

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

Timm Bönke* and Sebastian Eichfelder†

Abstract*

Analysing the distributive justice of taxation we compare the equivalent income of eight types of employee households in relation to their net tax and social security payment. Using widely accepted equivalence scales we find evidence for a structural discrimination of low income families that is driven by the imputation instructions of the “Arbeitslosengeld II”. In the high income bracket we can demonstrate that families and especially married couples are privileged by the tax and social security contribution system. Based on these results we can state a significant contradiction of value judgements between tax and social insurance legislation and the social welfare system.

Key words: 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 recent survey by order of the Bertelsmann Stiftung (Vehrkamp, and Kleinstauber, 2007), only a minority of the population believes to be part of a “just” economic system. 78% of the respondents find it especially important to enhance social justice by reducing child poverty. In contrast, only 26% suggest to raise the maximum tax rate in improving social justice. Thus, the taxation of families is a central question of distributive justice.

An emphasis in the previous literature about family taxation has been laid on the parental split for married couples and the child benefit of the personal income tax code. Especially, the

* Institute for Public Finance and Social Policy, Freie Universität Berlin.

† Institut für Betriebswirtschaftliche Prüfungs- und Steuerlehre, Freie Universität Berlin.

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question if these regulations are to be interpreted as an unjustified privilege has been widely discussed (see Maiterth (2005) for a thorough overview). Maiterth (2004) and Steiner, and Wrohlich (2008) analyze the distributional effects of alternative forms of family taxation using a microsimulation approach. Lambert, and Yitzhaki (1997) as well as Cremer, Arnaud, and Pestieau (2003) investigate the theoretical background of a “just” personal income taxation for families. The ambition of our study is to amplify this field of research in two ways:

1. The focus of the literature has been almost exclusively on the personal income tax (“Einkommensteuer”) and additional supplements like the “Solidaritätszuschlag”. Taking an employee point of view, the disposable income is also affected by social security contributions and public transfers like the “Arbeitslosengeld II”. Therefore, these payments are to be included in an integrated “tax-benefit system”. Muellbauer, and Van de Ven (2004) use a similar methodology to reinvestigate the distributive aspects of the tax-benefit system in Australia.
2. The concept of equivalent income¹ is a widely accepted instrument in conducting distributive analysis on households differing in size and needs (*inter alia* Vickrey, 1947). Based on theoretical and empirical studies (*inter alia* Seneca, and Taussig 1971; Ebert, and Moyes, 2000) this approach is methodologically conform to the concept of needs-adjusted income taxation.² Therefore, we use equivalent incomes to analyze the distributive justice of the German tax-benefit system.

In our study we compare eight different household types. To keep the analysis tractable, we consider employee households only. Using the single household (one adult and no children) as point of reference we apply four specific functional forms of equivalent income (equivalence scales) for our distributional analysis. The distributive justice of the tax-benefit system is tested against two benchmarks for horizontal equity common in the literature. Hence, we measure for a set of two definitions of horizontal equity and four equivalence scales whether different household types are treated equally by the German tax benefit system. To our knowledge this is the first contribution analysing the distributive justice of German taxes, social security contributions and public transfers in this detail. The paper is organised as follows: Chapter 2 elucidates the theoretical background on horizontal equity

¹ Assuming a constant additional need of 70% of income for an additional adult to keep the material welfare constant, we can conclude that a household with two adults and a market income of 34,000€ can consume an equivalent income of 20,000€. See for further explanation subchapter 2.2.

² An alternative would be the concept of market income taxation that has been widely discussed in the literature. See for example Schneider (1979) or Wosnitza and Treisch (1999).

and the concept of equivalent income taxation. Chapter 3 exemplifies the simulated tax-benefit function for the eight household types considered. The results of our analysis are discussed in Chapter 4. The contribution is concluded by Chapter 5.

2. Theoretical foundations

2.1. Distributive justice of a tax-benefit system

Let F be a function capturing the tax-benefit system, defined as sum of all taxes and public transfers affecting the disposable income of the employee household. Appropriate to international standards (Heady, 2003; OECD, 2006) the social security contributions S of the employer and the employee are looked upon as taxes. This approach is unproblematic as long as the marginal contribution is not adequately compensated by insurance payments³ and the employee bears economically the burden of social security contributions (see Gruber, 1997 for empirical evidence). As a result we include also the distributive effects of the free of charge health and nursing insurance for spouses and children. The unemployment compensation Z is interpreted as a negative tax payment while T describes the personal taxes on income (“Einkommensteuer” and “Solidaritätszuschlag”; in the following income tax and income tax supplement). Formalised we obtain

$$F(y_i, \theta_i) = T(y_i, \theta_i) + S(y_i, \theta_i) - Z(y_i, \theta_i), \quad (1)$$

where y_i denominates the gross market income of the household i including the social security contributions of the employer and θ_i the size of the household, with $A \in \{1, 2\}$ denoting the number of adults and $C \in \{0, 1, 2, 3\}$ denoting the number of children.

Economically $F(y_i, \theta_i)$ can be treated like an ordinary tax function (Muellbauer, and Van de Ven, 2004). Deducting F from the market income we attain the disposable income of household i

$$x(y_i, \theta_i) = y_i - F(y_i, \theta_i). \quad (2)$$

The distributive justice of a tax-benefit system can be defined by vertical and horizontal equity (Musgrave, 1990). Vertical equity of a tax system is subject to a social welfare function as well as to assumptions that may be arbitrary (*inter alia* Atkinson, 1970). In contrast, the equal treatment of equals (horizontal equity) can at least in theory be interpreted

³ In a marginal approach that statement holds at least for the health insurance and the nursing insurance. The insurance payments of these institutions – except for the sick pay – are widely independent from contribution payments. Relating to the German pension insurance it is further questionable to what extent the contributions will be an adequately compensated by future payments (Ohsmann, and Stolz, 2004 or Thiede, 2005). That applies especially if the right to a minimum pension is considered.

as a basic requirement for distributional justice of taxation. Nevertheless, the implementation of this concept bears a number of problems. These include the distinction of income and consumption (Hundsdoerfer, 2002) as well as the treatment of different household types. Allowing for a heterogeneous population varying in θ_i and defining welfare as material comfort per household member, the measurement of the household's welfare by means of y_i and $x(y_i, \theta_i)$ is likely to be insufficient. For example, for constant y_i and fixed basic needs per person a household's welfare is decreasing in size. Therefore, a concept based solely on market income taxation will not ensure horizontal equity in a tax-benefit system including public transfers.⁴ The consideration of the family situation in the tax-benefit function is confirmed by the survey results of Liebig, and Mau (2005). Hence, we employ the concept of equivalent income to compare the welfare of different household types.

2.2. Equivalent income and equivalence scales

Let r and k be two households, with $\theta_r \neq \theta_k$. The reference household r is a single household, with $\theta_r = \theta_{AICO}$. Under these definitions we call a market income y_k equivalent to y_r if it grants the members of household k and r the equal level of material comfort. Formalised this can be written by

$$E(y_k, \theta_k) = y_r, \quad (3)$$

with E describing the equivalent income function in relation to r (*inter alia* Donaldson, and Pendakur, 1999). The market income y_k and the equivalent income $E(y_k, \theta_k)$ are connected by two effects:

- The basic needs of the household k increase in household size resulting in a decrease of the equivalent income E in relation to r .
- According to the literature (*inter alia* Faik, 1995) and empirical results (Koulovatianos, Schröder, and Schmidt, 2006) this effect is to some extent contradicted by positive within-household size economies. As a result the needs of a household are not linearly dependent on the number of household members.⁵

⁴ In contrast, Bareis, and Siegel (2006) argue in favour of market income taxation while accounting for the family situation by public transfers. This argument does not hold if public transfers are interpreted as negative tax payments. Maintaining the market income concept would imply to disregard the family situation in the tax-benefit system as a whole.

