Does a Simpler Income Tax Yield More Equity and Efficiency?

Clemens Fuest, Andreas Peichl and Thilo Schaefer*

Abstract
This article investigates the impact of tax simplification on various indicators of the efficiency of the tax system and on the distribution of income. The analysis is based on a simulation model (FiFoSIM) using German income tax and household survey microdata. We model tax simplification as the abolition of a set of deductions from the income tax base. We find that this form of tax base simplification leads to a reduction in the use of professional tax advice, a more equitable income distribution and an increase in tax revenue. If this is combined with a reduction of income tax rates to preserve revenue neutrality, the effects depend on the type of rate schedule adjustment. The combination with a flat rate tax increases income inequality at the expense of the middle class, but it also leads to efficiency gains because tax distortions of labour supply are reduced. The combination with a rate schedule adjustment, which preserves the directly progressive schedule reduces inequality but increases overall tax distortions. We conclude that the effects of tax base simplification on after tax income inequality and tax distortions mainly depend on the type of tax schedule adjustment. (JEL Codes: D3, H2, J22)

Keywords: Flat tax, income tax reform, tax simplification.

1 Introduction

The simplification of the tax system is a key objective of many income tax reform proposals in various countries. This is not only because complexity leads to high compliance costs for taxpayers and tax evasion. The complexity of the income tax system is also widely seen as an obstacle to fairness and efficiency beyond costs of administration and compliance. For instance, complexity is thought to be a barrier for achieving a fair distribution of the tax burden because it might allow taxpayers with high incomes to use tax loopholes and reduce their tax burden. Therefore,
simplicity of the income tax is generally seen as an important feature of tax systems. Simplification makes it easier for taxpayers to understand and pay taxes, and makes it also easier for tax authorities to collect taxes in a fair way.

Given the importance attributed to simplification in tax reform debates, there is surprisingly little empirical research on the impact of tax simplification on the equity and the efficiency of the tax system. To some extent, this may be due to the fact that the theoretical and empirical analysis of tax simplification faces considerable conceptual problems. In particular, tax simplification itself is not a clearly defined concept. Explicit measures are seldomly defined or seem rather randomly picked as part of reform proposals. It is also not clear whether changes in the tax law increase or decrease the complexity of the tax system. In many cases, measures which broaden the tax base are considered to be simplifications. But in some cases (e.g. the taxation of the imputed rent of owner occupied housing) tax base broadening may also complicate the system.\(^2\) Despite these difficulties, it is important to investigate whether the basic idea that income tax simplification through eliminating special loopholes indeed leads to a more equitable and a more efficient tax system can be supported empirically.

In the literature, quantitative studies of the impact of tax simplification on the efficiency of the tax system and the distribution of income exist for the US. The debate on tax simplification in the US in the beginning of the 1980s (see e.g. Pechman 1987 or Slemrod 1984) was followed by the Tax Reform Act from 1986, which introduced a tax rate cut cum base broadening with the aim of simplifying the income tax system (see Slemrod (1992) for an economic evaluation). Slemrod (1989) estimates the reduction in compliance costs from alternative simplification options. In a recent contribution, Gale and Rohaly (2003) studied the effect of different tax simplification proposals. Among other things, they consider the introduction of a flat rate income tax, combined with a value added tax reform. They found that such a tax reform would increase the tax burden of the middle class and reduce the tax burden for very high and very low incomes. Gale, Houser and Scholz (1996) analyse the effects of introducing a flat tax in the US according to the concept of Hall and Rabushka (1995) and similar versions. They conclude that high income households profit most while households with low incomes suffer from a flat tax reform. This study does not distinguish between the effects of tax base variation and tax rate changes, though. As far as we know there is no empirical analysis of the distributional and efficiency effects of tax

simplification for the German tax system. However, von Loeffelholz and Rappen (2003) analyse the compliance cost of the German tax system. But there are several studies on the effects on revenue and distribution of tax reform proposals including the objective of tax simplification. For example, Wagenhals (2001) examines the incentive and distributional effects of the reform proposal by Kirchhof et al. (2001).

The present article uses a simulation model based on German microdata to quantify the impact of income tax simplification on equity and efficiency in terms of the distribution of after tax income, the effective marginal income tax rates, the supply of labour and the welfare of the households. The change in effective marginal income tax rates may be considered as rough indicators for the distortions caused by the tax system. The labour supply responses and the welfare effects can be seen as more comprehensive indicators for the efficiency effects. We study both equity and efficiency effects within the same microeconometric framework. Given that the chosen simplification measures have not yet been implemented in Germany, the economic effects can only be studied on the basis of simulation models. We use a microsimulation model (FiFoSiM) based on a unique database of German microdata to provide empirical evidence for our analysis. The qualitative results should be of interest to a wider range of countries.

We model income tax simplification as the abolition of a set of deductions from the tax base included in the current income tax system. We distinguish between measures concerning the determination of earnings and measures concerning the calculation of the taxable income. The selection of simplification measures is based on the ongoing policy debate in Germany.3 We find that this form of tax base broadening leads to a more equitable income distribution and, not surprisingly, an increase in tax revenue. If these measures are combined with a reduction of income tax rates to preserve revenue neutrality, the distributional impact depends on the type of rate schedule adjustment. The combination with a flat rate tax implies that the reform redistributes in favour of the very high and very low incomes, while overall income inequality increases. The combination with a less radical rate schedule adjustment, which preserves the directly progressive rate schedule, yields a tax reform which reduces the inequality of after tax incomes. We also consider the effect of these tax measures on the marginal income tax rate. If we combine the tax

