budget constraint becomes almost a plane (due to joint taxation). At low incomes of the primary or the secondary earner, trenches caused by the tax exemption for marginal employment are clearly visible.

Figure 4b shows a flat area at low labor incomes in the *Full-Time* alternative due to marginal withdrawal rates of 100%. As soon as one of the spouses earns more than about 1,200 euros, the employment subsidy is received. This causes an elevation of the budget surface. The withdrawal of the employment subsidy makes the surface slightly flatter at higher levels than in the *status quo*. For each level of household labor income, in this reform the allocation of working hours between partners makes a difference, which is not the case in the *status quo*. The reason is that, in contrast to household-based taxes,

Figure 3
Marginal Tax Rate by Monthly Gross Labor Income of Both Spouses in Germany, 2011



(a) *Status Quo* (b) *Full-Time*

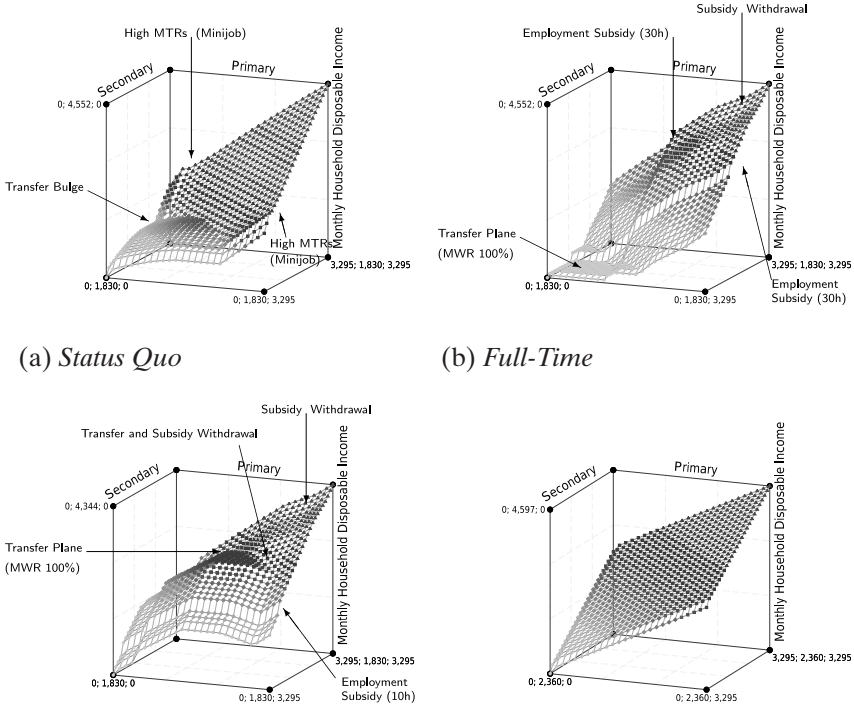
(c) *Employment* (d) *Flat Tax*

Note: Own calculations based on a modified version of the STSM.

the employment subsidy is granted individually. Points where both partners work full-time result in higher net income, as shown in the figure.

In figure 4c, the employment subsidy of the *Employment* reform is visible starting from about 400 euros of labor incomes as an area bulging incomes upwards. Recall that because from 1,500 euros upward labor income on transfers is withdrawn at a rate of 100%, net income is unchanged with increasing labor income. Net income even decreases for labor incomes over 2,200 euross when the household still receives unemployment benefits. This is because the transfer withdrawal rate and the withdrawal of the subsidy add up to 119%.

Figure 4
Budget Constraints by Monthly Gross Labor Income of Both Spouses in Germany, 2011



(a) *Status Quo* (b) *Full-Time*

(c) *Employment* (d) *Flat Tax*

Note: Own calculations based on a modified version of the STSM.

Flat Tax leads to a flat budget surface depicted in figure 4d. As in the *status quo*, different labor income combinations that imply a given level of household labor income result in the same amount of household net income.

To make the analyzed reforms comparable to the literature (Bartels and Pestel, 2015; Immervoll et al., 2007), we show *participation tax rates* (PTRs) in table 2 for interesting discrete decisions of exemplary households for all reform scenarios. This measure is calculated as

$$1 - \frac{(\text{post-government income}_{\text{hc}=j} \quad - \quad \text{post-government income}_{\text{hc}=0})}{\text{gross labor income}_{\text{hc}=j}}, \tag{1}$$

Table 2
Participation Tax Rates in Percent

	Employment	Full-Time	Flat Tax	Status Quo
Couples (Primary Earner Hourly Wage: 20 euros, Secondary 10 euros)				
full-time (40 h), 0 children	59	56	67	58
full-time (40 h), 1 child	61	58	67	60
full-time (40 h), 2 children	64	61	67	63
part-time (20 h), 0 children	55	71	64	71
part-time (20 h), 1 child	50	76	64	74
part-time (20 h), 2 children	50	82	64	74
full-time (40 h), zero hours (0 h), 0 children	68	65	67	65
full-time, zero hours, 1 child	72	68	67	68
full-time, zero hours, 2 children	76	73	67	73
full-time (40 h), part-time (20 h), 0 children	61	60	66	60
full-time, part-time, 1 child	64	63	66	63
full-time, part-time, 2 children	67	67	66	67
Singles (Hourly Wage: 20 euros)				
full-time (40 h), 0 children	66	62	67	62
full-time, 1 child	69	65	65	65
full-time, 2 children	72	69	65	69
part-time (20 h), 0 children	62	76	65	76
part-time, 1 child	55	83	61	78
part-time, 2 children	55	90	61	78

Note: Own calculations based on a modified version of the STSM.

where j indicates the hours categories (hc) where at least one household member works part-time (20 hours) or full-time (40 hours). hc = 0 denotes that no household member works. The higher the PTRs, the more the tax and transfer system reduces the monetary incentives to work. The exemplary household holds no wealth and does not earn nonlabor income, and is thus eligible for Unemployment Benefit II (see section 2).

Couples with a primary earner with an hourly wage of 20 euros and a secondary earner with an hourly wage of 10 euros face the strongest incentive for both to work full-time in the *Full-Time* scenario (PTR of 56 percent for a couple without children). Compared to the *status quo* (PTR of 58 percent) and *Employment* (PTR of 59 percent), these incentives are quite similar, while the *Flat Tax* offers weaker incentives (PTR of 67 percent) to work full-time.

Employment dominates all other alternatives regarding incentives to work part-time (PTR of 50 percent for a couple with one child), while *Flat Tax* offers the second-best incentives, and *Full-Time* is similar to the *status quo*. The picture is similar for a single with a 20-euro hourly wage. However, the *Flat Tax* offers the best incentives to work full-time for singles with children.