⁵ Some consumer goods like a car, an internet access, a washing machine or heating costs can be used by multiple persons. Therefore, it is possible to ensure a higher relationship between material comfort and the appropriate costs. For further explanation on within-household size economies see Faik (1995), pp. 40.

The relationship of market income y_k and the equivalent income $E(y_k, \theta_k)$ can be described by an equivalence scale. We consider three alternative forms of equivalence scales. An absolute and constant equivalence scale (in the following absolute scale) implies that each additional household member requires fixed amount of income⁶ to maintain the household's level of material comfort. According to this approach a household can realize perfect within-household size economies apart from that fixed. This form of an equivalence scale corresponds to the basic allowance of § 32a EStG as can be documented by

$$E(y_i, \theta_i) = y_i - a(\theta_i), \quad (4)$$

where a denotes the basic needs as a function of θ_i . In contrast, a relative and constant equivalence scale (in the following relative scale) implies that for each additional household member a relative increase in income (for example 70% for an adult) is needed to maintain the standard of living. Hence, within-household size economies are assumed to be constant across all incomes. This approach corresponds to a parental split of the tax-benefit system.⁷ Formalised we receive

$$E(y_i, \theta_i) = \frac{y_i}{m(\theta_i)}, \quad (5)$$

where the deflator m depends on household size θ_i only. With n denoting the number of household members and positive within-household size economies we obtain $n \geq m(\theta_i) \geq 1$.

Empirical evidence (*inter alia* Donaldson, and Pendakur, 1999) suggests that within-household size economies depend not only on the number of household members but also on the level of disposable income. We can model this effect by an relative equivalence scale (in the following income dependent scale) generalising the exemplified specific equivalence scales above

$$E(y_i, \theta_i) = \frac{y_i}{m(y_i, \theta_i)} = y_i - a(y_i, \theta_i), \quad (6)$$

where m respectively a depend on θ_i and y_i . A constant absolute scale can be transformed to a scale dependent from income as can be demonstrated by

$$m(y_i, \theta_i) = \frac{y_i}{y_i - a(\theta_i)}. \quad (7)$$

⁶ It is possible to differentiate the fixed amount by type and composition of the household members – for example by the basic needs of adults and children.

⁷ In contrast to the parental split in Germany the equivalence scales of the OECD as documented in table 1 account for the within-household size economies.

Thus, the absolute scale is discussed as a special case of an income dependent scale. Considering (7) we have to keep in mind that $m(y_i, \theta_i)$ converges to infinity for a low y_i . Moreover, an absolute scale assigns a negative equivalent income to multiple member households for y_i being smaller than a . Therefore, results obtained from an absolute scale should be treated with caution in the lower income bracket.

The equivalence scales applied in our analysis are presented in table 1. It should be considered that the choice of an equivalence scale basically is a value judgement (Faik, 1995).

Table 1

Equivalence scales employed in this contribution

Household type		Equivalence scale				
		OECD $m(\theta_i)$	Mod. OECD $m(\theta_i)$	Absolute ^c $a(\theta_i)$	Income dependent $m(y_i, \theta_i)$	
A ^a	C ^b				Minimum	Maximum
1	0	1	1	0	1.000	1.000
1	1	1.5	1.3	5,808	1.113	1.754
1	2	2.0	1.6	11,616	1.204	2.437
1	3	2.5	1.9	17,424	1.291	3.065
2	0	1.7	1.5	7,664	1.312	2.000
2	1	2.2	1.8	13,472	1.419	2.895
2	2	2.7	2.1	19,280	1.498	3.547
2	3	3.2	2.4	25,088	1.583	4.111

Acknowledgments: a) Number of adults; b) Number of children; c) a is calculated as the child allowance multiplied with the number of children and the basic allowance multiplied with the number of adults

We deploy the original OECD scale as well as the modified OECD scale. The original OECD scale assigns the first adult a weight of 1.0, for each additional adult a weight of 0.7 and for each child under the age of 15 a weight of 0.5 (OECD, 1982). These weights are similar to the scale inherent in the German unemployment compensation considering the material needs of a second adult by 80% and of children younger 14 years by 60% of the basic rate.⁸ The modified OECD scale has been put forward by Haagenars, DeVos, and Zaidi (1994) and has been adopted in the late nineties by the Statistical Office of the European Community.

The applied absolute scale mirrors the implicit value judgements of the “Einkommensteuergesetz” (German income tax code). We assess a basic need of 7,664€ per adult pursuant to § 32a EStG and a child allowance of 5,808€ per child. Taking into account the income-dependency of the within-household size economies, we additionally deploy a income dependent relative equivalence scale based on a survey of Koulovatianos, Schröder,

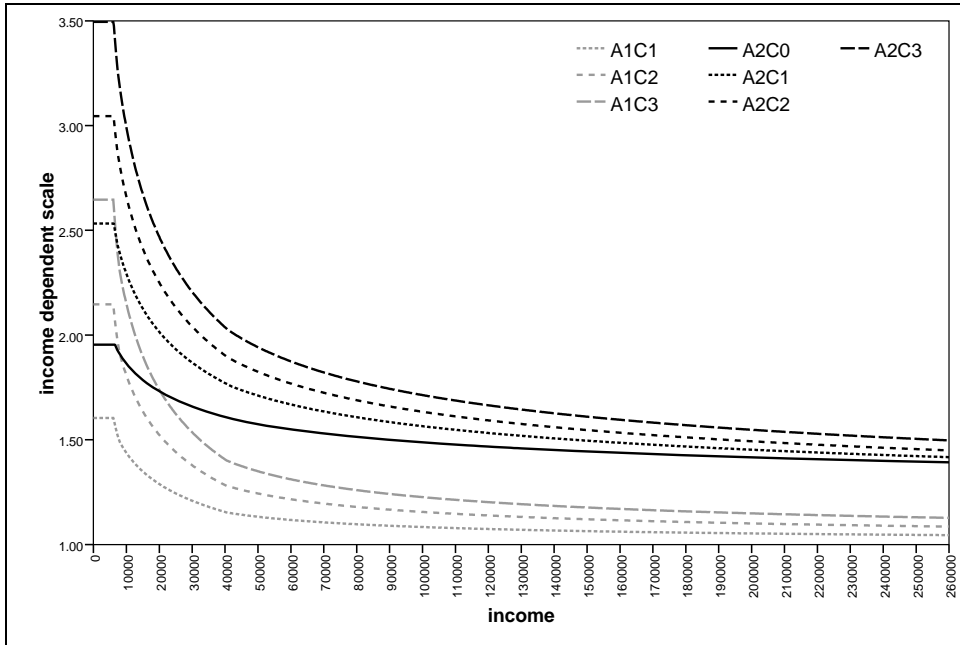
⁸ These weights do not hold for cost of housing or the social security contributions of children and spouses that are calculated by accordant costs.

⁹ The child allowance is doubled in case of a parental split. Single parents use the single allowance if they receive material support by the other parent. Also in this case the allowances of both parents would sum up to 5,808€

and Schmidt (2006). Table 1 contains the minimum and maximum deflators of this income dependent equivalence scale. A graphic illustration is given by figure 1.

