Uneven Treatment of Family Life?
Horizontal Equity in the U.S. Tax and Transfer System

Timm Bönke
Sebastian Eichfelder
Stephen Utz

Uneven Treatment of Family Life?

Horizontal Equity in the U.S. Tax and Transfer System

Timm Bönke, Sebastian Eichfelder, and Stephen Utz[*]

Abstract

We analyze the distributive justice of the combined burden of income taxes, social security taxes and public transfers on employee households in the United States on the federal level and in six member states. To investigate whether the treatment of families by the aggregate tax and transfer system can be regarded as "fair", we compare the equivalent incomes of eight different household types. Using the concepts of horizontal equity and system-inherent equivalence scales, we find evidence for a privileged treatment of families with children and a low market income due to the earned income tax credit (EIC), the child tax credit and the supplemental nutrition assistance program (SNAP). If employment taxes are interpreted as taxes in the proper sense, we obtain a favorable treatment of family households and especially married couples for middle-sized market incomes. For high market incomes, we observe a decreasing privilege for all family types. Regarding state tax and transfer systems, temporary aid for needy families (TANF) substantially increases the observed privilege for low-income families compared to singles, while the analyzed state income taxes are generally in line with the federal tax scheme. Overall, our results imply a significant contradiction in value judgments within the U.S. tax and transfer system.

Keywords: horizontal equity, family taxation, distributive justice, tax and transfer system, equivalent income, equivalent income taxation

JEL classification: D31, D63, H24

Version: 11th of July 2012

---

[*] Timm Bönke is assistant professor of public finance at the Freie Universität Berlin. Sebastian Eichfelder is assistant professor of taxation at the University of Wuppertal. Stephen Utz is senior professor of law at the University of Connecticut.

1. Introduction

Social justice and the poverty of children and families are important subjects of the public debate in the United States (e.g. Rainwater and Smeeding, 2003). Within the last decades about 20% of the children in the U.S. have been officially poor (Pressman, 2011). As instrument to overcome poverty issues, federal, state and local governments have initiated public transfer programs, tax credits and allowances to account for the higher income needs of families and especially households with children. These include the child tax credit, TANF benefits and higher claims for the EIC and SNAP. As Moffitt and Scholz (2009) have shown, the level of U.S. social transfer programs expanded significantly in the last decades, affecting the distribution of income between different groups of household types.

Nevertheless, the literature has largely ignored the distributive consequences of these revised U.S. transfer and tax programs. While considerable number of contributions have analyzed the horizontal equity of the U.S. federal income tax (see for example Seneca and Taussig, 1971; Habib, 1979; Leuthold and Husby, 1989; Allan and Iglarish, 1996; Auerbach and Hassett, 2002; Gravelle and Gravelle, 2006; Bryant et al., 2008), research on corresponding aspects of other taxes and transfer payments is scarce (see Stranahan and Borg, 1998 for property taxes, Cornia and Slade, 2006 for the lottery tax and Gravelle and Gravelle, 2006 for refundable tax credits of the federal income tax).

Gravelle and Gravelle (2006) analyze federal income taxation (including the EIC and the child tax credit) of 14 different types of U.S. households using equivalence scales, and conclude that there is a much more favorable tax treatment of low income families with children compared to single households. The privilege increases in the number of children and results mainly from the child tax credit and higher EIC payments for households with children. At higher income levels, Gravelle and Gravelle (2006) find more equal treatment for all family types. In this range of incomes, the child tax credit reduces tax penalties for families with children.

Our paper extends the approach of Gravelle and Gravelle (2006) in a number of ways. First, we account not only for the federal income tax, but also for payroll taxes of employees and the supplemental nutrition assistance program (SNAP) on the federal level. Second, we enrich previous research by the use of system-inherent equivalence scales based on implicit value judgments of the U.S. federal income tax. Thus, these equivalence scales can be derived from the federal income tax code. Third, we consider additional taxes and transfers on the state level including state income taxes and the temporary aid for needy families program (TANF).

Our methodology allows us to draw conclusions about potential contradictions in value judgments within the U.S. tax and transfer system. These include the following aspects: (1) different levels of pre-tax material comfort of families in relation to singles; (2) different subsystems of the aggregate tax and transfer system (e.g. social security taxes or SNAP) and (3) tax and transfer systems in a number of selected member states (e.g. New York) compared to the value judgments of the federal system.

To keep our analysis tractable, we restrict the exposition in a number of ways. (1) Our main focus is on employee households. Thus, we do not consider specific tax and transfer treatments for other sources of income (e.g. capital income). (2) We consider eight household types with one or two adults and zero up to three children. The single household is our point of reference. Two adults living in the same household are regarded as married joint filers. (3) We consider six U.S. member states which represent different forms of state tax and transfer systems. These include California, Florida, Michigan, New York, Ohio and Texas.

Our investigation is related to a number of other contributions analyzing tax and transfer systems. While Muellbauer and Van De Ven (2004) derive implicit equivalence scales for Australia, Bönke and Eichfelder (2010) investigate the horizontal equity of the German tax-benefit system for employee households. Furthermore, there have been studies investigating tax and transfer systems in the U.S. and European countries without addressing horizontal equity (Bernhardt and Holtzblatt, 2008; Immervoll et al., 2009; Bargain et al., 2011).

To our knowledge, we are the first to analyze the combined burden of the U.S. federal income tax, state income taxes, social security taxes and public transfer programs (SNAP and TANF) from a horizontal equity perspective. Furthermore, we identify potential contradictions within the U.S. tax and transfer system by the use of system-inherent equivalence scales and report simulation results for the marginal and the average tax and transfer burden on the federal level for eight household types.

Our paper is organized as follows. Section 2 describes the theoretical background on horizontal equity and the applied concept of equivalent income taxation. Section 3 exemplifies the simulated tax and transfer system on the federal level and on the state level (governing law in the tax year of 2010). The results on horizontal equity are presented in section 4 and the main findings are recapitulated in section 5. The appendices include additional simulation results.

2. Basic concepts

2.1. Distributive justice of a tax and transfer system

We define F as a function of the tax and transfer system, encompassing taxes on income, social security taxes and public transfers. The sum of taxes T includes the federal income tax, state income taxes and corresponding tax credits like the EIC. The tax function depends on the market income y_i and the composition θ_i of a household i, with $A \in \{1,2\}$ denoting the number of adults and $C \in \{0,1,2,3\}$ denoting the number of children. The frequencies of these eight household types are displayed in Table 1 and cover about 76% of the U.S. population. The remaining 24% are typically households with three or more adults.[1]

[Table 1 about here]

In the case of employee households, the most important group of taxpayers, a considerable reduction of disposable income results from social security taxes. According to international standards (OECD, 2012), the combined compulsory social security taxes S of employers and employees are interpreted as taxes on wage income. This approach is not problematic as long as the marginal contribution is not adequately compensated by insurance benefits and the employee bears economically the burden of social security taxes.

As documented by Gruber (1997), there is evidence that the incidence of payroll taxation falls mainly on the employee. Furthermore, it can be argued that public insurance contributions do not generally mirror a fair price for insurance entitlements (Moffitt and Scholz, 2009). This perspective may be justified by insurance benefits for spouses and children, the existence of a minimum pension (SSCI) and other distributional aspects and is supported by the simulation results of Steuerle and Rennane (2011) who provide evidence for a strong redistribution within the U.S. social security system.[2]

Thus, we generally consider social security taxes to be part of the U.S. tax and transfer system. Nevertheless, we also calculate a specification excluding corresponding burdens (Appendix A). This alternative setting accounts for the effect of not interpreting contributions for the hospital insurance and the age, survivors and disability insurance as taxes. In addition,

---

[1]   We have to take into account that there is no joint filing for households with three and more adults. Therefore, these households cannot be taken as tax-relevant units, but have to be separated in sub-units with one or two adults for tax purposes.

[2]   The effect of redistribution holds especially for the age, the family type and the composition of a household's income. For example, the estimated net benefit (gross benefit minus contributions paid) is much higher for single income earners compared to two-income earners.

this scenario is relevant for self-employed taxpayers who do not face corresponding payments.

Furthermore, we account for public transfers Z (e.g. SNAP), which can be taken as a negative tax payment. Formalized we obtain

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

For further analysis the combined tax and transfer function $F(y_i, \theta_i)$ 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

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

The distributive justice of a tax system as well as a tax and transfer system can be defined by vertical and horizontal equity. Vertical equity of a tax and transfer 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 and transfer system (Musgrave, 1990; for the pitfalls of this concept see Kaplow, 1989).

In spite of this general statement, the implementation of horizontal equity is associated with a number of major challenges. First of all, our analysis requires the identification of households with an equal pre-tax material comfort. Second, we need to substantiate an equal tax and treatment of these equivalent single and family households. Furthermore, corresponding measures should allow for a quantitative interpretation.

The identification of equals is not straightforward. It requires a measure to compare the material comfort of singles and families. A corresponding instrument that is widely accepted for the distributional analysis of households differing in size and needs is the concept of equivalent income (Vickery, 1947; Ebert and Moyes, 2000; Muellbauer and Van de Ven, 2004).

2.2. Equal treatment of equals

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

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

5

with E describing the equivalent income function, which will take the form of an equivalence scale.

The market income y_k and the equivalent income $E(y_k, \theta_k)$ are connected by two fundamental effects (Donaldson and Pendakur, 2004; Gravelle and Gravelle, 2006): (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 offset 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, an internet flat rate or housing costs. Positive within-household size economies have been substantiated by a considerable number of theoretical studies based on consumption models (for a review see Schröder, 2009) as well as by empirical surveys (Koulovatianos et al., 2009 with further references).

The choice of an equivalence scale is basically a value judgment. For that reason, we rely on regulations of the U.S. federal income tax code to construct a benchmark for our investigation. This approach allows us to draw conclusions about potential contradictions of value judgments within the U.S. tax and transfer system. To construct our equivalence scales, we focus solely on the federal income tax. This is due to the following aspects: (1) State income taxes and programs (TANF) do provide as useful yardstick for the overall system. (2) In case of social security taxes, there are no family-specific regulations that could be used as a benchmark. (3) The scope of the federal SNAP program is rather limited as SNAP payments are not sufficient to allow for a reasonable maintenance (see Table 4 for SNAP benefits).

The Internal Revenue Code accounts for a number of family-specific deductions to calculate the federal taxable income. These include the standard deductions in I.R.C. §63 of $5,700 for singles, $8,400 for heads of households and $11,400 for married joint filers (governing law December 2010). In addition, there are personal exemptions of $3,650 for each household member (I.R.C. §151). Accounting for these family-specific deductions, federal taxable income can be interpreted as a form of equivalent pre-tax income for a specific household type. Thus, we may use these inherent value judgments to construct equivalence scales serving as our point-of-reference.

Constructing the equivalence scales, we do not account for additional and more complex regulations of the federal income tax like the child tax credit, the earned income tax credit (EIC) and the alternative minimum tax (AMT). This can be justified by the following arguments. First of all, the focus of these regulations is typically restricted to a range of

market incomes. For example, the EIC is relevant for low-income households, the AMT and the child tax credit is phased out for gross incomes exceeding $75,000.

Furthermore, these additional regulations do not include value judgments that are fully in line with the concepts of horizontal equity and equivalent income taxation. That holds especially for the EIC. For example, the maximum EIC in the tax year of 2010 is $457 for a single household, $3,050 for a head of household and $457 for a married couple. Unless a couple can live as cheap as a single while maintaining the same standard of living, it is obvious that these numbers do not reflect the material needs of the corresponding household types.

By contrast, the deductions in I.R.C. §63 and I.R.C. §151 can be taken as a consistent benchmark for the material needs of different family households from the perspective of the U.S. legislator. The deduction amounts are reported in Table 2.