Incentives for all employment choices worsen with an increasing number of children for all scenarios except for the *Flat Tax*. Also, in the *Employment* scenario, incentives to take up part-time work do not deteriorate with increasing number of children. If a household without children adds a child, in the *status quo* the PTR then increases from 65 to 68 percent, e.g., if one partner works full-time and the other zero hours. With two children, the PTR increases to 73 percent.

For couples and singles earning hourly wages of 10 euros, the *Employment* reform offers the lowest participation tax rates (not reported) for all employment states relative to unemployment, save for full-time working couples with no children. This is due to the fact that the decrease in transfer withdrawal rates is especially relevant for low-wage households.

4. A Structural Labor Supply Model

We estimate the effect of the three hypothetical reforms on welfare, labor supply, and government revenues using the microsimulation model STSM; see Steiner et al. (2012). In addition to the income tax formula and transfers, it takes account of deductions, allowances, social security payments, and child benefits as well as the interactions of the different components of the tax and transfer system on the household level. The underlying database is the Socioeconomic Panel (SOEP), an annual representative survey of German households with about 20,000 observations per year; see Wagner et al. (2007). In this study we use wave 29, which contains retrospective information for the year 2011. The specification of the structural household labor supply model embedded in STSM follows van Soest (1995); Aaberge et al. (1995); Aaberge and Colombino (2014). Households are assumed to jointly maximize utility, which depends on hours worked and consumption. Given their hourly wage, agents make a discrete choice of weekly working hours. The discretization of working hours into j alternatives allows for the precise calculation of net incomes associated with labor supply decisions using the STSM and – in contrast to continuous labor supply models – does not impose any restrictions on the form of the budget set, such as convexity. Additionally, this approach allows for joint labor supply decisions of couples in a consistent way.

Estimation of this general model requires some modeling decisions. These include the choice set of work hours, wage imputation, the utility function, unobserved heterogeneity, and the simulation of behavioral transitions. We discuss each of our approaches, present alternatives, and compare their results in the following.

4.1. Set of Hours of Work

We discretize female weekly working hours into 0, 10, 20, 30, 38, and 45, and male weekly working hours into 0, 10, 20, 30, 38, and 48, which results in six choice alternatives for single households and 36 alternatives for couples. These hours categories were chosen because they are observed frequently in the data. We reestimated our model using a choice set for women of 0, 10, 20, 30, 40, and 50 weekly working hours and for men of 0, 20, 40, and 50 weekly working hours. Estimated uncompensated own-wage and cross-wage elasticities using the latter choice set are reported in table 9. The results from this estimation differ little from the main results. In a more restrictive specification, we reestimated the model with 0, 20, 30, and 40 weekly working hours for women and 0, 40, and 50 weekly working hours for men. This restrictive specification of the choice set reduced estimated elasticities somewhat, as expected (see table 9). Therefore, we prefer the more flexible specification of the choice set.

A general discussion of how the specification of choice sets may influence results is provided in Aaberge et al. (2009). The main conclusion is that the way the choice set is constructed has little effect on the model fit, but a more significant and important effect on the out-of-sample prediction performance.

4.2. Wage Imputation

Gross labor income is given by the product of hours of work and hourly wage. Potential hourly wages of the unemployed as well as hourly wages of employed with item nonresponse are predicted using a selectivity-corrected wage regression, where selection is taken account of by the two-step Heckman (1979) approach with binary variables for young children of four age groups, marital status, nonlabor income, and indicators for health as exclusion restriction. An alternative strategy would be to estimate potential wages jointly with the preference parameters. However, we do not follow this approach, because the small-sample properties of the wage prediction might be better without joint estimation, and chances of misspecification increase under joint estimation.

4.3. Specification of Deterministic Utility

Let Lf denote leisure of the female partner, Lm leisure of the male partner, C consumption, and ε a random disturbance. Then the utility of household i of choice alternative j is given by

$$V_{ij} = U(Lf_{ij}, Lm_{ij}, C_{ij}) + \varepsilon_{ij}\,. \tag{2}$$

Following van Soest (1995), we use the translog specification of the deterministic part of individual utility in our main model and allow for interactions of the components of the utility function, i.e.,

$$\begin{aligned} U_{ij} = {} & \beta_1 \ln(C_{ij}) + \beta_2 \ln(C_{ij})^2 + \beta_3 \ln(Lf_{ij}) + \beta_4 \ln(Lf_{ij})^2 + \beta_5 \ln(Lm_{ij}) \\ & + \beta_6 \ln(Lm_{ij})^2 + \beta_7 \ln(C_{ij}) \ln(Lf_{ij}) + \beta_8 \ln(C_{ij}) \ln(Lm_{ij}) \\ & + \beta_9 \ln(Lf_{ij}) \ln(Lm_{ij}) \,. \end{aligned} \tag{3}$$

To assess the sensitivity of our results to the translog assumption, we reestimate our model using quadratic utility (Keane and Moffitt, 1998) as an alternative specification of the utility function. In table 9 in the appendix, estimated elasticities using quadratic utility are reported. A comparison of the results shows that the implied labor supply elasticities are quite robust regarding this alternative specification of preferences.

4.4. Observed Heterogeneity

Observed heterogeneity between households is incorporated through taste shifters – observed household characteristics that affect some of the coefficients of the utility function:

$$\begin{aligned} \beta_1 &= \alpha_0^C + X_1' \alpha_1^C, \\ \beta_3 &= \alpha_0^{Lf} + X_2' \alpha_1^{Lf}, \\ \beta_5 &= \alpha_0^{Lm} + X_3' \alpha_1^{Lm} \,. \end{aligned} \tag{4}$$

X_1, X_2, and X_3 contain individual and household characteristics like age, disability indicators, whether the observed person is a German citizen, and number and age of children (see table 8 for the exact specification of the utility function).

If the error terms ε_{ij} are assumed to be independently and identically distributed across hours categories and households according to the extreme-value type I (EVI) distribution, the probability that alternative k is chosen by household i is given by a conditional logit model (McFadden, 1974):

$$P_{ik} = \Pr(V_{ik} > V_{ij}, \forall j = 1, ..., J) = \frac{\exp(U_{ik})}{\sum_{j=1}^{J} \exp(U_{ik})}, \qquad k \in J \,. \tag{5}$$

Alternative k is chosen if it implies a higher utility than any other alternative. Estimation results for the labor supply model are reported in table 8. We distinguish among couples with flexible labor supply of both spouses, those with inflexible labor supply of one of the spouses, single men, and single women, where labor supply is assumed to be inflexible for civil servants, self-employed, pensioners, people on parental leave, soldiers, apprentices, and disabled people who work in sheltered workshops.

