Voting on income tax exemptions

Salvatore Barbaro
Johannes-Gutenberg
University of Mainz*

Jens Suedekum
University of Duisburg-Essen†

June 1, 2008

Abstract

Income tax systems in many countries contain numerous deduction possibilities, but structural income tax reforms—though frequently recommended—are difficult to implement in practice. In this paper we analyze the political economy of abolishing tax exemptions. Specifically, we build on the observation that they often lead to significant deduction amounts for a minority of the population only. We develop a simple direct democracy model with rational voting and perfect information where the government proposes to abolish one tax exemption. This reform proposal may not be politically feasible even though the majority uses the exemption at stake far below the average. Confronting our model with data, we estimate the political outcome of a widely discussed tax reform scenario: the abolition of commuting cost deductions in Germany in exchange for lower tax rates. Our model predicts that the majority would vote against such a reform, even though the distribution of deduction amounts is skewed to the right.

Keywords: Income tax reform, Tax exemptions, Tax base determination, Public choice

JEL Classification: D 72, D 74

*Johannes-Gutenberg University, Department of Law and Economics (FB03), 55099 Mainz, Germany.

†Corresponding author: Mercator School of Management. Lotharstraße 65, 47057 Duisburg, Germany. Phone: +49/(0)203/379-2357. jens.suedekum@uni-due.de

1 Introduction

Simplification of income tax systems is a policy issue of top priority in many countries. In the United States the federal government has recently appointed an expert commission that strongly adviced to cut back certain popular tax exemptions, e.g. of mortage interest or employer-provided health insurance, in exchange for lower tax rates. Tax base determination is even more complicated in most European countries and structural tax reforms are at least as urgently recommended (e.g., OECD, 2001). Pros and cons of itemized tax deductions have been widely discussed from a normative point of view, both in general terms (Kaplow, 1998; Slemrod and Kopczuk, 2002; Kopczuk, 2005; Richter, 2006) and with respect to specific cases (e.g. Kaplow, 1992). Advocates of comprehensive reforms emphasize that the availability of legal deduction possibilities eases illegal non-compliance, and that complexity may run counter to the intended distributive effects of taxation (Lang et al. (1997), Barbaro and Kaul (2007)).

An issue that has received far less attention is the *political feasibility* of abolishing tax exemptions. Although there seems to be a broad consensus that tax systems *should* be simplified, the political obstacles for adopting such reforms appear enormous. The aim of this paper is to address this difficulty of eliminating deduction possibilities. Straightforward political economy arguments suggest that the long-lasting persistence of certain (potentially inefficient) institutional features is due to the fact that they benefit the majority of the voting population. Yet, one remarkable feature of many tax exemptions is that only a *minority* in the society is significantly affected by them.

A vivid example is the tax deduction of commuting costs in Germany.[1]

[1]For illustrative purposes we will frequently refer to this example. However, this paper is concerned with tax deductions in general, not with commuting expenses in particular. For a more specific analysis of the political economy of commuting subsidies see Borck and Wrede (2005).

Figure 1 illustrates the distribution of total annual deduction amounts (in €) across German tax payers in 1997.[2] This distribution is skewed to the right with a median deduction amount of 1,482 € (the solid vertical line), and 67% of all tax payers writing off an amount below the average (1,875 €, the broken line). Figure 1 shows that a comfortable majority has deducted commuting expenses well below the average. Still this exemption has been part of German tax laws since the 1920s and has survived many political attempts to eliminate it.

If the majority of voters makes little use of a particular tax exemption, why do they not aim for its abolition in exchange for lower tax rates or alternative uses of goverment resources? Several arguments can be found in the political economy literature, which could be applied to the present context of structural income tax reforms. For example, one reason for the persistence of the commuting cost exemption could be the political power of lobby groups (like the powerful German car producers). An alternative reason could be that agents are not really aware of whether they belong to the winners or losers of a potential reform, due to incomplete information, and they might then exhibit a status-quo bias (Fernandez and Rodrik, 1991; Konrad, 2004).

The main point of this paper is to argue that there exists another simple reason why tax reforms can fail which try to abolish an exemption that is used below the average by the majority. The mechanism that we describe in this paper is not just an application of a general political economy argument to the area of tax reforms, but it is specific to tax reforms since it relies on the fundamental logic of government budget constraints. Moreover, we not only decribe this argument from a theoretical point of view, but we also provide evidence that it is empirically relevant.