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3 See e.g. Fuest, Peichl and Schaefer (2007a) or Wagner (2006). In principle, the general debate is similar in various countries: the income tax shall be simplified through tax base broadening via the abolition of tax breaks and specific deductions. Nevertheless, the specific debate in each country depends on the country-specific tax system and cannot be easily compared across countries.
base simplification measures with the revenue neutral introduction of a flat rate tax, we find that marginal income tax rates for very high incomes decline whereas marginal tax rates of middle income taxpayers increase. Therefore, the overall effect of introducing a flat rate on tax distortions is ambiguous. The combination with a directly progressive tax rate schedule assures a reduction of the marginal income tax rate for all taxpayers except the highest income decile. The employment effects also depend on the type of schedule adjustment. The progressive combination decreases aggregate labour supply, whereas the flat tax slightly increases it. The welfare effects are negative for the progressive combination but positive for the flat tax. In this respect, the data confirms the idea that tax reforms inevitably face a tradeoff between equity and efficiency.

The setup of the article is organised as follows: Section 2 contains a short description of FiFoSiM, Section 3 presents the reform scenarios. Section 4 illustrates the effects on distribution. Section 5 presents the effects on the marginal tax rates, labour supply and household welfare as measures for efficiency. Section 6 concludes.

2 FiFoSiM: database and model

Our analysis is based on a behavioural microsimulation model for the German tax and transfer system (FiFoSiM) using income tax and household survey microdata. The basic module of FiFoSiM is a static microsimulation model for the German tax and benefit system using income tax and household survey microdata. The approach of FiFoSiM is innovative insofar as it creates a dual database using two microdatasets for Germany: FAST01 and GSOEP.4 FAST01 is a microdataset from the German federal income tax statistics 2001 containing the relevant income tax data of nearly 3 million households in Germany. Our second data source, the German Socio-Economic Panel (GSOEP), is a representative panel study of private households in Germany. The simultaneous use of both databases allows for the imputation of missing values or variables in the other dataset using techniques of statistical matching.

The layout of the tax benefit module follows several steps: First, the database is updated using the static ageing technique, which allows controlling for changes in global structural variables and a differentiated adjustment for different income components of the households. Second, we simulate the current tax and benefit system in 2006 using the

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4 In the last years several tax benefit microsimulation models for Germany have been developed (Peichl 2005 or Wagenhals 2004). Most of these models use either GSOEP or FAST data. FiFoSiM is so far the first model to combine these two databases.
uprated data. This allows us to compute the disposable incomes for each person and household taking into account the detailed rules of the complex tax benefit system. The basic steps for the calculation of the personal income tax under German tax law are as follows. The income of a taxpayer from different sources is determined and to allocate it to the seven forms of income defined in the German income tax law. For each type of income, the tax law allows for certain income related expenses. Then deductions like contributions to pension plans or charitable donations are taken into account and subtracted from the sum of incomes, which gives taxable income as a result. Finally, the income tax is calculated by applying the tax rate schedule to taxable income. To derive the disposable income \( Y \) from gross income \( G \), received benefits (like unemployment benefit, social assistance, child benefits, etc.) are added and taxes \( T \) and social insurance contributions \( S \) are subtracted:

\[
Y = G + B - T - S
\]

The modelling of the tax and transfer system uses the technique of microsimulation.\(^5\) FiFoSiM computes individual tax payments for each case in the sample considering gross incomes and deductions in detail. The individual results are multiplied by the individual sample weights to extrapolate the fiscal effects of the reform with respect to the whole population. After simulating the tax payments and the received benefits, we can compute the disposable income for each household. Based on these household net incomes we estimate the distributional and the labour supply effects of the analysed tax reforms. For the econometric estimation of labour supply elasticities, we apply a discrete choice household labour supply model. The result of this simulation is the benchmark for different reform scenarios, which are also modelled using the modified database applying the different tax benefit rules using the technique of microsimulation. A detailed description of the FiFoSiM simulation model can be found in Peichl and Schaefer (2006).

3 Tax simplification scenarios

A simpler income tax system can appear in the form of tax base simplification, the simplification of the tax rate schedule or both. We focus mainly on tax base simplification. Tax rates are adjusted to control for revenue neutrality. Among other things, we consider the introduction of a flat rate tax schedule, which is also an element of tax simplification. Tax base simplification is modelled as the abolition of a set of specific

deductions from the tax base included in the German income tax system. Our choice of simplification measures is influenced by the ongoing German policy debate about existing tax breaks, deductions and simplification of the income tax system.6 Naturally, the analysis is restricted by the availability of data. The key idea is to make fewer distinctions across economic activities and personal characteristics. Taxes should be imposed on a broad base at relatively low rates that do not vary by income source or expenditure type.7

The chosen measures can be differentiated into two categories: measures concerning the determination of earnings (category A) and those concerning the calculation of the taxable income (category B). Concerning the determination of earnings (category A), we focus on labour income related expenses. According to § 19 EStG (German income tax law) labour income consists of gross wages minus related expenses; there is a lump sum amount of €920 unless higher expenses can be claimed. An integral part of these expenses are commuting costs. The applicable law allows for a deduction of €0.3 per kilometer. Furthermore, we examine the abolition of tax free bonuses for night, weekend and holiday labour. Concerning capital income we look at the reduction and abolition of the saver’s allowance (Sparerfreibetrag: current system €1370 for a single, €2740 for a couple household). In category B, we look at several tax allowances for age, single parents, children8 and deductions for tax accountancy costs, church tax and donations (charitable and for political parties).