4.5. Unobserved Heterogeneity

Allowing for unobserved heterogeneity relaxes the restrictions on the substitution patterns implied by the assumption of independence of irrelevant alternatives in conditional logit models.

In table 9, we show estimates of elasticities based on models that include unobserved heterogeneity. Unobserved heterogeneity is implemented as random-coefficient model following van Soest (1995). The additional results from this exercise show that the main results change only slightly. This finding is in accordance with other examinations of the importance of unobserved heterogeneity. For example, Haan (2006) shows that the qualitative implications of the labor supply model resulting from the random specifications do not differ significantly from those derived within the conditional logit model.

An alternative approach to modeling unobserved heterogeneity is to use a latent-class model (Hoynes, 1996). In this approach, a set of discrete mass points are assumed for the estimated coefficients. Keane and Wasi (2013) discuss the performance of several approaches for the estimation of unobserved heterogeneity and find that none of the models dominates the others.

4.6. Simulation of Behavioral Transitions

Changes in net income associated with specific hours points leads to changes in the choice probabilities given by equation (5). These allow for the calculation of aggregate labor supply effects of the hypothetical reforms. We simulate these effects by the calibration method, i.e., we add random error terms from the (EVI) distribution to the estimated utility levels of each choice alternative in the baseline (*status quo*) simulation until the utility-maximizing choice matches the observed labor supply at the individual level. This set of choice-specific individual errors is then used in the simulation of labor supply reactions to the reforms (see Creedy and Kalb, 2005).[14]

The aim of the calibration method is to use information efficiently for simulation purposes. Given the individual parameters of the utility functions and the expected disposable incomes for the *status quo* and the reform scenarios, we may use alternative procedures:

14 We only simulate labor supply responses for households with flexible labor supply and positive first derivatives. Budget neutrality has been obtained using the entire sample. The fraction of households with positive derivatives along with resulting labor supply elasticities is reported at the bottom of table 8. Households with positive derivatives have a slightly higher average net equivalence income (28,376 versus 21,819 euros); thus the positive welfare effects of the highly redistributive basic income reform can be interpreted as a lower bound.

1. *Probability or expectation method*
   Assign to each individual expected working hours and an expected participation rate given the probability of each choice category (see Creedy and Duncan, 2002).
2. *Calibration method*
   Combine the probabilities with information about the *status quo* choice as proposed and discussed by Duncan and Weeks (1998), Creedy and Duncan (2002), and Bonin and Schneider (2006).

The calibration method makes full use of available information about the choices of the households in the *status quo*. This is done by random drawings from the extreme-value distribution, keeping only those that are consistent with the actual choice of the respective household in the simulation step. Each household actually chooses exactly one category in the *status quo*, thus we end up with a genuine probability distribution over all options for each individual in the reform scenario, which it is not possible to derive with the probability method.

Aaberge and Colombino (2014, p. 190) describe this method in detail. They state that the probability method and the calibration method should be asymptotically equivalent; however, they might diverge on small samples or subsamples. Typically, the estimated outcomes from the two methods do not differ much if evaluated at mean characteristics in the population, but may differ substantially if calculated for specific labor market groups or at the tails of the income distribution. In table 9, we show that estimated elasticities, on average, do not differ much if the probability method is used instead of the calibration method.

5. Simulation Results

5.1. Effects on Government Revenue

The three reform scenarios have been calibrated to be close to budget-neutral after labor supply reactions. Table 3 shows the changes in government revenues before and after labor supply reactions. In the absence of any labor supply responses, the *Employment* and especially the *Flat Tax* reforms would result in a substantial increase in government revenues, whereas they would be reduced by about 462 million euros per year in the case of the *Full-Time* reform. Allowing for labor supply responses renders all three reform scenarios virtually budget-neutral due to the decrease in employment elicited by the *Employment* and *Flat Tax* reforms and a small overall increase in total working hours in the *Full-Time* reform, as described below.

Table 3
Changes in Government Revenue in Millions of Euros before and after Behavioral Adjustments

Labor Supply Responses	Employment	Full Time	Flat Tax
Before	3,302	−462	26,187
After	25	16	164

Note: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

5.2. Labor Supply Effects

Table 4 shows the estimated percentage changes in working hours. The last line of the table shows that both the *Employment* and *Flat Tax* scenarios would reduce the total labor supply, while the total effect of the *Full-Time* reform would be negligible. The *Employment* reform would reduce supplied hours by 1%, the increase induced by the *Full-Time* reform would be virtually zero, and the *Flat Tax* reform would reduce supplied hours substantially, by 4.9%. For the *Employment* and *Flat Tax* reforms, female labor supply reacts more strongly than male labor supply, which is a typical result in labor economics.

All three reforms are designed to improve work incentives for low-income households, and indeed all three reforms would increase the labor supply in the decile with the lowest net equivalence income under the *status quo*. While the *Employment* and *Full-Time* reforms would increase the labor supply in the first decile by 0.3% and 0.9% respectively, the *Flat Tax* reform would lead to the strongest increase, 1.4%, in this decile. For all reforms, the positive changes in labor supply would be almost entirely due to men increasing their labor supply in the first decile. For all other deciles, the labor supply effects of the *Employment* and *Flat Tax* reforms are negative due to increased marginal tax rates and, in the case of the *Flat Tax*, the increased transfer income for larger households. The *Full-Time* reform, which leaves marginal tax rates unchanged, has modest effects in the upper nine deciles, ranging from −0.4% to 0.2%.

The lower part of table 4 shows labor supply reactions by household types – divided into singles and couples with zero, one, or two or more two children. Overall, the *Employment* and *Flat Tax* reforms lead to negative total labor supply changes for all of these household types. The *Full-Time* reform reduces the labor supply for some types of single households and increases it for all types of couple households.

Table 5 shows simulated effects, in percentage points, of the reform scenarios on the participation rate by income deciles and household types. The

Table 4

Simulated Labor Supply Effects of the Reform Scenarios by Household Types, Over the Income Distribution, and on Aggregate.

