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A simulation approach for employees

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Horizontal equity in the German tax-benefit system: A simulation approach for employees

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Abstract

We analyze the distributive justice of the combined burden of taxes, social security contributions and public transfers on employee households. In order to investigate whether the treatment of families by the aggregate tax-benefit system can be regarded as "fair", we compare the equivalent incomes of eight different household types. Using the concepts of system-inherent equivalence scales and horizontal equity we find evidence for a structural discrimination of low income families, while families in the high income brackets tend to be privileged. The equity in the treatment of a household type is not only affected by the amount but also by the distribution of income between the household members. Based on these results we can state a significant contradiction of value judgments within the German tax-benefit system. From the perspective of our paper, there is no convincing justification for this inconsistency.

Keywords: horizontal equity, family taxation, distributive justice, tax-benefit system, equivalent income

JEL classification: D31, D63, H24

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1. Introduction

Social justice and the poverty of children and families are important subjects of the public debate in Germany. According to a survey of Vehrkamp and Kleinsteuber (2007), only a minority of the German population believes to be part of a "just" economic system. 78% of the respondents find it important to enhance social justice by reducing child poverty. Thus, the taxation of and benefits for families are central issues to tackle the perceived fairness of the German tax system.

The emphasis in the literature concerning family taxation in Germany has been on income tax arrangements for married couples (*German: Ehegattensplitting*) and child benefits (*German: Kindergeld*). Research in this direction aimed at answering whether these regulations are to be interpreted as an unjustified privilege (for a thorough overview see Maiterth, 2005). Furthermore, Maiterth (2004) as well as Steiner and Wrohlich (2008) analyze the distributional effects of alternative family taxation concepts using a micro-simulation approach.

The aim of our study is to complement the aforementioned research in two ways. (1) The focus of the literature has been almost exclusively on the personal income tax and additional supplements like the solidarity tax surcharge (*German: Solidaritätszuschlag*). Taking an employee point of view, the disposable income is also affected by social security contributions and public transfers like the unemployment benefit II (*German: Arbeitslosengeld II*). Therefore, these payments are to be included in an aggregate tax-benefit system (for an analysis of the tax-benefit burden in Australia see Muellbauer and Van de Ven, 2004). (2) The concept of equivalent income is a widely accepted instrument in conducting distributive analysis when households differ in size and needs (Vickery, 1947). Based on the theoretical and empirical literature on equivalent income taxation (Seneca and Taussig, 1971; Lambert and Yitzhaki, 1997; Ebert and Moyes, 2000), we utilize this concept to reinvestigate the distributive justice of the tax-benefit burden of German family households.

To keep our analysis tractable, we consider eight different household types with the single household (one adult and no children) as point of reference. We apply two alternative forms of equivalence scales for the identification of households with an equal material comfort. The choice of an equivalence scale is in principle a value judgment. Consequently, we use system-inherent equivalence scales resulting from value judgments of the German tax and social welfare legislation. As we apply these scales not only for the analysis of the respective subsystems, this approach allows us to draw conclusions on the consistency of the German tax-benefit system as a whole.

To our knowledge this is the first contribution analyzing the combined burden of German taxes, social security contributions and public transfers in this detail. Furthermore, we apply for the first time equivalence scales immanent in the tax and social welfare legislation to analyze the horizontal equity of an aggregate tax-benefit system.

The paper is organized as follows: Chapter 2 elucidates the theoretical background on horizontal equity and the applied concept of equivalent income taxation. Chapter 3 exemplifies the simulated tax-benefit function for the eight household types considered including a number of alternative scenarios. The results are presented in Chapter 4 and the main findings are recapitulated in Chapter 5. The appendix contains further calculations on alternative scenarios regarding the tax-benefit system.

2. Basic concepts

2.1. Distributive justice of a tax-benefit system

We define F as a function of the tax-benefit system, encompassing the sum of taxes and public transfers affecting the employee household's disposable income. According to international standards (Heady, 2003; OECD, 2009) the combined compulsory social security contributions S of employers and employees may be interpreted as taxes on wage income. This approach is unproblematic as long as the marginal contribution is not adequately compensated by insurance benefits and the employee bears economically the burden of social security contributions (for empirical evidence see Gruber, 1997).

In case of the German public health and long term care insurance (*German: Krankenversicherung und Pflegeversicherung*), benefit payments in general do not depend on the amount of contributions paid.[1] Furthermore, these public insurances are free of charge for non-income receiving spouses and children with accordant distributive effects. In contrast, there is a marginal benefit of contributions to the unemployment and old age pension insurance (*German: Arbeitslosenversicherung und Rentenversicherung*). However, due to the design of these institutions, the marginal benefit may not be adequate to compensate the contribution payments.[2] Taking into account these ambiguities we classify social security contributions within the baseline scenario in general as taxes. By contrast, we assume in an alternative social security scenario that the net cost of contributions for the old age pension

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[1] Sickness benefits (*German: Krankengeld*) that depend on the health insurance contributions can be regarded as a negligible exception.

[2] Regarding the German old age pension insurance, it is questionable to what extent the contributions will be adequately compensated by future payments (Ohsmann and Stolz, 2004; Thiede, 2005). That holds especially if the entitlement to a minimum old age pension is taken into account. It has also to be considered that unemployment contribution payments may not be valuable for households with a low market income and a low property.

and unemployment insurance equals the accordant net benefit payments. Hence, there is no negative effect of these social security contributions on a household's disposable income in this scenario.

The public transfer Z is interpreted as a negative tax payment, while T denotes the personal taxes on income (personal income tax plus solidarity tax surcharge). Formalized we obtain

$$F\left(y_i,\theta_i\right)=T\left(y_i,\theta_i\right)+S\left(y_i,\theta_i\right)-Z\left(y_i,\theta_i\right), \tag{1}$$

where y_i denominates the market income of the household i including the employer's social security contributions. The composition of a household is captured by θ_i, with $A \in \{1,2\}$ denoting the number of adults and $C \in \{0,1,2,3\}$ denoting the number of children. The following Table 1 documents the distribution of household types over the German population. As the questionnaire does not differentiate household types above two children, A1C3 and A2C3 include also households with four and more children. The most frequent household types are A1C0 and A2C0. Furthermore, we can observe a negative effect of the number of children as well as of being a single parent on the frequency of a household type.

[Table 1 about here]

For further analysis the combined tax-benefit function $F\left(y_i,\theta_i\right)$ can be treated like an ordinary tax function (Muellbauer and Van de Ven, 2004). Deducting F from market income we attain the disposable income of household i

$$x\left(y_i,\theta_i\right)=y_i-F\left(y_i,\theta_i\right). \tag{2}$$

The distributive justice of a tax system as well as a tax-benefit system can be defined by vertical and horizontal equity. Vertical equity of a tax-benefit system is subject to a social welfare function based on a fundamental paradigm of social justice (Atkinson, 1970). In contrast, the equal treatment of equals (horizontal equity) can at least in theory be regarded as a basic requirement for a just tax-benefit system (Musgrave, 1990).

In spite of this general statement, the implementation of this concept is associated with at least two significant challenges. On the one hand horizontal equity requires the identification of equals. On the other hand we have to substantiate how to interpret an equal treatment of these equivalent single and family households. Considering the tax-benefit system we regard an equal treatment as adequate if the material comfort of a family household is equivalent to the material comfort of a single household.

An accordant concept of taxation has not been unquestioned. Parts of the literature argue in favor of a market income taxation neglecting any personal circumstances.[3] However, in case of a tax-benefit system a market income concept is not sufficient to ensure distributive justice. Taking into account not only taxes on income but also social security contributions and public transfers, a market income concept implies not only the elimination of income tax arrangements for married couples and child benefits in the income tax code (*German: Einkommensteuergesetz*), but also an identical unemployment benefit II for singles and families.[4] An accordant tax-benefit system would dissent empirical evidence (Liebig and Mau, 2005), contrast the main principles of family treatment in the German income tax, social security and social welfare legislation[5] and violate German constitutional law.[6]

Consequently, we apply a concept of income taxation taking into account not only the net earnings but also the material needs of the taxpayer and his family. This needs-adjusted concept of taxation is based on value judgments of the German tax and social welfare legislation. Nevertheless, the identification of equals in this kind of setting is not straight-forward. It requires a measure to compare the material comfort of singles and families. An accordant instrument that is widely accepted for the distributional analysis of households differing in size and needs is the concept of equivalent income. As has been demonstrated by the theoretical (Vickery, 1947; Ebert and Moyes, 2000) and empirical (Seneca and Taussig 1971; Muellbauer and Van de Ven, 2004) literature, this instrument is not only appropriate for distributional studies but also to investigate the horizontal equity of tax systems.

2.2. Identification of equals

Let r and k be two households with $\theta_r \neq \theta_k$. We define the single household r as point of reference with $\theta_r = \theta_{A1C0}$. Under these assumptions we call a market income y_k equivalent to y_r if it grants the members of household k and r an equal level of material comfort.

Formalized this can be written as

$$E\left(y_k, \theta_k\right) = y_r,\tag{3}$$

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[3] See for example Schneider (1979) or Wosnitza and Treisch (1999) for an overview.

[4] Bareis and Siegel (2006) argue in favour of a market income taxation accounting for the family situation by public transfers. Obviously this argument does not hold for a tax-benefit system interpreting public transfers as negative tax payments.

[5] The German tax-benefit system contains various regulations regarding personal living conditions of a family (income tax arrangements for married couples, child benefits, deductions for single parents, free of charge insurances for spouses and children, etc.).

[6] As is documented by the jurisdiction of the German Federal Constitutional Court, the subsistence level has not only to be taken into account by the unemployment benefit II but also by the income tax code. See for example the decision 2 BvL 1/06 from the 13th of February 2008.

with E describing the equivalent income function.

The market income y_k and the equivalent income $E(y_k, \theta_k)$ are connected by two fundamental effects (Donaldson and Pendakur, 1999). (1) The basic needs of a household k increase in the number of household members, resulting in a decrease of the equivalent income in relation to r; (2) this effect is to some extent contradicted by positive within-household size economies resulting from the fact that some goods are not exclusive in consumption and can be pooled on the household level. Hence, the marginal price for material comfort decreases in the number of household members.

Examples for goods not exclusive in consumption are cars, washing machines or an internet flat rate. Also the housing costs per person are typically higher for singles than for family households. This is for example documented by the accordant payments for indigent families in Germany (Statistik der Bundesanstalt für Arbeit, 2007). Positive within-household size economies have been substantiated by a considerable number of theoretical studies based on consumption models (for a thorough review see Faik, 1995; Schröder, 2009) as well as by empirical surveys (Koulovatianos et al., 2009 with further references).

As stated by Donaldson and Pendakur (2004) the fraction of expenses for goods not exclusive in consumption increases in a household's income. This is partially driven by the fact that expenses for luxury goods like swimming pools, sport cars, etc. raise the material comfort of all household members. In contrast, the use of basic commodities like food and clothing is in general restricted to one household member. Thus, the within-household size economies can be interpreted as function rising in income.

The choice of an equivalence scale is basically a value judgment. For that reason we conduct our investigation on the basis of equivalence scales that are inherent in the German tax and social welfare legislation. As elucidated above, the focus of our paper lies on the analysis of the aggregate tax-benefit system. Hence, deriving our identification criteria for equality from subsystems like the income tax enables us to identify possible contradictions in value judgments within the German tax-benefit system.

Common functional forms are relative and absolute equivalence scales. A relative and constant equivalence scale calls for a relative increase in income to maintain the level of material comfort. A prominent member of the relative equivalence scale family is the modified OECD scale (Hagenaars et al., 1994) assuming an additional need of disposable income of 50% (30%) for each additional adult (each additional child) to maintain the material comfort of the household. Formalized we obtain

$$E(y_i, \theta_i) = \frac{y_i}{m(\theta_i)}, \tag{4}$$

where the deflator m is in general smaller than the number of household members n. Contrasting Donaldson and Pendakur (2004) an accordant equivalence scale assumes constant within-household size economies across all incomes. Therefore, a relative and constant scale can be interpreted as a conservative estimate for the within-household size economies of a wealthy family household compared to the within-household size economies of an indigent family.