[Table 2 about here]

The deduction amounts displayed in Table 2 match the needs to construct two simple equivalence scales representing different assumptions on within-household size economies. If we interpret the additional need of a family household as relative, we obtain a constant relative equivalence scale (in the following *relative scale*). For example, the deduction amount of a single parent with one child (A1C1) is $15,700 compared to $9,350 for a single household. That implies a necessary increase in income of 68% to obtain the same level of material comfort. A relative and constant equivalence scale implies that within-household size economies do not vary with the amount of income. Thus, it abstracts from a positive relationship of within-household size economies and the household's disposable income that has been stated by Donaldson and Pendakur (2004). Formalized this can be written as

$$E_R\left(y_i, \theta_i\right) = \frac{y_i}{m\left(\theta_i\right)}, \tag{4}$$

where the deflator m depends exclusively on the household type θ_i and is typically smaller than the number of household members.

As an alternative, we construct a constant and absolute equivalence scale (in the following *absolute scale*). This scale type assumes a fixed income amount for each additional household member to maintain the household's level of material comfort. This fits well with the deduction amounts of the I.R.C. presented by Table 2. For example, the child of A1C1 increases the necessary disposable income by $6,350.

Contrasting the *relative scale*, the additional income amounts of an *absolute scale* do not depend on income. For example, a household with a disposable income of $100.000 (high income household) requires the same additional income amount for one child ($6,350) as a household with a disposable income of $20.000. This implies an indefinite elasticity of within-household size economies with regards to income. Thus, the additional welfare of the high income earner household of $80.000 improves the material comfort of the child without any additional cost.

Therefore, both scales can be taken as two extreme forms of a potential set of equivalence scales. Formalized an absolute scale can be written as

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

with $a(\theta_i)$ denoting the required additional income amount. As exemplified by (5) the *absolute scale* can be interpreted as an income-dependent relative equivalence scale with the deflator $m(y_i, \theta_i)$.

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. Our point of reference are singles with an AGI of $9,350 and family households with an equivalent pre-tax income (for example $15,700 for A1C1). The calculation of an absolute equivalence scale for lower income values does not yield reasonable results. Therefore, the maximum deflator $m(y_i, \theta_i)$ equals by construction the value of the *relative scale* (for a thorough discussion see Bönke and Eichfelder, 2010). The income-dependent deflators of the *absolute scale* are documented by Figure 1.

[Figure 1 about here]

Based on the *absolute scale* and the *relative scale*, we are able to identify for each level of market income a two-or-more-person household with an equal pre-tax material comfort as the reference one-person household $(E(y_k, \theta_k) = y_r)$. Once pre-tax equals are identified, we need a definition of an equal treatment. According to Lambert (2004), there are three important possibilities in case of a tax system: (1) equal absolute burden, (2) equal average burden and (3) equal post-tax material comfort.

However, as has been argued by Muellbauer and Van De Ven (2004) and Bönke and Eichfelder (2010), the first and the third approach are not well-suited for the analysis of an aggregate tax and transfer system encompassing social transfer programs.[3] Therefore, we focus on criterion (2), which requires an equal average tax and transfer payment. This can be written as

$$\frac{F(y_k,\theta_k)}{y_k}=\frac{F(y_r,\theta_r)}{y_r}=\frac{F(E(y_k,\theta_k),\theta_r)}{E(y_k,\theta_k)} \text{ or } \frac{x(y_k,\theta_k)}{y_k}=\frac{x(y_r,\theta_r)}{y_r}. \tag{6}$$

Using conditions (4), (5) and (6), we are able to derive a criterion for an equal treatment of different household types in case of an equal pre-tax material comfort

$$HE = \frac{x(y_k,\theta_k)}{m(y_k,\theta_k)\cdot x(y_r,\theta_r)} \quad \text{for} \quad E(y_k,\theta_k)=y_r, \tag{7}$$

with m depending exclusively on θ_k in case of the *relative scale*.

Thus, we measure horizontal equity by the equivalent post-tax family income of the family household $x(y_k,\theta_k)/m(y_k,\theta_k)$ in relation to the post-tax income of the single household $x(y_r,\theta_r)$. For $HE=1$, the treatment of k meets the principle of horizontal equity in relation to the single. In case of $HE>1$ ($HE<1$), we can state a privilege (a discrimination) of the family household.

3. Tax and transfer system

We calculate the burden of social security taxes, the federal income tax (including tax credits) and federal public transfers in form of the supplementary nutrition assistance program (SNAP) (governing law December 2010) for market incomes from $0 to $250,000. In addition, we account for state income taxes and transfers resulting from the temporary assistance for needy families program (TANF) in six U.S. states. The inclusion of TANF implies that the maximum eligibility period for this program of typically 60 months has not been expired.

The states of California, Florida, Michigan, New York, Ohio and Texas have been selected to include economically important regions and to account for different forms of tax and transfer systems. Florida and Texas do not rely on a state income tax, while income tax rates are relatively high in New York and California. In addition, TANF transfers are significantly

---

[3]   The criteria (1) and (3) yield to contra-intuitive results for households with a negative average tax and transfer burden. For example, criterion (1) implies an identical transfer payment for a single household and a family with two adults and two children in case of a zero market income (see Muellbauer and Van de Ven, 2004 and Bönke and Eichfelder, 2010 for a more detailed discussion).

higher in California compared to Texas. In New York and Michigan, there exist additional EIC payments increasing the level of social welfare.

We assume that a household's gross earnings are generated by employment income (see Appendix A for an alternative specification). Thus, market income y_i can be defined as the sum of the gross wage y_i^G and the social security taxes of the employer S_i^{EM}. We do not consider earnings from other sources (e.g. capital income) and do not account for unearned income. In addition, we expect that income is constant over the whole period under consideration to calculate transfer programs on a yearly basis.

As has been mentioned, we simulate the tax and transfer burden of eight household types. Two adults living in one household are regarded as married joint filers for income tax purposes, while single parents are considered as heads of households. Children live in the parents' household and are qualifying children in terms of the child tax credit, the EIC and TANF. We assume further that the market income is generated by one household member only. This assumption affects the maximum contribution limits for the age, survivors and disability insurance. Therefore, we include an alternative scenario in Appendix B, where the market income is split evenly in case of married joint filers.

3.1. Federal tax and transfer system

3.1.1. Social security taxes

The basis of assessment for social security taxes is the gross wage y_i^G. Up to a gross wage of $106,800, the employer and the employee pay social security taxes with a marginal rate of 6.2% for the old age, survivors and disability insurance. In addition, there are payments for the hospital insurance with a marginal rate of 1.45% (I.R.C. §3101). As the impact of the Federal Unemployment Act (FUTA) on disposable income is small, we neglect corresponding payments. Due to the contribution ceiling for the old age, survivors and disability insurance, social security taxes are regressive. While households with a gross income up to $106,800 (respectively a market income of $114,970) face a marginal burden of 15.30% of gross income (14.21% of market income), the marginal burden is 2.90% of gross income (2.85% of market income) for earnings exceeding that limit. The effective contribution ceiling is higher for two-income earner households as the contributions are calculated for each income earner separately (see Appendix B).

If only one household member generates the family's market income, the family structure does not affect the social security tax due. The sum of social security taxes of the employer and the employee can be written as

$$S(y_i, \theta_i) = S_i^{WE} + S_i^{EM},\qquad\qquad(8)$$

with S_i^{WE} denoting the social security taxes of the employee. The relationship of market income y_i and gross wage y_i^G is illustrated by (9). In this equation $\hat{C}$ describes the contribution ceiling of social security taxes for old age, survivors and disability insurance of \$106,800 being enlarged by the social security taxes of the employer (altogether about \$114,970), s_o^{EM} the employer's marginal rate for the old age, survivors and disability insurance and s_h^{EM} the employer's marginal rate for the hospital insurance:

$$y_i^G = \begin{cases} \dfrac{y_i}{1 + s_o^{EM} + s_h^{EM}} & y_i \leq \hat{C} \\[2ex] \dfrac{y_i - s_o^{EM} \cdot \hat{C}}{1 + s_h^{EM}} & y_i > \hat{C} \end{cases}\qquad\qquad(9)$$

3.1.2. Federal income tax

In addition to employment taxes, the gross wage y_i^G is debited by federal income tax payments. Under the conditions of our model, the gross wage is identical to the gross income (I.R.C. §61) and the adjusted gross income (I.R.C. §62). Taxable income is calculated by the gross income, which is reduced by the standard deduction in I.R.C. §63 and personal exemptions in I.R.C. §151. The tax payment is calculated corresponding to I.R.C. §1.

We assume for simplicity that the household uses the standard deduction in I.R.C. §63. This may be justified as follows. First of all, any assumption on the amount of itemized deductions is somewhat arbitrary as these deductions depend on the taxpayer characteristics. Furthermore, itemized deductions result partially from expenses reducing a household's material comfort. Therefore, itemized deductions should not only be considered in calculating taxable income, but also in calculating pre-tax income. If we assume a similar impact on both measures, itemized deductions should be a minor issue with regards to horizontal equity.[4]

The alternative minimum tax (AMT) is calculated as provided by I.R.C. §55. The assessment base is the taxable excess, respectively the alternative taxable income minus the exemption amount in I.R.C. §55 (d). In our simulation, alternative taxable income is equal to the gross wage. The tax rate is 26% for a taxable excess up to \$175,000 and 28% for any earnings above. The exemption amount is phased out at a rate of 25% for alternative minimum taxable income exceeding \$112,500 (in case of married joint filers \$150,000).

---

[4]   If pre-tax material comfort would be unaffected by itemized deductions, itemization results in a more equal treatment for all household types (Gravelle and Gravelle, 2006).

Disposable income is increased by the making work pay credit (I.R.C. §36A), which is refundable and equal to the minimum of 6.2% of the gross income and $400. The credit is phased out with a rate of 2% for gross wages exceeding $75,000. In case of married joint filers, the maximum credit is $800 and the phase-out limit is $150,000.

Families with children receive a child tax credit according to I.R.C. §24 up to a maximum of $1,000 per child and year. The maximum refundable credit is 15% of the taxpayer's earned income as it exceeds an amount of $3,000. In case of households with three children, the maximum refundable credit may also be higher if the difference of social security taxes over the earned income tax credit according to I.R.C. §32 exceeds the regular refundable child tax credit. The child tax credit is phased-out with a rate of 5% if the adjusted gross income exceeds $75,000 ($110,000 in case of married joint filers).[5]

Households with a low market income receive an earned income tax credit (EIC). The EIC is paid as a surcharge to earned income and is significantly higher for households with children. Table 3 provides an overview of the phase-in rate, the phase-in amount, the phase-out rate, the phase-out amount and the maximum benefit for the household types considered. The assessment base for the phase-in rate is earned income up to the phase-in amount, while the phase-out rate is applied to earned income minus the phase-out amount. The credit is calculated corresponding to I.R.C. §32. However, the phase-in amount, the phase-out amount and the maximum earned income to receive a benefit are based on the tables in IRS (2010a). A more detailed description of the credit is given by IRS (2010b).

[Table 3 about here]

3.1.3. Supplemental nutrition assistance program

Regarding the supplemental nutrition assistance program (SNAP), families are treated as a community in need. 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 household is eligible for SNAP if it meets the gross income test and the net income test. Hence, gross income and net income must not exceed the corresponding income amounts. In our simulation, the SNAP-relevant net income is equal to 80% of gross income minus a standard deduction of $142 per month ($1,704 per year). In case of households with more than three

---

[5] According to the Internal Revenue Code, the child tax credit is phased out in steps of $50 per $1,000 adjusted gross income. As a corresponding approach results in a considerable number of marginal rates of more than 100%, it would lead to confusing figures of the marginal tax and transfer rate. Therefore, we approximate the phase-out regulations by a constant phase-out rate of 5%.

members the standard deduction is $153 per month ($1,836 per year). We do not account for additional deductions like the dependent care deduction or the deduction for excess shelter costs.