Tax simplification in terms of tax break abolition generates additional revenue. As we intend to design a potential tax reform without revenue effects, we model the following progressive tax schedule according to the current tax law:

\[
T(x) = \begin{cases} 
0 & \text{if } x \leq G \\
\left( \frac{t_m-t_e}{S-M} \right) (x - G) + t_e (x - G) & \text{if } G < x \leq M \\
\left( \frac{t_m-t_e}{S-M} \right) (x - M) + t_m (x - M) + (M - G) \frac{t_m + t_e}{2} & \text{if } M < x \leq S \\
t_s (x - S) + \frac{t_m + t_e}{2} (S - M) + \frac{t_m + t_e}{2} (M - G) & \text{if } x > S 
\end{cases}
\]

x indicates the tax base, \(T(x)\) the tax payment, \(G\) is the basic personal allowance, \(M\) the upper limit of the first progression zone, \(S\) the lower limit applicable to the top rate \(t_s\), \(t_e\) the lowest tax rate and \(t_m\) the highest tax rate of the lower progression zone (i.e. the lowest tax rate of the upper progression zone). To ensure revenue neutrality in combination with tax

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7 See Burman and Gale (2001).
8 Child benefits are still paid.
simplification through base broadening, we adjust the rate schedule to the right (progressive adjustment) on the one hand and we introduce a flat tax rate of 30% on the other hand. The marginal tax rate of 30% is chosen as it corresponds to the proposal by the council of economic advisors to the Ministry of Finance.\(^9\) The progressive adjustment is chosen to have the same basic allowance as the flat rate adjustment. The parameters for the reform scenarios can be found in Table 1. A graphical comparison of the different tariffs can be found in Figure 1.\(^{10}\)

The effects of these various scenarios are calculated in the microsimulation model FiFoSiM by changing the policy parameters or switching off the appropriate module. In the first step, we abstract from behavioural adjustments, i.e. we assume that the economic agents do not change their behaviour in response to tax reforms. In the second step (see Section 5.2), we consider the effects on labour supply. First, we analyse the segregated effects on these measures of tax simplification before we examine joint effects of combined measures. All scenarios and the corresponding fiscal effects are presented in Table A1 in the Appendix B.\(^{11}\) In the following we concentrate on the simplification and combination bundles for the sake of clarity.

### 4 Distributional effects

The introduction of a revenue neutral tax reform always yields winners and losers.\(^{12}\) To analyse the distributional effects of different reform

<table>
<thead>
<tr>
<th></th>
<th>(G)</th>
<th>(M)</th>
<th>(S)</th>
<th>(t_c)</th>
<th>(t_m)</th>
<th>(t_e)</th>
</tr>
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<tr>
<td>Status quo</td>
<td>7664</td>
<td>12739</td>
<td>52151</td>
<td>0.15</td>
<td>0.2397</td>
<td>0.42</td>
</tr>
<tr>
<td>Progr. adjustm.</td>
<td>9500</td>
<td>14575</td>
<td>53987</td>
<td>0.1480</td>
<td>0.2365</td>
<td>0.4144</td>
</tr>
<tr>
<td>Flat tax</td>
<td>9500</td>
<td>9500</td>
<td>9500</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

\(^{9}\) C.f. Wissenschaftlicher Beirat beim Bundesministerium der Finanzen (2004). We have also computed various scenarios with different flat tax parameters. The empirical results for the flat tax in comparison to the progressive adjustment remain robust. Nevertheless, inequality is decreasing whereas the efficiency effects are decreasing with increasing flat tax parameters (see also Fuest, Peichl and Schaefer 2007b).

\(^{10}\) We have also computed various scenarios with different flat tax parameters. The empirical results for the flat tax in comparison to the progressive adjustment remain robust. Nevertheless, inequality is decreasing whereas the efficiency effects are decreasing with increasing flat tax parameters (see also Fuest, Peichl and Schaefer 2007b).

\(^{11}\) A detailed analysis of the fiscal effects of different parts and deduction rules of the German income tax system 1995 can be found in Müller (2004).

\(^{12}\) The distributional effects in this section differ slightly from the results presented in Fuest, Peichl and Schaefer (2007a) because of a newer version of the database. Furthermore, we also analyse the fraction of people gaining and losing in terms of disposable income.
scenarios we compute different distributional measures based on equi-
valised household net incomes. Furthermore, we estimate the polarisa-
tion effects of each alternative. Generally speaking, polarisation is the 
occurrence of two antipodes. A rising income polarisation describes the 
phenomenon of a declining middle class resulting in an increasing gap 
between rich and poor. The proportion of middle income households is 
declining while the shares of the poor and the rich are both rising. 

We compute the Gini coefficient as an inequality measure and the 
polarisation index of Schmidt (2004). The main results are presented 
in Table 2. We simulate the percentage changes of the mean income in 
each decile and of the distributional and polarisation indices compared 
to the status-quo for each tax rate schedule adjustment, the tax base 
adjustment and the combinations of rate schedule reforms and tax base 
simplification.

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13 We use the OECD-scale which weights the household head with a factor of 1, household 
members over the age of 14 with 0.5 and under 14 with 0.3. The households net income is 
divided by the sum of the individual weights of each member (=equivalence factor) to 
compute the equivalence weighted household income.


15 Schmidt (2004) creates a polarisation index which in analogy to the Gini index (Lorenz 
curve) is based on a polarisation curve for a better comparability of the results and their 
interpretations.

16 The complete tax base adjustment bundle (kumAB) consists of bundles A (kumA) and 
B (kumB). All category B measures of Table A1 are combined in bundle B. bundle A 
contains the abolition of deductibility of commuting costs (A1: noKm), the abolition of 
the saver’s allowance (Sparerfreibetrag, A4: noSpfb) and the restriction of labour income 
related expenses to € 1000 (A8: wkfix).
The first column of Table 2 shows the cumulated effects of the tax base adjustment (kumAB). The accumulated measures of tax simplification burden the higher incomes more heavily than the middle and the lower incomes. Inequality and polarisation are both reduced. The separate examination of each bundle yields the same qualitative results.\(^{17}\) The abolition of several tax rule exemptions in both categories A (determination of adjusted gross income) and B (calculation of taxable income) affects the high incomes more than the middle and low incomes.