A relative equivalence scale corresponds in principle to the income tax arrangement for married couples. However, stating an additional need of 100% for a spouse, the German income tax code neglects within-household size economies that have been substantiated by the theoretical and empirical literature. In spite of that, accordant effects are considered by the need-oriented basic income support of the German unemployment benefit II. Taking into account that this public program represents the subsistence level of the German legislator (Deutscher Bundestag, 2006), we use the unemployment benefit II as point of reference for our relative equivalence scale (in the following *relative scale*). The material need of a household type θ_i is calculated by its average benefit compared to the transfer of a single household θ_r for $y_i = y_r = 0$.

A constant and absolute equivalence scale implies that an additional household member (for example a child) requires a fixed amount of income to maintain the household's level of material comfort. Unlike the *relative scale*, an absolute equivalence scale takes into account the positive relationship of income and within-household size economies that has been stated by Donaldson and Pendakur (2004). An absolute equivalence scale may also be interpreted as an income dependent relative equivalence scale that can be written as

$$E(y_i, \theta_i) = y_i - a(\theta_i) = \frac{y_i}{m(y_i, \theta_i)}. \tag{5}$$

The basic needs of an absolute scale are denoted by a as a function of θ_i, while m tags the deflator of an accordant income dependent relative scale as a function of y_i and θ_i.

An absolute equivalence scale corresponds to the German child allowance (*German: Kinderfreibetrag*) of 5,808€ for income tax purposes (governing law January 2007). The same holds for the basic allowance of 7,664€ regarding the material needs of an adult. These allowances do not depend on the household's income and represent the subsistence level granted by the income tax. Therefore, it is suitable to construct our absolute equivalence scale (in the following *absolute scale*) on the value judgments of the German income tax code. We

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also consider a tax allowance for single parents (*German: Entlastungsbetrag für Alleinerziehende*) of 1,308€

A limitation of an absolute and constant equivalence scale lies in the fact that low market incomes result in zero or even negative values of equivalent income. For that reason, we restrict our *absolute scale* to a maximum deflator $m(y_i, \theta_i)$ for low incomes of the reference household. As a result of the unemployment benefit II single households receive in our setting 7,178€ as a minimum disposable income. The calculation of an equivalence scale for lower income values does not yield to a realistic scenario. Therefore, we calculate the maximum deflator $m(y_i, \theta_i)$ for this minimum income of the reference household.[7] This approach is equivalent to an income dependent absolute scale for low market incomes.

It would also be possible to construct the *absolute scale* on the basis of the German social security legislation. We abstain from that approach for two reasons. (1) The measurement of income in the German income tax code is more detailed compared to the social security system; (2) the value judgments of the social security legislation depend on the distribution of a household's income. A free of charge insurance exists only for non-income receiving household members.

The equivalence scales applied in our analysis are presented in Table 2. The first two columns define the household type. According to our *relative scale* a household with one adult and one child needs an increase in income of 53.8% to maintain its material comfort. The last two columns give the parameters for the *absolute scale*. In this scenario a household with one adult and one child requires an additional income of 7,116€ to achieve an equal material comfort as the single household. As mentioned above, the additional need is restricted to 99% of the single households' income. A graphic illustration for this deflator *m* of the *absolute scale* is provided by Figure 1.

[Table 2 about here]

[Figure 1 about here]

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[7] The maximum deflators are calculated as $m(y_i, \theta_i) = \dfrac{y_i}{y_i - a(\theta_i)}$ with $y_i - a(\theta_i) = y_r^{Min} = 7{,}178€$.

2.3. Definition of equal treatment

Based on the equivalence scales in Table 2 we are able to identify for each level of income a family household with an equal pre-tax material comfort as the reference household $(E(y_k, \theta_k) = y_r)$. In these cases we need a definition of an equal treatment. Lambert (2004) gives the following possibilities: (1) equal absolute tax burden; (2) equal average tax burden; and (3) equal post-tax material comfort. Mathematically, these criteria for $E(y_k, \theta_k) = y_r$ can be written as follows:

$$C1: F(y_k, \theta_k) = F(y_r) \tag{6}$$

$$C2: \frac{F(y_k, \theta_k)}{y_k} = \frac{F(y_r, \theta_r)}{y_r} = \frac{F(E(y_k, \theta_k), \theta_r)}{E(y_k, \theta_k)} \text{ or } \frac{x(y_k, \theta_k)}{y_k} = \frac{x(y_r, \theta_r)}{y_r} \tag{7}$$

$$C3: E(x(y_k, \theta_k), \theta_k) = x(y_r, \theta_r) \tag{8}$$

All three concepts have been applied in previous studies to investigate horizontal equity in tax systems (Seneca and Taussig, 1971; Habib, 1979). However, the first and the third approach do not seem to be suited for the analysis of an aggregate tax-benefit system (Muellbauer and van de Ven, 2004).

According to C1 an equal pre-tax material comfort implies an identical tax-benefit payment. In case of the *relative scale* as well as the *absolute scale* a family household and a single household with a zero market income are regarded as equivalent. Under these conditions C1 calls for an unemployment compensation disregarding the household type. This outcome is not in line with a needs-adjusted public transfer system and would violate German constitutional law. Therefore, C1 is not applicable for the whole range of incomes.

For similar reasons we also reject C3. Interpreting the *absolute scale* as a relative and income dependent equivalence scale $E(y_i, \theta_i) = y_i - a(\theta_i) = \dfrac{y_i}{m(y_i, \theta_i)}$, C2 and C3 can be rewritten as:

$$C2: x(y_k, \theta_k) = m(y_k, \theta_k) \cdot x\left(\frac{y_k}{m(y_k, \theta_k)}, \theta_r\right) \tag{9}$$

$$C3: x(y_k, \theta_k) = m(x(y_k, \theta_k), \theta_k) \cdot x\left(\frac{y_k}{m(y_k, \theta_k)}, \theta_r\right) \tag{10}$$

In contrast to (9) condition (10) generally requires the application of the equivalence scale to two different levels of income, namely the net and the gross income. The income-dependency of the *absolute scale* results in a scale effect $\Delta m = m(y_i, \theta_i) \big/ m(x(y_i, \theta_i), \theta_i)$. Due to the aforementioned positive correlation of within-household size economies and income, we gain an additional decrease (increase) of the material comfort per household member for

$F(y_i, \theta_i) > 0$ $\left(F(y_i, \theta_i) < 0 \right)$. There is no accordant scale effect for the *relative scale,* where the deflator *m* depends exclusively on the family status.

The scale effect of criterion C3 is problematic in case of the *absolute scale*. For a disposable income x_i close to $a(\theta_i)$ the deflator $m(x_i, \theta_i)$ converges to infinity. That implies very small values of Δm. Furthermore, the restriction of the *absolute scale* to a maximum deflator for income values below 7,178€ has only a limited impact on the equivalent disposable income $E(x_i, \theta_i)$. This is caused by the fact that the lowest disposable income x_i is the minimum unemployment benefit II of 7,178€ As a result we may obtain even negative equivalent incomes $E(x_i, \theta_i)$. For the reasons elucidated above, there is no meaningful interpretation for the *absolute scale* and criterion C3 for the full range of incomes. For the reasons mentioned above, we choose exclusively the criterion C2 (identical average tax-benefit burden) as measure of an equal treatment. Using condition (9) we derive as criterion of horizontal equity

$$ HE = \frac{x(y_k, \theta_k)}{m(y_k, \theta_k) \cdot x(y_r, \theta_r)} \quad \text{for} \quad E(y_k, \theta_k) = y_r . \tag{11} $$

For $HE = 1$ the treatment of k meets the principle of horizontal equity in relation to the single household. $HE > 1$ ($HE < 1$) implies a privilege (a discrimination) of k compared to *r*.

3. Tax-benefit system

3.1. Prefatory annotations

We calculate the aggregate burden of taxes, social security contributions and public transfers (governing law January 2007) for market incomes from 0€ to 250,000€ In the baseline scenario we assume that the whole market income is generated by the employment of one household member. Two adults living in one household are regarded as married. The market income y_i is defined as the sum of gross wage y_i^G and the social security contributions of the employer S_i^{EM}.

If the household qualifies for support according to social code II (*German: Sozialgesetzbuch II*) it receives a public transfer in form of the unemployment benefit II. We do not account for entitlements originating from an unemployment insurance like the unemployment benefit I (*German: Arbeitslosengeld I*). The costs of housing are calculated from average payments according to the statistical office of the German labor administration (Statistik der

Bundesagentur für Arbeit, 2007).[8] Initially, we do not consider alternative public transfer programs.

All household members are insured in the statutory health insurance paying an average rate of contribution. A possible private health insurance as well as profession-specific casualty insurance payments (*German: Unfallversicherung*) are neglected (for the accordant effects see Hundsdoerfer and Sommer, 2005). Regarding the social security contribution ceilings and the cost of housing we assume the household to be located in the Old German Laender. Resulting deviations of the New German Laender are limited. A more detailed documentation is given by Bönke and Eichfelder (2008).

In addition to the baseline case, we consider two alternative scenarios resulting in significant derivations of the calculated tax-benefit burden. Within the two earner scenario each spouse generates 50% the household's employment income. We take into account that especially the burden of social security contributions does not only depend on the amount but also on the distribution of the household's income. Furthermore, we develop an alternative social security scenario disregarding contribution payments for the unemployment and old age pension insurance. Unlike the health and long term care insurance these contribution payments grant a marginal benefit for the taxpayer. Therefore, it may be questionable to qualify these insurance contributions as taxes.

The baseline scenario is described in section 3.2. Adjustments for alternative scenarios are documented by section 3.3. The aggregate tax-benefit burden is analyzed in 3.4. The appendix contains further calculations regarding public transfer programs. In the housing and child benefit scenario (see appendix A) we take into account housing benefits (*German: Wohngeld*) and supplementary child benefits (*German: Kinderzuschlag*) that can be applied instead of the unemployment benefit II. The supplementary unemployment benefit scenario (see appendix B) contains a supplement to the unemployment benefit II (*German: Befristeter Zuschlag nach Bezug von Arbeitslosengeld*) for households who received insurance payments from the unemployment benefit I in previous years.

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[8]   In calculating the average housing costs, the Statistik der Bundesanstalt für Arbeit (2007) considers only the number of household members but not the composition of households. Households with two adults and two children and households with one adult and three children are assumed to receive the same payment. Thus, the financial situation of couples receiving unemployment compensation could be underestimated.

3.2. Baseline scenario

3.2.1. Tax-benefit system of a single household

The assessment base of the social security contributions is the gross wage y_i^G. In calculating the social security contributions of the employee (respectively the "wage earner") S_i^{WE} we can distinguish five pay levels:

$$
S_i^{WE} = \begin{cases}
0 & y_i^G \leq 4{,}800 € \\
\left(s_{WE1} + s_{EM1}\right) \cdot FR_i - s_{EM1} \cdot y_i^G & 4{,}800 € < y_i^G \leq 9{,}600 € \\
s_{WE1} \cdot y_i^G & 9{,}600 € < y_i^G \leq C_1 \\
s_{WE1} \cdot C_1 + s_{WE2} \cdot \left(y_i^G - C_1\right) & C_1 < y_i^G \leq C_2 \\
s_{WE1} \cdot C_1 + s_{WE2} \cdot \left(C_2 - C_1\right) & C_2 < y_i^G
\end{cases}
\tag{12}
$$

C_1 and C_2 denominate the contribution ceilings of the health and long term care insurance respectively the unemployment and old age pension insurance, s_{WE1} and s_{WE2} the corresponding cumulated contribution rates of the wage earner and s_{EM1} the cumulated contribution rate of the employer for the first contribution ceiling. The fictive remuneration in the second pay level FR_i is defined as $s_R \cdot 4{,}800 + \left(2 - s_R\right) \cdot \left(y_i^G - 4{,}800\right)$ with s_R describing the remuneration factor "F" of the social code II. In calculating the social security contributions of the employer we can differentiate four pay levels:

$$
S_i^{EM} = \begin{cases}
s_F \cdot y_i^G & y_i^G \leq 4{,}800 € \\
s_{EM1} \cdot y_i^G & 4{,}800 € < y_i^G \leq C_1 \\
s_{EM1} \cdot C_1 + s_{EM2} \cdot \left(y_i^G - C_1\right) & C_1 < y_i^G \leq C_2 \\
s_{EM1} \cdot C_1 + s_{EM2} \cdot \left(C_2 - C_1\right) & C_2 < y_i^G
\end{cases}
\tag{13}
$$

The global flat rate contribution for minor employment[9] (*German: Pauschaler Beitragssatz für geringfügig Beschäftigte*) is denoted by s_F, while s_{EM2} tags the cumulated contribution rate of the employer between the first and the second contribution ceiling. We apply the following contribution rates and contribution ceilings for the single household: $s_{WE1} = 0.2073$, $s_{EM1} = 0.1958$, $s_{WE2} = s_{EM2} = 0.1205$, $s_F = 0.30$, $s_R = 0.7673$, $C_1 = 42{,}750 €$, $C_2 = 63{,}000 €$. The sum of social security contributions can be written as

$$
S\left(y_i, \theta_i\right) = S_i^{WE} + S_i^{EM} .
\tag{14}
$$

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[9]   Up to a monthly wage of 400€ all social security contributions and taxes are paid as a flat rate contribution by the employer.