SNAP benefits are calculated as the maximum benefit of a household type minus 30% of net income as calculated for SNAP purposes. The gross income amount, the net income amount and the maximum benefit are given in Table 4. As we assume a constant market income over the whole period under consideration, SNAP operating numbers are provided on a yearly basis. The maximum benefit depends exclusively on the number of household members, but not on the composition of a household. Hence, an adult and a child receive the same benefit amount.

[Table 4 about here]

3.2. Taxes and transfers on the state level

3.2.1. State income taxes

There are substantial differences among the state income tax regimes in the states considered. First, Florida and Texas do not have income tax systems. In California, which does have a state income tax, taxable income is equal to adjusted gross income (in our simulation equal to the gross wage) minus a standard deduction of $3,670 ($7,340 in case of married joint filers). The tax rate is progressive with scales for single filers (A1C0), heads of households (A1C1 to A1C3) and married joint filers (A2C0 to A2C3). The marginal tax rate varies from 1.25% to 9.55% of state taxable income.

In Michigan, taxable income is defined as adjusted gross income minus a personal exemption of $3,600 for each household member. The constant tax rate is 4.35%. There are no standard deductions and no specific tax scales for married joint filers and heads of households. However, there is an additional earned income tax credit equal to 20% of the federal EIC.

New York taxable income is defined as federal adjusted gross income minus a standard deduction and a personal exemption of $1,000 per household member. The standard deduction is $7,500 for single filers, $10,500 for heads of households and $15,000 for married joint filers. The tax rate is progressive with a separate tax scale for single filers (A1C0), heads of households (A1C1 to A1C3) and married joint filers (A2C0 to A2C3). The marginal rate varies from 4.00% to 8.97%. There is an additional earned income tax credit equal to 30% of the federal EIC.

Ohio taxable income is defined as federal adjusted gross income reduced by a personal exemption of $1,600 per household member. The uniform tax scale is progressive with an initial marginal rate of 4.00% and a maximum marginal rate of 6.24%. There is no standard deduction. However, we account for the Ohio tax credit for exemptions and the Ohio tax credit for taxpayers with AGI lower than §10,000.

3.2.2. Temporary assistance for needy families

Similar to SNAP, families are treated as a community in need in terms of the TANF program. Hence, all payments are adjusted to the material needs of the household as a whole. In our simulation, TANF payments are exclusively available for families with children. Hence, we do not account for TANF payments for pregnant women. A household is eligible for TANF if it meets the corresponding income eligibility criteria. In general, there is an initial eligibility test for the first time to receive TANF and a continued eligibility test for repeated payments. Due to the fact that we calculate TANF on a yearly basis, we restrict our analysis on the continued eligibility tests.

In California, a household is not eligible if the gross earned income exceeds the monthly recipient's maximum income amount.[6] Due to the fact that TANF benefits are reduced by a household's earnings, there is also no TANF payment if the gross income of a household minus earned income disregard exceeds the maximum benefit. The earned income disregard is equal to $225 per month ($2,700 per year) plus 50% of any additional earned income.

In New York, there is a two-stage eligibility test. First of all, gross income must not exceed the adjusted federal poverty level.[7] Second, gross income minus earned income disregard must not exceed 185% of the New York standard of need. In addition, the TANF benefit is reduced by gross income minus earned income disregard. The earned income disregard is defined as $90 per month ($1,080 per year) plus 52% of any additional earned income.

In Texas, there is only a test with regards to gross income minus the earned income disregard. For the continued eligibility test, this amount must not exceed the recognizable needs depending on the household size and the household's composition. The Texas earned income disregard is $120 per month ($1,440 per year). We do not account for the additional disregard in Texas of 90% of additional earned income up to $1,400 per year that is only relevant for the first four months of TANF eligibility.

---

[6] There are two maximum amounts for different regions in California. In our simulation, we use the limits for region 1, which are slightly higher.

[7] As the federal poverty level is adjusted for the earned income disregard, this test is in fact relevant for the unadjusted gross income.

In Florida, Michigan and Ohio, there is only an eligibility test for the maximum benefit compared to the gross income reduced by the earned income disregard. Hence, we calculate a TANF payment if the gross income minus earned income disregard does not exceed the maximum benefit. The Florida earned income disregard is $200 per month ($2,400 per year) plus 50% of any additional earned income. The corresponding disregard in Michigan is $200 per month ($2,400 per year) plus 20% the remainder. The Ohio earned income disregard is $250 per month ($3,000 per year) plus 50% of any additional earned income.

There is a considerable variance of maximum TANF benefits of the six member states that are documented by Table 5. As we assume a constant market income over the whole period under consideration, the maximum benefits are given on a yearly basis. Maximum benefits are high in California and New York and low in Florida and Texas.

[Table 5 about here]

3.4. Tax and transfer burden on the federal level

We analyze the tax and transfer function F of the household type i in relation to gross market income by the average rate $f_i = \dfrac{F(y_i, \theta_i)}{y_i}$ and the marginal rate $F_i' = \dfrac{\partial F(y_i, \theta_i)}{\partial y_i}$.

Figure 2 illustrates f_i and F_i' of the federal tax and transfer system for households with one adult and zero to three children as a function of market income y_i. Average and marginal rates below 0% (exceeding 100%) are generally restricted to a minimum value of -50% (maximum value of 110%).

[Figure 2 about here]

For $y_i < \$9{,}950$, the average rate of the single household f_{A1C0} is negative as a result of public transfers from SNAP, the EIC and the making work pay credit. For higher market incomes, the average rate increases sharply up to a level of 12.5% for a market income of about $13,000 and, with a moderate slope, to a level of 32.5% for a market income of about $115,000. For higher market incomes, we find a very small increase in the average rate.

The marginal rate is initially close to zero as a result of social security taxes being compensated by the EIC and the making work pay credit. However, for market incomes ranging from $2,300 to about $10,000 the marginal rate increases in a number of steps to a

maximum of 52.9%. This is due to the imputation of earned income against SNAP benefits, the ending of the making work pay credit's phase-in, the phase-out of the EIC and the start-up of the regular federal income tax payment. The decrease to a marginal rate of 23.5% is due to the expiration of SNAP for market incomes exceeding $13,050, and the EIC for market incomes exceeding $14,500.

The following increase in the marginal rate for market incomes up to a maximum of 42.1% results from the progressive federal income tax scale and the phase-out of the making work pay credit. The sharp reduction of the marginal rate from 40.2% to 30.5% for market incomes exceeding $114,970 is caused by the contribution ceiling for the old age, survivors and disability insurance. At a market income of about $190,500, the marginal rate increases again to a level of 35.4% due to the fourth federal income tax bracket for a taxable income exceeding $171,850.

For households with children, we find in general a similar pattern. Due to the higher SNAP and EIC, the child tax credit and deductions, the average and the marginal rate are lower. The initial marginal rate is even negative. In addition, we obtain marginal rates of more than 100% resulting from a negative SNAP eligibility test. Due to the higher SNAP benefit amount for families, there is a broader income range relevant for a SNAP phase-out. Therefore, we observe market incomes with a negative SNAP eligibility test, resulting in a full loss of the remaining SNAP benefit. This implies a sharp increase in the average rate.

The average and the marginal rate for the federal tax and transfer system regarding households with two adults are presented by Figure 3.

[Figure 3 about here]

In general, average rates are smaller due to higher public transfers (SNAP), higher tax credits and a lower tax rate for married joint filers. As the amount of the SNAP benefit increases in family size, we find even for the household type A2C0 marginal rates exceeding 100% due to the full loss of the remaining SNAP benefit. By contrast, the reduction of the marginal rate caused by the contribution ceiling of social security taxes is not affected by the family type in case of one-income earner (see Appendix B for two-income-earner households).

Concluding, the average rate is clearly progressive with a degrading slope. Marginal rates are initially low (even negative for families with children), but increase sharply by reason of the phase-out of the SNAP program and the EIC. For market incomes of more than $25,000, there is no clear upwards or downwards trend in marginal tax rates. This is a result of the phase-out

of tax credits, the AMT and the contribution ceiling of social security taxes counterbalancing the progressive income tax scale.

For expositional reasons, we refrain from reporting the tax and transfer systems for the six federal states considered. Generally it can be stated that TANF and state EIC decrease the average burden for low income households, while state income taxes increase the burden of high income households. Furthermore, the phase-out of the TANF counterbalances the phase-in effect of the EIC.

4. Horizontal equity

In the following we present our results on HE. Using the *absolute scale* and the *relative scale* introduced in 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 and transfer burden for both households according to Section 3. Our criterion of horizontal equity is documented by formula (7).

We illustrate HE for equivalent market incomes of all household types. $HE > 1$ $\left(HE < 1\right)$ indicates a privilege (discrimination) of the corresponding family household k. In quantitative terms an $HE = 1.1$ means that a family household could forego 10% of its equivalent post-tax income to obtain the same post-tax material comfort as a single with an equivalent pre-tax income. Thus, HE values of 1.1 imply a significant privilege.

4.1. Federal tax and transfer system

Figure 4 illustrates HE for the *absolute scale* and the *relative scale*. The results are not fully identical, but nevertheless similar. For both scales we obtain a significant privilege for all family types with children in case of low market incomes. This is driven by three divergent aspects: (1) The child tax credit, (2) the considerably higher EIC payments for households with children and (3) the fact that SNAP provides the same benefits for adult household members and children.[8]

[Figure 4 about here]

---

[8] By contrast, the federal income tax law as our point of reference assumes that the material needs of children are lower. This is in line with empirical evidence and widely-used equivalence scales (Donaldson and Pendakur 2004, Gravelle and Gravelle 2006, Koulovatianos et al. 2009).

There is also a clear disadvantage for low-income married couples without children. This is due to the low EIC payments (the maximum benefit is the same as for the single household) and the fact that SNAP accounts to a higher degree for within-household size economies as the equivalence scales for A2C0. Concluding, HE is up to 40% higher than 1 for households with children (with the strongest effect for A1C3) and about 10% lower 1 for A2C0.

For middle-income earners, we observe initially a trend towards an equal treatment for all family types $\left(HE \approx 1\right)$, which is caused by the phase-out of SNAP and of the EIC. However, we observe again an increasing privilege for equivalent market incomes exceeding $50,000. This effect is strong for married couples and results from the contribution ceiling of the old age, survivors and disability insurance at a market income ($\neq$ equivalent income) of $114,970. As social security taxes are in fact regressive, singles pay a higher average burden than families with an equivalent pre-tax income. It has to be noted that the expected social security benefits of family households are typically higher (Steuerle and Renanne, 2011). This effect fades out reflecting a tendency for horizontal equity in case of high market incomes.

The main difference between the *absolute scale* and the *relative scale* can be observed for heads of households with an equivalent income of about $50,000. While the *relative scale* implies a slight disadvantage for this household group, the *absolute scale* states a clear privilege. This divergence results from different assumptions on the elasticity of within-household size economies with regards to disposable income in case of the *absolute scale* (indefinite elasticity) and the *relative scale* (zero elasticity).

In addition to the baseline case, we made calculations disregarding social security taxes (Appendix A) and accounting for dual-income earners (Appendix B). Appendix A is relevant if there are no social security taxes of if corresponding contributions are not interpreted as taxes. We still find a (somewhat smaller) privilege of high income families for the *absolute scale*. For the *relative scale*, we obtain a (slight) discrimination of high-income families compared to a clear privilege of this group in the baseline case. Thus, social security taxes have a strong impact on horizontal equity and imply a privilege for families.

For two-income earners, we obtain a significantly smaller advantage of high income married couples compared to singles. That documents a discrimination of dual-income earners compared to households with only one-income earner. The effect is driven by higher effective contribution ceilings for the old age, survivors and disability insurance in case of two-income earners. As a result, households with two-income earners and a high market income pay up to the double amount for the old age, survivors and disability insurance.