Figure 1

Income dependent equivalence scale



2.3. Criteria for horizontal equity

Horizontal equity of a tax-benefit system can be defined in various ways (Lambert, 2004). To keep our analysis tractable we restrict ourselves on two common criteria. Considering households with equal equivalent market incomes according to (3) horizontal equity can be defined as:

1. Equal post-tax material comfort of both households implying equivalent disposable incomes (**norm 1**).
2. Identical average tax-benefit burdens of both households (**norm 2**).

These value judgements can be formulated mathematically as

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

$$\frac{x(y_k, \theta_k)}{y_k} = \frac{x(y_r, \theta_r)}{y_r} \text{ or } \frac{F(E(y_k, \theta_k), \theta_k)}{E(y_k, \theta_k)} = \frac{F(y_r, \theta_r)}{y_r}, \tag{9}$$

where $F(E(y_k, \theta_k), \theta_k)$ denotes the net payment on the equivalent income. The measure of horizontal equity depends on these norms as well as on the underlying equivalence scale.

Presuming a relative scale we obtain for **norm 1** from (5) and (8)

$$x(y_k, \theta_k) = m(\theta_k) \cdot x\left(\frac{y_k}{m(\theta_k)}, \theta_r\right). \quad (10)$$

For an income dependent equivalence scale and respectively for an absolute equivalence scale we receive for **norm 1** by (6) and (8)

$$x(y_k, \theta_k) = m(x(y_k, \theta_k), \theta_k) \cdot x\left(\frac{y_k}{m(y_k, \theta_k)}, \theta_r\right). \quad (11)$$

Condition (11) usually requires the application of the equivalence scale on two different levels of income, with $m(y_i, \theta_i) \neq m(x(y_i, \theta_i), \theta_i)$.¹⁰ Only for $F(y_i, \theta_i) = 0$ and $y_i = x(y_i, \theta_i)$ we obtain $m(y_i, \theta_i) = m(x(y_i, \theta_i), \theta_i)$. Potential within-household size economies are therefore affected by the net tax payment resulting in a positive or negative income effect. If within-household size economies rise in the level of market income a further decrease (increase) of the material comfort per household member is gained for $F(y_i, \theta_i) > 0$ ($F(y_i, \theta_i) < 0$).

Putting **norm 1** to use, horizontal equity of two households with equivalent market incomes can be measured by the ratio of the disposable equivalent incomes of the household types k and r (**criterion 1**):

$$HE1 = \frac{x(y_k, \theta_k)}{m(x(y_k, \theta_k), \theta_k) \cdot x(y_r, \theta_r)} \stackrel{\leq}{\geq} 1 \quad \text{for} \quad \frac{y_k}{m(y_k, \theta_k)} = y_r \quad (12)$$

For $HE1 = 1$ the treatment of k meets the principle of horizontal equity in relation to r . In contrast, $HE1 > 1$ ($HE1 < 1$) implies the household type k to be privileged (discriminated) compared to r .

Using a relative equivalence scale and the alternative **norm 2** we obtain from conditions (5) and (9)

$$F(y_k, \theta_k) = m(\theta_k) \cdot F\left(\frac{y_k}{m(\theta_k)}, \theta_r\right). \quad (13)$$

Substituting $x(y_i, \theta_i)$ for $y_i - F(y_i, \theta_i)$ demonstrates (10) and (13) to be synonymous.

Norm 1 and **norm 2** are thus equivalent in case of a relative scale.

Defining horizontal equity by **norm 2** and assuming an income dependent scale we receive from (6) and (9)

¹⁰ Following this principle, a tax system ensuring horizontal equity for income dependent equivalence scales will be defined implicitly and not explicitly. See also Lambert (2004).

$$F(y_k, \theta_k) = m(y_k, \theta_k) \cdot F\left(\frac{y_k}{m(y_k, \theta_k)}, \theta_r\right). \quad (14)$$

Rewriting yields

$$x(y_k, \theta_k) = m(y_k, \theta_k) \cdot x\left(\frac{y_k}{m(y_k, \theta_k)}, \theta_r\right). \quad (15)$$

In contrast to the relative scale (15) and (11) are not synonymous. Hence, we need an alternative **criterion 2** if we apply **norm 2** and an income dependent equivalence scale. Similar to *HE1* we can define *HE2* as

$$HE2 = \frac{x(y_k, \theta_k)}{m(y_k, \theta_k) \cdot x(y_r, \theta_r)} \stackrel{\leq}{\geq} 1 \quad \text{for} \quad \frac{y_k}{m(y_k, \theta_k)} = y_r. \quad (16)$$

Unlike *HE1* the disposable income is divided by the equivalence scale of the market income $m(y_k, \theta_k)$ and not by the equivalence scale of the disposable income $m(x(y_k, \theta_k), \theta_k)$.

3. The tax-benefit system

3.1. Preliminary remarks

We simulate taxes, social security contributions and public transfers (governing law January 2007) for market incomes between 0€ and 260,000€ The simulation approach of the reference household (single) and the adjustments for the other household types are explained in 3.2. The integrated tax-benefit function is analyzed in 3.3. A more detailed explanation is given by Bönke, and Eichfelder (2008). The simulation is based on the following assumptions:

- In each household the whole market income is generated by the employment of one household member only. Two adults living in one household are regarded as married.
- The market income y_i is defined as the sum of the gross wage y_i^G and the social security contributions of the employer S_i^{EM} .
- If the household is in need for material support according to § 9 SGB II it will receive an unemployment compensation in form of the “Arbeitslosengeld II”. There are no entitlements to an unemployment insurance like the “Arbeitslosengeld I”.
- All household members are insured in the statutory health insurance paying a statistical average rate of contribution. The possibility of a private health insurance is neglected.
- Contributions for the casualty insurance by law depend on the profession of the employee (Hundsdoerfer, and Sommer, 2005) and are excluded from the analysis.

- The costs of housing according to § 22 SGB II are calculated from statistical average payments according to the “Bundesagentur für Arbeit“ (Statistik der Bundesagentur für Arbeit, 2007).¹¹
- Relating to the contribution ceilings and the costs of housing we assume the household to be located in the Old Laender of Germany. That assumption ensures the majority of German households to be included. The resulting deviations in relation to households in Eastern Germany should be limited.

3.2. Simulation approach

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:

$$S_i^{WE} = \begin{cases} 0 & y_i^G \leq 4,800\text{€} \\ (s_{WE1} + s_{EM1}) \cdot FR_i - s_{WE1} \cdot y_i^G & 4,800\text{€} < y_i^G \leq 9,600\text{€} \\ s_{WE1} \cdot y_i^B & 9,600\text{€} < y_i^G \leq C_1 \\ s_{WE1} \cdot C_1 + s_{WE2} \cdot (y_i^G - C_1) & C_1 < y_i^G \leq C_2 \\ s_{WE1} \cdot C_1 + s_{WE2} \cdot (C_2 - C_1) & C_2 < y_i^G \end{cases} \quad (17)$$

C_1 and C_2 denominate the contribution ceilings of the health and nursing insurance respectively the unemployment and pension insurance, s_{WE1} and s_{WE2} the corresponding cumulated contribution rates, s_{EM1} the cumulated contribution rate of the employer for the first contribution ceiling and FR_i the fictive remuneration in the second pay level. In calculating the social security contributions of the employer we can differentiate four pay levels:

$$S_i^{EM} = \begin{cases} s_F \cdot y_i^G & y_i^G \leq 4,800\text{€} \\ s_{EM1} \cdot y_i^G & 4,800\text{€} < y_i^G \leq C_1 \\ s_{EM1} \cdot C_1 + s_{EM2} \cdot (y_i^G - C_1) & C_1 < y_i^G \leq C_2 \\ s_{EM1} \cdot C_1 + s_{EM2} \cdot (C_2 - C_1) & C_2 < y_i^G \end{cases} \quad (18)$$

¹¹ In calculating the average housing costs the Statistik der Bundesanstalt für Arbeit (2007) considers only the number of the 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. Furthermore, we do not consider possible advantages of the employee household that could be generated by applying for the “Wohngeld” instead of the “Arbeitslosengeld II”.