The connection of market income y_i and gross wage y_i^G is illustrated by (15). In this equation $\hat{C}_1$ and $\hat{C}_2$ describe the contribution ceilings C_1 and C_2 being enlarged by the social security contributions of the employer:

$$y_i^G = \begin{cases} \dfrac{y_i}{1+s_F} & y_i \leq 6{,}240€ \\[2ex] \dfrac{y_i}{1+s_{EM1}} & 6{,}240€ < y_i \leq \hat{C}_1 \\[2ex] \dfrac{y_i - \left(s_{EM1} - s_{EM2}\right)\cdot C_{1.}}{1+s_{EM2}} & \hat{C}_1 < y_i \leq \hat{C}_2 \\[2ex] y_i - s_{EM1}\cdot C_{1.} - s_{EM2}\cdot\left(C_2 - C_{1.}\right) & \hat{C}_2 < y_i \end{cases} \tag{15}$$

In addition to social security contributions the gross wage y_i^G is debited by taxes on income. Calculating the taxable income we deduct a lump-sum for income-related expenses *LE* of 920€ and a lump-sum for special private expenses (*German: Sonderausgaben*) *LS* of 36€ Expenses exceeding these lump-sum deductions are neglected. Pursuant to § 10 income tax code the social security contributions of the employee are at least partially deducted as special private expenses. As a result of the reform of the pension taxation in 2004 these expenses are calculated as a maximum of two different deduction schemes SE_i^{m1} and SE_i^{m2} (for further explanation see Bönke and Eichfelder, 2008). Hence, taxable income can be characterized as

$$y_i^T = y_i^G - LE - LS - Min\left(Max\left(SE_i^{m1}, SE_i^{m2}\right), S_i^{WE}\right). \tag{16}$$

The resulting income tax T_i^I is calculated by the tariff in § 32a income tax code. Additionally, a solidarity tax surcharge t_S yielding 5.5% of the income tax payment is raised if the income tax exceeds the exemption limit EL^S of 972€ In the first pay level this surcharge is raised with a higher marginal rate t_{S*} of 20%. Therefore, *T* is given by:

$$T\left(y_i, \theta_i\right) = \begin{cases} T_i^I & T_i^I \leq EL^S \\[1ex] Min\left(T_i^I \cdot\left(1+t_S\right), T_i^I + \left(T_i^I - EL^S\right)\cdot t_{S*}\right) & T_i^I > EL^S \end{cases} \tag{17}$$

In addition to the deduction of taxes and social security contributions the employee household can assert possible claims on unemployment benefit II. This is possible if its net wage does not permit a reasonable maintenance. Own income and property apart from the exceptions in §§ 11, 12 and 30 social code II reduce the possible claims for unemployment benefit II. Assuming that the household's property does not exceed the exemption limits we obtain

$$Z\left(y_i, \theta_i\right) = Max\left(R_i + H_i - Max\left(y_i^G - T\left(y_i, \theta_i\right) - S_i^{WE} - Max\left(LZ, y_i^G\right) - A_i, 0\right), 0\right), \tag{18}$$

with R_i characterizing the regular payment according to § 20 social code II, H_i the average cost of housing, LZ the lump-sum income-related expenses of 100€ per month in § 11 social code II and A_i the allowance of i according to § 30 social code II. Conditions (14), (17) and (18) describe the elements of equation (1).

3.2.2. Adaptations for family households

Within our baseline scenario the statutory social security payments are free of charge for spouses and children resulting from the fact that the whole market income is generated by one household member only. Furthermore, households with children obtain a reduction in the rate for the long term care insurance of 0.25 percentage points.

We assume a joint assessment of couples for income tax purposes. Therefore, the tax rate is calculated on the household's taxable income divided by two. In the baseline scenario this yields to a reduction of the tax rate. Also a number of allowances and thresholds is doubled affecting the special private expenses pursuant to §§ 10, 10c income tax code. A solidarity tax surcharge is raised if the income tax payment exceeds 1,944€ Within the income tax, families receive a child benefit of 1,848€ per year and child. Alternatively, a child allowance of 5,808€ can be deducted from taxable income reducing taxes but not social security contributions. The financial authorities identify the most advantageous alternative in favor of the taxpayer. The solidarity tax surcharge is calculated on the basis of a child allowance. In case of single parents we consider an additional allowance of 1,308€

Regarding the unemployment benefit II families are treated as a community (*German: Bedarfsgemeinschaft*). As a result, all payments are adjusted to the material needs of the household as a whole. The household members are liable for each other. The second adult receives 80% of the regular rate of a single adult. We assume that children are younger than 14 years. Hence, they are eligible for 60% of the regular payment. Single parents obtain a supplement to the regular payment of 12% in case of one child and 36% in case of more than one child. The child benefit of 1,848€ is fully credited against the unemployment benefit II. The benefit payments for housing and heating are adapted to the average level of the specific household type (Statistik der Bundesanstalt für Arbeit, 2007). In contrast, there is no adaptation of the lump-sum expenses LZ and just a slight expansion of the allowance A_i for households with at least one child.

3.3. Adaptations for alternative scenarios

3.3.1. Two earner scenario

In the two earner scenario we assume that each spouse of a couple earns 50% of the total employment income. Due to the income tax arrangement for married couples this alternative distribution of income does only have limited effects on the calculation of the tax base. On the one hand changes in the social security contributions affect the accordant special private expenses for income tax purposes. On the other hand an employment income for each spouse implies an additional lump sum deduction for income-related expenses LE of 920€

By contrast, the alternative distribution of income has a considerable impact on the household's social security contributions. Unlike the income tax, the contribution payments are calculated for each spouse separately. Therefore, the contribution ceilings of the household as a whole have to be multiplied by two. As a consequence, two earner households bear a double maximum contribution payment. There is only a free of charge insurance for the household's children if both spouses are wage earners.

Regarding the unemployment benefit II also the lump sum expense LZ and the allowance A_i according to § 11 and § 30 social code II are calculated for each household member separately. Therefore, an even distribution of the market income on both couple members implies a higher unemployment benefit payment for households with a low level of market income.

3.3.2. Social security scenario

As mentioned above, there is typically a marginal benefit in paying contributions for the German unemployment and old age pension insurance. In the social security scenario we assume that the net value of the unemployment and old age pension insurance is for each household equal to the net contribution paid. These assumptions may not be realistic due to the demographic development, the reallocation of income within the public old age pension and unemployment insurance or claims for a minimum public transfer like the unemployment benefit II. Nevertheless, the social security scenario can be regarded as a converse to the interpretation of the contribution payments as taxes.

In disregarding the unemployment and the old age pension insurance, we apply the following rates and contribution ceilings that account for the health and long term care insurance only: $s_{WE1} = 0.0868$, $s_{EM1} = 0.0753$, $s_{WE2} = s_{EM2} = 0$, $s_F = 0.15$, $s_R = 0.7673$, $C_1 = 42,750$€. Due to the zero value of $s_{WE2} = s_{EM2}$ it is not necessary to take into account the second contribution ceiling C_2. Consequently, we also do not have to deduct contribution payments

for the unemployment and old age pension insurance as special private expenses from the tax base. As a result, there is a stronger effect of the contributions for the health and long term care insurance on the income tax burden.

3.4. Tax-benefit burden

3.4.1. Baseline scenario

We analyze the tax-benefit function F of the household type i by the average rate

$$f_i = \frac{F(y_i, \theta_i)}{y_i} \tag{19}$$

as well as by the marginal rate

$$F_i' = \frac{\partial F(y_i, \theta_i)}{\partial y_i} . \tag{20}$$

Figure 2 illustrates f_i and F_i' for households with one adult and zero to three children as a function of market income y_i. Average and marginal rates below 0% (above 100%)[10] are generally restricted to a minimum value of -10% (maximum value of 110%).

For $y_i < 10,000€$ the average rate of the single household f_{A1C0} is negative as a result of the unemployment benefit II. Subsequent to a small income bracket with a marginal rate of 23%,[11] we find very high marginal rates caused by the imputation of the unemployment benefit II. Beyond a market income of about 16,400€ the complete imputation $(Z=0)$ implies a decrease of F_{A1C0}' to about 50%.

The positive trend for market incomes of the single household below 66,000€ is a result of the progressive income tax. By reason of the contribution ceilings of the social security system, the marginal rate declines from about 60% to 44.3% for market incomes exceeding 73,800€ Hence, the tax-benefit system as a whole is not continuously progressive for the single household.

[Figure 2 about here]

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[10] Within the baseline scenario as well as the two earner scenario and the social security scenario the maximum marginal rate is 100%. However, the housing and child benefit scenario as well as the supplementary unemployment benefit scenario in the appendix include tax-benefit rates above 100%.

[11] This low marginal rate is a result of the lump-sum expenses LZ of 1,200€ included in the calculation of the unemployment benefit II in condition (18).

Regarding the household types $A1C1$ to $A1C3$ we find an up to 100% marginal rate for low market incomes. This is caused by the fact that the unemployment benefit II increases in family size, while the accordant imputation instructions of §§ 11, 30 social code II depend just slightly on the number of household members. Further discontinuities in the marginal rates result from the deduction of the child allowances. The average rates decrease in the number of children.

Figure 3 documents the average and the marginal rate of families with two adults and up to three children. Similar to single parents the average rate f_i does not rise in y_i for each household type and all income levels. Therefore, the tax benefit system is not strictly progressive. Furthermore, we can observe marginal rates of 100% even in cases without children. This is induced by the higher unemployment benefit II as well as the aforementioned imputation instructions of §§ 11, 30 social code II.

[Figure 3 about here]

3.4.2. Alternative scenarios

Figure 4 contains the tax-benefit burden in the two earner scenario for two adults and up to three children. Compared to the baseline case the results are "Janus-faced". We find a lower average and marginal rate regarding the unemployment benefit II. Thus, a two earner family receives on average a higher benefit payment. This is caused by the fact that the lump-sum LZ as well as the allowance A_i of the unemployment benefit II are calculated for each wage earner separately.

By contrast, there is a significantly higher tax-benefit burden for incomes exceeding the first contribution ceiling of the social security system. In a two earner scenario, both spouses are liable for insurance contributions. As a consequence, we obtain double contribution ceilings as well as double maximum contribution payments.

[Figure 4 about here]

Figure 5 and Figure 6 document the average and marginal rate for the social security scenario. Due to the neglect of the unemployment and old age pension insurance the overall burden is significantly lower. Furthermore, the tax-benefit system can be interpreted as progressive for all household types if we restrict the analysis on the average tax-benefit rate.

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[Figure 5 about here]

[Figure 6 about here]

4. Results

In the following section we present the results of our analysis. Using the equivalence scales of section 2.2 we identify for each household k of a family type θ_k a reference household with an equivalent pre-tax market income $\left(E(y_k, \theta_k) = y_r\right)$. Thereafter, we calculate the net tax-benefit burden for both households according to section 3. Our criterion of horizontal equity is derived from the disposable incomes of the households k and r according to formula (11). The following figures illustrate HE for equivalent market incomes of all household types. We include a line for $HE = 1$ as reference point. $HE > 1$ $\left(HE < 1\right)$ implies a privilege (a discrimination) of the accordant family household k.

4.1. Baseline scenario

Figure 7 illustrates HE for the *relative scale*. As the scale is based on the value judgments of the unemployment benefit II, we can state an equal treatment of all family types with a zero market income.

[Figure 7 about here]

However, for a low but non-zero market income, we find a discrimination of all family types. This disadvantage results especially from the imputation instructions of the social code II. In contrast to the benefit payment itself, the lump sum expense LZ is not adjusted to family size, while A_i depends just slightly on the number of children. This yields to a relatively low benefit payment for families with a non-zero market income.