4.2. Taxes and transfers on the state level

In addition to the federal tax and transfer system, we account for TANF benefits and state income taxes for six member states. While state income taxes are low compared to the federal burden (even zero in case of Florida and Texas), TANF payments can be high compared to federal transfer programs. That holds especially for households with a zero market income who do not benefit from the child tax credit, the EIC or the making work pay credit. Table 6 documents SNAP benefits on the federal level and the sum of SNAP benefits and TANF maximum payments for each member state.

[Table 6 about here]

Obviously benefits for family households are much higher. In California, a single obtains a maximum benefit of $2,400, while a head of household with one child (three children) receives $11,928 ($19.092). Thus, one child (three children) implies (imply) an increase in the social welfare benefits of 397% (696%) or $9,528 ($16.692). As aforementioned, low income earners with children seem to be privileged by the federal system. This prerogative is extremely expanded if TANF is considered. In Table 7, we present our results for *HE* for households with a zero market income.

[Table 7 about here]

As should be expected, the privilege is especially high (low) in states with high (low) TANF maximum benefits like California and New York (Florida and Texas). Furthermore, the effect increases in the number of children and is higher for single parents. Altogether, our results document a strong impact of welfare benefits on horizontal equity.

This can be exemplified for a household with two adults and two children in California (A2C2). According to our *relative scale* (which is identical to the *absolute scale* in case of households with a zero market income), such a household requires 278% of the income of a single to obtain an identical material comfort. The maximum SNAP for this household is 334% of the SNAP for a single household. Including TANF, the relative advantage compared to single is even higher (796% of the benefit for singles).

This divergence between the value judgments on the federal level and on the state level can be captured by an additional measure. Taking the value judgments of the federal system as point

of reference, we can define the horizontal equity on the state level in relation to the federal level by a normalized version of our usual measure for horizontal equity

$$HE_S = \frac{1}{HE} \cdot \frac{x_S(y_k, \theta_k)}{m(y_k, \theta_k) \cdot x_S(y_r, \theta_r)} \quad \text{for} \quad E(y_k, \theta_k) = y_r . \tag{10}$$

with HE_S denoting the state effect on horizontal equity in relation to the federal level, HE the measure for horizontal on the federal level and $x_S(y_k, \theta_k)$ the post-tax income on the state level. The calculation of HE_S in relation to the federal system has two major advantages. (1) Deviations between the federal system and the state system can be easily identified and (2) HE_S provides a quantitative estimate of the deviations.

Figure 5 contains the results for California. Because of the limited effect of the state income taxes, the range of Figure 5 is restricted to a maximum variation of 10 percentage points.

[Figure 5 about here]

As aforementioned, California TANF provides a clear privilege even if compared to the federal system. By contrast, the horizontal equity implications of the state income tax are relatively small and contradictory. While the *absolute scale* states a privilege for families and especially married couples, the *relative scale* provides evidence for a slight discrimination with a relatively small effect for households with a high number of children. Taking into account the small deviations, it may be concluded that the state income tax is broadly in line with the value judgments of the federal system.

The results for the other member states are reported by Appendix C. Apart from TANF, we do not find strong deviations from the federal system. Regarding New York and Michigan, there are additional EIC payments, which increase the privilege for families with children and a low but non-zero market income. We do not find significant effects for middle-sized and high market incomes. Thus, the value judgments of the state income taxes considered are largely the same as for the federal income tax.

5. Conclusion

The distributive justice of the tax and transfer system in the United States, as these achieve or fall short of horizontal equity in the treatment of families, is the focus of our study. It is the first such study to account not only for the federal income tax, but also for additional taxes and transfer programs on the federal level and on the state level with a main focus on

employment income. In particular we consider social security taxes, the federal income tax, the supplemental nutrition assistance program (SNAP), as well as state income taxes and TANF benefits in California, Florida, Michigan, New York, Ohio and Texas.

Methodologically, the contribution is based on the concept of needs-adjusted income taxation. Using value judgments inherent in the calculation of the federal taxable income, we compare the treatment of seven different types of family households with the single as point of reference. Furthermore, we analyze deviations of state tax and transfer systems in relation to the federal level. This comparative approach allows us to draw conclusions on the consistency of the tax and transfer system with regards to three aspects: (1) different levels of income; (2) different subsystems and (3) state tax and transfer systems in relation to the federal system.

Regarding households with a low market income, we find a distinct privilege for single parents and couples with children. The effect is driven by SNAP, the child tax credit and especially the EIC, which are not in line with the value judgments of our equivalence scales. The privilege for low-income households with children is enormously expanded if we additionally consider TANF payments. This may be interpreted as a contradiction of value judgments between the federal system and the divergent tax and transfer systems on the state level.[9]

For households with a middle-sized and high market income our results are not as decisive. In our baseline scenario, we find still a significant but smaller advantage for families and married couples. This privilege is driven by within-household-size economies in case of the *absolute scale* and, even more important, by the contribution ceilings of the old age, survivors and disability insurance affecting employment income. Thus, if social security taxes are excluded from our analysis (e.g. for the self-employed, see Appendix A), we obtain a tendency towards a more equal treatment.

The privilege of middle income families is significantly smaller if employment income is evenly distributed among both spouses. Therefore, two-income-earner couples tend to be discriminated compared to couples with only one income earner by reason of the contributions ceilings of the old age, survivors and disability insurance. This is due to the fact that maximum contributions of dual-income earners are doubled, while corresponding benefits are typically not (Rennane and Steuerle, 2011). We do not find strong effects for higher market incomes on the state level. Thus, the analyzed state income taxes are broadly in line with the value judgments of the federal system.

---

[9]   It should be noted that there are large differences between TANF benefits of the different states considered. TANF is especially generous in California and New York and low in Florida and Texas (see table 4).

Our analysis implies contradictions in value judgments within the U.S. tax and transfer system. That holds especially for the strong public support for low income households with children, who in fact receive a form of a "child subsidy". It seems to be an important question if this support can be justified by other aspects as horizontal equity. An important issue is the problem of child poverty (Rainwater and Smeeding, 2003; Pressman, 2011). As has been argued by Holzer et al. (2007) poverty implies large costs for the society by lowering productivity, increasing crime rates and raising health expenditures. Furthermore, it has to be noted that children are not able to care about themselves, but depend on the care of their parents and – as an alternative – the society.

Nevertheless, it may be questionable if the strong focus of public support on households with children by the EIC, the child tax credit and TANF is a wise policy. As argued by this paper, a corresponding approach should not be in line with fairness concepts like horizontal equity. Furthermore, it has to be considered that providing a "child premium" for low-income families may result in suspect incentive effects for the poor. As the equivalent income of households with children is higher, having a child could be a strategy to obtain a higher level of material comfort for the adult household member. That holds especially for the first child as can be demonstrated by maximum benefits reported by Table 6. If corresponding behavioral reactions are strong, public support could even boost child poverty.

We also found a privilege of family households and especially married couples with only one income earner, which is mainly induced by the contribution ceilings of the old age, survivors and disability insurance. A regressive component of a tax and transfer system necessarily implies a violation of horizontal equity. Potential strategies to overcome this inconsistency could be higher tax rates for households with market incomes exceeding $114,970 or an adaption of the contribution ceilings to the household size and the higher effective benefits of families as calculated by Steuerle and Rennane (2011).

Finally, it has to be noted that the choice of the applied equivalence scales as well as the underlying assumptions of our approach have an impact on the ascertained outcome. Our results are based on value judgments inherent in the calculation of U.S. federal taxable income. In our baseline case, we interpret payments to the old age, survivors and disability insurance as well as to the hospital insurance as taxes. Furthermore, we restrict our analysis on clearly specified household types and rely on simplifying assumptions on the structure of generated earnings and the corresponding tax and transfer burden.

References

Allan, R.G., and Iglarish, H.J. (1996), A Cluster Analysis of Horizontal Equity, Journal of the American Taxation Association 18, 31-46.

Atkinson, A.B. (1970), On the Measurement of Inequality, Journal of Economic Theory 60, 244-264.

Auerbach, A.J., and Hassett, K.A. (2002), A new Measure of Horizontal Equity, American Economic Review 92, 1116-1125.

Bargain, O., Dolls, M., Neumann, D., Peichl, A., and Siegloch, S. (2011), Tax-Benefit Systems in Europe and the US: between Equity and Efficiency, IZA Discussion Paper No. 5440, IZA Bonn.

Bernhardt, P., and Holtzblatt, J. (2008), Low-Income Childless Individuals and the Tax and Transfer Systems, NTA Proceedings of the 101st Annual Conference on Taxation, 156-163.

Bönke, T., and Eichfelder, S. (2010), Horizontal Equity in the German Tax-Benefit System: A Simulation Approach for Employees, FinanzArchiv/Public Finance Analysis 66, 295-331.

Bryant, V.L., Countryman, L., Diamond, J.L., and Dinh, T. (2009), Marriage Penalty Relief in the 2001 and 2003 Tax Cuts: Implications for Horizontal Equity, NTA Proceedings of the 101st Annual Conference on Taxation, 193-200.

Cornia, G.C., and Slade, B.A. (2006), Horizontal Equity in the Property Taxation of Apartment, Industrial Office and Retail Properties, National Tax Journal 59, 33-55.

Donaldson, D., and Pendakur, K. (2004), Equivalent-expenditure Functions and Expenditure-dependent Equivalence Scales, Journal of Public Economics 88, 175-208.

Ebert, U., and Moyes, P. (2000), Consistent Income Tax Structures when Households are Heterogenous, Journal of Economic Theory 90, 116-150.

Gravelle, J., and Gravelle, J. (2006): Horizontal Equity and Family Tax Treatment: The Orphan Child of Tax Policy, National Tax Journal 59, 631-649.

Gruber, J. (1997), The Incidence of Payroll Taxation: Evidence from Chile, Journal of Labor Economics 15, 72-101.

Habib, J. (1979): Horizontal Equity with Respect to Family Size, Public Finance Quarterly 7, 283-302.

Holzer, H.J., Schanzenbach, D.W., Duncan, G.J., and Ludiwig, J. (2007), The Economic Costs of Poverty in the United States: Subsequent Effects of Children Growing up Poor, Institute of Research on Poverty Discussion Paper No. 1327-07, University of Wisconsin-Madison.

Immervoll, H., Kleven, H.J., Kreiner, C.T., and Verdelin, N. (2009), An Evaluation of the Tax-Transfer Treatment of Married Couples in European Countries, IZA Discussion Paper No. 3965, IZA, Bonn.

IRS (2010a): 1040 Instructions 2010, IRS, Washington D.C.

IRS (2010b): Tax Guide 2010 – Your Federal Income Tax for Individuals, IRS, Washington D.C.

Kaplow, L. (1989), Horizontal Equity: Measures in Search of a Principle, National Tax Journal 42, 139-154.

Koulovatianos, C., Schröder, C., and Schmidt, U. (2009), Non-market Household Time and the Cost of Children, Journal of Business and Economic Statistics 27, 42-51.

Lambert, P.J. (2004), Equivalence Scales, Horizontal Equity and Horizontal Inequity, in: Dagum, C., and Ferrari, G. (Eds.), Household Behaviour, Equivalence Scale, Welfare and Poverty, Physica, Heidelberg et al., 75-84.

Leuthold, J.H., and Husby, R.D. (1989), Horizontal Equity and Taxpayer Characteristics: Who is Advantaged and Disadvantaged by the Federal Income Tax?, Eastern Economic Journal 15, 35-44.

Moffitt, R., and Scholz, J.K. (2009), Trends in the level and distribution of income support, NBER Working Paper No. 15488, NBER, Cambridge MA.