[2]Data are taken from the most recent official national micro-survey of tax declarations that is currently available ("FAST98"). Below we provide more details about this data set. Tax laws in 1997 were such that every tax payer was allowed to write-off between 0.36 € and 0.41 € per kilometer of workplace commuting from the individual tax base.

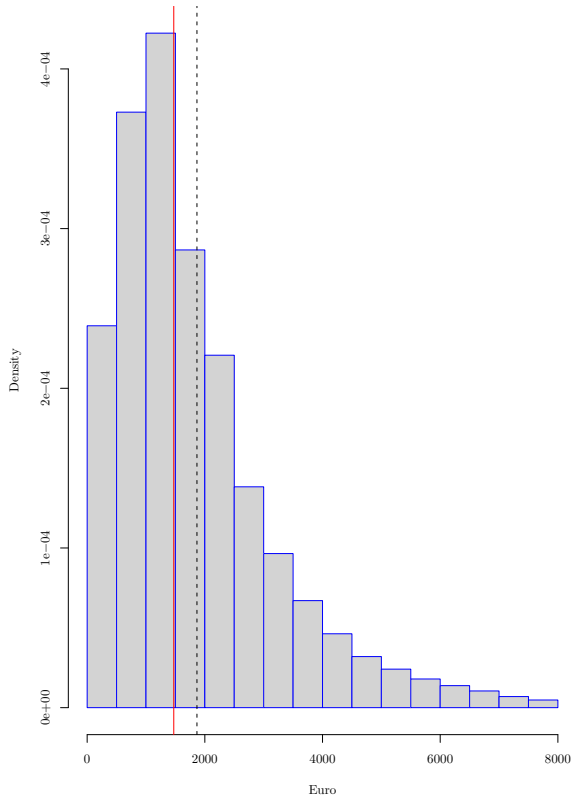

Figure 1: Distribution of commuting cost deductions in Germany, 1997. Source: own calculations based on "FAST98".

We model a society that consists of heterogeneous individuals, who differ in gross income and the use of several deduction possibilities. The tax schedule that is applied on individual tax bases exhibits direct progression, since this is a salient feature of income tax systems in many countries. Starting from an initial situation, the government wants to broaden tax bases by abolishing one legal write-off possibility. Additional tax proceeds that are generated by this reform could be used to increase the size of the public budget, for lowering tax rates, or for any combination of the two. Because of its political relevance we focus on one particular scenario from these various

possibilities, the proposal for a *tax-cut-cum-base-broadening* reform.[3]

We use the most basic political economy framework with direct democracy and fully informed and rational voters. The political feasibility of the reform proposal in the voting equilibrium can be shown to depend on the *joint* distribution of taxable income and all existing write-off possibilities across voters. This can give rise to the situation that the abolition of one particular deduction possibility is not feasible, even though the univariate distribution of deduction amounts is such that the majority uses it below the average (or hardly at all). Taking our model to real world data, we simulate the voting outcome on the proposal to abolish the deductability of commuting expenses in Germany, in exchange for a downward shift of the progressive tax schedule. We find that this reform agenda would *not* have been supported by the majority of German tax payers, despite the fact that the distribution of commuting cost deductions is skewed to the right.

These results suggest that fundamental budget logic in the most basic political economy model may help to understand why the abolition of certain tax exemptions is so difficult to implement in practice. This is not to say that the other arguments, like the power of lobby groups or information deficits, are irrelevant. We rather point at another, simple but previously unnoticed theoretical channel that complements and reinforces the well known ones.

The remainder of this paper is structured as follows. In section 2 we review some related literature. The model is presented in section 3, and section 4 turns to the empirical application. Section 5 concludes.

2 Related literature

Voting on taxes and public spending is one of the oldest themes in public choice theory, dating back to the seminal contributions by Tullock (1959)

[3]In the case of the US revenue neutrality was claimed to be one irrefutable constraint for the proposals of the tax reform panel of the federal government. The same is true for most European tax reform agendas.

and Buchanan and Tullock (1962). Our model relates to this general literature, and in particular to the discussion about the political economy of income redistribution (Romer (1975); Roberts (1977), Meltzer and Richard (1981, 1983)). In these papers, voters decide on tax-transfer schemes and the personal attitude towards more redistribution is inversely related to income or income-generating abilities. While these papers mostly assume proportional taxation for simplicity, Pestieau (1975); Cukierman and Meltzer (1991); Creedy and François (1993), and Gans and Smart (1996) allow for progressive taxation.