By contrast, Figure 7 states a privilege for families in the income range above 16,400€ The level of this privilege increases until the equivalent market income exceeds the second contribution ceiling of the social security system (73,800€). In addition, it increases in the number of children and is higher for married couples. These results are driven by two aspects: (1) families are burdened to a lower extent by the social security contributions caused by the free of charge insurance for spouses and children in conjunction with the contribution ceilings. Thus, a family household with an equivalent pre-tax income to a single household

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within the contribution ceilings may pay a lower average rate for social security by exceeding the contribution limits; (2) as mentioned above the German income tax arrangement for married couples does not take into account within-household size economies. While the unemployment benefit II implies an additional material need of a married couple of 58.5%, the income tax arrangement is based on an additional need of 100%.

Taking into account the *absolute scale* we obtain Figure 8.

[Figure 8 about here]

In contrast to the *relative scale* we find a discrimination of families for a zero market income. This is caused by the fact that the maximum deflators of the *absolute scale* exceed the deflators of the *relative scale* (for example 1.99 instead of 1.538 in case of one adult and one child). Thus, the value judgments of the income tax law call for a higher subsistence level of family households than the average payments of the unemployment benefit II.

The further results are comparable to the outcome of the *relative scale*. We find a disadvantage of families in the lower income brackets being partially driven by the imputation instructions of the unemployment benefit II. For high market incomes we can state a privilege increasing in family size. This privilege decreases for market incomes exceeding the second contribution ceiling of the social security system.

Concluding, both equivalence scales support a privilege of families with a high equivalent market income, while families in the lower income brackets seem to be discriminated against the single household. Hence, our findings suggest a contradiction of value judgments between the unemployment benefit II and the tax and social security legislation.

4.2. Two earner scenario

In the two earner scenario the *relative scale* yields to similar results for households with children. We find a contrasting outcome for A2C0 that corresponds to our interpretation of the baseline scenario. As mentioned above the instructions of the social code II result in a doubling of the imputation exemptions according to § 11 and § 30 social code II in the two earner scenario. However, the *relative scale* calls for an additional need of only 58.5% for a married couple. From the viewpoint of the scale A2C0 is for low market incomes better off than the single household.

[Figure 9 about here]

We obtain an opposite effect for high market incomes. From a household perspective, the two earner scenario implies a doubling of the contribution ceilings of the social security system. This is partially contradicted by the free of charge insurance for children. Therefore, we find a discrimination (*HE*<1) only for couples without children. According to these results the privilege of family households with a high market income in the baseline scenario is especially driven by the free of charge insurance for spouses and children.

The application of the *absolute scale* has similar implications with two exceptions: (1) contrasting the *relative scale* we find no privilege of A2C0 for low market incomes. This is caused by the fact that the maximum deflator of the *absolute scale* is 2.07 compared to 1.585 of the *relative scale*; (2) we find not only a disadvantage for A2C0 but also for A2C1 and A2C2 in the higher income brackets. This is also driven by the differences in the value judgments of both equivalence scales.

[Figure 10 about here]

In summary, the outcome for the two earner scenario supports our interpretation of the baseline case. Furthermore, these findings suggest that a disadvantage (privilege) of a specific family type does not only depend on the amount of the household's market income but also on its distribution. Also from this perspective we can determine a significant contradiction of value judgments within the German tax-benefit system.

4.3. Social security scenario

The *relative scale* yields to Figure 11. As in the baseline scenario we find by tendency that family households with a high equivalent market income are better off, while there is a disadvantage for households depending on the unemployment benefit II. Due to the fact that the unemployment and the old age pension insurance are not interpreted as taxes, the privilege for families with a high equivalent market income is smaller than in the baseline scenario. Regarding households with only one adult we even find a slight disadvantage for very high market incomes.

[Figure 11 about here]

By contrast, the *absolute scale* implies also for the social security scenario a definite privilege for all family households in the higher income brackets. Concluding, the results of both scales in the social security scenario support to a lesser extent the outcome of our baseline case.

[Figure 12 about here]

5. Conclusion

Our study attended to the distributive justice of the German tax-benefit system including for the first time social security contributions and public transfers like the unemployment benefit II. We compared the treatment of seven different types of households with the single as point of reference. Methodologically the contribution is based on the concept of needs-adjusted income taxation. For the measurement of the households' basic needs we used the widely accepted instrument of equivalent income. The applied equivalence scales are based on the German income tax and social welfare legislation. That approach allowed us to draw conclusions on the consistency of the German tax-benefit system as a whole.

According to the simulation results we can state that families with a low market income tend to be discriminated compared to a single household. That outcome is partially driven by the imputation instructions of §§ 11, 30 social code II accounting to an insufficient extent for the households' family situation. In contrast, we find families and married couples with high market incomes to be privileged. This result is caused by the family members' free of charge social insurance, the regressive elements of the tax-benefit function (especially the contribution ceilings of the social security system) and the income tax arrangement for married couples disregarding within-household size economies.

We can conclude that the current tax-benefit system in Germany contains significant contradictions in value judgments between the tax, the social security and the social welfare legislation. These include also the dependency of the tax-benefit burden on the distribution of income that has been demonstrated in the two earner scenario. Our findings are supported by further scenarios including alternative public transfer programs like housing benefits (see the appendices A and B).

If it is not possible to legitimate the stated antagonism within the tax-benefit system by aspects not considered in our study, it seems intimating to think about potential reform measures. As demonstrated in the social security scenario, the privilege for families in the higher income brackets is especially driven by the free of charge insurances for spouses and children in conjunction with the contribution ceilings of the social security system.

From this perspective, a reduction of the difference between the tax-benefit rate in the middle income brackets of about 60% and the constant marginal tax rate for higher market incomes of about 44% could have a share in promoting horizontal equity. As an alternative, the contribution ceilings could be adjusted to family size (with larger contribution ceilings for families) or a reduced contribution rate could be raised instead of a free of charge insurance. Furthermore, an alignment of the assessment bases of income taxes and social security contributions to a consistent form of equivalent market income should promote the distributive justice of the tax benefit-system. The same holds for a consideration of within-household size economies within the tax and social security legislation. Also the consideration of the family situation in calculating the imputation exemptions of the unemployment benefit II should account for the observed antagonism.

It has to be considered that the choice of the applied equivalence scales as well as the underlying assumptions of our approach have an impact on the ascertained outcome. That holds especially for the interpretation of the unemployment and old age pension insurance contributions as taxes. A regressive tax-benefit function necessarily implies a violation of horizontal equity. Unambiguously, we find regressive income brackets within the tax-benefit system as long as the full amount of social security contributions can be regarded as taxes. Nevertheless, the outcome of the social security scenario supports to a lesser extent the observed contradiction of value judgments within the German tax-benefit system.

6. Appendices

Appendix A: Housing and child benefit scenario

Within the baseline scenario we neglect possible claims for housing benefits as well as supplementary child benefits for families that do not receive unemployment benefit II. In the following scenario we include these alternative programs for families and singles with a low market income. It is tested in each case, which public welfare program results in a higher disposable income. The housing benefit is calculated in accordance to the following formula of the German housing benefit act (*German: Wohngeldgesetz*):

$$H_i^{HB} - \left(a_i + b_i \cdot H_i^{HB} + c_i \cdot y_i^{HB}\right) \cdot y_i^{HB}, \tag{A.1}$$

where H_i^{HB} denotes the relevant housing costs, y_i^{HB} the relevant net market income and a_i, b_i, c_i denominate the factors in appendix 1 of the housing benefit act.

The relevant income for housing benefits y_i^{HB} consists of the gross income y_i^G reduced by the lump-sum for income-related expenses LE of 920€ Employees paying taxes on income deduct from the remainder 10%. The same holds for employees paying contributions for the health and long term care insurance or for the old age pension insurance. Hence, households with tax payments as well as contributions to all obligatory public insurances deduct altogether 30% from the remainder. Households with no tax and social security liabilities deduct 6% only. In addition single parents with children of less than 12 years reduce the residue by 600€ per child. For this scenario we assume that all children are younger than 12 years. We also take into account the minimum values of y_i^{HB} according to appendix 2 in the housing benefit act.

The relevant housing costs H_i^{HB} are calculated on the same data source as the housing costs for the unemployment benefit II (Statistik der Bundesanstalt für Arbeit, 2007). However, heating costs and payments for domestic warm water were not relevant for the housing benefit in 2007. Therefore, we deduct 11.8% of the average costs for heating (Statistik der Bundesanstalt für Arbeit, 2006) and additional 3.4% for domestic warm water (Deutscher Mieterbund, 2008). Taking further into account that on average only 95% of all costs are accepted for the unemployment benefit II (Statistik der Bundesanstalt für Arbeit, 2006), we divide the remainder by 0.95.[12] According to that approach H_i^{HB} comprehends 89.2% of the housing costs relevant for the unemployment benefit II. By reason of the relatively low amount of H_i^{HB} we do not have to consider the cost limits within the housing benefit act.

The supplementary child benefit is calculated according to § 6a of the German child benefit act (*German: Bundeskindergeldgesetz*). The relevant income for this program is described by

$$y_i^{SB} = y_i^G - S_i^{WE} - T(y_i, \theta_i) - CB_i - Max(LZ, y_i^G) - A_i,$$ (A.2)

with CB_i characterizing the regular child benefit of 1,848€ per year, LZ the lump-sum for income-related expenses of 100€ per month in § 11 social code II and A_i the allowance of i according to § 30 social code II.

A supplementary child benefit is granted if the relevant income y_i^{SB} is sufficient to compensate the virtual unemployment benefit II Z_i^{Vir} for the adults of the household (*minimum amount of income*). Z_i^{Vir} consists of the regular payments for the unemployment

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[12] The non-acceptance of housing costs for the unemployment benefit II does not imply that these costs are not relevant for housing benefits.

benefit II plus the original housing costs multiplied with an average cost fraction allocated to the adult household members (Deutscher Bundestag, 2006; Familienkasse, 2007).

The maximum supplementary child benefit is 1,680€ per child and year. It is reduced by 70% of the difference of the relevant income y_i^{SB} and the virtual unemployment benefit II. If the relevant income y_i^{SB} exceeds Z_i^{Vir} plus 1,680€ per child, there are no further claims for a supplementary child benefit (*maximum amount of income*).

Figure A.1 takes into account the effects of housing benefits as well as supplementary child benefits on the tax-benefit burden of households with one adult only. Due to our assumptions on housing costs, there are no significant effects for the single household. By contrast, there is a considerable and positive impact of the sum of housing benefits and supplementary child benefits for single parents. The supplementary child benefit is exclusively available for specified income brackets between the *minimum amount of income* and the *maximum amount of income*. As a result, we obtain remarkable discontinuities in the average and marginal tax-benefit rates with the marginal rates exceeding 110% (-10%).

[Figure A.1 about here]

Regarding households with two adults we attain a similar outcome.

[Figure A.2 about here]

Figure A.3 and Figure A.4 document the horizontal equity results for the housing and child benefit scenario. For the *relative scale* we find especially an improvement for households with a high number of children which are eligible for the supplementary child benefit. Hence, the introduction of the supplementary child benefit in 2005 seems to reduce the discrimination of families with a high number of children. From this perspective the extension of this public program in 2008 can be regarded as a step in achieving an equal tax-benefit system for family households.

[Figure A.3 about here]

Figure A.4 documents the outcome for the *absolute scale*. By reason of the higher deflator of this scale in the lower income brackets (1.99 instead of 1.538 in case of A1C1), we can state a disadvantage also for households being eligible for the housing benefit and the supplementary

child benefit. Nevertheless, we find also in this case an enhancement for households with a low market income and a high number of children.

[Figure A.4 about here]

Appendix B: Supplementary unemployment benefit scenario

Regarding the German unemployment benefit II there is a supplement for households that received an unemployment benefit I in previous years. The maximum supplement consists of 2/3 of the difference between the previous unemployment benefit I and the entitled unemployment benefit II. The monthly amount is further restricted to 160€ per adult and 60€ per child. In the following scenario we assume that a maximum supplement is paid.

The supplement is restricted to households with a claim for the regular unemployment benefit II. Therefore, an additional labor income of one € may result in a full loss of the supplementary unemployment benefit II. The erratic effects of this program are documented by the average and the marginal tax-benefit rates in the following figures. As should be expected, the annulation of the supplement results in a significantly higher average payment as well as a marginal rate exceeding 100%.