Whereas the special flat rate for low-income earners is denoted by s_F , s_{EM2} tags the cumulated contribution rate of the employer between the first and the second contribution ceiling. We can write the sum of social security contributions as

$$S(y_i, \theta_i) = S_i^{WE} + S_i^{EM}. \quad (19)$$

The connection of market income y_i and gross wage y_i^G is illustrated by equation (20):

$$y_i^G = \begin{cases} \frac{s}{1+s_F} & y_i \leq 6,200\text{€} \\ \frac{y_i}{1+s_{EM1}} & 6,200\text{€} < y_i \leq \widehat{C}_1 \\ \frac{y_i - C_1 \cdot (s_{EM1} - s_{EM2})}{1+s_{EM2}} & \widehat{C}_1 < y_i \leq \widehat{C}_2 \\ y_i - s_{EM1} \cdot C_1 + s_{EM2} \cdot (C_2 - C_1) & \widehat{C}_2 < y_i \end{cases} \quad (20)$$

\widehat{C}_1 and \widehat{C}_2 describe the contribution ceilings C_1 and C_2 being enlarged by the social security contributions of the employer.

The gross wage y_i^G is also 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 LS of 36€. Private expenses exceeding the respective lump-sum deduction are neglected. Pursuant to § 10 EStG the social security contributions of the employee are at least partially to be deducted as special expenses. As a result of the reform of pension taxation in 2004 these special expenses are calculated as a maximum of two different deduction schemes. Hence, taxable income can be characterised as

$$y_i^T = y_i^G - LE - LS - \text{Min}\left(\text{Max}\left(SE_i^{m1}, SE_i^{m2}\right), S_i^{WE}\right). \quad (21)$$

SE_i^{m1} and SE_i^{m2} denote the maximum amount of the two deduction schemes of § 10 EStG.

The resulting income tax T_i^I is calculated by the tariff in § 32a EStG. Additionally, a supplement rate t_s of 5.5% of the income tax payment is charged if the income tax exceeds the exemption limit EL^S of 972€. In the first pay level this ‘‘Solidaritatzuschlag’’ is raised with a marginal rate t_{s^*} of 20%. T is given by

$$T(y_i, \theta_i) = \begin{cases} T_i^I & T_i^I \leq EL^S \\ \text{Min}\left(T_i^I \cdot (1+t_s), T_i^I + (T_i^I - EL^S) \cdot t_{s^*}\right) & T_i^I > EL^S \end{cases} \quad (22)$$

After deducting taxes and social security contributions the employee can assert possible claims on unemployment compensation (ALG II) if he does not earn enough net wage for a

reasonable maintenance. Own income and property apart from the exceptions in § 11, § 12 and § 30 SGB II have to be imputed and thus reduce unemployment compensation. We assume that the property of the analyzed households does not exceed the exemption limits stated in § 12 SGB II. Formalised we obtain

$$Z(y_i, \theta_i) = \text{Max}\left(R_i + H_i - \text{Max}\left(y_i^G - T(y_i, \theta_i) - S_i^{WE} - \text{Max}(LZ, y_i^G) - A_i, 0\right), 0\right), \quad (23)$$

with R_i characterising the regular payment according to § 20 SGB II, H_i the average cost of housing, LZ the lump-sum income-related expenses of 100€ per month in § 11 SGB II and A_i the allowance of i according to § 30 SGB II. Conditions (19), (22) and (23) describe all elements of equation (1).

As stated by § 10 SGB V and § 25 SGB XI the statutory health and nursing insurance are free of charge for spouses and children. The payments for pension insurance and unemployment insurance are independent from the family situation. Hence, modifications for couples and children are mainly due to taxes and the unemployment compensation. Assuming a joint assessment of couples for income tax purposes we include the following adjustments for couples:

- The income of both spouses is summed up for income taxation. The tax rate will be calculated on this sum divided by two. This can result in a “splitting-advantage”.
- A number of allowances and thresholds are doubled, affecting the special expenses pursuant to §§ 10, 10c EStG. The “Solidaritätszuschlag“ is only charged on an income tax payment above 1,944€
- The cost of housing regarding the unemployment compensation is adapted to the average level of the specific household type. In contrast, there is no adaption of the lump-sum expenses LZ or the allowance A_i .
- Regarding unemployment compensation couples are treated as a “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.

We assume children to be younger than 14 years and exclude possible claims to maintenance – for example from divorced spouses. In case of children we integrate the following modifications:

- The supplement for nursing insurance of 0.25% of the gross wage rate for households without children (§ 55 SGB XI) is not raised.
- The household receives a child benefit of 1,848€ per year and child. Alternatively, a child allowance of 5,808€ can be deducted from taxable income reducing the tax

payments but not the social security contributions. The financial authorities calculate the most advantageous alternative in favour of the employee.

- Calculating the “Solidaritatzuschlag“ § 3 SolZG implies the child allowance being deducted from taxable income.
- In case of single parents an additional allowance of 1,308€ is deducted for tax purposes.
- The unemployment compensation is raised by 60% of the regular payment per child. Single parents receive a supplement to the regular payment of 12% in case of one child and 36% in case of more than one child. The average cost of housing is adjusted for household size but there is no adaption of the lump-sum expenses LZ or the allowance A_i . The child benefit of 1,848€ is fully imputed and reduces the unemployment compensation.

3.3. Simulated burden of the tax-benefit system

Initially, we analyze the defined tax-benefit function F of the household type i by the average rate