	Employment			Full-Time			Flat Tax		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Changes in Hours Worked (in Percent)									
Deciles of Net Equivalence Income									
1st	−0.0	0.8	0.3	−0.7	3.8	0.9	−0.1	4.1	1.4
2nd	−0.4	−0.2	−0.3	−0.1	0.0	−0.0	−2.5	−0.1	−1.5
3rd	−1.1	−0.7	−0.9	−0.8	0.1	−0.4	−7.2	−0.7	−4.1
4th	−3.2	−0.1	−1.7	0.1	0.0	0.1	−3.2	−0.9	−2.0
5th	−1.7	−0.2	−0.9	−0.2	0.1	−0.0	−7.2	−2.3	−4.7
6th	−4.8	−0.2	−2.4	−0.2	0.0	−0.1	−9.2	−4.0	−6.5
7th	−2.3	−0.9	−1.6	0.5	−0.1	0.2	−10.0	−1.6	−5.6
8th	−0.7	−0.6	−0.7	0.0	0.0	0.0	−13.4	−3.0	−8.1
9th	−0.6	−0.1	−0.3	−0.1	−0.1	−0.1	−9.1	−2.6	−5.4
10th	−1.7	−0.2	−0.8	−0.0	−0.0	−0.0	−12.0	−5.1	−8.0
By Household Type									
Couples, 0 children	−1.2	−0.4	−0.8	−0.1	0.2	0.1	−7.2	−1.4	−4.0
Couples, 1 child	−1.0	−0.4	−0.7	−0.1	0.3	0.1	−6.7	−1.5	−3.8
Couples, 2+ children	−1.0	−0.4	−0.7	−0.2	0.3	0.1	−6.6	−1.6	−3.8
Singles, 0 children	−2.2	0.0	−1.2	−0.2	0.0	−0.1	−9.2	−4.6	−7.1
Singles, 1 child	−4.1	0.0	−3.7	0.2	0.0	0.1	−8.2	−14.3	−8.8
Singles, 2+ children	−3.0	0.0	−2.6	−0.9	0.0	−0.7	−4.4	−0.7	−3.8
All households	−1.7	−0.3	−1.0	−0.1	0.2	0.0	−7.7	−2.2	−4.9

Note: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

effects are in line with the responses for working hours: The *Flat Tax* has a relatively strong negative effect (−3.3 percentage points), while the negative effects of the *Employment* reform (−0.3 percentage points) and of the *Full-Time* reform (−0.2 percentage points) are negligible.

The *Employment* reform succeeds in increasing the participation rate for the lowest two income deciles only, while the effect is positive only in the lowest decile for the *Flat Tax* and zero or negative in all other deciles. For the *Full-Time* reform, both positive and negative effects can be found over the income distribution.

For men, the participation effects of the *Full-Time* reform are nonnegative for all deciles and all household types. This can be explained by the fact that men rarely work part-time and are therefore less affected by the abolition

Table 5

Simulated Participation Effects of the Reform Scenarios by Household Types, Over the Income Distribution, and on Aggregate.

	Employment			Full-Time			Flat Tax		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Changes in Participation Rates (in Percentage Points)									
Deciles of Net Equivalence Income									
1st	0.0	1.0	0.4	−1.7	2.6	0.0	−0.7	2.1	0.4
2nd	0.3	0.0	0.2	−0.3	0.0	−0.2	−1.8	0.0	−1.1
3rd	−0.5	0.0	−0.3	−1.4	0.0	−0.8	−3.0	−0.4	−2.0
4th	0.0	0.0	0.0	−0.9	0.0	−0.5	−2.3	−1.5	−2.0
5th	−0.6	−0.7	−0.6	−0.3	0.0	−0.2	−3.8	−2.6	−3.2
6th	−0.8	0.0	−0.4	0.0	0.0	0.0	−4.2	−3.3	−3.8
7th	−0.6	−0.6	−0.6	0.0	0.0	0.0	−6.3	−1.8	−4.1
8th	−0.3	−0.3	−0.3	0.0	0.0	0.0	−8.3	−2.5	−5.5
9th	−0.5	0.0	−0.3	−0.3	0.0	−0.1	−6.0	−2.4	−4.2
10th	−0.9	−0.2	−0.6	0.0	0.0	0.0	−7.2	−2.6	−4.9
By Household Type									
Couples, 0 children	−0.5	−0.2	−0.3	−0.5	0.2	−0.1	−4.5	−1.2	−2.8
Couples, 1 child	−0.3	−0.1	−0.2	−0.5	0.2	−0.2	−4.6	−1.0	−2.8
Couples, 2+ children	−0.4	−0.1	−0.2	−0.5	0.2	−0.2	−4.5	−1.0	−2.8
Singles, 0 children	0.0	0.0	0.0	−0.2	0.0	−0.1	−6.2	−5.6	−5.9
Singles, 1 child	−0.9	0.0	−0.8	−0.5	0.0	−0.4	−3.2	−8.0	−3.7
Singles, 2 children	−0.8	0.0	−0.8	−1.7	0.0	−1.5	−1.7	−8.3	−2.3
All Households	−0.4	−0.1	−0.3	−0.4	0.2	−0.2	−4.5	−1.8	−3.3

Note: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

of exemptions for marginal employment and increased transfer withdrawal rates while profiting from the subsidization of full-time employment. In contrast, the effect of the *Full-Time* reform on participation rates for women is either negative or zero in all income deciles.

Split into household types, the participation effects have the same sign as the hours changes for the *Employment* and *Flat Tax* reforms: they are nonpositive for all household types and zero for single men for the *Employment* reform. For the *Full-Time* reform, participation effects are negative for all household types, while hours effects are positive for most household types. This shows that the incentives provided by this reform lead households to change from part-time employment to full-time employment or unemployment.

5.3. Income Effects and Welfare

Table 6 shows annual changes in average incomes and compensating variations, i.e., the amount of money that would have to be given or taken away from a household after a reform for it to reach the utility level it had before the reform.

Because the utility functions are estimated on the household level, we adjust these measures by the OECD equivalence scale to obtain changes on the personal level. Note that the compensating variations are not comparable *across* households, but only measure utility changes *within* a household. Positive compensating variations indicate welfare gains. The compensating variations are generally larger than the income changes when households reduce their labor supply.

All three reforms lead to income and welfare gains for lone parents. The *Full-Time* reform leads to both income and welfare gains for all household types. The *Employment* reform leads to welfare gains for all household types except for childless singles, while only lone parents gain financially. The *Flat Tax* induces the most radical effects: because transfers are no longer adjusted for household size, people with children gain substantially; the compensating variation of singles with at least two children is more than 2,200 euros. On the other hand, singles without children have a negative compensating variation of more than 400 euros because of the increase in tax rates. The income loss for this group is close to 2,000 euros, but it is partially offset in welfare terms by a substantial reduction in labor supply.

Table 7 depicts income and welfare changes adjusted by the OECD equivalence scale over the income distribution. The *Employment* reform clearly benefits those with low incomes at the cost of those with higher incomes.

Compensating variations for the lowest decile are more than 1,900 euros on average and 1,600 euros for the 2nd decile; the average compensating variations decrease steadily with increasing income. While households in the 5th decile still gain on average, those in the 6th decile lose, and the compensating variation for the 10th decile is about −1,500 euros on average.

In the *Full-Time* reform all deciles of the income distribution gain in terms of both income and welfare; the highest gains are reached by the 3rd to 5th income deciles, while the upper deciles gain less from the employment subsidy.