[Figure B.1 about here]

[Figure B.2 about here]

The figures B.3 and B.4 contain our simulation results accounting for the supplementary unemployment benefit II. We find volatile effects resulting from the annulation of the supplementary payment. Regarding the *relative scale*, the supplement results tendentially in a disadvantage for family households due to the fact that the supplement is cancelled for a lower equivalent pre-tax income compared to the single household. On the other hand there is an additional advantage for couples resulting from the fact that they receive the double supplement as the single household. By reason of the supplementary unemployment benefit II we cannot observe an equal treatment for all households with a zero market income.

[Figure B.3 about here]

As documented in Figure B.4 we find similar effects for the *absolute scale*.

[Figure B.4 about here]

In summary, the erratic effects of the supplementary unemployment benefit II do not seem to convey the horizontal equity within the German tax-benefit system. From a horizontal equity perspective, a phase out instead of an annulation of this supplementary benefit should convey distributive justice.

Tables

Table 1

Distribution of household types in 2007

household type		distribution of household type		
adults	children	frequency	percentage	cumulated
A	C			
1	0	16,106,814	39.78	39.78
1	1	1,374,778	3.40	43.17
1	2	664,458	1.64	44.82
1	3	65,772	0.16	44.98
2	0	11,808,791	29.16	74.14
2	1	4,655,208	11.50	85.64
2	2	3,901,062	9.63	95.27
2	3	1,329,204	3.28	98.56
other		584,910	1.44	100.00
total		40,490,997	100.00	100.00

Source: German Socio-Economic Panel (GSOEP) 2008,
wave 2007 own calculations

Table 2

Equivalence scales

household type		relative scale	absolute scale	
adults	children	deflator	deduction	max deflator
A	C	$m(\theta_i)$	$a(\theta_i)$	$m(y_i,\theta_i)$
1	0	1.000	0	1.000
1	1	1.538	7,116	1.990
1	2	2.114	12,924	2.800
1	3	2.576	18,732	3.610
2	0	1.585	7,664	2.070
2	1	2.022	13,472	2.880
2	2	2.483	19,280	3.690
2	3	2.988	25,088	4.500

Figures

Figure 1

Deflator m for the absolute scale
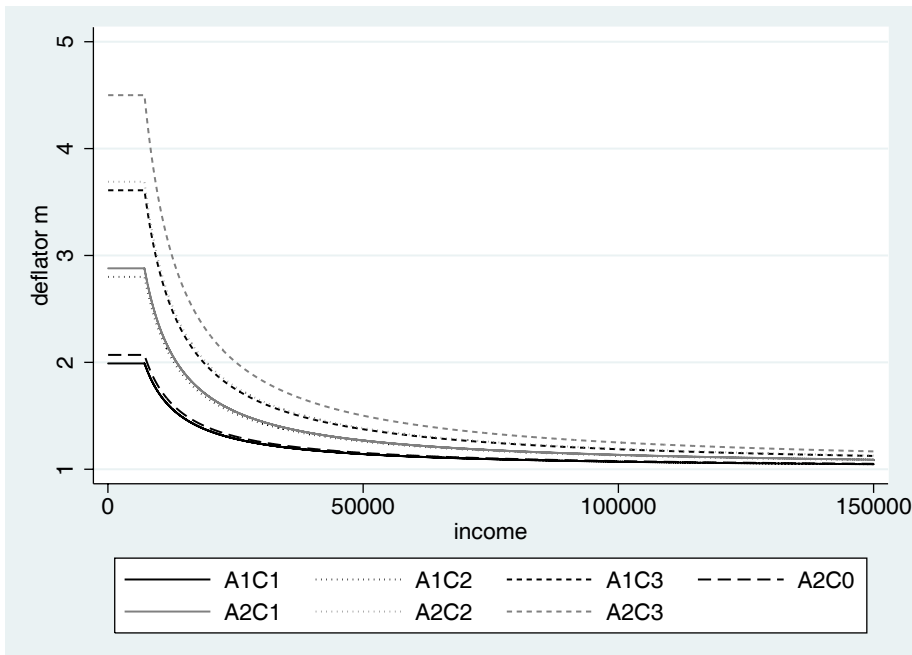
Figure 2

Average and marginal rate of households with one adult, baseline scenario
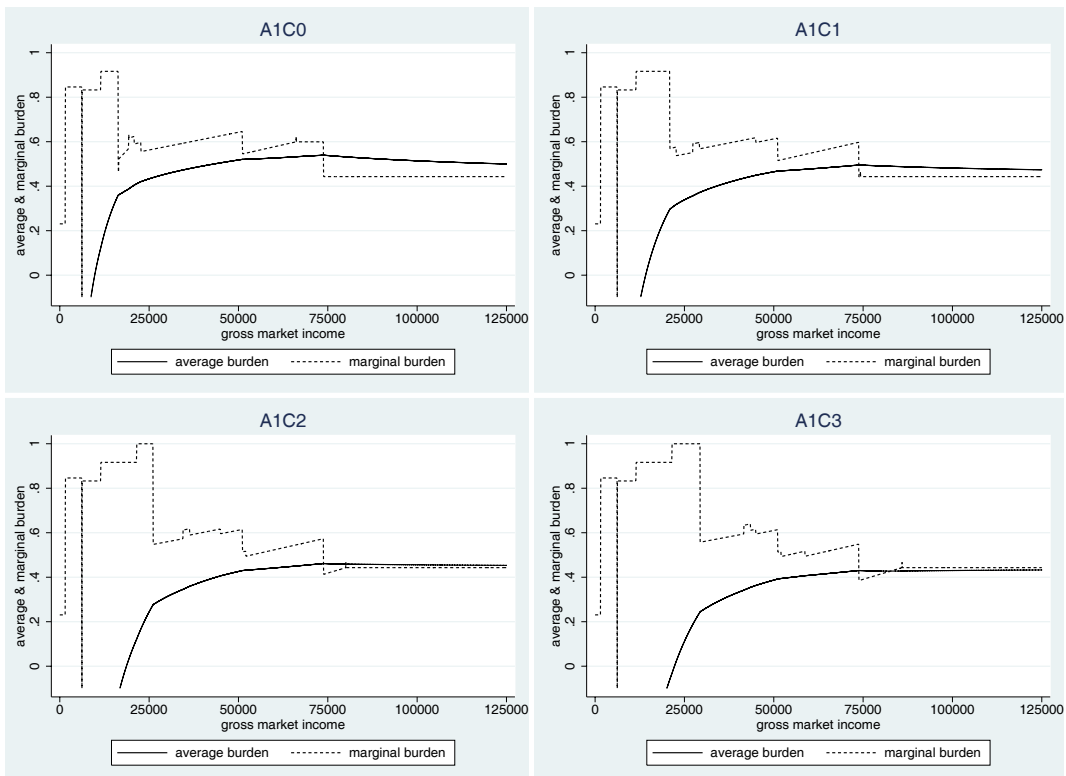
Figure 3

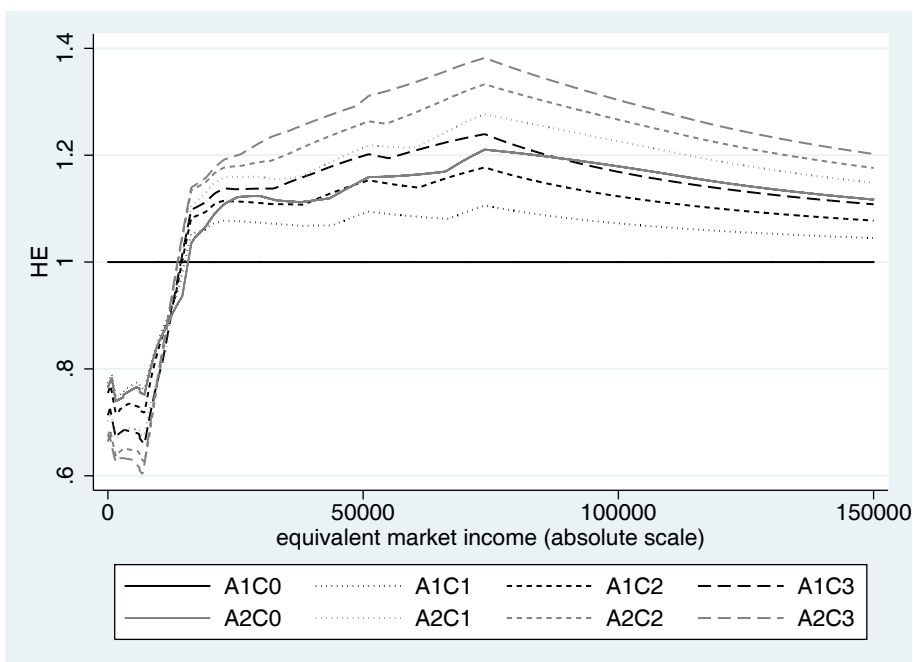*Average and marginal rate of households with two adults, baseline scenario*
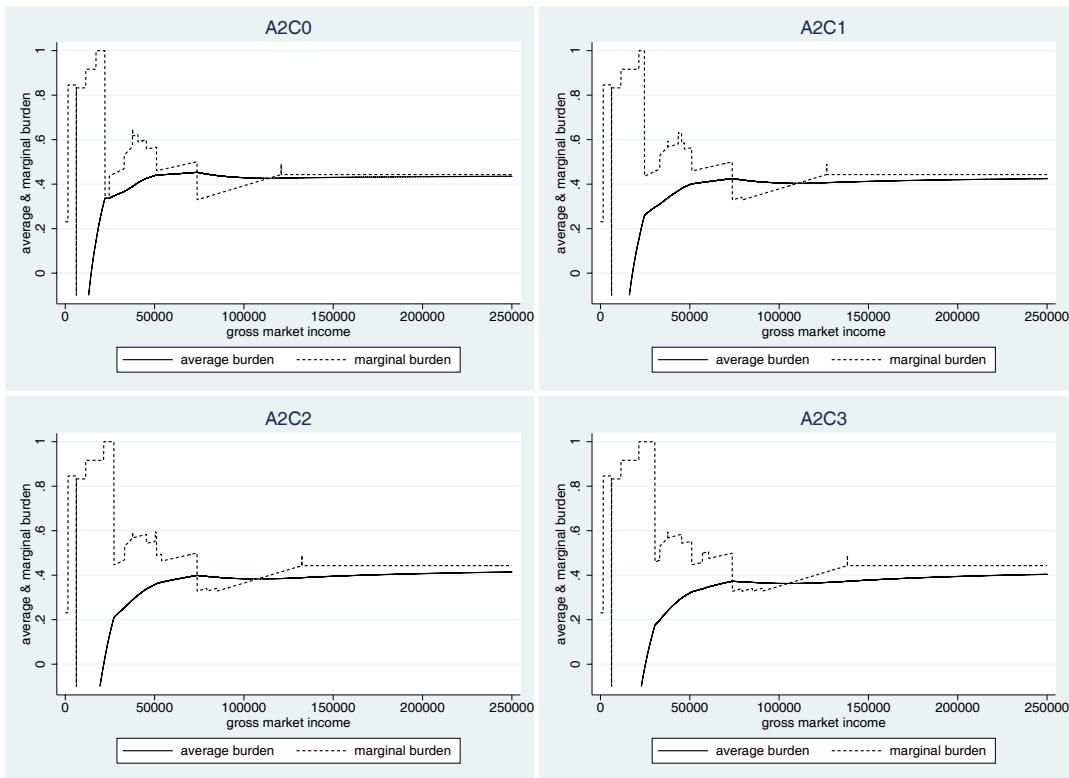
Figure 4