$$f_i = \frac{F(y_i, \theta_i)}{y_i} \quad (24)$$

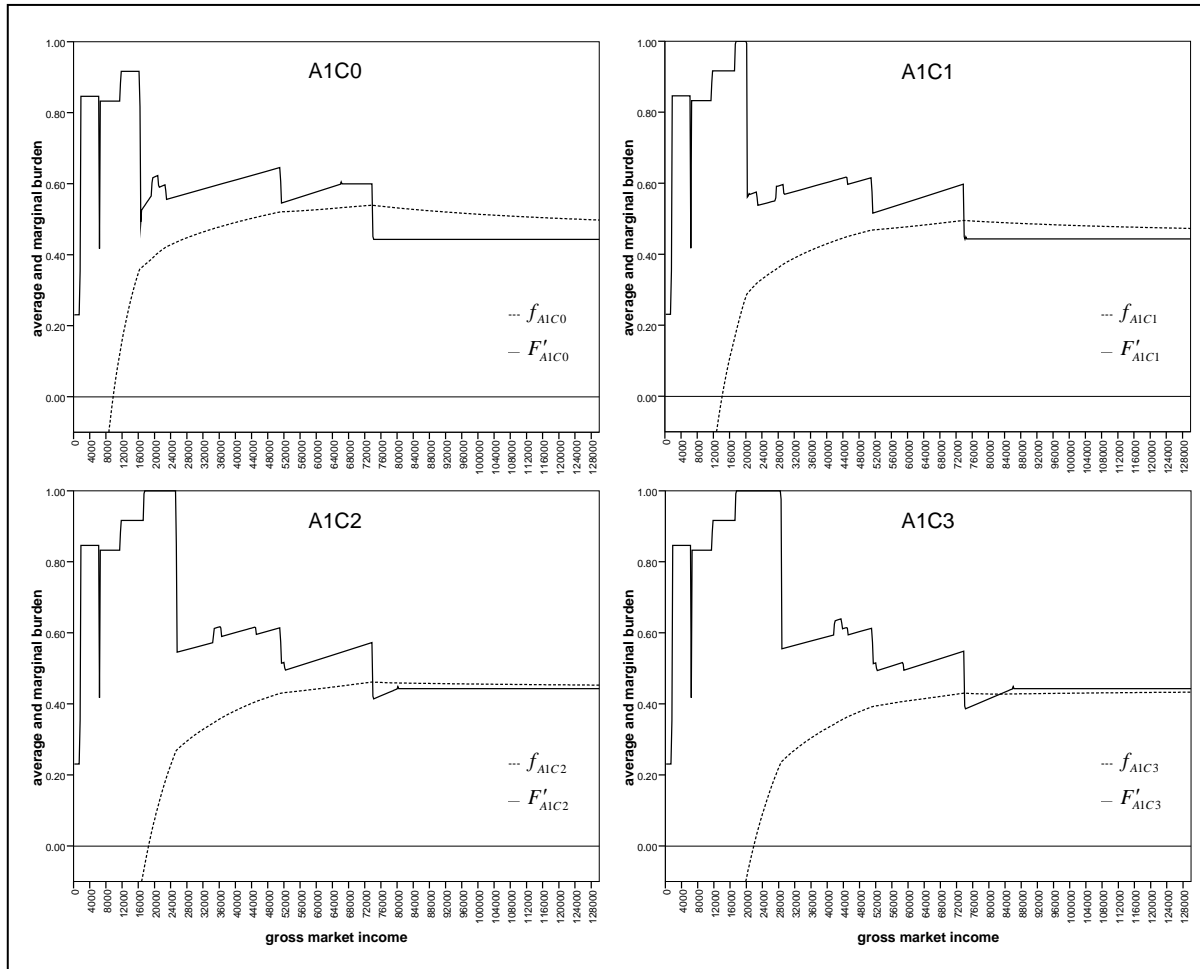
and the marginal rate

$$F'_i = \frac{\partial F(y_i, \theta_i)}{\partial y_i}. \quad (25)$$

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 . For $y_i < 10,000\text{€}$ the average rate of the single household f_{AIC0} is negative due to the unemployment compensation. A maximum average rate of 53.9% is reached at a market income of about 73,400€ Beyond this point f_{AIC0} declines to the lower marginal rate of 44.3% being identical to the constant tax rate in the fourth pay level of the tariff. Consequently, the tax-benefit function is not continuously progressive. Analysing the average tax-benefit rate for a increasing number of children we can state a “shift-to-the-right” with $f_{AIC3} \leq f_{AIC2} \leq f_{AIC1} \leq f_{AIC0}$ for identical y_i .

Figure 2

Average and marginal burden of households with one adult



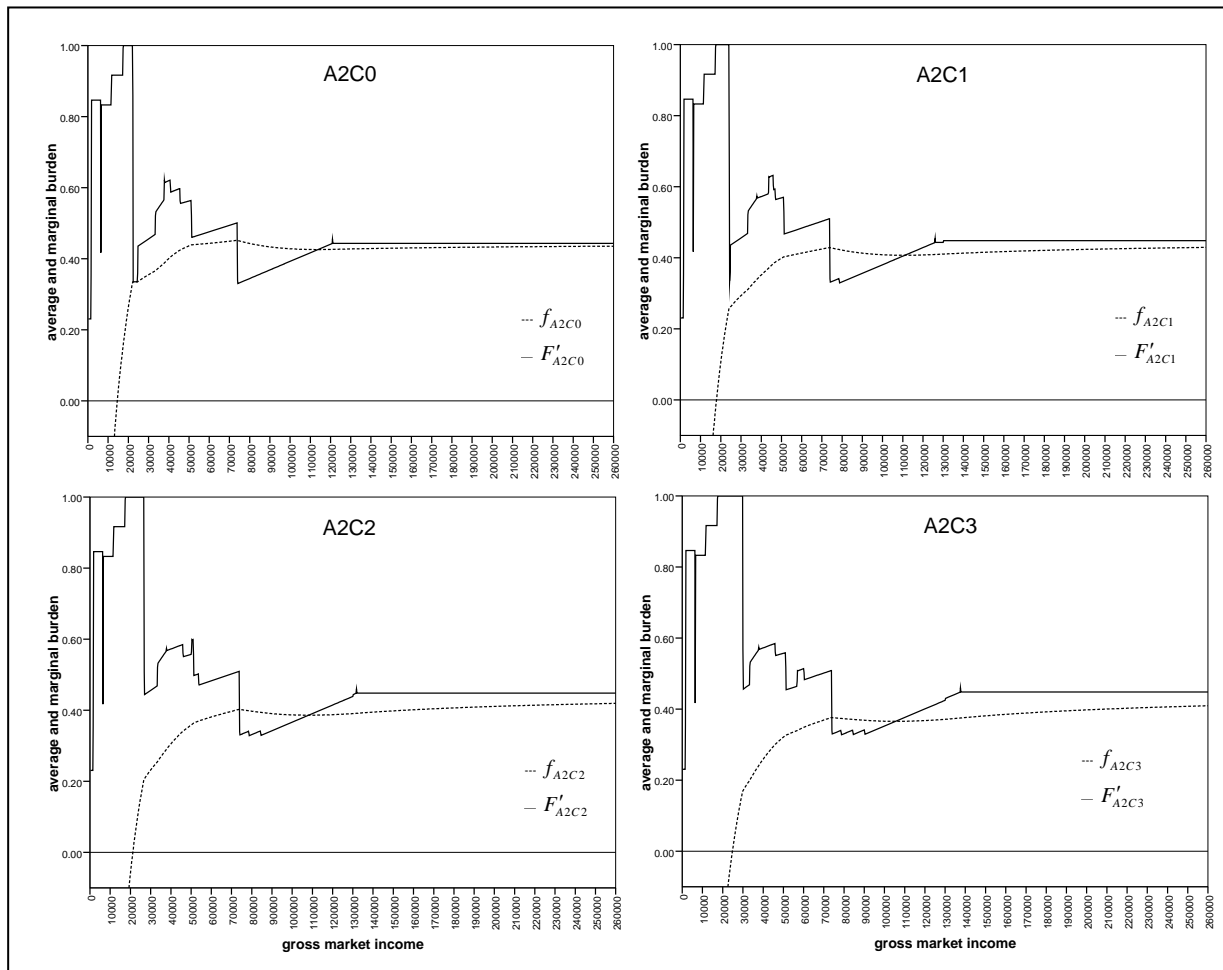
- Considering F'_{A1C0} a number of apparently non-systematic “jump” discontinuities can be observed. Due to the lump-sum expenses of 1,200€ per year the initial marginal rate is about 23% of market income and will be paid as a flat-rate by the employer. Thereafter, F'_{A1C0} is considerably raised by the imputation instructions according to § 11 SGB II. Discontinuities result from the sliding pay-scale (“Gleitzone“) in the second pay level of the employees’ social security contributions as well as the imputation allowance of § 30 SGB II. Beyond a market income of about 16,300€ the unemployment compensation of a single is fully imputed ($Z = 0$) implying a decrease of F'_{A1C0} to about 50%. The positive trend for market incomes below 66,000€ is caused by the progressive income tax brackets of § 32a EStG. The fluctuation of F'_{A1C0} in the range between 16,000€ and 23,000€ can be attributed to the two deduction schemes for social security contributions in § 10 EStG as well as to the initial

marginal rate of 20% of the “Solidaritätszuschlag”. The significant decrease in F'_{A1C0} to a level of about 44% is caused by market income exceeding the contribution ceilings of the social security system. On the contrary, singles with a lower market income pay regularly marginal tax-benefit rates of more than 50%. Regarding household types A1C1 to A1C3 the following can be observed: For low incomes there exist pay levels where an increase in y_i will not result in an increase of disposable income x_i hence $x'_i = 0$ in consequence of $F'_i = 100\%$. This is caused by the imputation exemptions of the unemployment compensation to be independent from family size.