The *Flat Tax* reform leads to income and welfare gains for the lower five deciles. On average, incomes in the 6th and 7th deciles decrease, but in welfare terms this is more than offset by the increase in leisure. For the upper three deciles both the income changes and the compensating variations are negative on average. The largest welfare gains are registered for the 1st

Table 6

Simulated Income and Welfare Changes of the Reform Scenarios Adjusted by the OECD Equivalence Scale by Household Types and on Aggregate in Euros per Year and Household.

	Employment		Full-Time		Flat Tax	
	Income Change	CV	Income Change	CV	Income Change	CV
Couples, 0 children	−172	84	451	501	88	972
Couples, 1 child	−93	139	447	492	255	1066
Couples, 2+ children	−102	140	434	491	241	1055
Singles, 0 children	−379	−128	485	483	−1987	−469
Singles, 1 child	5	640	282	282	325	1832
Singles, 2+ children	433	579	85	69	1682	2249
All households	−182	81	444	473	−423	662

Note: Our sample comprises households with members who have flexible labor supply. Source: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

Table 7

Simulated Income and Welfare Changes of the Reform Scenarios Adjusted by the OECD Equivalence Scale over the Income Distribution and on Aggregate.

	Employment		Full-Time		Flat Tax	
	Income Change	CV	Income Change	CV	Income Change	CV
Deciles of Net Equivalence Income						
1st	1943	1920	229	98	4296	4210
2nd	1558	1600	515	511	4065	4078
3rd	941	992	741	747	2941	3330
4th	389	613	750	805	2178	2561
5th	−73	134	613	696	1067	1830
6th	−852	−294	459	543	−48	1165
7th	−928	−498	424	463	−948	48
8th	−1137	−885	348	375	−2822	−998
9th	−1418	−1215	242	264	−4531	−2827
10th	−2209	−1515	117	228	−10387	−6715
All households	−182	81	444	473	−423	662

Note: Our sample comprises households with members who have flexible labor supply. Source: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

decile (compensating variation of more than 4,200 euros), while the highest average welfare loss is estimated at about 6,700 euros for the 10th decile.

5.3.1. Aggregate Welfare Effects and Discussion of Welfare Measures

The average welfare measures in the bottom line of table 7 imply that each person is given the same weight. As compensating variations only reflect welfare changes within a household and not across households, aggregation is generally problematic.[15] However, in practice policymakers have to weight and trade off positive welfare changes of some households against negative welfare changes for others. We use two heuristics commonly applied in empirical welfare analysis, namely the OECD equivalence scale and decreasing weights with increasing income. Consider two households with different levels of income, and suppose that a reform leads to the same change in income for these two households, while labor supply remains unchanged. In this case, the compensating variation of both households is the amount by which income changes. However, policymakers might value the compensating variation of the household with higher income differently, for instance because of decreasing marginal utility of consumption or because of inequality aversion. This is taken into accout by decreasing weights with increasing income. The rationale for the use of OECD equivalence scales is similar: Consider the same thought experiment, but where household sizes differ instead of income levels. Again, the policymaker might value the compensating variations of the two households differently; with a larger household size, the same compensating variation implies a smaller increase in individual welfare ceteris paribus.

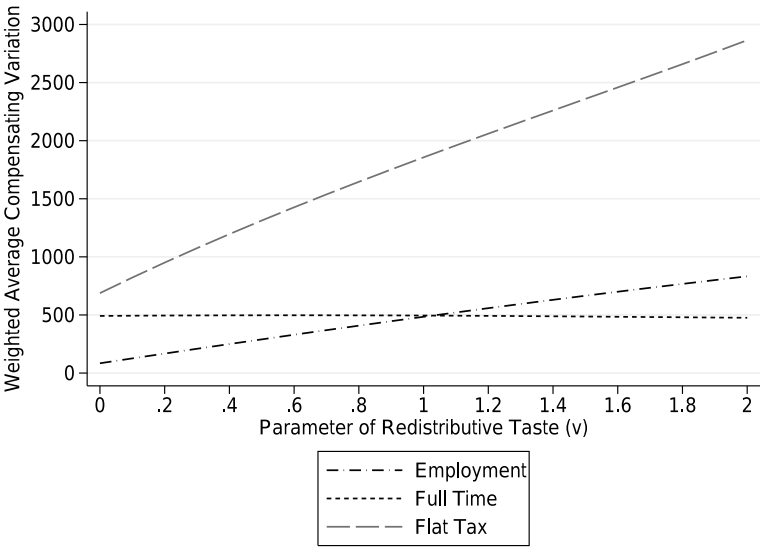
An alternative to our approach consists in choosing reference preferences (for an empirical application, see Aaberge and Colombino, 2013), which, however, contradicts preference heterogeneity of the labor supply model. Decoster and Haan (2015) propose alternative welfare measures that respect preference heterogeneity and allow for individual welfare ordering given explicit normative priors. Here, we do not aim to rank individuals or households.

Aggregate welfare changes are evaluated by a social welfare function with individual weights depending on some function of individual income. Figure 5 and table 10 in the appendix show aggregate welfare gains for different values of a parameter v for redistributive taste. The weighted-average compensating variation (w_{cv}) is given by

$$w_{cv} = \frac{\sum_{i=1}^{N} cv_i / y_i^v}{\sum_{i=1}^{N} 1/y_i^v}, \tag{6}$$

15 See Decoster and Haan (2015) for a discussion.

Figure 5
Average Weighted Compensated Variations of Reforms



Note: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

where y denotes income and cv denotes the compensating variation, both adjusted by the OECD equivalence scale. The higher is v, the higher is the welfare weight assigned to individuals with lower incomes. $v = 0$ leads to the utilitarian social welfare function, which assigns the same weight to all members of society. If $v = 1$, w_{cv} is a weighted mean with weights y_i^{-1}. If $v \to \infty$, w_{cv} converges to the Rawlsian social welfare function.

All three reforms lead to average welfare gains for all values of v. Using a utilitarian social welfare function, the aggregate welfare gains of the *Employment* reform are relatively small, and the *Full-Time* and *Flat Tax* reforms lead to average welfare gains of about 500 and 700 euros, respectively. The welfare gains of the *Flat Tax* reform are monotonically increasing with v; it leads to the highest welfare gains for low-income households and welfare losses for higher-income households. Aggregate welfare gains of the *Full-Time* reform decrease smoothly, because the employment subsidy starts at rather high levels of income and the transfer withdrawal rates are increased. Welfare gains of the *Employment* reform increase with v. The *Full-Time* reform dominates the *Employment* reform in welfare terms for $v < 1$, the reverse is true for higher values of v. The *Flat Tax* reform dominates both *Full-Time* and *Employment* at all levels of v.