Average and marginal rate of households with two adults, two earner scenario
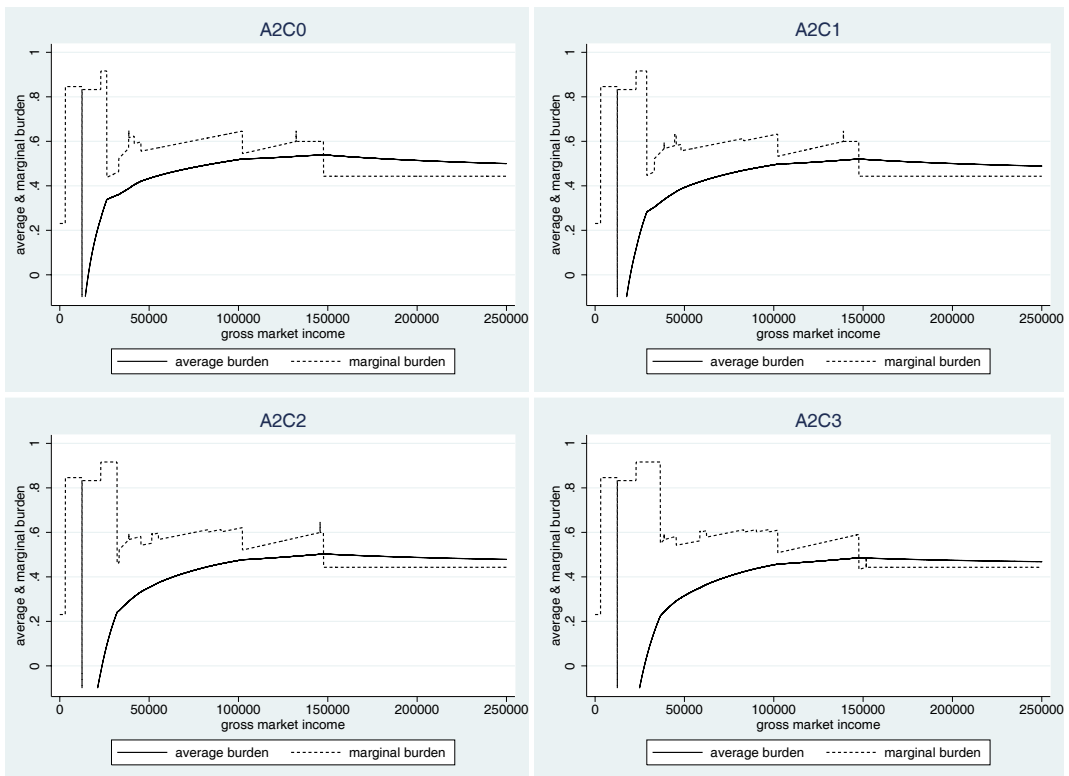
Figure 5

Average and marginal rate of households with one adult, social security scenario
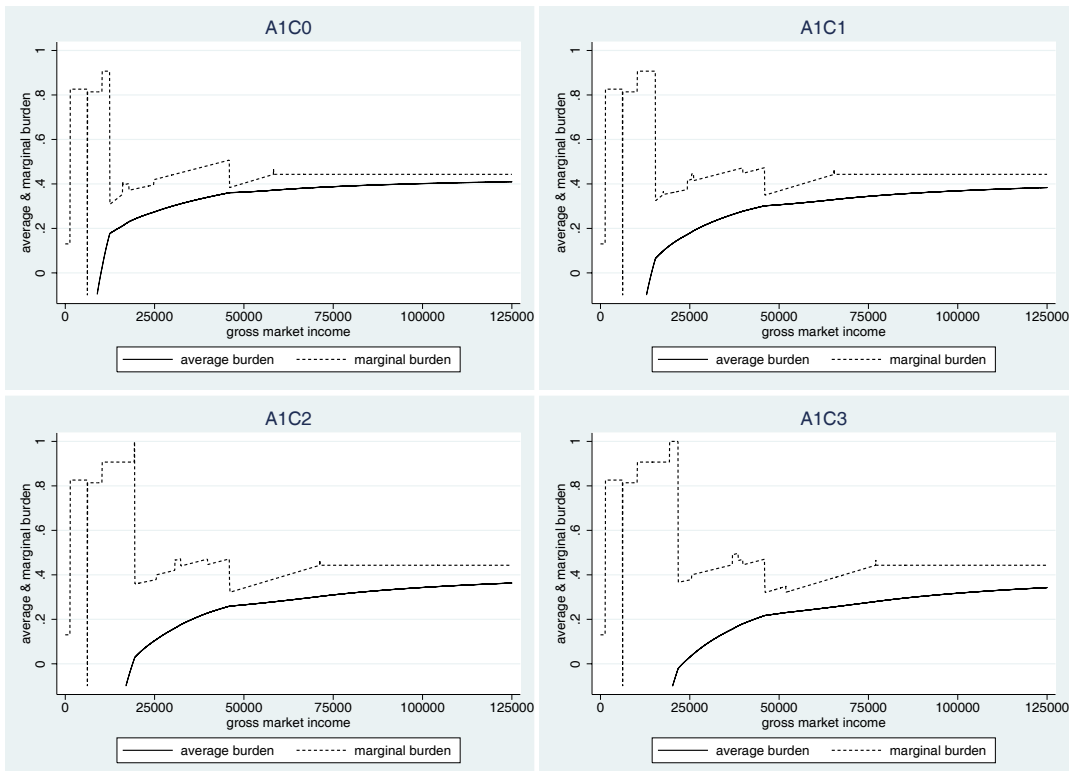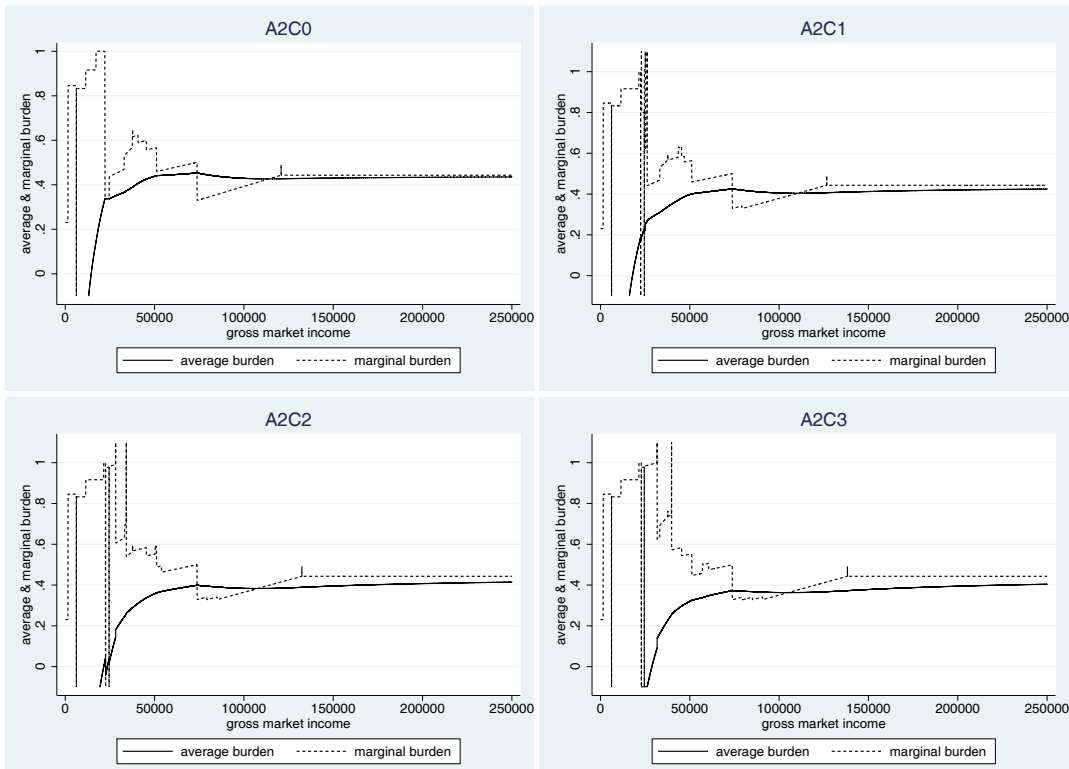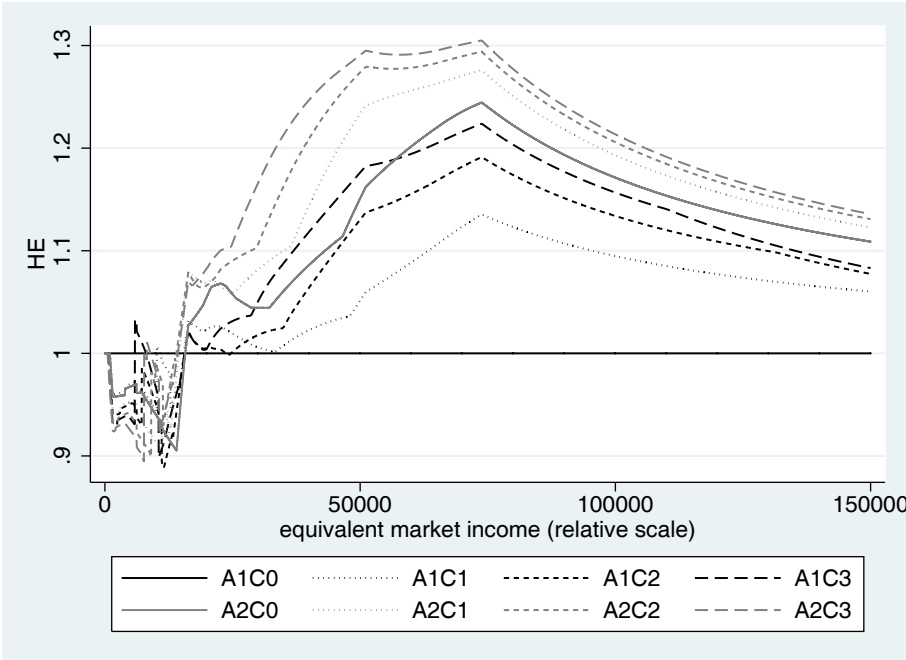

Figure 6

Average and marginal rate of households with two adults, social security scenario
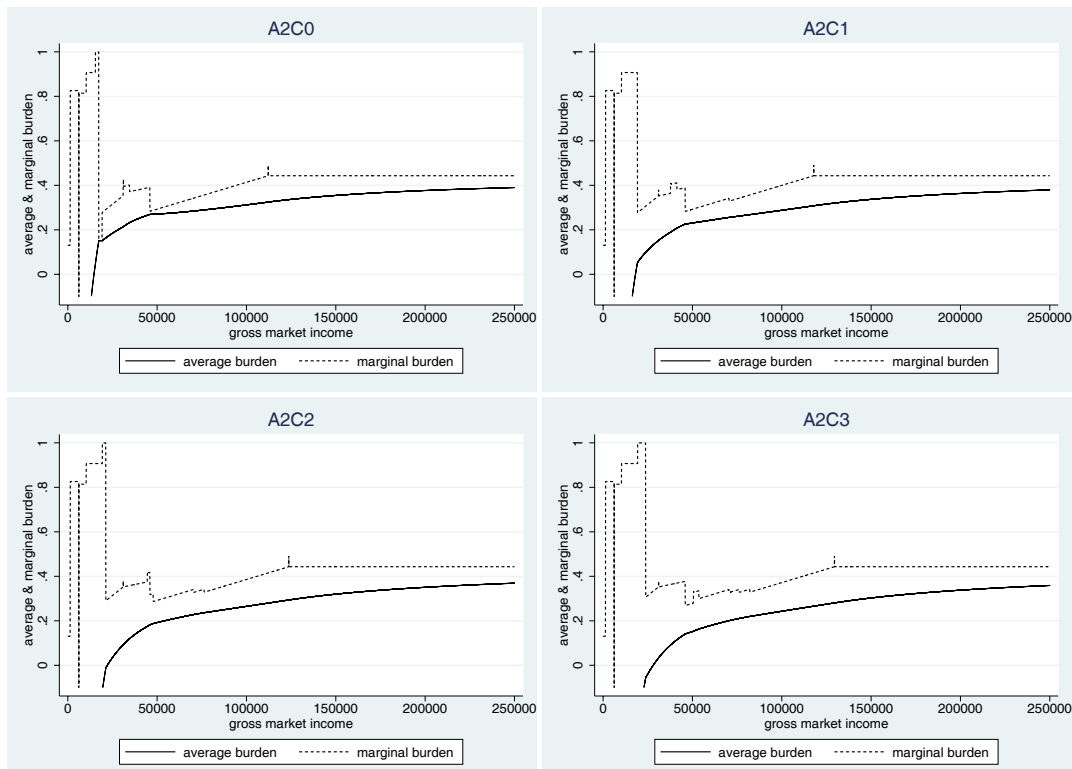
Figure 7