- Families with an average income tax rate above 31.8% will gain financial benefit from the deduction of the child allowance resulting to further discontinuities in the marginal tax-benefit rate.

Figure 3

Average and marginal rate of households with two adults



In relation to the single household we observe in figure 2 the following deviations for households with two adults:

- The average rate f_i is rising in y_i across all income levels. Thus, we find a constantly progressive tax-benefit function for the income range considered.
- Owing to a higher unemployment compensation for large families there exist pay levels with $x'_{A2C0} = 0$ respectively $F'_{A2C0} = 100\%$ for couples without children. The extent of these income ranges is growing with the number of children C .

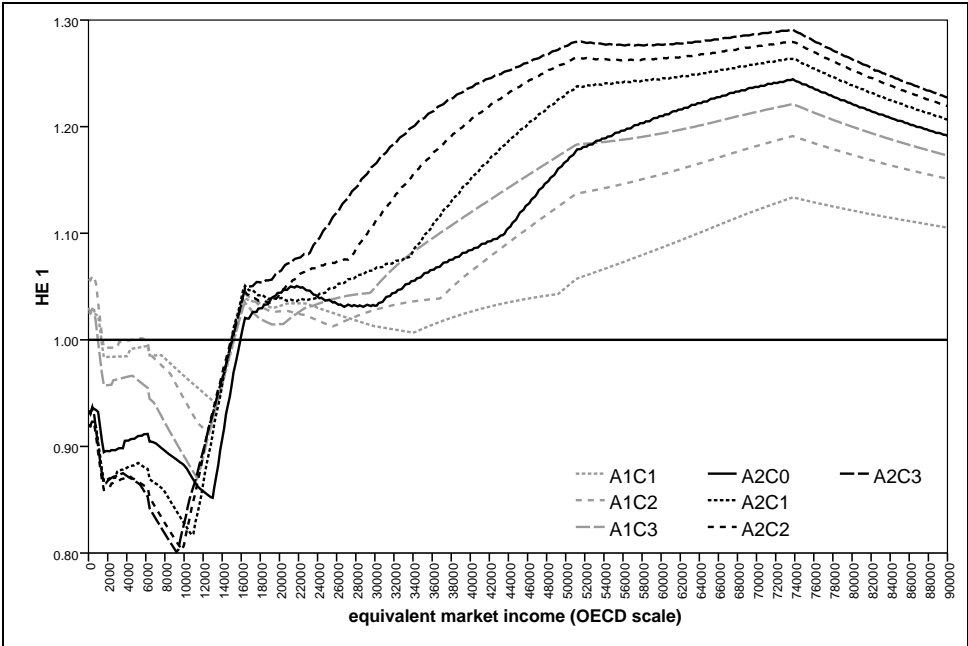
4. Results

Matching the households with equivalent market incomes we analyze the simulation results for the exemplified criterions of horizontal equity. For a relative equivalence scale $HE1$ covers both definitions recognised for horizontal equity. $HE2$ is only taken into account for the absolute and the income dependent scale.

4.1. Criterion 1: Equal disposable income

Figure 4 illustrates $HE1$ for equivalent market incomes $y_k/m(\theta_k)$ of all household types according to the original OECD scale.

Figure 4
Horizontal equity for the original OECD Scale: Criteria 1 and 2



The figure depicts the value of $HE1$ being significantly dependent on the amount of equivalent income. Contemplating on equivalent market incomes of 0€ we can state rather weak deviations from horizontal equity ($HE1 \sim 1$). The small privilege of A1C1, A1C2 and A1C3 households results mainly from the supplements of unemployment compensation for single parents.¹² For a growing market income we initially determine an increasing impairment of all the family types in relation to r . This result can be explained by the negligence of the family situation in the imputation exemptions of § 11 and § 30 SGB II. Therefore, families with lower incomes are structurally discriminated by the imputation system of the German unemployment compensation. In contrast, figure 4 states a privilege for families in the income range above 16,000€. The level of this privilege rises until the equivalent market income exceeds the second contribution ceiling of the social security system (73,400€). In addition, it increases in the number of children and higher for married couples. These results are driven by two aspects:

- Families are burdened to a lower extent by the social security contributions due to the free of charge insurance by law for children and spouses as well as of the ceiled social security payments.
- The German parental split related to the income tax for married couples can in parts be interpreted as a privilege by neglecting within-household size economies. While the original OECD scale defines the need of an additional adult by 70% of a single household to keep the material comfort constant, the German parental split implies an accordant need of 100%.

Putting the original OECD scale to use, families are discriminated by the unemployment compensation system and privileged by the social security and the taxation system. These findings hold only to some extent if we apply the modified OECD scale (figure 5). The higher implicit within-household size economies lead to an increase in the relative position of all household types. Applying the modified OECD scale, families are basically privileged by the German tax-benefit system. Nevertheless, we find again the elucidated income brackets of figure 4. The relative position of families initially declines as consequence of the imputation exemptions in § 11, § 30 SGB II. In contrast, families and especially married couples are

¹² In parts this effect may be also driven by an underestimation of the housing costs of couples due to imprecise statistical data (see further Fn. 11). But taking into account the oppsing results of $HE1_{A1C3} < HE1_{A1C2}$ and $HE1_{A2C0} > HE1_{A2C3}$ for an equivalent market income of 0€ that effect should not be decisive.

privileged for higher market incomes. Again this effect is growing up to the second contribution ceiling of about 73,400€