The isolated effects of changes in the tax schedule are as follows. The adjustment to the right of the current schedule (column 2) increases inequality as well as polarisation. The flat rate tax strongly increases inequality while the polarisation index decreases. The obvious winner of a flat tax rate is the 10th decile due to lower statutory and effective marginal rates and to some extent the first deciles while the middle to upper deciles suffer from an increased tax charge due to the flat tax reform. These effects result in an overall increase in the Gini index. The decrease in polarisation is surprising at first glance, but this result can be attributed to the following two effects: The heterogeneity between the

\(^{17}\) The separated results for each simplification measure can be found in Tables A2 and A3.

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**Table 2** Percentage change of household equivalence weighted net income

<table>
<thead>
<tr>
<th></th>
<th>Tax base adj.</th>
<th>Schedule adj.</th>
<th>Combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kumAB</td>
<td>Progr. Flat rate</td>
<td>Progr. Flat rate</td>
</tr>
<tr>
<td>1. Decile</td>
<td>-0.01</td>
<td>0.00 0.00</td>
<td>-0.00 -0.01</td>
</tr>
<tr>
<td>2. Decile</td>
<td>-0.12</td>
<td>0.16 0.04</td>
<td>0.05 -0.06</td>
</tr>
<tr>
<td>3. Decile</td>
<td>-0.67</td>
<td>0.96 0.39</td>
<td>0.52 -0.22</td>
</tr>
<tr>
<td>4. Decile</td>
<td>-1.06</td>
<td>1.54 0.02</td>
<td>0.74 -1.11</td>
</tr>
<tr>
<td>5. Decile</td>
<td>-1.31</td>
<td>1.84 -0.48</td>
<td>0.76 -1.90</td>
</tr>
<tr>
<td>6. Decile</td>
<td>-1.47</td>
<td>2.05 -0.91</td>
<td>0.75 -2.49</td>
</tr>
<tr>
<td>7. Decile</td>
<td>-1.60</td>
<td>2.14 -1.09</td>
<td>0.66 -2.78</td>
</tr>
<tr>
<td>8. Decile</td>
<td>-1.57</td>
<td>2.11 -0.83</td>
<td>0.44 -2.61</td>
</tr>
<tr>
<td>9. Decile</td>
<td>-1.57</td>
<td>1.96 -0.02</td>
<td>-0.05 -1.96</td>
</tr>
<tr>
<td>10. Decile</td>
<td>-1.72</td>
<td>1.37 6.32</td>
<td>-0.75 4.68</td>
</tr>
<tr>
<td>Gini</td>
<td>-0.38</td>
<td>0.13 2.86</td>
<td>-0.55 2.54</td>
</tr>
<tr>
<td>PolS</td>
<td>-0.98</td>
<td>0.72 -0.56</td>
<td>-0.20 -1.69</td>
</tr>
<tr>
<td>Winners</td>
<td>0.00</td>
<td>47.94 43.02</td>
<td>30.07 19.94</td>
</tr>
<tr>
<td>unchanged</td>
<td>53.19</td>
<td>51.63 52.14</td>
<td>55.12 55.44</td>
</tr>
<tr>
<td>Losers</td>
<td>46.82</td>
<td>0.43 4.84</td>
<td>14.81 24.62</td>
</tr>
</tbody>
</table>

*Source: Own calculations based on FiFoSiM.*
two groups decreases because of the higher tax burden for most people above the median income and because of a decrease of the tax liability of some people below the median. The homogeneity within the upper group decreases as well because of the opposite directions of the effects in those deciles. Both effects lead to a decrease in the polarisation index. The increase of the polarisation index for the adjusted current schedule can be explained by the relatively larger relief for people above the median income resulting in an increasing heterogeneity between the two groups.

The revenue neutral combination of the tax base bundle with a tax schedule adjustment to the right (column 4) decreases both the inequality and the polarisation indices, whereas the combination with a flat tax (column 5) increases the inequality but reduces the polarisation. The explanation is analogous to the effects of the pure tariff reforms. Given these results, we can conclude that revenue neutral tax simplification does not necessarily lead to redistribution from poor to rich. The combination with the adjustment of the current tax schedule even leads to a decrease of inequality, i.e. the simplification of the tax system can lead to a more equal distribution of after tax income. More inequality only arises if tax base adjustment is combined with the introduction of a flat rate tax.

The fractions of households winning or losing disposable income\textsuperscript{18} yield the expected results for the tax base and schedule adjustments. The progressive combination yields a majority of people gaining whereas with flat rate combination more people are losing disposable income than gaining. Because of the large fraction of people losing disposable income, the implementation of a revenue neutral flat tax reform proposal in the political process seems unlikely.

The distributional effects of the single measures are described in the appendix and yield some interesting results\textsuperscript{19}. The abolition of tax free bonuses for night, weekend and holiday labour results in an increase of income equality which seems to be counter-intuitive. The burden of this simplification particularly affects middle and high incomes. The same results apply to the abolition of the deduction for commuting costs. This measure also burdens middle and higher incomes more heavily than lower income categories.

\textsuperscript{18} Households whose disposable income does not change more than € 50 in either direction are regarded as “unchanged”.