The subsequent literature has considered various related issues. For example, Traxler (2006) analyzes tax evasion in the model of Meltzer and Richard (1981). Roine (2005) introduces costly investments in legal tax avoidance and shows that the rich may vote in favour of more redistribution if they can avoid taxes at low costs. Van Velthofen and Van Winden (1991) adopt a comprehensive view on the political economy of tax reforms with a particular focus on the effects of compliance and administrative costs, while Besley and Coate (2003) show how the availability of additional government instruments can change majorities on tax issues. Finally, Profeta (2007) analyze governments' attempts to attract swing voters by pursuing a tax reform.

None of these papers has specifically focused on the political economy of abolishing tax exemptions in revenue-neutral tax reforms, however, which is the main focus of this paper. In our model individuals do not vote over income tax schedules. The policy choice is whether to support or reject the abolition of a given tax exemption, whereas the tax-transfer scheme adjusts via the budget constraint of the state. Efficiency aspects, or any normative argument why exemptions exist in the first place, are deliberately neglected in order to focus exclusively on public choice mechanisms. The paper that is most closely related to ours is Barbaro and Suedekum (2006), who have analyzed the feasibility of drastic versus small tax reforms. However, they have only considered the special case of uniform gross incomes and proportional

taxation, and they have not confronted their model with real world data.

3 The model

3.1 Basic setup

Consider a population of heterogeneous individuals which is equally distributed on the interval $[0, 1]$. Individuals differ with respect to gross endowed income, y_i, and with respect to $n \geq 1$ tax deductible characteristics θ_j, where $j \in \{1, \ldots, n\}$. The j^{th} deduction of agent i (measured in monetary units) is denoted by $\theta_{ij} \geq 0$. These tax deductible characteristics are assumed to be exogenously given. Endogenous choice on the use of tax exemptions, or other forms of tax avoidance (such as illegal evasion) are not considered.[4] An individual i deducts the predetermined amount $\sum_j \theta_{ij}$ to arrive at taxable income $x_i \equiv y_i - \sum_j \theta_{ij}$, which is assumed to be strictly positive for all agents.

An initial tax schedule $T_0(x)$ is defined, which has the following form:

$$T_0(x) = t_0 \cdot x + f(x), \tag{1}$$

with $0 < t_0 < 1$. In case of proportional taxation, the term $f(x)$ is equal to zero. In a progressive tax system, we consider $f(x)$ to be positive, continuous, differentiable, and strictly monotonously increasing in taxable income x, with $f(0) = T_0(0) = 0$. Moreover, $f'(x)$ is strictly concave (i.e. $f'' > 0, f''' < 0$) with $f'(0) = 0 \Rightarrow T'(0) = t_0$ and $\lim_{x\to\infty} f'(x) = \hat{t} > 0$ with $0 < t_0 + \hat{t} < 1$. I.e., the marginal tax rate schedule $T_0'(x)$ starts at some initial tax rate t_0,

[4] In reality, there is endogenous choice on the use of deductions. Agents can, for example, adjust their tax relevant behaviour (the commuting distance) to prevailing tax incentives (the deduction amount per kilometer). This endogenous initial choice, or possible adjustments of the tax relevant behaviour are not the focus of our model, however, because agents with predetermined deductions will be faced with the one-shot decision whether to support or reject an abolition of a tax exemption.

rises less than proportionately according to $f'(x)$, and then approaches some limit $t_0 + \hat{t}$ strictly below unity. This captures several key aspects of directly progressive tax schedules.

Tax revenue is redistributed by the government in a lump-sum fashion, so that every individual receives a transfer $\lambda_0 > 0$. After-tax income of agent i including transfer in the initial situation is

$$U_{i,0} = y_i - T_0(x_i) + \lambda_0, \tag{2}$$

which is used to purchase a private consumption good for which the price is normalized to unity. To close the model we impose a balanced budget of the state,

$$\lambda_0 = \int_0^1 T_0(x_i)\ di = t_0\bar{x} + \int_0^1 f(x_i)\ di, \tag{3}$$

where a bar over a variable indicates the average value in the society.

In this paper we focus on the case where the government makes a reform proposal aiming for the elimination of one single exemption θ_n, with all other deductions remaining constant. The proceeds received by eliminating θ_n are used to finance lower tax rates (tax-cut-cum-base-broadening). The state is the agenda setter and makes only one proposal in the time period that we consider. This proposal either gains support by the majority in a direct democratic vote, or the status quo prevails. That is, we limit the available policy space to a one-shot 0/1-decision.