Horizontal equity for the baseline scenario, relative scale
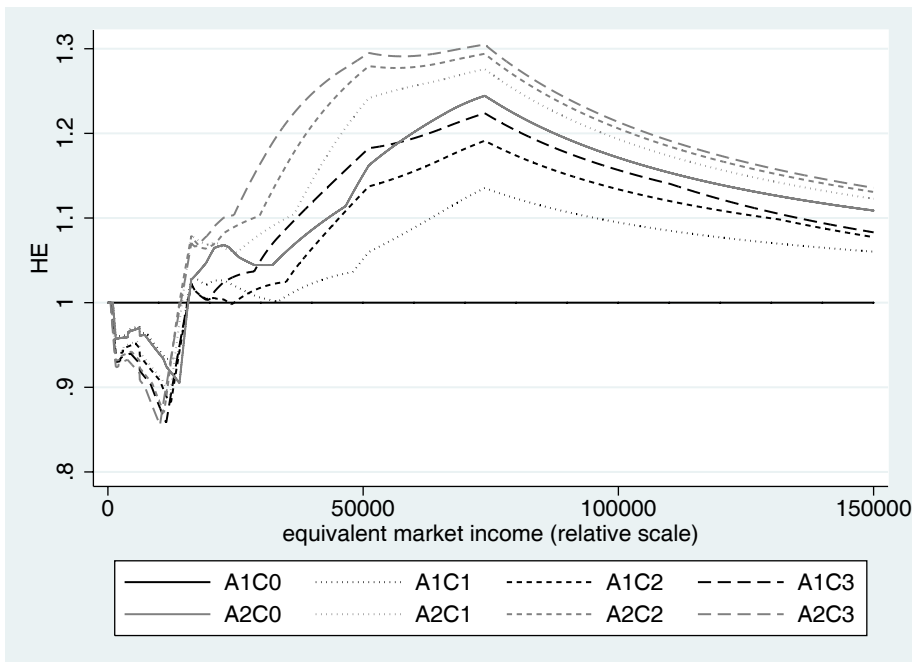
Figure 8

Horizontal equity for the baseline scenario, absolute scale

Figure 9

Horizontal equity for the two earner scenario, relative scale
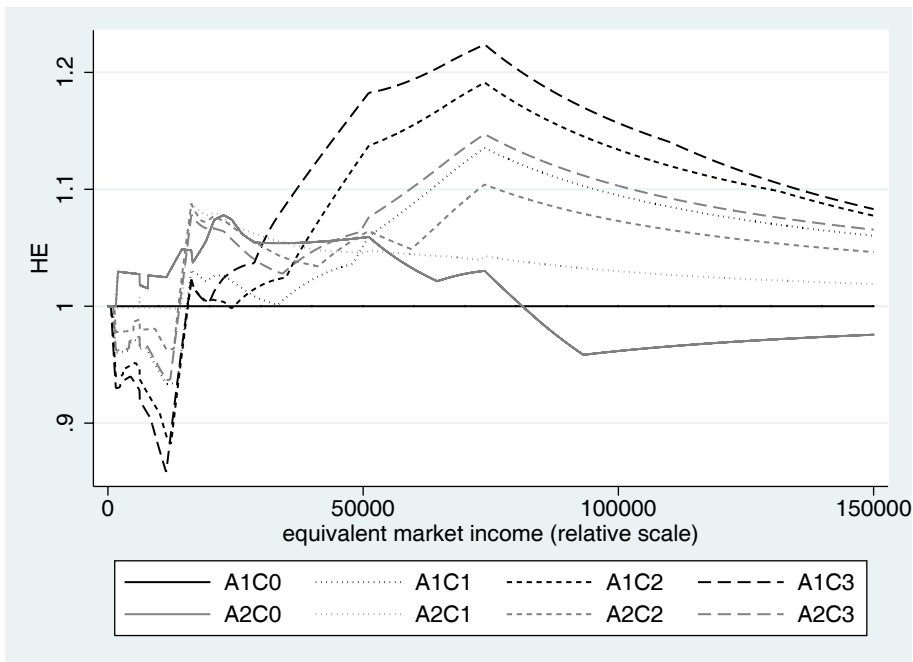
Figure 10

Horizontal equity for the two earner scenario, absolute scale
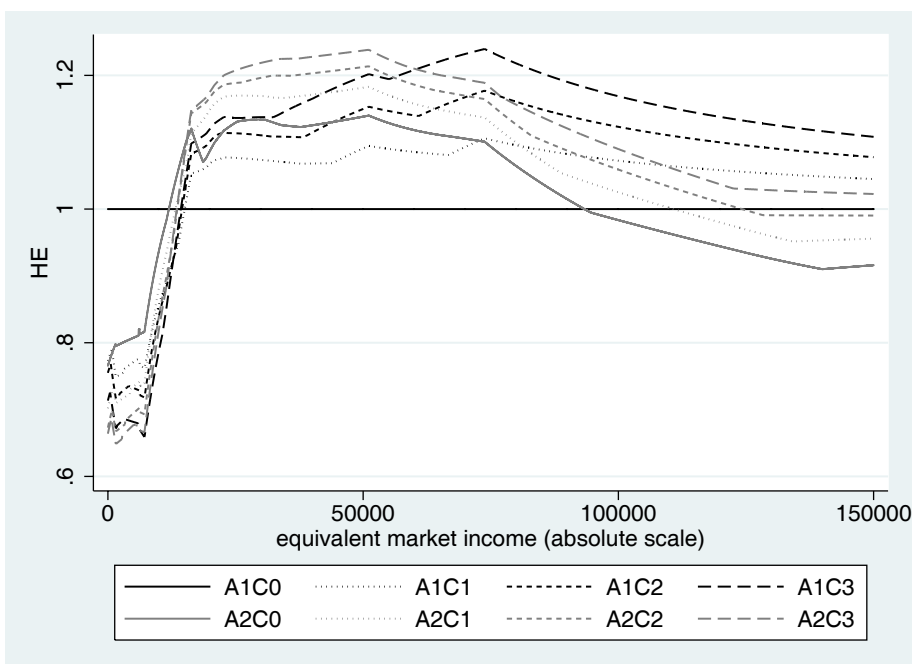
Figure 11

Horizontal equity for the social security scenario, relative scale
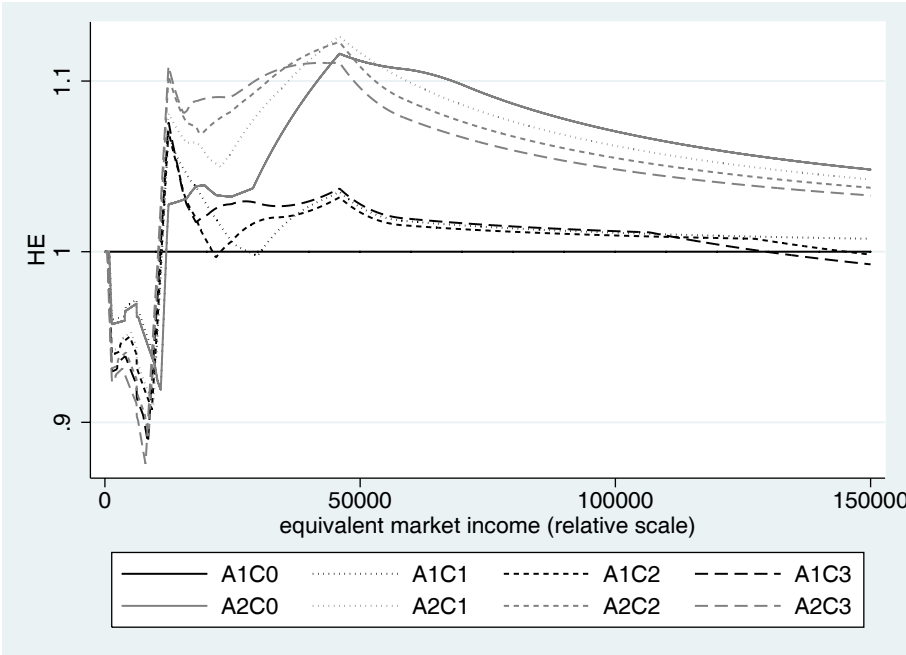
Figure 12

Horizontal equity for the social security scenario, absolute scale
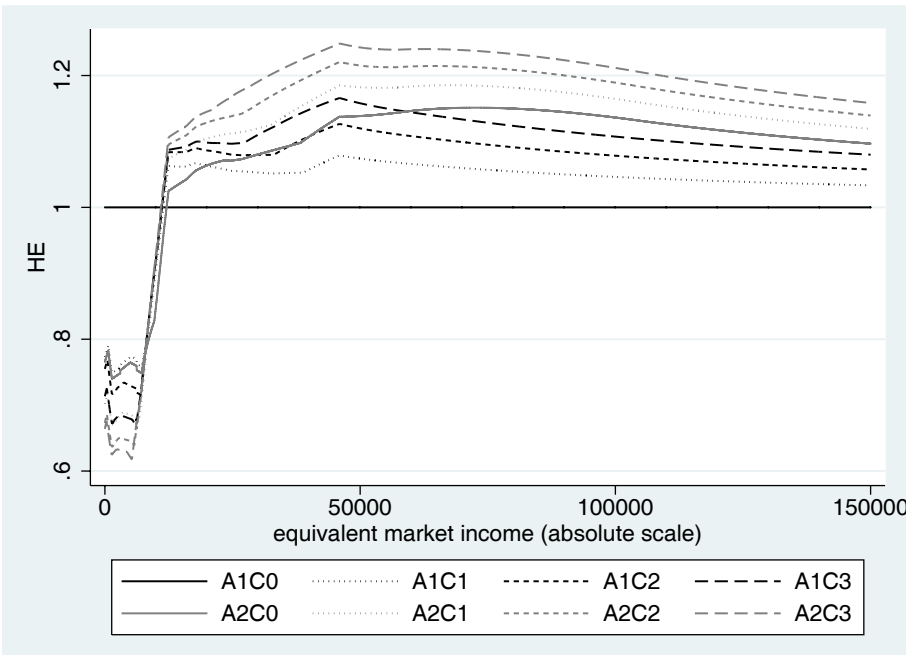
Figure A.1

Average and marginal rate of households with one adult, housing and child benefit scenario
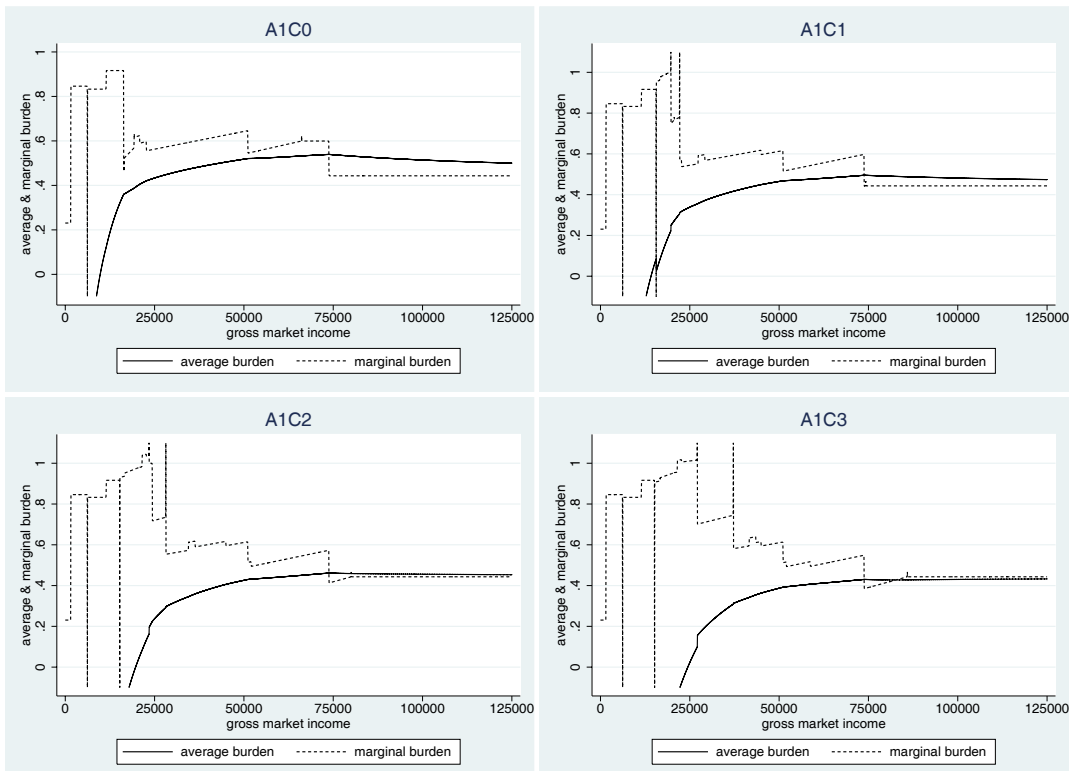
Figure A.2