6. Summary and Conclusions

In this paper we have analyzed three budget-neutral reforms of the German tax and transfer system – two reforms that employ employment subsidies to improve work incentives for people with low incomes, and a *Flat Tax* reform with a basic income equal to the current level of Unemployment Benefit II. The first two reforms stipulate employment subsidies of 1,560 euros per year for people working at least 10 (*Employment*) or 30 (*Full-Time*) hours a week, respectively. In addition, the 10-hour reform involves a reduction of marginal transfer withdrawal rates. It is financed by abolishing social security exemptions for marginal employment and increasing marginal tax rates. The *Full-Time* reform is financed by abolishing social security exemptions for marginal employment and increasing marginal transfer withdrawal rates.

Using a structural labor supply model, we have estimated labor supply reactions and welfare effects of the reform scenarios. We find that all three reforms increase labor supply in the first decile of the income distribution. However, the *Flat Tax* reform and the reform designed to increase incentives for labor market participation (*Employment*) reduce the labor supply of households at most other income deciles, while the *Full-Time* reform has a negligible effect on overall labor supply. The *Flat Tax* scenario reduces overall labor supply by about 4.9%, while the *Employment* reform scenario has only a relatively small negative effect on labor supply. With equal welfare weights, aggregate welfare gains are realizable under all three reforms. The stronger the redistributive taste, the higher are the welfare gains of the flat tax reform. The results are not obvious. Among the few simulation studies comparable to ours, only Colombino et al. (2010), Colombino and Narazani (2013), and Colombino (2015) report positive labor supply and welfare effects. For Germany, this is the first study to consider a tax and transfer schedule that is flat over the whole range of taxable income and does not include a basic allowance.

A word of caution about the limitations of the model employed for our analysis is in order, as the application of a dynamic labor supply model could result in lower potential welfare gains. First, empirical studies of labor supply tend to find small labor supply elasticities (see Meghir and Phillips, 2010), and this includes structural models limited to one period. However, this common finding is challenged by models that allow for learning on the job and often find substantially larger elasticities (see Keane and Rogerson, 2012). In the presence of larger labor supply elasticities than the ones estimated by the model applied in this study, the basic income of the *Flat Tax* reform as well as the employment subsidy of the *Employment* reform would have to be financed by even larger tax increases, which in turn would reduce the welfare gains of these reforms. However, Blundell et al. (2013) estimate a dynamic

model for women that allows for learning on the job and find elasticities similar to the ones obtained with a static one-period model. Moreover, the static model does not allow for uncertainty. The welfare gains of the *Flat Tax* are smaller when households are forward-looking decision-makers and future income is uncertain.

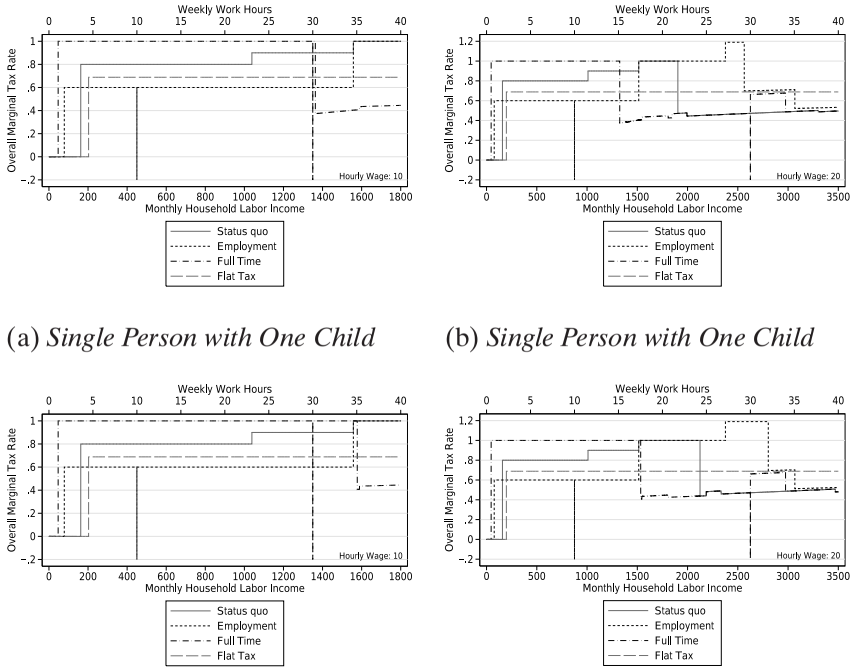
Keeping these caveats in mind, we conclude that it is difficult to reform the German tax and transfer system in a way that improves work incentives for low-income households without decreasing the overall labor supply and violating budgetary neutrality. However, aggregate welfare improvements are possible through more redistribution to low-income households and households with children. A flat tax with unconditional basic income may achieve these aims for Germany.

7. Appendix

Figures (next page)

Figure 6

Marginal Tax Rates by Monthly Household Gross Labor Income and Weekly Working Hours in Germany, 2011



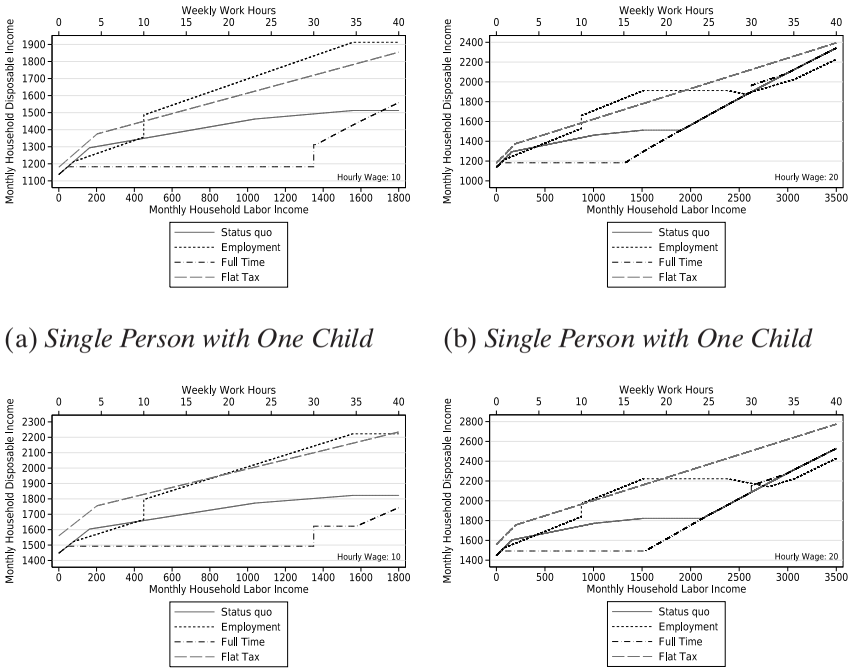
(a) *Single Person with One Child* (b) *Single Person with One Child*

(c) *Single Person with Two Children* (d) *Single Person with Two Children*

Note: Own calculations based on a modified version of the STSM.