Muellbauer, J., and Van De Ven, J. (2004), Equivalent Scales and Taxation: Simulation Analysis, in: Dagum, C., and Ferrari, G. (Eds.), Household Behaviour, Equivalence Scale, Welfare and Poverty, Physica, Heidelberg et al., 85-116.

Musgrave, R.A. (1990), Horizontal Equity, once more, National Tax Journal 43, 113-122.

OECD (2012), Taxing Wages 2011-2012, OECD, Paris.

Pressman, S. (2011), Policies to Reduce Child Poverty: Child Allowances versus Tax Exemptions for Children, Journal of Economic Issues 45, 323-332.

Rainwater, L., and Smeeding, T.M. (2003), Poor Kids in a Rich Country: America's Children in Comparative Perspective, Russel Sage Foundation, New York.

Schröder, C. (2009), The Construction and Estimation of Equivalence Scales and their Uses, in: Slottje, D.J. (Ed.), Quantifying Consumer Preferences, Emerald Publishing, Bingley, 349-362.

Seneca, J.J., and Taussig, M.K. (1971), Family Equivalence Scales and Personal Income Tax Exemptions for Children, Review of Economics and Statistics 53, 253-262.

Steuerle, E., and Rennane, S. (2011), Social Security and Medicare Taxes and Benefits over a Lifetime, The Urban Institute, Washington D.C. (http://www.urban.org/UploadedPDF/-social-security-medicare-benefits-over-lifetime.pdf).

Stranahan, H., and Borg, M.O. (1998), Horizontal Equity Implications of the Lottery Tax, National Tax Journal 51, 71-82.

USDA (2011), Information Letter SNAP313INS11, USDA, Washington D.C. (http://www.fns.usda.gov/snap/outreach/Translations/English/313Insert-11.pdf).

Vickery, W.S. (1947), Agenda for Progressive Taxation, Augustus M. Kelley Publishers, Clifton New Jersey, Reprinted 1972.

Appendices

Appendix A:

Contrasting our baseline case, we do not consider social security taxes in our tax and transfer function *F*. This is for two reasons. First of all, social security taxes are not relevant for all groups of taxpayers. That holds especially for the self-employed. Second, it may be argued that contributions for social security taxes are at least partially outweighed by corresponding benefits.

However, we account for these payments in calculating the market income. This may be justified as follows. If social security taxes are not regarded as taxes, they nevertheless increase the market income of an employee household. With regards to self-employed taxpayers, we implicitly assume that there exist similar fringe benefits being tax-exempt. This is to make different forms of earnings comparable to each other. The main effect of accounting for social security taxes in market income results in a reduction of the tax and transfer burden for all family types.

The figures A1 and A2 depict the tax and transfer burden of households with one and two adults. Due to the neglect of social security taxes, the average burden and marginal burden are generally lower. Furthermore, the tax burden is not any more affected by the contribution ceiling for the old age, survivors and disability insurance of $114,970.

[Figure A1 about here]

[Figure A2 about here]

Figure A3 documents the results for *HE* excluding social security taxes. The corresponding outcome is largely the same for the *absolute scale*. However, that does not hold for the *relative scale*. In our baseline scenario, we obtain a clear privilege of family households and especially married couples by reason of the contribution ceilings of the old age, survivors and disability insurance. If we do not take into account this payment, there is even a slight disadvantage of all family types in case of the *relative scale*. Therefore, the inclusion of social security taxes has a significant impact on our results.

Appendix B: Distribution of Earned Income

In our baseline specification, we assume that a single household member generates the family's entire market income. This assumption simplifies our analysis but cannot be taken as realistic for households with two adults. As an alternative, we assume that the whole market income is split evenly in case of married joint filers (household types A2C0 to A2C3). In this case social security taxes are calculated for each income earner separately. This implies a doubling of the contribution ceilings for the household as a whole and, as a result, a double maximum payroll tax payment.

On the contrary, the alternative distribution of income does only have a minory effect on the other subsystems of the tax and transfer system. Due to joint filing, there is no effect on the federal income tax. That holds also for most of the included state income taxes (an exception is for example Ohio). Furthermore, social transfer programs (SNAP, TANF) are calculated on the household level. Thus, the distribution of earned income within the household does not affect the provided benefits. Figure B1 depicts the federal tax and transfer burden if the earned income of married couples is split evenly on both spouses.

[Figure B1 about here]

We obtain a higher marginal and average burden for market incomes exceeding $114,970 by reason of the higher contribution ceilings. The *HE* results for an alternative distribution of earned income are documented by Figure B2. It can be noted that the advantage of high-income married joint filers in relation to the single are clearly smaller as in our baseline scenario. This implies a discrimination of two-income earners filing jointly compared to couples with exclusively one-income earner.

[Figure B2 about here]

Appendix C: State Tax and Transfer Systems

The following figures present our results for *HE* regarding the states of Florida, Michigan, NewYork, Ohio and Texas. Similar to California, we concentrate on additional advantages and disadvantages on the state level. Our figures are restricted to a maximum additional relative change in post-tax equivalent income of 10 percentage points. We do this in order to account for the relatively small effects of state income taxes relevant for the whole range of market incomes.

[Figure C1 about here]

[Figure C2 about here]

[Figure C3 about here]

[Figure C4 about here]

[Figure C5 about here]

Tables

Table 1: Distribution of Household Types

| Household Type | | Distribution | | |
Adults	Children	Frequency	Percentage	Cumulated
1	0	61,879	14.85	14.85
1	1	9,213	2.21	17.06
1	2	10,102	2.42	19.48
1	3	4,539	1.09	20.57
2	0	100,721	24.18	44.75
2	1	41,279	9.91	54.66
2	2	58,672	14.08	68.74
2	3	28,857	6.93	75.67
Other		101,322	24.32	100.00
Total		416,584	100.00	

Note: Composition of other households: one or two adults with four or more children 4.09%, three adults with no children 6.87%, three adults with one or more children 7.43%, four ore more adults with zero or more children 5.93%.
Source: Cross-National Equivalent File Panel Study of Income Dynamics (CNEF-PSID) 2011, wave 2007. All numbers are obtained with cross-sectional frequency weights.

Table 2: Deductions and Equivalence Scales

| Household Type | | Deductions ($) | | | Scale | |
Adults	Children	Standard	Exemption	Overall	Relative	Absolute
1	0	5,700	3,650	9,350	1.00	0
1	1	8,400	7,300	15,700	1.68	6,350
1	2	8,400	10,950	19,350	2.07	10,000
1	3	8,400	14,600	23,000	2.46	13,650
2	0	11,400	7,300	18,700	2.00	9,350
2	1	11,400	10,950	22,350	2.39	13,000
2	2	11,400	14,600	26,000	2.78	16,650
2	3	11,400	18,250	29,650	3.17	20,300

Table 3: EIC Operating Numbers for the Year 2010

Household Type		EIC Operating Numbers				
Adults	Children	Phase-in Rate (%)	Phase-in Amount ($)	Phase-out Rate (%)	Phase-out Amount ($)	Maximum Benefit ($)
1	0	7.65	5,950	7.65	7,500	457
1	1	34.00	8,950	15.98	16,450	3,050
1	2	40.00	12,550	21.06	16,450	5,036
1	3	45.00	12,550	21.06	16,450	5,666
2	0	7.65	5,950	7.65	12,500	457
2	1	34.00	8,950	15.98	21,500	3,050
2	2	40.00	12,550	21.06	21,500	5,036
2	3	45.00	12,550	21.06	21,500	5,666

Sources: I.R.C. §32; IRS (2010a); IRS (2010b).

Table 4: SNAP Operating Numbers for the Year 2010

Household Type		SNAP Operating Numbers per Year ($)		
Adults	Children	Gross Income Amount	Net Income Amount	Maximum Benefit
1	0	14,088	10,836	2,400
1	1	18,948	14,580	4,404
1	2	23,808	18,312	6,312
1	3	28,668	22,056	8,016
2	0	18,948	14,580	4,404
2	1	23,808	18,312	6,312
2	2	28,668	22,056	8,016
2	3	33,528	25,800	9,516

Source: USDA (2011).

Table 5: TANF Maximum Benefits for the Year 2010

Household Type		TANF Maximum Benefit per Year ($)					
Adults	Children	California	Florida	Michigan	New York	Ohio	Texas
1	0	0	0	0	0	0	0
1	1	7,524	2,892	4,836	6,576	4,260	2,316
1	2	9,312	3,636	5,904	9,036	5,208	2,676
1	3	11,076	4,368	7,164	10,860	6,432	3,216
2	0	0	0	0	0	0	0
2	1	9,312	3,636	5,904	9,036	5,208	2,940
2	2	11,076	4,368	7,164	10,860	6,432	3,300
2	3	12,600	5,112	8,328	12,756	7,524	3,828

Sources: Urban Institute data base; TANF state regulations

Table 6: Public Transfers (SNAP and TANF) on Federal and State Level

Household Type		Maximum Benefit ($)						
Adults	Children	Federal	California	Florida	Michigan	New York	Ohio	Texas
1	0	2,400	2,400	2,400	2,400	2,400	2,400	2,400
1	1	4,404	11,928	7,296	9,240	10,980	8,664	6,720
1	2	6,312	15,624	9,948	12,216	15,348	11,520	8,988
1	3	8,016	19,092	12,384	15,180	18,876	14,448	11.232
2	0	4,404	4,404	4,404	4,404	4,404	4,404	4,404
2	1	6,312	15,624	9,948	12,216	15,348	11,520	9,252
2	2	8,016	19,092	12,394	15,180	18,876	14,448	11,316
2	3	9,516	22,116	14,628	17,844	22,272	17,040	13,344

**Table 7: Horizontal Equity Effects for Households with Zero Market Income**

Household Type		HE Values						
Adults	Children	Federal	California	Florida	Michigan	New York	Ohio	Texas
1	0	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	1	1.09	2.96	1.81	2.29	2.72	2.15	1.67
1	2	1.27	3.14	2.00	2.46	3.09	2.32	1.81
1	3	1.36	3.23	2.10	2.57	3.20	2.45	1.90
2	0	0.92	0.92	0.92	0.92	0.92	0.92	0.92
2	1	1.10	2.72	1.73	2.13	2.68	2.01	1.61
2	2	1.20	2.86	1.86	2.28	2.83	2.17	1.70
2	3	1.25	2.91	1.92	2.35	2.93	2.24	1.75