\textsuperscript{19} Table A2 contains the simplification measures of category A (determination of adjusted gross income), which would lead to a decrease in both inequality and polarisation. Table A3 presents the results for category B (calculation of taxable income) where both inequality and polarisation decrease.
5 Efficiency effects

There are many ways in which tax reforms affect the efficiency of the tax system. In this section, we analyse the effects of the flat tax reform scenarios on the effective marginal tax rates, the labour supply decision and the welfare of households.

5.1 Effective marginal tax rates

In this subsection, we analyse the effect of the tax reform scenarios on the effective marginal income tax rate faced by different groups of taxpayers. The underlying idea is that the marginal income tax rate affects the labour supply and savings incentives. Here, we focus on the marginal labour income tax rate. The results are summarised in Table 3.

It turns out that tax base adjustment without tax rate adjustments increases the marginal tax rate for all taxpayers. This is not surprising, given the progressive nature of the income tax schedule. Combining these measures with a reduction of tax rates over the entire income tax schedule reduces the marginal tax rate for almost all taxpayers with the exception of the highest income decile. The combination with a flat rate tax, in contrast, reduces the marginal tax rate considerably (by five percentage points) for the highest income decile. For the middle income deciles, the marginal tax rate increases, especially for the third and the fourth income decile. This suggests that the efficiency gains that can be achieved through tax simplification, combined with the introduction of a flat rate tax, are limited. This is mainly due to the fact that revenue neutrality requires a flat tax rate of 30%. If the broadening of the tax base goes
beyond the measures considered here, revenue neutrality can be achieved at a lower statutory tax rate. In this case, it would be possible to attain lower marginal tax rates for more households.

5.2 Labour supply effects

To analyse the behavioural responses induced by different tax reform scenarios we simulate the labour supply responses. Following Van Soest (1995) we apply a structural discrete choice household labour supply model. Recent surveys of the empirical labour market literature and different kinds of labour supply models are for example provided by Heckman (1993), Blundell and MaCurdy (1999) or Creedy et al. (2002). A major finding of this literature is that labour supply responds rather along the extensive than the intensive margin (see also Immervoll et al. 2007). Working-hours elasticities are close to zero for men (Blundell and MaCurdy 1999) and women (see Mroz 1987, Triest 1990). In contrast, extensive labour supply responses seem to be much stronger than intensive (Heckman 1993), especially particular subgroups (at the bottom of the income distribution) have rather high participation elasticities (see Eissa and Liebman 1996; Meyer and Rosenbaum 2001 and Immervoll et al. 2007).

In the standard continuous model (see Hausman 1985), labour supply responds along the intensive margin: an infinitesimal change of the marginal tax rate changes the working hours only a little, whereas participation responses cannot be analysed within this framework satisfactorily (Blundell and 1999). Discrete choice labour supply models allow to analyse both the extensive (participation) and the intensive (hours worked) labour supply decision within the same modelling framework (Blundell and MaCurdy 1999; Van Soest and Das (2001) and Van Soest, Das and Gong 2002). The intensive decision depends on the effective marginal tax rate, whereas the extensive participation decision depends on the tax wedge between gross (pre-tax) labour costs and the after-tax net income of workers and, therefore, on the effective marginal tax rate (see Kleven and Kreiner 2003).

The continuous model “appears not to capture the data, in the sense that the number of part-time jobs is strongly overpredicted” (Van Soest 1995). There seems to be a lack of part-time jobs because of fixed costs of hiring workers or increasing returns to scale of the worker’s production. Furthermore, because of fixed costs of working (Cogan 1981) individuals are not willing to work below a minimum number of hours. In addition, there are working time regulations that limit the number of possible

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20 A detailed description of the FiFoSiM labour supply module is provided in the technical appendix and by Fuest, Peichl and Schaefer (2005).
working hours to a discrete set. Therefore, a discrete choice between distinct categories of working time seems to be more realistic than a continuum of infinitesimal choices. Using a discrete choice labour supply model has also the advantage to model non-linear budget constraints as a result of, for example, non-linear taxes, joint filing, unemployment benefits (MacCurdy, Green and Paarsch (1990), Van Soest 1995 or Blundell and MacCurdy 1999). Furthermore, a richer stochastic specification in terms of unobserved wage rates of non-workers and random preferences can be incorporated into a discrete choice model.

Table 4 contains the additional full time equivalents as results of our labour supply estimations.

On average, married men react stronger than women. For couple households, this can be explained by the German system of joint taxation. In this system of family taxation, it is quite attractive, if only one of the spouses works. The higher tax burden resulting from the tax base adjustment leads to an overall decrease of labour supply, while the relief of the tax payers resulting from the schedule adjustments increases the labour supply. Both schedule adjustments yield similar labour supply responses. The combinations of tax base and schedule adjustment yield overall labour supply responses which do not significantly differ from zero. Nevertheless, the different directions of the effects indicate responses one would expect intuitively: the flat rate rather increases labour supply, whereas the progressive adjustment decreases it.

5.3 Welfare effects

The computation of welfare measures is another important aspect for the evaluation of efficiency effects of tax reforms. Several methods and measures have been developed in the extensive literature of welfare economics.21

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Table 4 Labour supply effects (full time equivalents)

<table>
<thead>
<tr>
<th></th>
<th>Couple</th>
<th></th>
<th>Single</th>
<th></th>
<th>Σ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Tax base adj.</td>
<td>Δ KumAB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-68 423</td>
<td>-25 925</td>
<td>-52 599</td>
<td>-51 832</td>
<td>-198 779</td>
</tr>
<tr>
<td>Schedule adj.</td>
<td>Δ Progr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56 295</td>
<td>18 374</td>
<td>57 738</td>
<td>44 761</td>
<td>177 168</td>
</tr>
<tr>
<td></td>
<td>Δ Flat rate</td>
<td>60 853</td>
<td>14 717</td>
<td>51 442</td>
<td>44 077</td>
</tr>
<tr>
<td>Combinations</td>
<td>Δ Progr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-6729</td>
<td>-5863</td>
<td>10 138</td>
<td>-256</td>
<td>-5014</td>
</tr>
<tr>
<td></td>
<td>Δ Flat rate</td>
<td>2661</td>
<td>-911</td>
<td>9325</td>
<td>2573</td>
</tr>
</tbody>
</table>

Source: Own calculations based on FiFoSiM.