Figure 7

Budget Constraint by Monthly Household Gross Labor Income and Weekly Working Hours in Germany, 2011



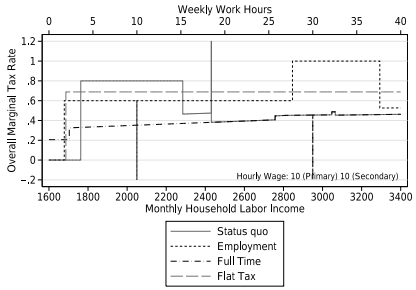
(a) *Single Person with One Child* (b) *Single Person with One Child*

(c) *Single Person with Two Children* (d) *Single Person with Two Children*

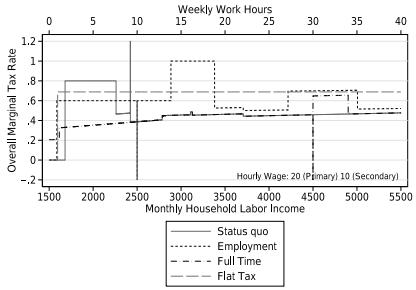
Note: Own calculations based on a modified version of the STSM.

Figure 8

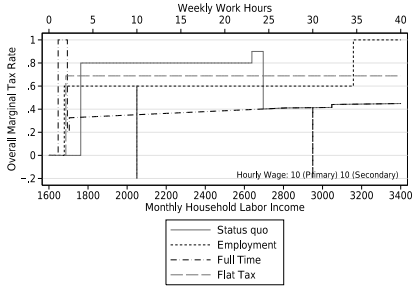
Marginal Tax Rates by Monthly Household Gross Labor Income and Weekly Working Hours in Germany, 2011



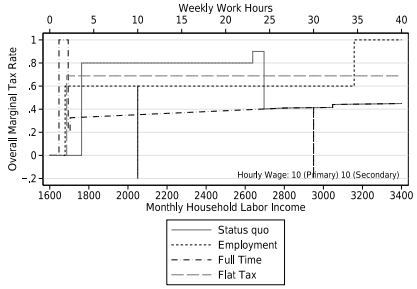
(a) *Married Household without Children*



(b) *Married Household without Children*



(c) *Married Household with One Child*

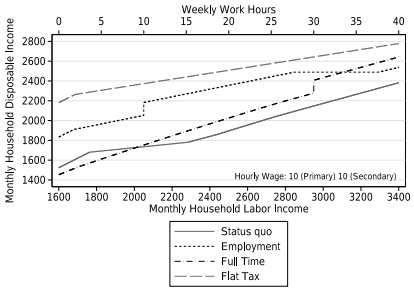


(d) *Married Household with One Child*

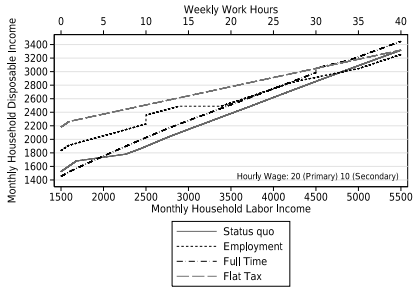
Note: Own calculations based on a modified version of the STSM.

Figure 9

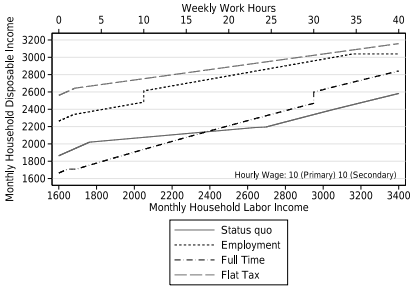
Budget Constraint by Monthly Household Gross Labor Income and Weekly Working Hours in Germany, 2011



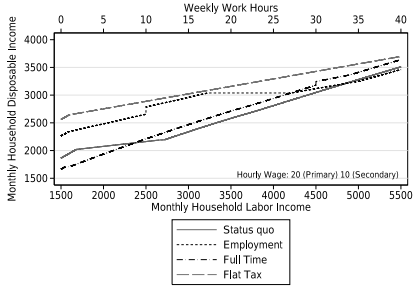
(a) *Married Household without Children*



(b) *Married Household without Children*



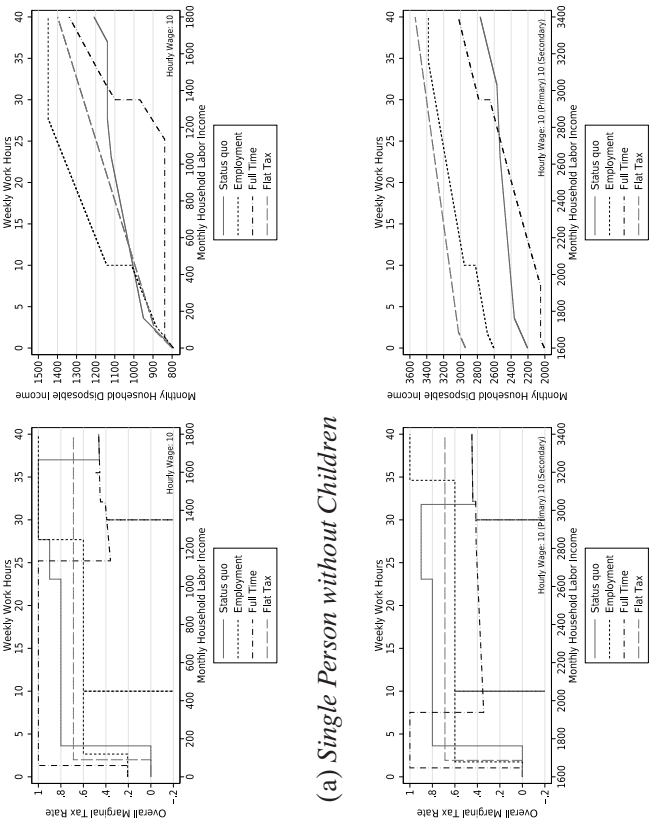
(c) *Married Household with One Child*



(d) *Married Household with One Child*

Note: Own calculations based on a modified version of the STSM.

Figure 10
Marginal Tax Rates and Budget Constraint by Monthly Household Gross Labor Income and Weekly Working Hours in Germany, 2011



(a) *Single Person without Children*

(b) *Married Household with Two Children*

Note: Own calculations based on a modified version of the STSM.