Figures

Figure 1: Absolute Scale
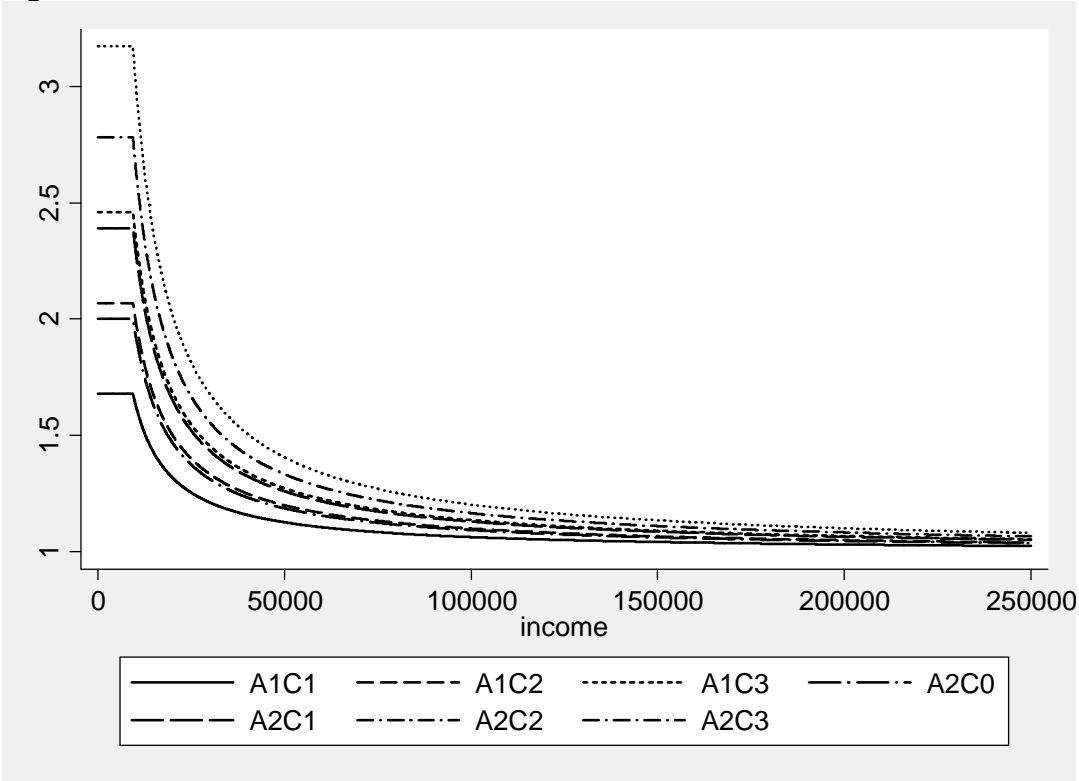
Figure 2: Absolute and Marginal Burden, Single Adult Households
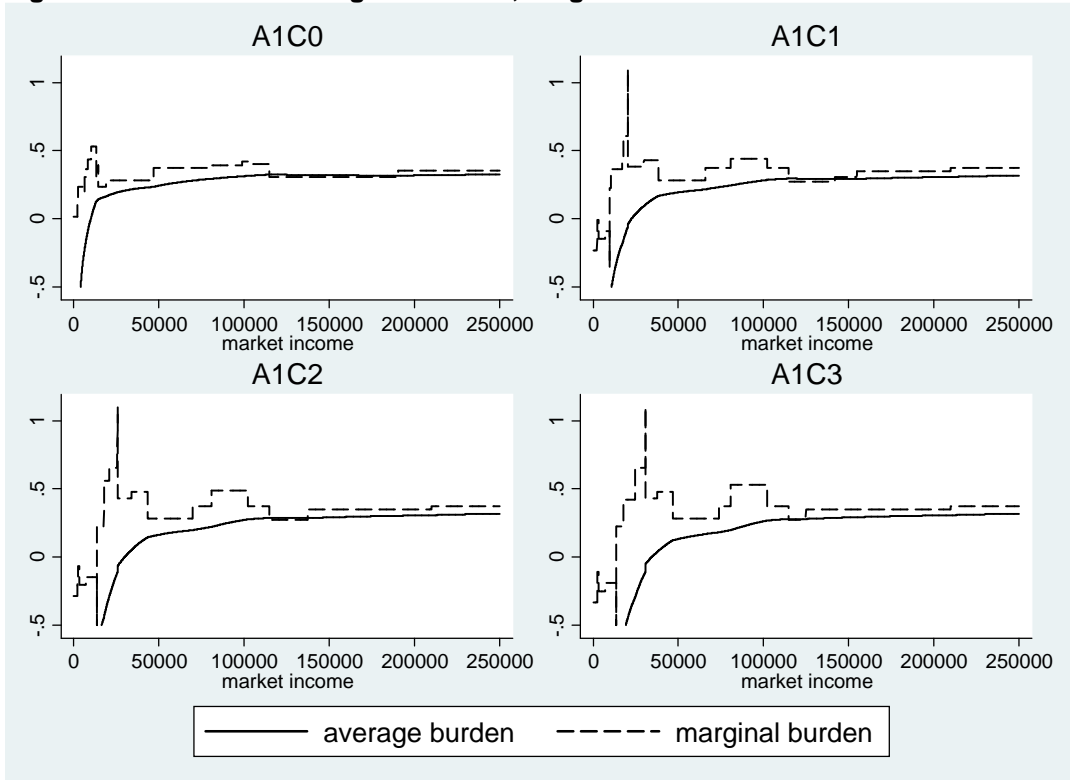