Average and marginal rate of households with two adults, housing and child benefit scenario

Figure A.3

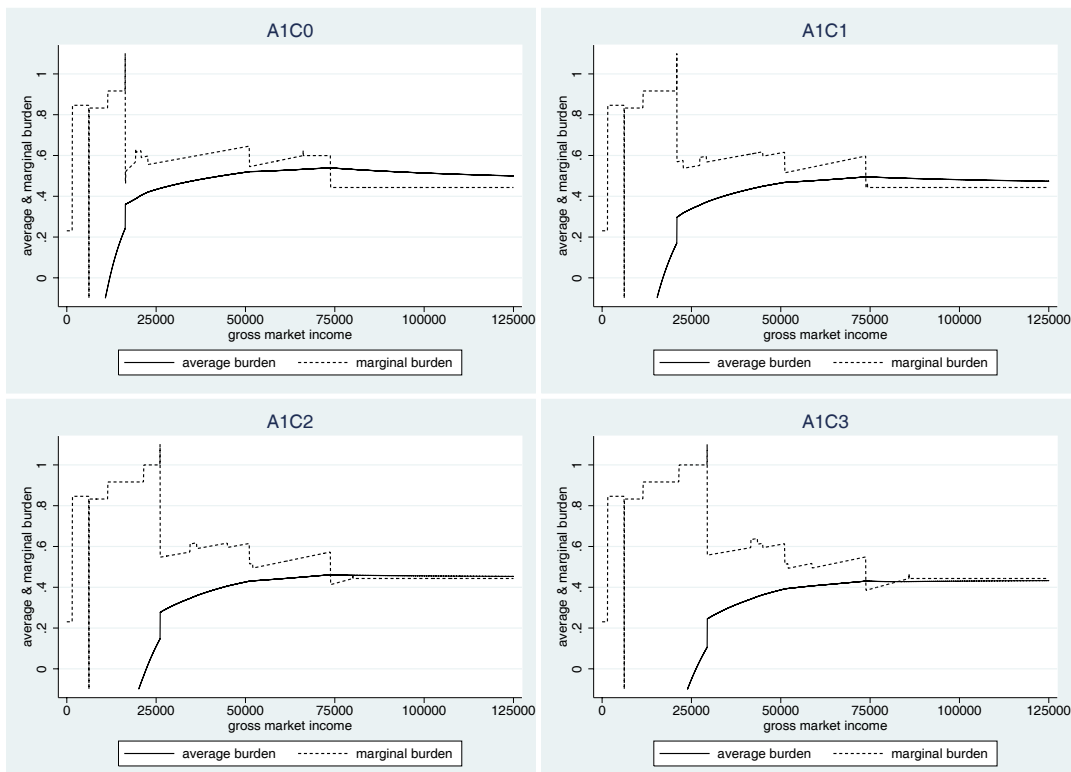*Horizontal equity for the housing and child benefit scenario, relative scale*

Figure A.4

Horizontal equity for the housing and child benefit scenario, absolute scale
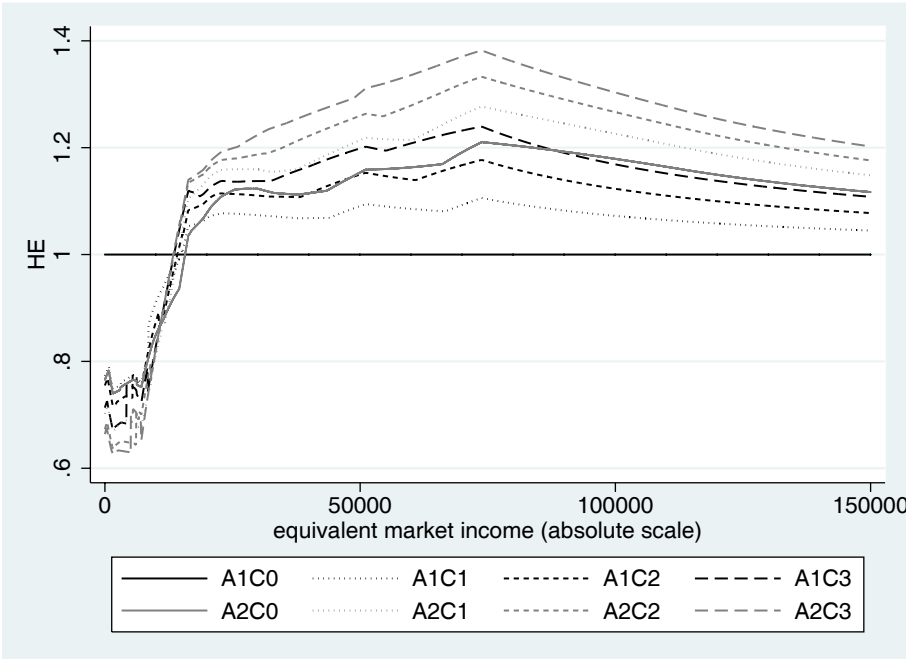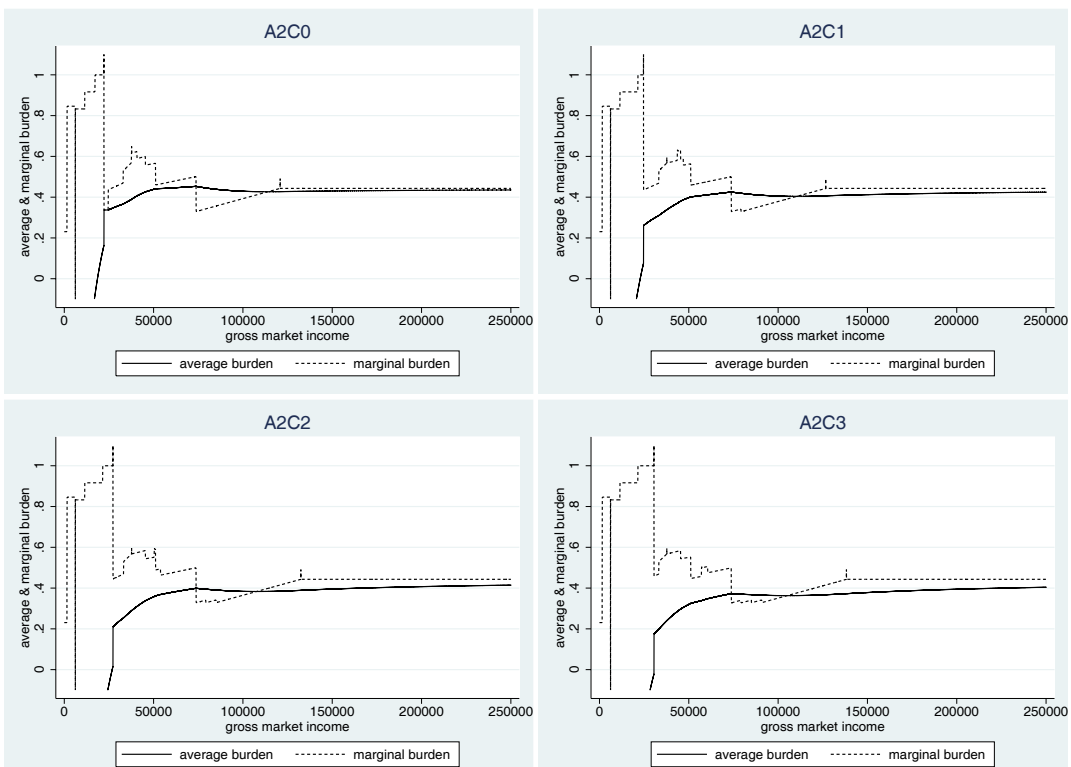
Figure B.1

Average and marginal rate of households with one adult, supplementary unemployment benefit scenario
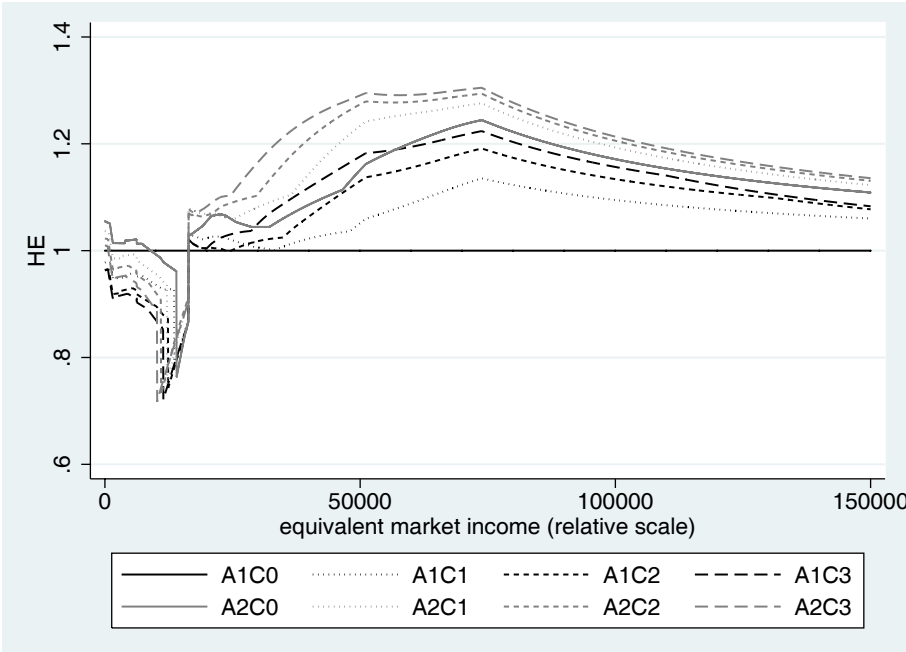

Figure B.2

Average and marginal rate of households with two adults, supplementary unemployment benefit scenario
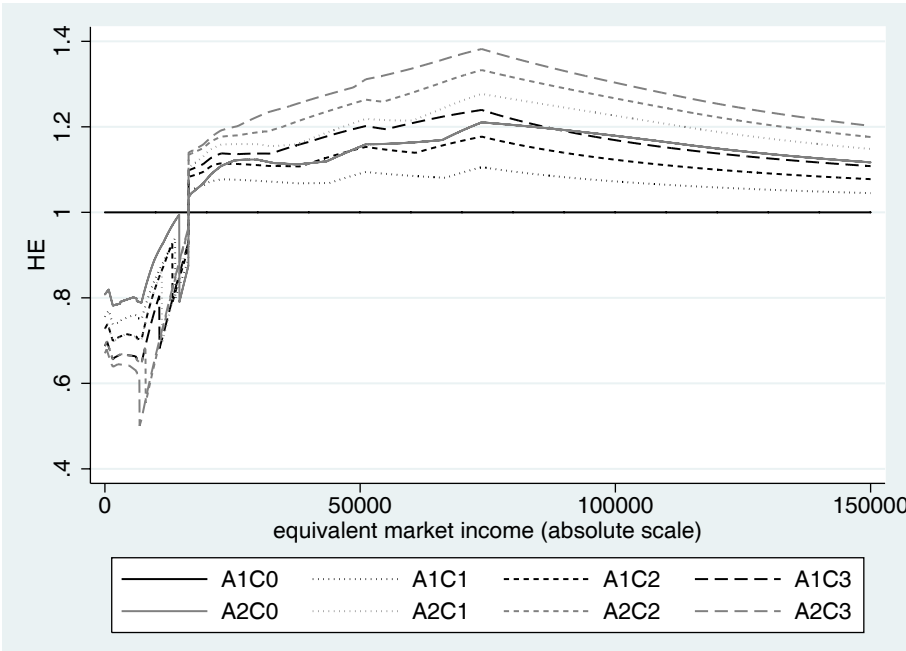
Figure B.3

Horizontal equity for the supplementary unemployment benefit scenario, relative scale

Figure B.4

Horizontal equity for the supplementary unemployment benefit scenario, absolute scale

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