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CESifo Economic Studies, 54, 1/2008
The empirical application of these methods mostly focuses on the \textit{ex post} evaluation of consumer demand. Creedy and Kalb (2006) propose a method for the \textit{ex ante} analysis of the labour-leisure decision. Following this method, we compute the changes in the equivalent variation as a money metric welfare measure based on the microeconometrically estimated utility function of the labour supply model described in Section 5.2. The equivalent variation $EV_i$ for each individual $i$ can be expressed as:

$$EV_i = E_i(p^0, U^0_i) - E_i(p^1, U^1_i) = E_i(p^1, U^1_i) - E_i(p^0, U^1_i)$$

where $E_i$ is the expenditure function, $p$ the price (wage) vector and $U_i$ the utility level before (superscript 0) and after (1) the reform. While the equivalent variation measures the impact of the reform on private welfare of an individual, a measure of the effect on social welfare has to take into account changes in tax payments. The change in the welfare for the economy as a whole “generated” by individual $i$ ($\Delta W_i$) is, therefore, given by

$$\Delta W_i = -(EV_i - \Delta T_i)$$

where $\Delta T_i$ is the change in the individual’s tax revenue. Assuming a Utilitarian aggregation function, the overall changes in welfare can be expressed as

$$\Delta W = \sum_i \Delta W_i.$$ 

Table 5 presents the results of the estimation on the aggregated welfare changes for the revenue neutral combinations. For a more comprehensive analysis, the distribution of the welfare changes together with the changes in tax payments and the labour supply effects for the income deciles are presented. The variable $\Delta T^0$ stands for changes in tax payments before labour supply reactions and $\Delta T^1$ is the change in tax payments after behavioural adjustment.

The overall welfare effects are negative for the progressive adjustment but positive for the flat tax adjustment. The tax increase induced by the tax base measures increases the distortion of the labour-leisure decision and results in negative labour supply reactions (see previous section). For the progressive combination, this effect dominates the positive labour supply effects induced by the schedule adjustments. Therefore, the overall welfare effects of the revenue-neutral combinations are still negative, whereas for the flat tax adjustment the latter effects prevail.

The differences in the welfare effects can be best explained taking into account the distribution of the labour supply effects and changes in the tax payments. The welfare effects of the tax base measures are unequally distributed across the deciles. The strongest reactions of our money metric welfare measure can be found in the deciles with the
highest incomes. Households in these deciles pay most of the income
taxes and face the highest marginal excess burden. Therefore, the reaction
of these households is crucial for the welfare effects of the reform for
the economy as a whole. In particular the highest income decile plays
a key role. The progressive combination increases the tax payments
of this decile by €3 billion before labour supply adjustments. Since
the positive effects of the tax rate reduction are weak, overall labour
supply declines. This increases the labour supply distortion, so that the
overall welfare effect generated in this decile is negative. In the case of
the flat rate combination, the reform reduces the taxes paid by the
highest income decile before labour supply adjustment. As a result, labour
supply increases. The increase in labour supply reduces the tax revenue
losses almost to zero. This explains why the overall welfare effect
in this decile is positive. One should note, though, that the overall
magnitude of welfare gains and losses is limited. For the flat rate
combination, we find a welfare gain of \( \sim 0.5 \) percent of overall income tax
revenue whereas the progressive combination yields a loss of the same
magnitude.

### 6 Summary and conclusion

In this article, we have examined the effects of tax simplification on the
income distribution, effective marginal income tax rates, labour supply

---

**Table 5** Distribution of labour supply (fulltime equivalents), tax payments and welfare changes (in million euro)

<table>
<thead>
<tr>
<th>Decile</th>
<th>( \Delta T^0 )</th>
<th>( \Delta T^1 )</th>
<th>( \Delta LS )</th>
<th>( \Delta EV )</th>
<th>( \Delta W )</th>
<th>( \Delta T^0 )</th>
<th>( \Delta T^1 )</th>
<th>( \Delta LS )</th>
<th>( \Delta EV )</th>
<th>( \Delta W )</th>
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<td>-1.7</td>
<td>-4.8</td>
<td>1171</td>
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<td>14.7</td>
<td>-2.0</td>
<td>-7.8</td>
<td>1419</td>
<td>32.4</td>
<td>24.6</td>
</tr>
<tr>
<td>2</td>
<td>-5.3</td>
<td>-5.2</td>
<td>3719</td>
<td>33.1</td>
<td>28.0</td>
<td>-5.6</td>
<td>-10.3</td>
<td>2506</td>
<td>71.0</td>
<td>60.8</td>
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<tr>
<td>3</td>
<td>-34.4</td>
<td>-42.5</td>
<td>7524</td>
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<td>51.6</td>
<td>-45.1</td>
<td>-63.2</td>
<td>8302</td>
<td>136.1</td>
<td>72.9</td>
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<tr>
<td>4</td>
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<td>-148.0</td>
<td>11771</td>
<td>221.1</td>
<td>73.1</td>
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<td>9</td>
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<td>-9856</td>
<td>43.3</td>
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<td>2294.0</td>
<td>1419.9</td>
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<td>-266.6</td>
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<td>2190.8</td>
<td>-3487</td>
<td>-31057</td>
<td>-914.9</td>
<td>-1279.1</td>
<td>-63.6</td>
<td>32115</td>
<td>1467.4</td>
<td>1403.8</td>
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<td>-497.2</td>
<td>-884.8</td>
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<td>-86.1</td>
<td>13651</td>
<td>939.7</td>
<td>853.6</td>
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</table>

*Source: Own calculations based on FiFoSiM.*
and welfare. The analysis is based on a behavioural microsimulation model for the German tax and transfer system (FiFoSiM). All effects were simulated for each single simplification measure, for bundles A (determination of earnings) and B (computation of taxable income) and for the complete tax base adjustment package. The abolition of tax exemptions increases tax revenue. Therefore, our tax base adjustment was combined with tax rate reforms to analyse the joint effects on distribution while controlling for revenue neutrality.