In the case that the reform is implemented, the tax base of individual i would broaden to become $y_i - \sum_{j=1}^{n-1} \theta_{ij} = x_i + \theta_{in}$. Disposable income would change to

$$U_{i,1} = y_i - T_1(x_i + \theta_{in}) + \lambda_0, \tag{4}$$

where $T_1(.)$ describes the post-reform tax schedule. An individual is indif-

ferent between the reform proposal and the initial status quo, and would abstain from voting, if

$$\begin{aligned}\tilde{U}_i &\equiv U_{i,1} - U_{i,0} \\ &= T_0\left(x_i\right) - T_1\left(x_i + \theta_{in}\right) = 0,\end{aligned} \tag{5}$$

i.e., if her total tax payment remains unchanged. She participates in an election if $\tilde{U}_i \neq 0$. In particular, she rejects the proposal if $\tilde{U}_i < 0$, and she supports it if $\tilde{U}_i > 0$.[5] The abolition of tax exemption θ_n is politically feasible if more than half of the participating voters support this reform proposal in a direct democratic vote.

There are many different ways *how* tax rates can be cut in a progressive system. Tax reform proposals in reality sometimes involve a flattening of the marginal tax rate schedule. In the extreme, the additional government revenue could even be used to finance a transition towards a flat tax regime. Altough these cases could be analyzed by referring to the indifference condition (5), we assume that the additional tax proceeds are used to finance a *parallel* downward shift of the marginal tax rate schedule by some factor δ. This case highlights the main mechanisms underlying the political economy of structural tax reforms while delivering analytically very tractable results.

When a parallel shift is considered, the post-reform marginal tax schedule is given by $T_1'(x_i) = T_0'(x_i) - \delta = (t_0 - \delta) + f'(x_i)$, which makes sure that marginal tax rates change such that $T_0''(x_i) = T_1''(x_i) = f''(x_i)$, and the post-reform tax payment would be

$$T_1(x_i + \theta_{in}) = (t_0 - \delta)(x_i + \theta_{in}) + f(x_i + \theta_{in}). \tag{6}$$

Setting eq.(6) equal to the pre-reform tax payment $T_0(x_i) = t_0 x_i + f(x_i)$,

[5] This simple rule deliberately neglects efficiency gains of a tax reform. If such effects were allowed for, post-reform gross income would increase to—say—y_i', and expression (5) would have an additional term $(y_i' - y_i) > 0$. Voters would then accept a tax reform more easily.

we obtain

$$\delta = \frac{t_0\theta_{in} + F_i}{x_i + \theta_{in}}, \tag{7}$$

where $F_i \equiv f(x_i + \theta_{in}) - f(x_i) \geq 0$ is labelled the "individual progression effect" for voter i. This term denotes the change in the personal tax payment that results from the upward movement in the progressive tax schedule after the broadening of the individual tax base.

Using (6) and the budget constraint of the state with unchanged government expenditure λ_0, we have

$$\lambda_0 = \int_0^1 T_1(x_i + \theta_{in})\, di = (t_0 - \delta)\left(\bar{x} + \bar{\theta}_n\right) + \int_0^1 f(x_i + \theta_{in})\, di. \tag{8}$$

Inserting the initial budget constraint (3) and solving for δ, the marginal tax rate schedule can shift down by the following factor:

$$\delta = \frac{t_0\bar{\theta}_n + F}{\bar{x} + \bar{\theta}_n}, \tag{9}$$

where $F \equiv \int_0^1 [f(x_i + \theta_{in}) - f(x_i)]\, di \geq 0$ is labelled the "average progression effect", i.e., the average tax bill increase due to the base broadening and the subsequent upward movement in the progressive schedule. Note that F and F_i are equal to zero under proportional taxation and strictly positive in a progressive tax system.