Figure 5

Horizontal equity for the modified OECD scale: Criteria 1 und 2

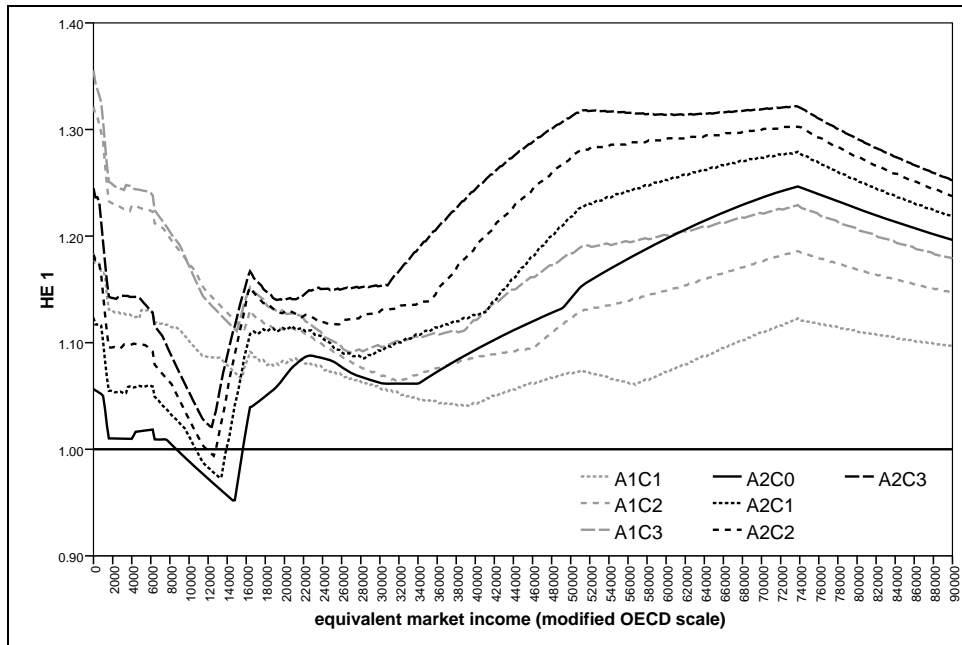
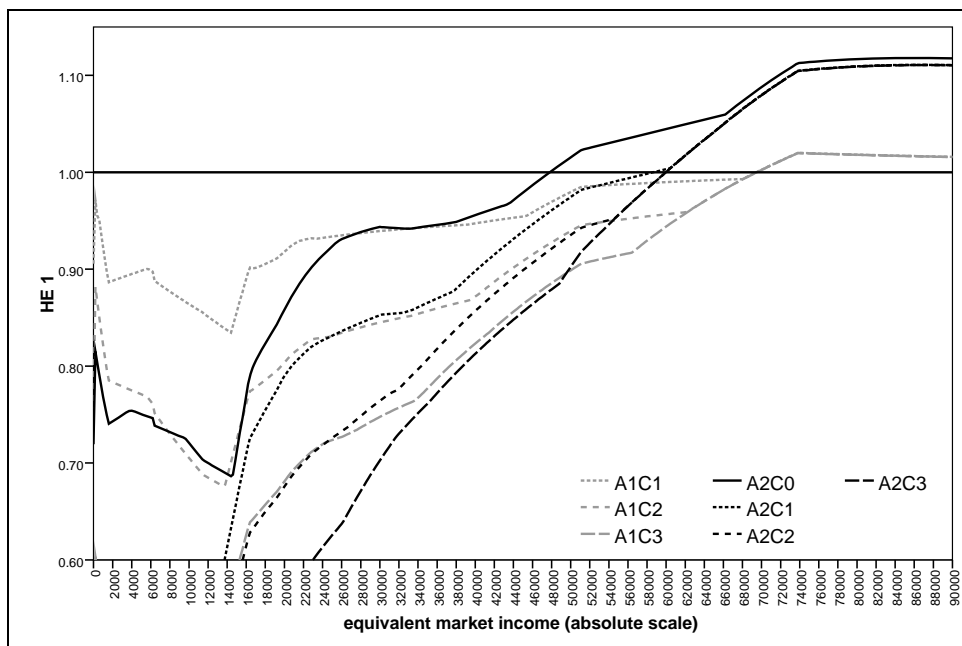


Figure 6

Horizontal equity for the absolute scale: Criterion 1



As displayed in figure 6 a similar basic structure of different income brackets is observable for the absolute scale considered. For low incomes we can state a discrimination of families increasing in family size and initially in income. For equivalent incomes exceeding 67,000€ we find families and especially married couples to be better off. Results for low equivalent market incomes should be interpreted with caution. For example, a household with two adults and three children receiving a market income of 25,088€ is treated to be equivalent to a single household receiving a market income of 0€. Evidently, the absolute scale ignores the need to maintain at least a basic standard of living for the employee himself. Nevertheless, figure 6 depicts the material needs granted by the income tax code for additional household members (the exemplified equivalence scale) to be much more generous than what is granted by the unemployment compensation.

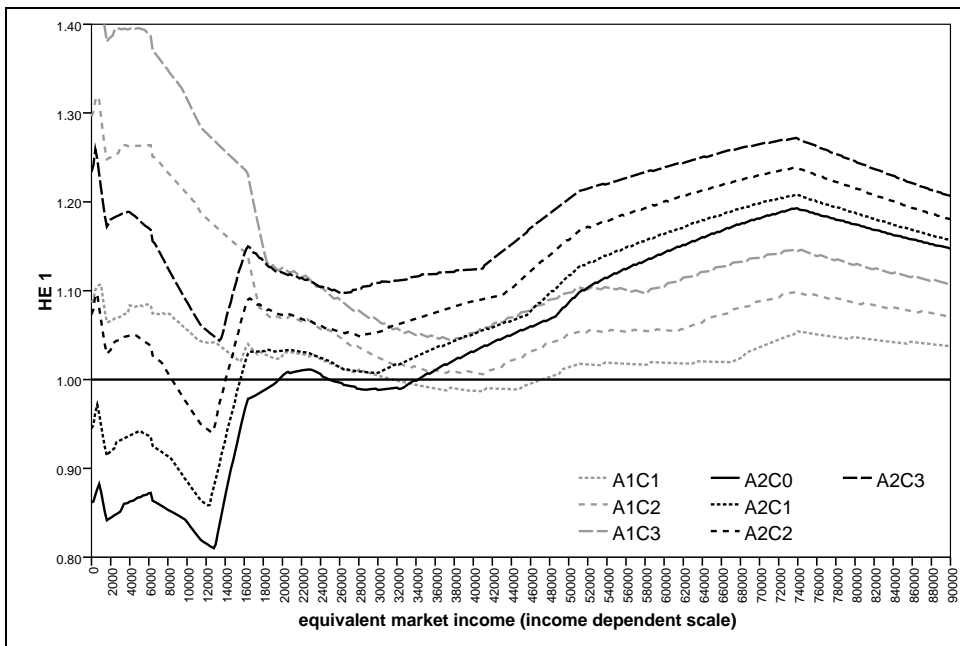
The results in case of the considered income dependent scale are illustrated in figure 7. According to 7 families with a relatively low income and a high number of children are privileged by the tax-benefit system. This result is mainly driven by two attributes of the deployed income dependent equivalence scale:

- Koulovationos, Schröder, and Schmidt (2006) quantify the material needs of children significantly lower than the material needs of adults.
- The within-household size economies in relation to the disposable income are calculated to be significantly higher for children than for adult household members.

Therefore, we receive a high and positive income effect due to the unemployment compensation for families with children. Again, this outcome should be interpreted with caution. According to equation (3) large households with a market income close to 0€ are compared to singles earning a nearly identical income. Due to the attributes of the income dependent scale the within-household size economies are significantly higher for families. Furthermore, the market income in lower income bracket used for the matching process may be insufficient to maintain a basic standard of living. Hence, these values cannot be targeted by the survey method of Koulovatianos, Schröder, and Schmidt (2006).