The main results are:

- Tax simplification concerning the determination of income for tax purposes (category A) and the determination of taxable income (category B) reduces inequality and polarisation.
- Simplification through the abolition of tax exemptions increases tax revenue. A tax reform with overall revenue neutrality implies tax rate changes with separate distributional effects. The adjustment of the current schedule to the right slightly increases inequality and polarisation while a flat tax leads to a distinct increase of inequality and decreases polarisation.
- The combination of the tax base measures with a progressive tax rate adjustment reduces inequality and polarisation, because the highest incomes suffer most. The marginal income tax rate for middle income households is also reduced.
- If the tax base adjustment is combined with a flat rate tax, inequality increases while polarisation decreases, as the upper middle class is particularly affected. Hence, the tax rate effect is stronger than the simplification effects on distribution and labour supply incentives of middle income households.
- The progressive combination decreases labour supply, whereas the combination with a flat tax increases labour supply. In both cases, the overall labour supply effects are rather small.
- The welfare effects are negative for the progressive combination, but positive for the flat tax. In both cases, the magnitude of the effects is $\sim 0.5$ percent of overall income tax revenue.

Summing up, revenue neutral tax simplification can increase or decrease both inequality and efficiency depending on the form of rate schedule adjustment. Tax base simplification in combination with a directly progressive tax rate schedule can reduce inequality. If inequality is regarded as an indicator for fair taxation, more fairness through tax simplification is possible. Furthermore, our results suggest that flat tax reforms combining tax base broadening with a single tax rate are likely to increase inequality.
at the expense of the upper middle class. This might be the reason for the limited success of flat tax proposals in the political process in Germany or other Western European countries. Hence, it seems advisable to separate the tax base simplification objective from tax rate schedule issues.

But income distribution is only one relevant aspect of tax reforms. If a higher national income, more efficiency or better incentives can be achieved through an income tax reform, higher inequality of income distribution might be deemed acceptable. Our results suggest that the effects of a (revenue neutral) flat tax rate reform on efficiency in terms of effective marginal tax rates, labour supply and household welfare are slightly positive. One may argue that a flat rate tax is also likely to reduce tax distortions in the corporate sector. This may lead to further efficiency gains due to more investment and labour demand. But these effects are beyond the analysis of this article.

These results have been derived using German microdata. Nevertheless, the qualitative effects should not differ very much for other (Western European) countries with a similar socioeconomic structure. To conclude, one can state that whether tax simplification leads to more fairness in terms of higher after-tax income equality and more efficiency in terms of employment and welfare depends on the way in which tax base simplification is combined with tax rate adjustments. The tax base adjustment package considered here, combined with an adjusted direct progressive tax rate (flat tax rate) reduces (increases) inequality as well as labour supply and welfare. Unfortunately, none of the reforms considered here are able to overcome the trade-off between equity and efficiency objectives.

References


Appendix A: Labour supply model

To analyse the behavioural responses induced by the different tax reform scenarios, we simulate their labour supply effects. Following Van Soest (1995) we apply a discrete choice household labour supply model,22 assuming that the household’s head and his partner jointly maximise a household utility function in the arguments leisure of both partners and net income. Household \(i (i = 1, \ldots, N)\) can choose between a finite number of combinations \((y_{ij}, \text{lm}_{ij}, \text{lf}_{ij})\), where \(j = 1, \ldots, J\), \(y_{ij}\) the net income, \(\text{lm}_{ij}\) the leisure of the husband and \(\text{lf}_{ij}\) the leisure of the wife of household \(i\) in combination \(j\). Based on our data we choose seven working time categories for men and women \((t \in [0, 8, 16, 24, 32, 40, 48])\).

We model the following translog23 household utility function

\[
V_{ij}(x_{ij}) = x_{ij}'Ax_{ij} + \beta_{ij}x_{ij} \tag{1}
\]

where \(x = (\ln y_{ij}, \ln \text{lm}_{ij}, \ln \text{lf}_{ij})'\) is the vector of the natural logs of the arguments of the utility function. The elements of \(x\) enter the utility function in linear [coefficients \(\beta = (\beta_1, \beta_2, \beta_3)\)], quadratic and gross terms [coefficients \(A_{(3 \times 3)} = (a_{ij})\)]. Using control variables \(z_p (p = 1, \ldots, P)\)24 we control for observed heterogeneity in household preferences by defining the parameters \(\beta_m, \alpha_{mn}\) as

\[
\beta_m = \sum_{p=1}^{P} \beta_{mp}z_p \tag{2}
\]

\[
\alpha_{mn} = \sum_{p=1}^{P} \alpha_{mnp}z_p \tag{3}
\]

where \(m, n = 1, 2, 3\).