Figure 3: Absolute and marginal burden, Two Adults Households

30
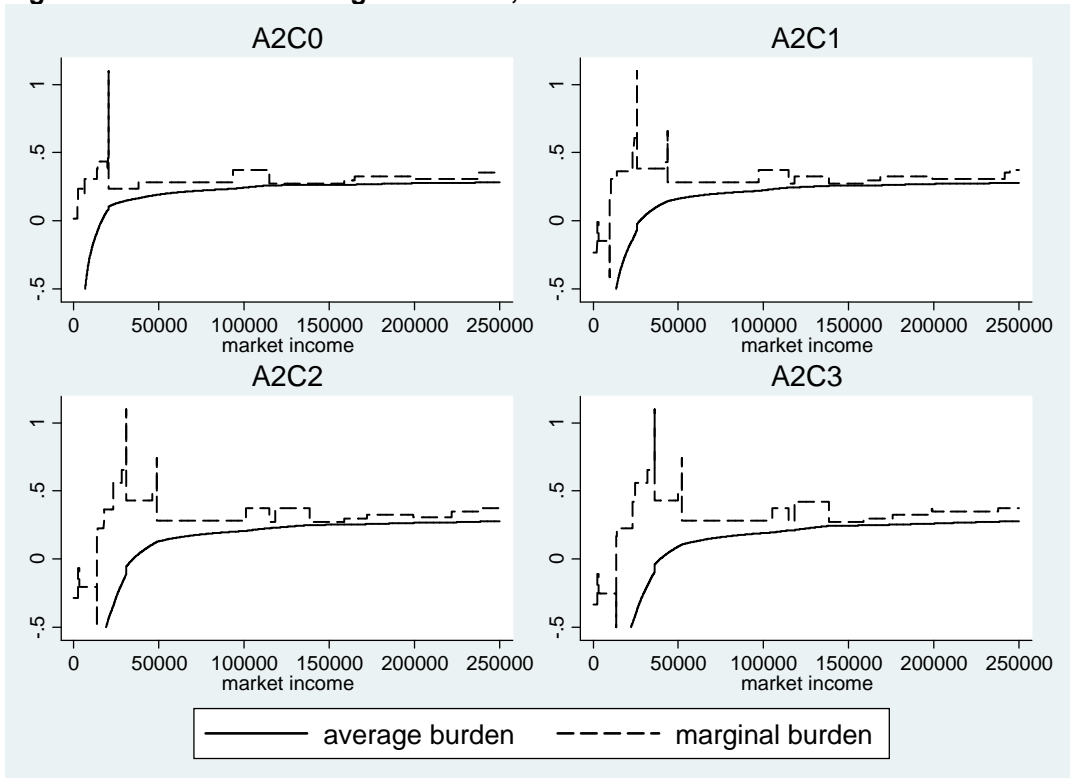
Figure 4: Horizontal Equity on Federal Level
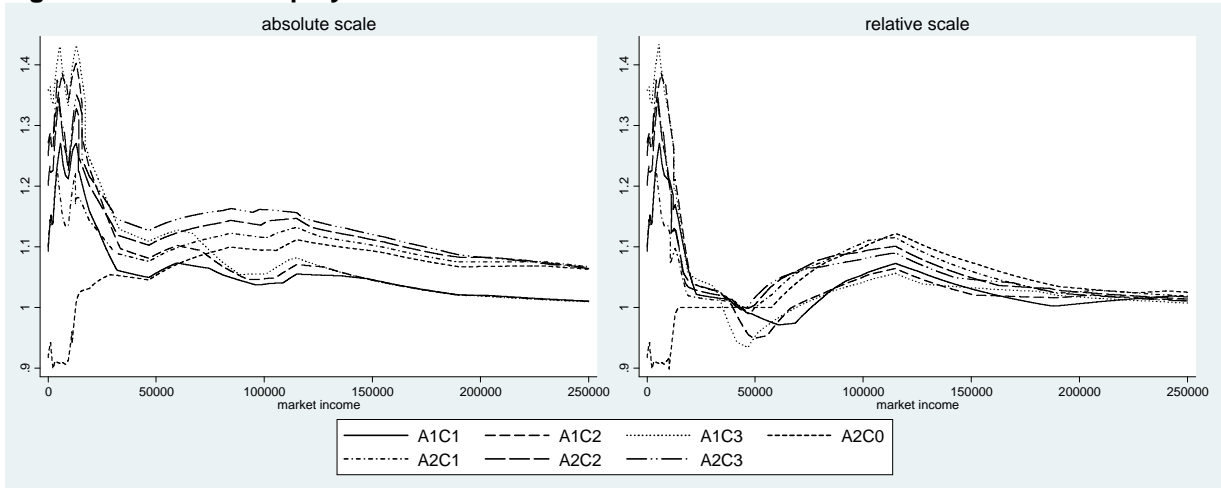
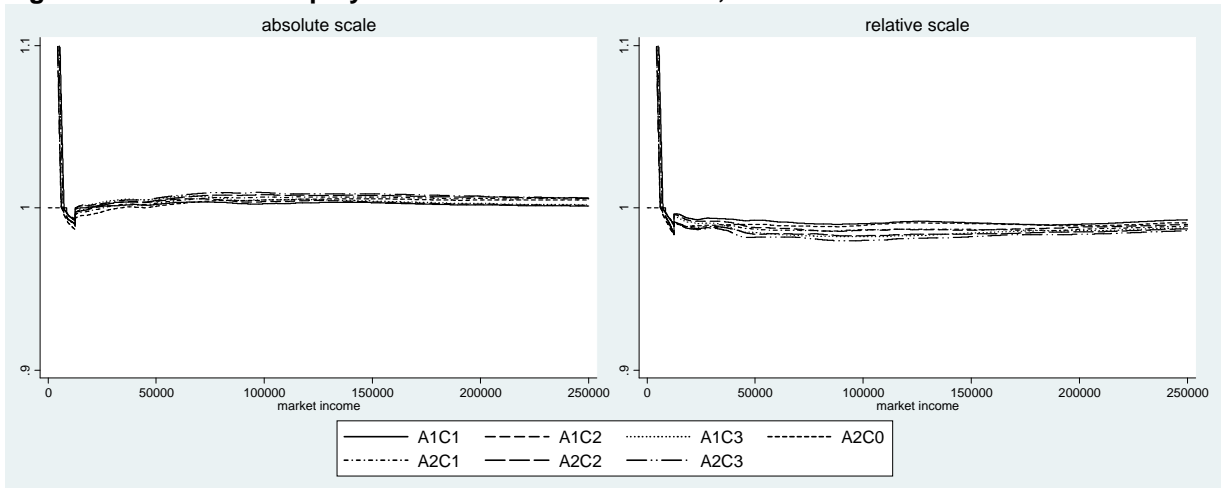**Figure 5: Horizontal Equity in Relation to Federal Level, California**
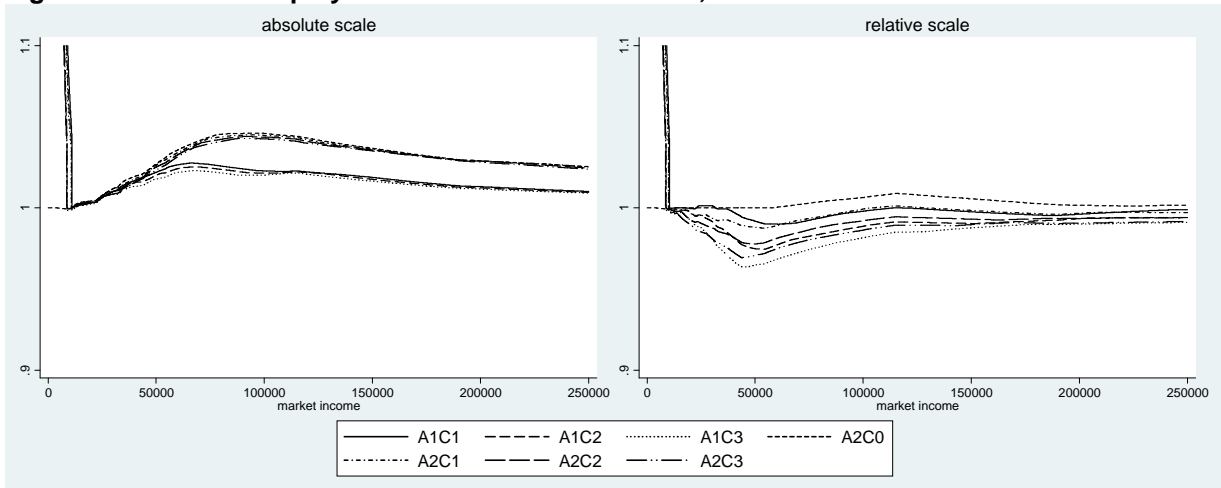
Figure A1: Absolute and Marginal Burden (excluding Social Security Taxes), Single Adult Households
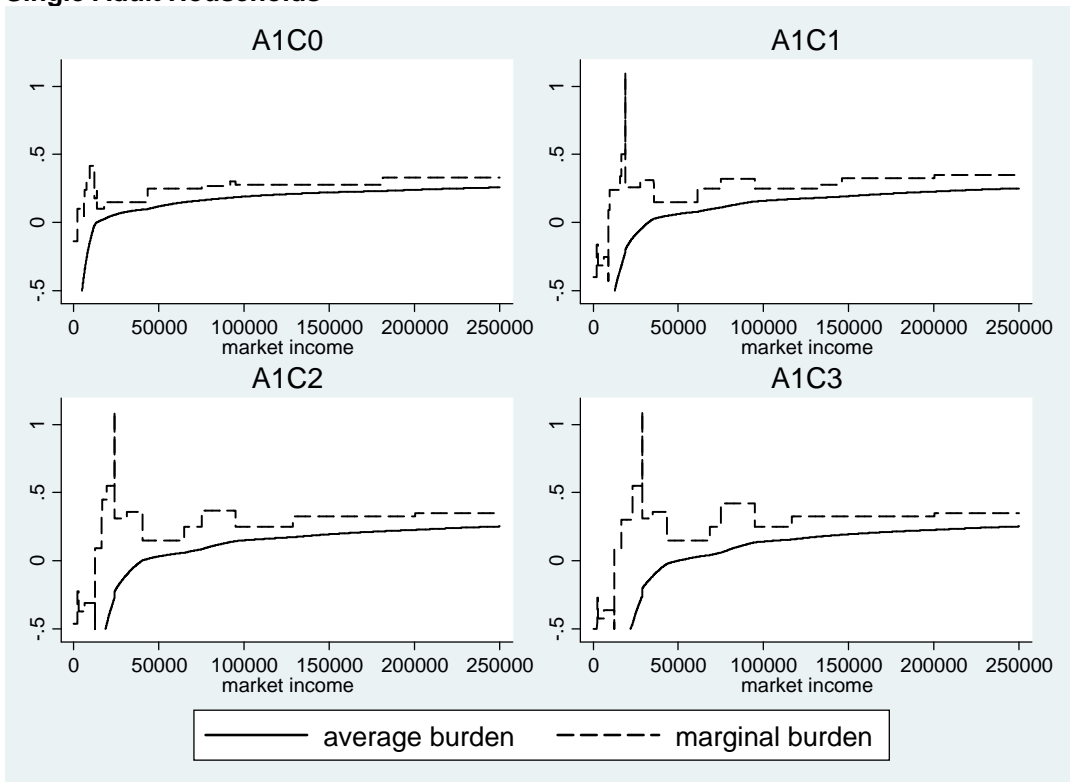
Figure A2: Absolute and Marginal Burden (excluding Social Security Taxes), Two Adults Households
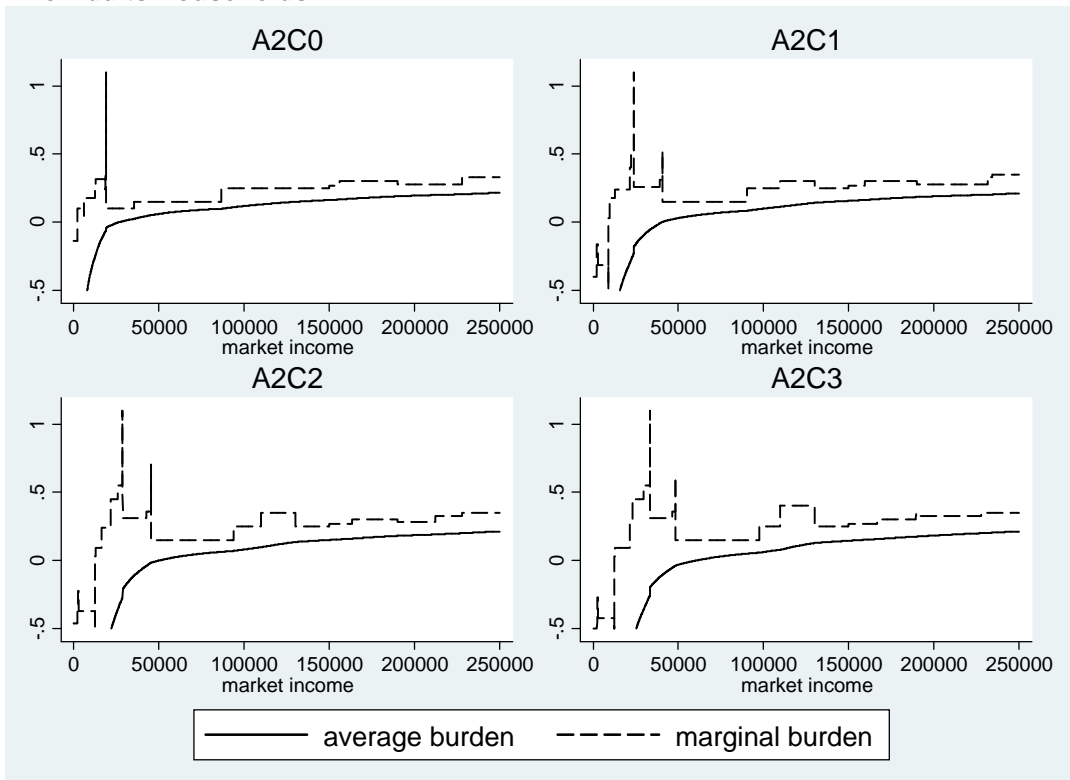
Figure A3: Horizontal Equity on Federal Level (excluding Social Security Taxes)
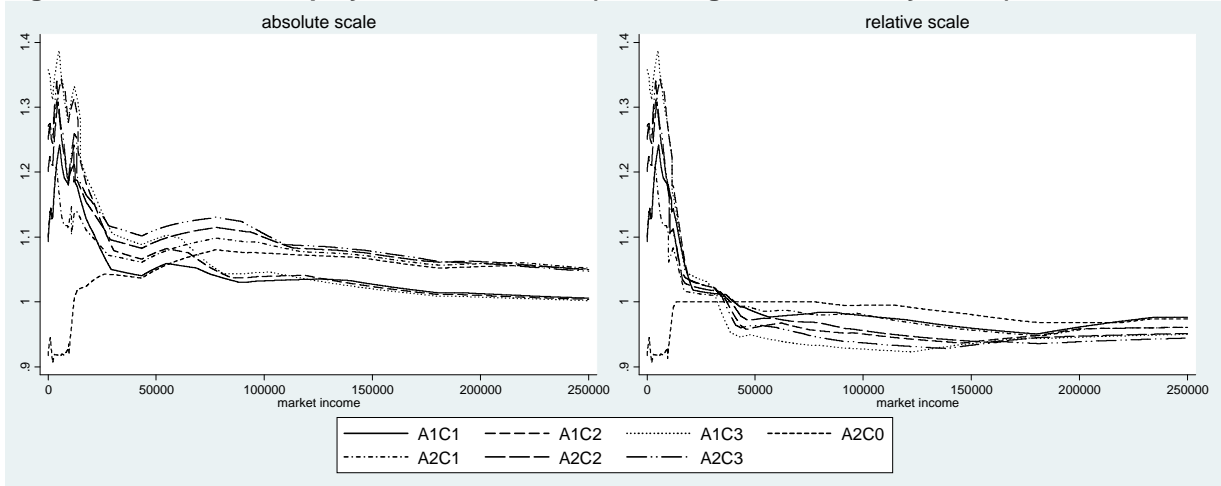
Figure B1: Absolute and Marginal Burden (Two-Income Earners), Two Adults Households
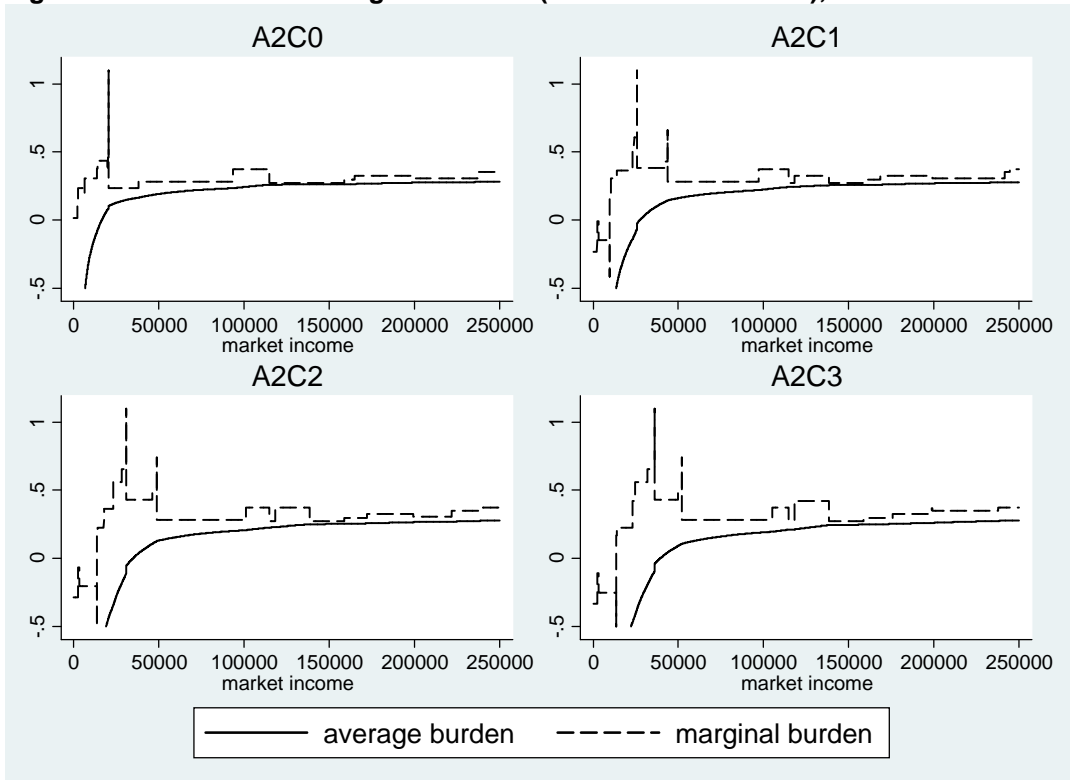
Figure B2: Horizontal Equity on Federal Level (Two-Income Earners)
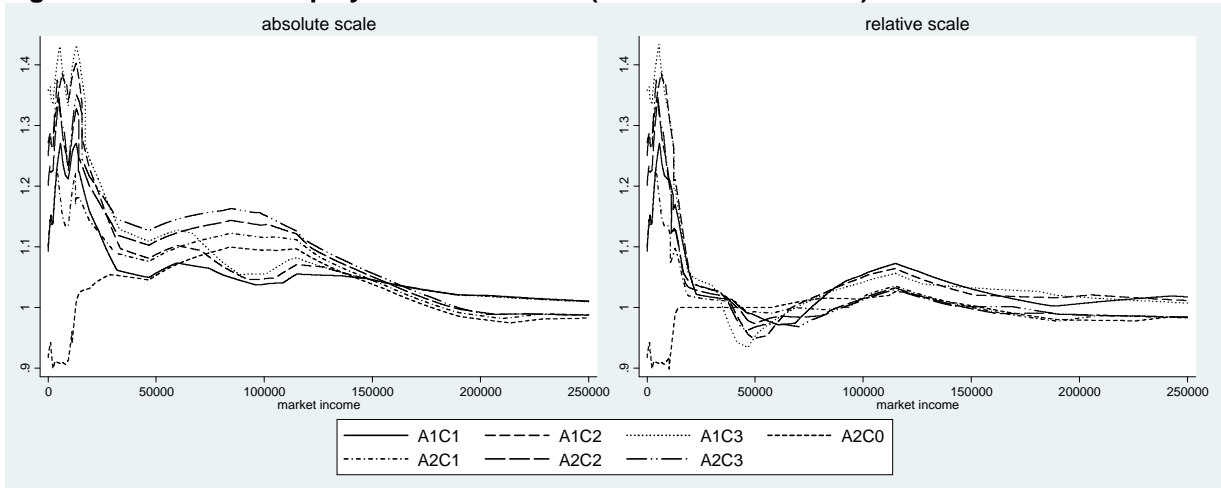
Figure C1: Horizontal Equity in Relation to Federal Level, Florida
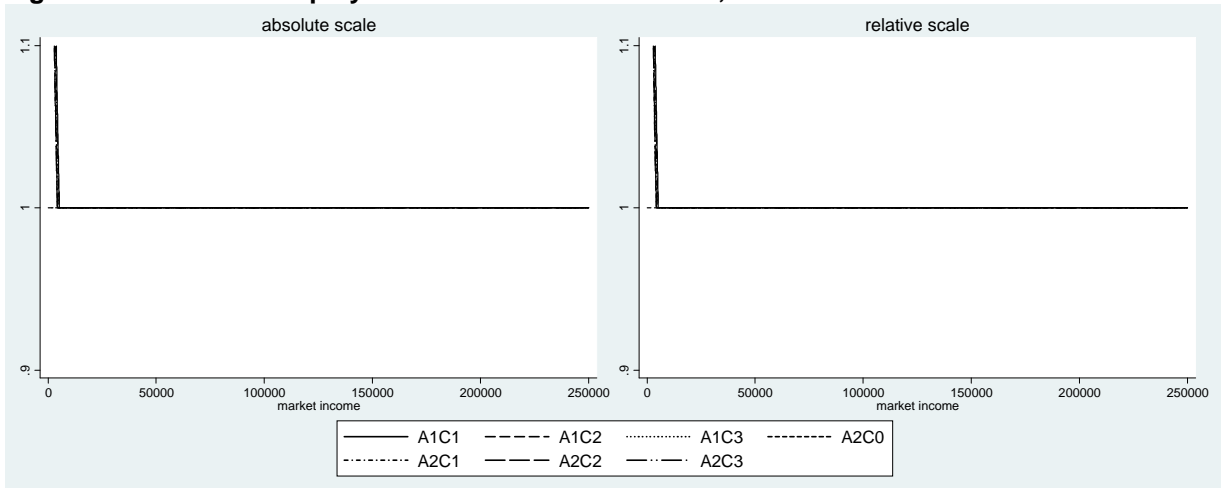
Figure C2: Horizontal Equity in Relation to Federal Level, Michigan