Figure 7

Horizontal equity for the income dependent scale: Criterion 1



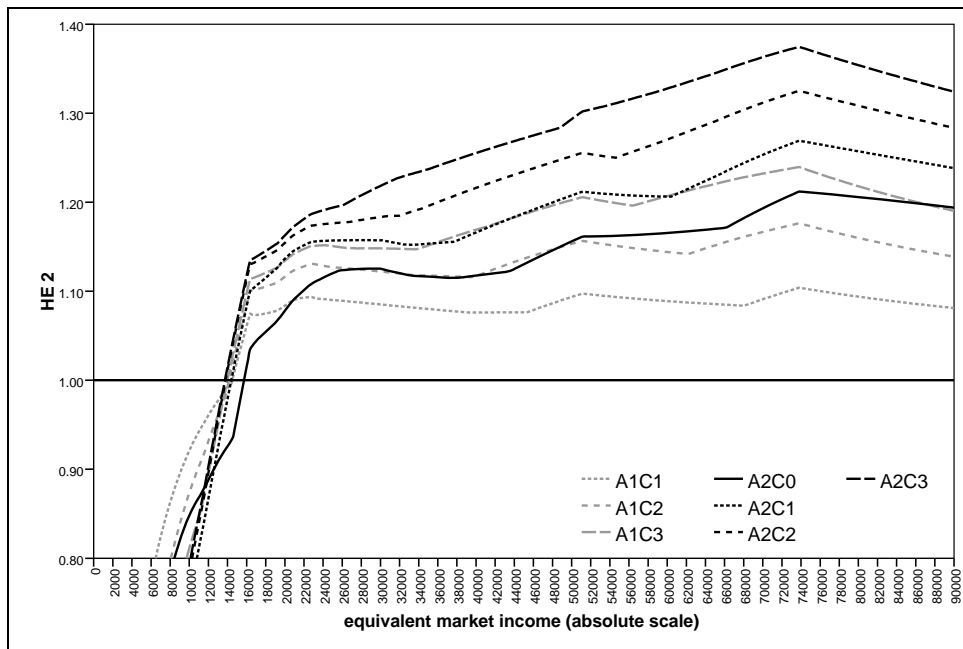
The further slope of *HE1* conforms rather well to the figures 4 to 6. The relative position of the family types considered initially decreases due to the imputation instructions of the unemployment compensation as well as the decreasing income effect. For an equivalent market income between 30,000€ and 40,000€ we can observe a betterment especially for couples that is rising with the level of income and the number of children. A maximum is reached again for an equivalent income of about 73,400€

4.2. Criterion 2: Equal average tax-benefit rate

As mentioned above, the usage of *HE2* is only necessary the absolute scale in figure 8. The extreme values in the lower income bracket cannot be interpreted reasonably. It has to be considered that a household *A1C1* with a market income of 5,808€ is equivalent to a single household with a market income of 0€. In this case and in comparable cases horizontal equity as defined by *HE2* is not attainable due to the fact that the average tax rate of the single household equals $-\infty$. From an equivalent income of about 16,000€ family households and especially married couples are better off than the reference household. As in the figures 4 to 7 the relative advantage of family households rises in family size and income until an equivalent market income of about 73,400€ is reached.

Figure 8

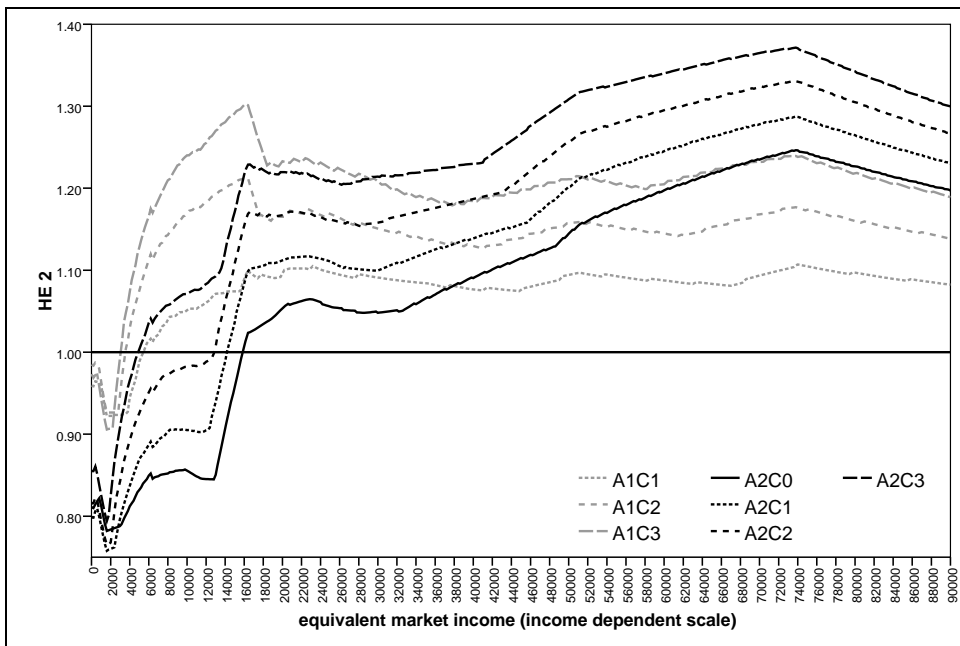
Horizontal equity for the absolute scale: Criterion 2



The results for the income dependent scale and *HE2* are given by figure 9. Again, we find a tendency of discrimination of families (mainly couples) by the unemployment compensation system while families and especially couples in the middle and higher income brackets are better off. The calculation of average tax payments for low incomes does not seem to be as problematic as in figure 8 due to the relative definition of the within-household size economies. In contrast to other simulation results we find a “relative optimum” for families with a high number of children and an equivalent income of about 16,000€ That effect is driven by the high income effects of the income dependent scale for families with children and by the imputation of the unemployment compensation. For example, the decline of the relative position of A1C1 for market incomes above 16,000€ can be explained by pay levels with a marginal tax-benefit rate of 100%. Thereafter, we observe the well-known picture of an increasing betterment of families and especially married couples up to the second contribution ceiling of 73,400€

Figure 9

Horizontal equity for the income dependent scale: Criterion 2



5. Conclusion

Our study attended to the distributive justice of the German tax-benefit system including for the first time social security contributions and unemployment compensation. We compared the treatment of seven different types of family households in relation to the single household as point of reference. Methodologically the contribution is based on the concept of disposable income taxation. For the measurement of the households' basic needs we applied the widely accepted instrument of equivalent income. 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 driven by the imputation instructions of § 11 SGB II disregarding the households' family situation. In contrast, we find families and especially 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 and the parental split disregarding within-household size economies. We can conclude that the current tax-benefit system in Germany contains significant contradictions in the value judgements of personal income taxation, social security contributions and unemployment compensation ("Arbeitslosengeld II"). Taking into account recent survey-based findings suggesting a social need for distributive justice and the reduction of child poverty (Vehrkamp, and Kleinststeuer,

2007), we cannot provide a satisfactory explanation for our results implying a discrimination of families with a low market income.

If it is not possible to legitimate this antagonism by aspects not considered in our study, it seems intimidating to think about possible reform measures. First of all a regressive tax-benefit function of singles and single parents necessarily implies a violation of horizontal equity. Therefore, a reduction of marginal tax-benefit rates of accordant households with a low market income in relation to the higher income bracket should convey distributive justice. A similar argument holds for the alignment of the assessment bases of income taxation and social security contributions to a consistent form of equivalent market income. Also the consideration of the family situation in calculating the imputation exemptions of the “Arbeitslosengeld II” should account for the observed antagonism. Nevertheless, it has to be considered that any chosen equivalence scale and any horizontal equity specification bears its own value judgement. It depends therefore on the form of the applied equivalence scale and the implemented social norm to what extent the parental split of the German income tax as well as the free of charge statutory health and nursing insurance for family members should be interpreted as a privilege.

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Author of correspondence:

M.A. Sebastian Eichfelder
Institut für Betriebswirtschaftliche Prüfungs- und Steuerlehre
Freie Universität Berlin
Boltzmannstr. 20, 14195 Berlin
Email: Sebastian.Eichfelder@fu-berlin.de
Tel. +49-30-838-52311