---

22 A detailed description of the FiFoSiM labour supply module can be found in Fuest, Peichl and Schaefer (2005).
23 Cf. Christensen, Jorgenson and Lace (1971).
24 We use control variables for age, children, region and nationality, which are interacted with the leisure terms in the utility function because variables without variation across alternatives drop out of the estimation in the conditional logit model (Train, 2003).
Following McFadden (1973) and his concept of random utility maximisation\textsuperscript{25}, we add a stochastic error term $\varepsilon_{ij}$ for unobserved factors to the household utility function:

$$U_{ij}(x_{ij}) = V_{ij}(x_{ij}) + \varepsilon_{ij} = x_{ij}'A + \beta'x_{ij} + \varepsilon_{ij}$$

(4)

Assuming joint maximisation of the households utility function implies that household $i$ chooses category $k$ if the utility index of category $k$ exceeds the utility index of any other category $l \in \{1, \ldots, J\} \setminus \{k\}$, if $U_{ik} > U_{il}$. This discrete choice modelling of the labour supply decision uses the probability of $i$ to choose $k$ relative to any other alternative $l$:

$$P(U_{ik} > U_{il}) = P[(x_{ik}'A + \beta'x_{ik}) > (x_{il}'A + \beta'x_{il})] = \exp \left( \frac{x_{ik}'A + \beta'x_{ik}}{x_{il}'A + \beta'x_{il}} \right)$$

(5)

Assuming that $\varepsilon_{ij}$ are independently and identically distributed across all categories $j$ to an Gumbel (extreme value) distribution, the difference of the utility index between any two categories follows a logistic distribution. This distributional assumption implies that the probability of choosing alternative $k \in \{1, \ldots, J\}$ for household $i$ can be described by a conditional logit model\textsuperscript{26}:

$$P(U_{ik} > U_{il}) = \frac{\exp(V_{ik})}{\sum_{l=1}^{J} \exp(V_{il})} = \frac{\exp(x_{ik}'A + \beta'x_{ik})}{\sum_{l=1}^{J} \exp(x_{il}'A + \beta'x_{il})}$$

(6)

For the maximum likelihood estimation of the coefficients we assume that the hourly wage is constant across the working hour categories and does not depend on the actual working time.\textsuperscript{27} For unemployed people we estimate their (possible) hourly wages by using the Heckman correction for sample selection.\textsuperscript{28} The household net incomes for each working time category are computed in the microsimulation module of FiFoSiM.

\textsuperscript{27} Cf. Van Soest and Das (2001).
\textsuperscript{28} Cf. Heckman (1979). A detailed description of these estimations can be found in Fuest, peichl and Schaefer (2005).
### Table A1: Scenarios and fiscal effects in billion euro

<table>
<thead>
<tr>
<th>Scenario Description</th>
<th>abbr.</th>
<th>income tax</th>
<th>solid. tax</th>
<th>Σ</th>
</tr>
</thead>
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<td>E06</td>
<td>180.97</td>
<td>9.95</td>
<td>190.93</td>
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<tr>
<td>Tax rate 1 (progressive adjustment)</td>
<td>tarif1</td>
<td>-12.35</td>
<td>-0.68</td>
<td>-13.03</td>
</tr>
<tr>
<td>Tax rate 2 (flat tax)</td>
<td>tarif2</td>
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<td>-0.63</td>
<td>-12.16</td>
</tr>
<tr>
<td>A1 Abolishment commuting costs allowance</td>
<td>noKm</td>
<td>4.29</td>
<td>0.24</td>
<td>4.53</td>
</tr>
<tr>
<td>A2 Reduction commuting costs allowance €0.25 per kilometer</td>
<td>km25</td>
<td>0.70</td>
<td>0.04</td>
<td>0.74</td>
</tr>
<tr>
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</tr>
<tr>
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<td>0.03</td>
<td>0.64</td>
</tr>
<tr>
<td>A6 Abolishment of tax free bonuses</td>
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<td>1.34</td>
<td>0.07</td>
<td>1.41</td>
</tr>
<tr>
<td>A7 Reduction labour income expenses to €600 per kilometer</td>
<td>wk600</td>
<td>1.02</td>
<td>0.06</td>
<td>1.07</td>
</tr>
<tr>
<td>A8 Labour income expenses restricted to €1000 per kilometer</td>
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<td>0.28</td>
<td>5.41</td>
</tr>
<tr>
<td>A accumulated (A1, A4, A8)</td>
<td>kumA</td>
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<td>0.36</td>
<td>7.00</td>
</tr>
<tr>
<td>B No deduction of tax accountancy costs</td>
<td>noStber</td>
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</tr>
<tr>
<td>B2 No deduction of church tax</td>
<td>noKist</td>
<td>2.86</td>
<td>0.16</td>
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</tr>
<tr>
<td>B3 No deduction of charitable donations</td>
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<td>0.83</td>
</tr>
<tr>
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Source: Own calculations based on FiFoSiM. *Indicates: only GSOEP survey data used.
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<th>km21*</th>
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<th>Spfb750</th>
<th>zuschl*</th>
<th>wk600</th>
<th>wkfix</th>
<th>kumA</th>
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</table>

**Source:** Own calculations based on FiFoSiM. *Indicates: only GSOEP survey data used.*
**Table A3** Percentage changes of net income in category B

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<th>kist</th>
<th>spend</th>
<th>partei</th>
<th>altfb</th>
<th>alerz</th>
<th>kifb</th>
<th>kumB</th>
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| Gini   | -0.05 | -0.25| -0.07 | -0.00  | -0.05 | 0.09  | 0.20 | -0.13|
| PolS   | -0.03 | -0.18| -0.04 | -0.00  | -0.19 | 0.08  | 0.07 | -0.32|
| P 90/10| -0.08 | -0.51| -0.16 | -0.01  | -0.18 | -0.03 | 0.62 | -0.30|

*Source: Own calculations based on FiFoSiM.*