34
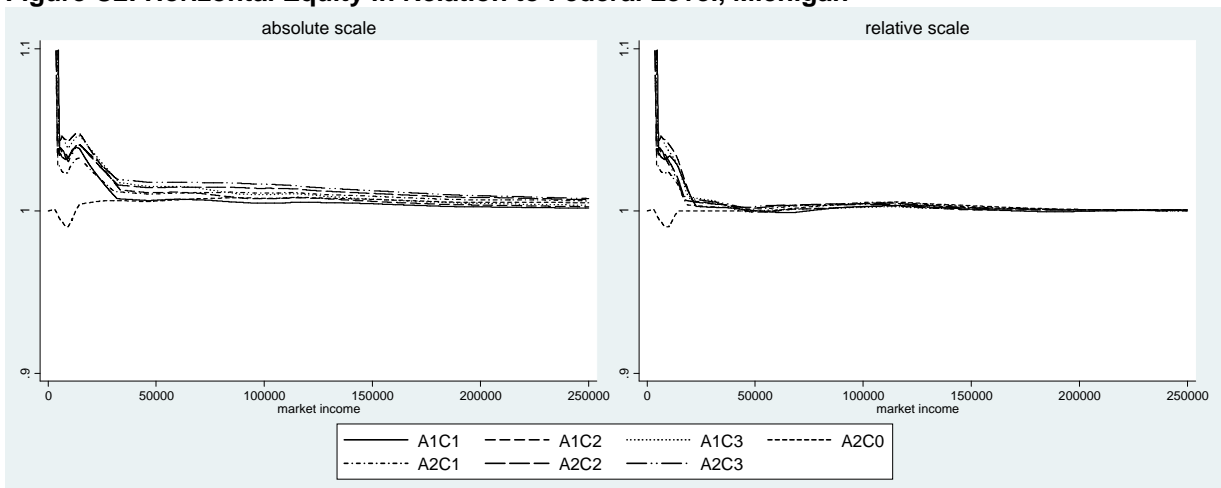
Figure C3: Horizontal Equity in Relation to Federal Level, New York
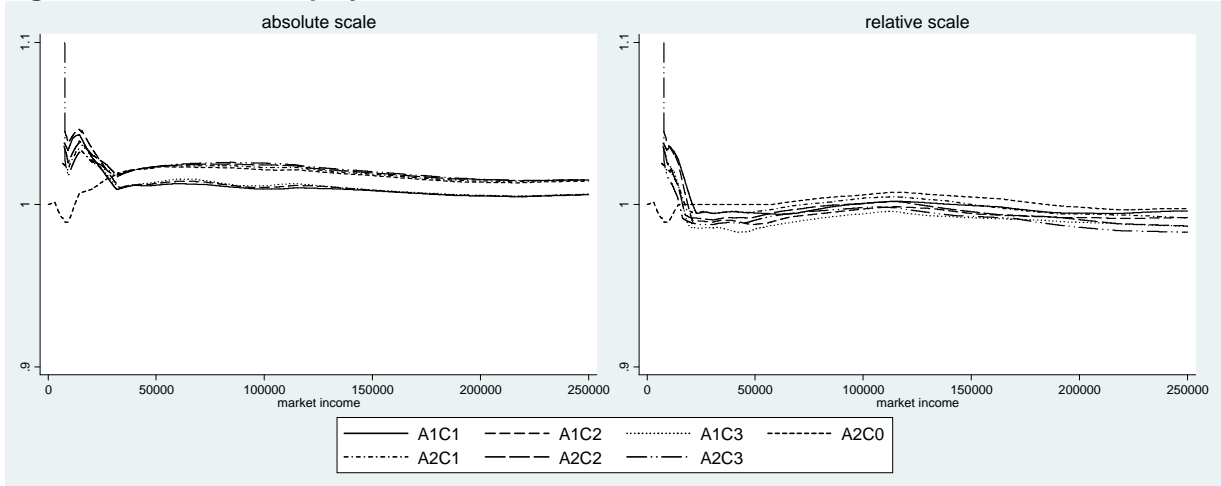
Figure C4: Horizontal Equity in Relation to Federal Level, Ohio

Figure C5: Horizontal Equity in Relation to Federal Level, Texas
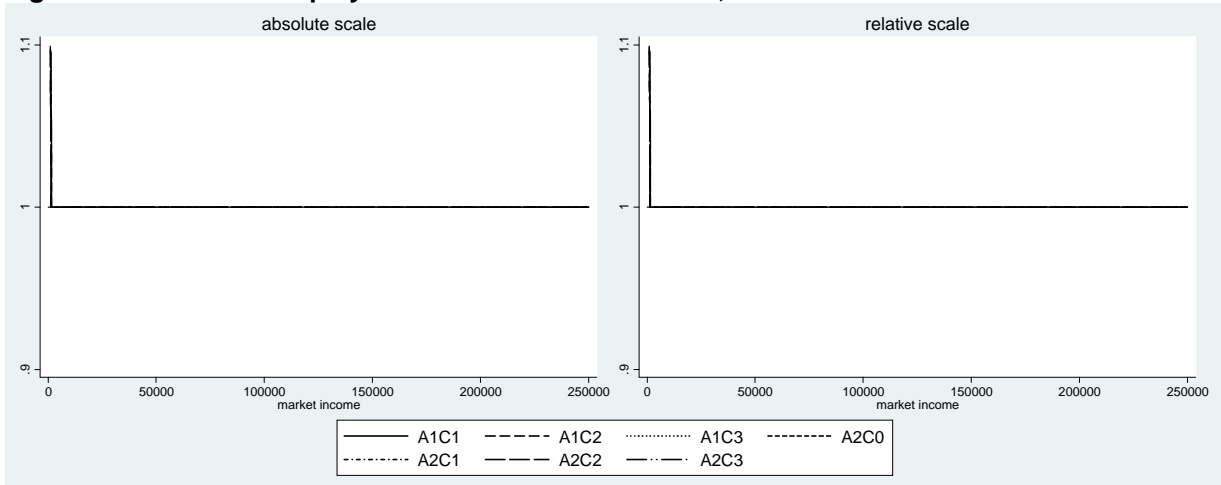
Diskussionsbeiträge
des Fachbereichs Wirtschaftswissenschaft
der Freien Universität Berlin

2012

2012/1 SCHULARICK, Moritz
     Public Debt and Financial Crisis in the Twentieth Century
     Economics

2012/2 NEHER, Frank
     Preferences for Redistribution around the World
     Economics

2012/3 BOCHOVE, Christiaan van / Lars BOERNER / Daniel QUINT
     Anglo-Dutch Premium Auctions in Eighteenth-Century Amsterdam
     Economics

2012/4 FOSSEN, Frank / Martin SIMMLER
     Differential taxation and firms' financial leverage – Evidence from the introduction
     of a flat tax on interest income
     Economics

2012/5 KÖNIG, Jan / Christoph SKUPNIK
     Labor market integration of migrants: Hidden costs and benefits in two-tier welfare
     states
     Economics

2012/6 CLUDIUS, Johanna / Martin BEZNOSKA / Viktor STEINER
     Distributional Effects of the European Emissions Trading System and the Role of
     Revenue Recycling
     Economics

2012/7 BRANDT, Thiemo / Rudi K. F. BRESSER
     Gaining Insight into Membership Strategy: Competitive Advantage by Shaping
     Institutions
     Strategic Management

2012/8 AMBROSIUS, Christian
     Are Remittances a 'Catalyst' for Financial Access? Evidence from Mexican Household
     Data
     Economics

2012/9 AMBROSIUS, Christian
     Are Remittances a Substitute for Credit? Carrying the Financial Burden of Health
     Shocks in National and Transnational Households
     Economics

2012/10 FRITZ, Barbara / André BIANCARELI / Laurissa MÜHLICH
     Regional Payment Systems: A Comparative Perspective on Europe and the
     Developing World
     Economics

2012/11 FOSSEN, Frank M.
     Risk Attitudes and Private Business Equity
     Economics

2012/12 HETSCHKO, Clemens / Dominic QUINT / Marius THYE
     Nationale Schuldenbremsen für die Länder der Europäischen Union : Taugt das
     deutsche Modell als Vorbild?
     Economics