Tables

Table 8

Estimation Results for Labor Supply Model, Dependent Variable: Hours Chosen

Variables	Flexible Couples	Women with Inflexible Spouse	Men with Inflexible Spouse	Single Men	Single Women
Log Net Income	4.018	−5.930*	2.983	−1.705	−3.338
	(2.858)	(2.318)	(9.246)	(2.596)	(2.319)
(Log Net Income)^2	0.193*	0.198*	−0.0526	0.0785	0.237***
	(0.0777)	(0.0884)	(0.351)	(0.0667)	(0.0659)
Log Net Income × East	3.261	−11.83	−2.336	5.420**	1.027
	(2.507)	(6.587)	(8.167)	(1.952)	(1.877)
(Log Net Income)^2 × East	−0.232	0.587	0.0650	−0.337**	−0.0691
	(0.132)	(0.339)	(0.413)	(0.117)	(0.116)
Log Net Income × German Female	0.428	2.614*	−0.124		0.380
	(0.312)	(1.050)	(0.387)		(0.412)
Log Leisure Female	62.91***	56.56***			55.44***
	(6.400)	(6.962)			(7.998)
Log Net Income × Log Leisure Female	−0.370	−0.00946			−0.0151
	(0.262)	(0.236)			(0.370)
Log Leisure Female ^{2}	−6.585***	−6.257***			−6.529***
	(0.541)	(0.730)			(0.704)
Log Leisure Female × German Female	−0.6885	−0.0200			−1.109
	(0.384)	(0.737)			(0.608)
Age Female × Log Leisure Female	−0.218**	−0.442***			−0.144
	(0.0720)	(0.0884)			(0.0853)
Age^2 × Log Leisure Female	0.00374***	0.00633***			0.00259**
	(0.000837)	(0.000992)			(0.000986)
Log Leisure Female × Disability I	0.192	0.944*			1.053**
	(0.348)	(0.435)			(0.403)
Log Leisure Female × Disability II	0.729	1.868*			1.546*
	(0.666)	(0.816)			(0.617)
Log Leisure Female × East	−15.48***	−1.480**			−0.515
	(2.506)	(0.468)			(0.456)
Log Leisure Female × Children Under 3 Years	4.649***	3.958***			4.393***
	(0.292)	(0.420)			(0.6885)
Log Leisure Female × Children 7 to 16 Years	1.888***	1.811***			1.202***
	(0.192)	(0.289)			(0.314)
Log Leisure Female × Children 4 to 6 Years	2.007***	1.977***			2.148***
	(0.266)	(0.420)			(0.487)
Log Leisure Female × Children over 17 Years	1.009***	0.829**			−0.561
	(0.189)	(0.267)			(0.323)
Female Part Time I	−1.087***	−1.406***			−2.185***
	(0.0722)	(0.106)			(0.146)
Female Part Time II	−0.890***	−1.079***			−1.515***
	(0.0725)	(0.101)			(0.0977)

Table 8
Continued.

Variables	Flexible Couples	Women with Inflexible Spouse	Men with Inflexible Spouse	Single Men	Single Women
Log Net Income × German Male	0.656 (0.461)	−0.139 (0.250)	−0.593 (1.695)	0.0380 (0.544)	
Log Leisure Male × Log Net Income	−1.447*** (0.292)		−0.0206 (0.590)	0.201 (0.412)	
Log Leisure Male	92.14*** (5.680)		54.52*** (9.276)	38.03*** (7.901)	
(Log Leisure Male)^2	−8.540*** (0.323)		−6.196*** (0.573)	−5.125*** (0.585)	
Log Leisure × German Male	−0.817 (0.495)		−0.902 (1.142)	0.365 (0.973)	
Log Leisure Male × Age Male	−0.320*** (0.0705)		−0.297** (0.109)	0.00263 (0.0784)	
Log Leisure Male × Age Male^2	0.00392*** (0.000782)		0.00368** (0.00123)	0.000140 (0.000922)	
Log Leisure Male × Disability I	0.994*** (0.291)		1.255* (0.494)	1.570*** (0.422)	
Log Leisure Male × Disability II	1.815*** (0.549)		2.171* (0.909)	1.819** (0.599)	
Log Leisure Male × East	−13.80*** (2.656)		−0.0987 (0.686)	−0.161 (0.555)	
Male Part Time I	−3.497*** (0.241)		−3.116*** (0.389)	−3.671*** (0.341)	
Male Part Time II	−3.484*** (0.106)		−3.299*** (0.204)	−3.398*** (0.177)	
Log Leisure Male × Log Leisure Female × German Male	−0.0293 (0.115)				
Log Leisure Male × Log Leisure Female	−0.785 (0.422)				
Log Leisure Male × Log Leisure Female × East	3.365*** (0.658)				
Observations	105,002	8,983	4,284	5,017	7,768
Pseudo R^2	0.28	0.11	0.41	0.37	0.16
Derivatives					
$U_y > 0$	97%	91%	100%	76%	100%
$U_{lf} > 0$	67%	58%			73%
$U_{lm} > 0$	100%		100%	78%	
Uncompensated own-wage elasticities					
Male	0.04		0.03	0.09	
Female	0.12	0.06			0.23
Uncompensated cross-wage elasticities					
Male	−0.01		0.00		
Female	−0.10	−0.02			

Note: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

Table 9

Sensitivity to Modeling Assumptions

	10% Own Wage Elasticities					
	Flexible Couples		Women with Inflexible Spouse	Men with Inflexible Spouse	Single Men	Single Women
Model Variation	Women	Men				
Choice set						
0, 20, 30, 40 women 0, 40, 50 men	0.10	0.12	0.10	0.01	0.02	0.26
0, 10, 20, 30, 40, 50 women 0, 20, 40, 50 men	0.19	0.11	0.07	0.01	0.06	0.14
Utility function						
Quadratic	0.13	0.09	0.06	0.08	0.24	0.14
Unobserved heterogeneity						
In C only	0.10	0.08	0.03	0.00	0.03	0.21
In L only	0.15	0.08	0.01	0.02	0.03	0.13
In C and L	0.25	0.09	0.03	0.00	0.00	0.23
In C and L (with correl.)	0.20	0.08	0.10	0.03	0.04	0.14
Simulation of behavioral transitions						
Probability method	0.14	0.09	0.09	0.05	0.08	0.17
Main model	0.12	0.04	0.06	0.03	0.09	0.23

Note: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

Table 10

Average Welfare Changes under Different Welfare Weights

	Employment	Full-Time	Flat Tax
$v = 0$	84	492	688
$v = 0.5$	290	497	1313
$v = 1$	484	495	1856
$v = 1.5$	666	487	2359
$v = 2$	833	476	2865

Note: Own calculations based on the SOEP v29l (2012) and a modified version of the STSM.

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