Combining (9) and (7) and solving for θ_{in}, we find that a voter is indifferent between the tax reform scenario and the status quo if her individual deduction equals some critical level $\tilde{\theta}_{in}$ that is given by

$$\tilde{\theta}_{in} = \frac{x_i\left(t_0\bar{\theta}_n + F\right) - F_i\left(\bar{x} + \bar{\theta}_n\right)}{t_0\bar{x} - F}. \tag{10}$$

If the voter's actual deduction amount is lower than this threshold level (if

$\theta_{in} < \tilde{\theta}_{in}$) she would support the reform proposal, whereas she would reject it if $\theta_{in} > \tilde{\theta}_{in}$. To ensure that this threshold level is non-negative for all voters ($\tilde{\theta}_{in} \geqq 0$), we have to assume that neither F_i nor F is too large. This assumption, which is provided formally in appendix A, implies economically that the degree of tax progression is not too strong in this economy. We can then state the following result:

Proposition 1 *Under a progressive tax schedule, the proposal to abolish exemption θ_n in exchange for a downward shift of the marginal tax rate schedule is accepted if $\theta_{in} < \tilde{\theta}_{in}$ is true for more than half of voting population, and the proposal is rejected otherwise. The final voting outcome need not coincide with the policy preference of the individual with median value of deduction θ_{in}.*

To prove that the voter with median value of the deduction θ_{in} is in general not decisive for the voting outcome follows immediately, because $\tilde{\theta}_{in}$ depends on *two* independent individual characteristics: the deduction amount θ_{in} and overall taxable income x_i. Hence the single-crossing property with respect to θ_{in} does not hold, and the voting outcome cannot be inferred from the univariate distribution of θ_{in} alone.[6]

One implication of the proposition is that a person with low deduction amount may actually vote *against* the abolition of θ_n. What is the intuition for this result? On the one hand, voters with low deduction face only a small "cost" when the reform is implemented, because the tax base is broadened only by a small amount. However, the "benefits" of the reform are also unequally distributed across the voting population, because the falling tax rates apply to the entire taxable income. For a given deduction amount the

[6]The single crossing property in the present context with a 0/1 policy space states that if some voter with individual type $\theta_{1n} > \bar{\theta}_n$ prefers the status quo over the reform scenario, then any other voter with $\theta_{2n} > \theta_{1n}$ has the same policy preference. Analogously, if one with $\theta_{1n} < \bar{\theta}_n$ supports the reform, then anyone with $\theta_{2n} < \theta_{1n}$ also does so. This is not the case in the present context, however, because individuals with equal θ_{in} can have a different policy preference, subject to differences in x_i.

reform is more valuable to individuals with high taxable income x_i while individuals with low income benefit less from the falling tax rates. Every person trades off the individual costs and benefits of the reform. Hence, even if the reform implies only a small cost for a person with low θ_{in}, the beneficial effect of falling tax rates can be even smaller if income x_i is sufficiently low, so that a negative vote on the reform proposal results. More formally, we show in appendix A that the same restrictions which ensure $\tilde{\theta}_{in} > 0$ also imply that this threshold levelis increasing in x_i ($d(\tilde{\theta}_{in})/dx_i > 0$). That is, voters become more willing to accept the reform proposal for a given deduction amount the larger their taxable income is, because they are relatively stronger affected by the falling tax rates.

3.2 An example with proportional taxation

The central insight of the proposition remains valid even in a proportional tax system. Consider the threshold deduction amount in (10) with $F_i = F = 0$, which reduces to $\tilde{\theta}_{in} = \left(\frac{x_i}{\bar{x}}\right)\bar{\theta}_n$. The voting decision of any person depends on two variables also in this tax regime (x_i and θ_{in}), so that the person with median deduction amount is in general not decisive for the political outcome.[7] Therefore, the reform proposal to abolish θ_n may be voted down even if the this tax exemption is used below the average by the majority of voters. The following simple example illustrates this point:

Suppose the economy consists of three (homogenous groups of) voters. The distribution of the deduction θ_n is such that the median ($\theta_2 = 3$) is below the average ($\bar{\theta}_n = 10$). At the same time, voters differ with respect to pre-reform taxable income, with average income equal to $\bar{x} = 40$ and aggregate tax base equal to 120. With an initial income tax rate $t_0 = 0.25$, aggregate

[7] It is possible in this particular case of proportional taxation to precisely characterize the voting equilibrium. It is easily seen that all voters with $\frac{\theta_{in}}{x_i} < \frac{\theta_n}{\bar{x}}$ support the reform proposal, and all voters with $\frac{\theta_{in}}{x_i} > \frac{\bar{\theta}_n}{\bar{x}}$ reject it. Hence, the abolition of θ_n is politically feasible iff the joint distribution of θ_{in} and x_i is such that $\frac{\theta_{in}}{x_i} < \frac{\bar{\theta}_n}{\bar{x}}$ is true for more than half of the voting population.

		Voter 1	Voter 2	Voter 3	
	θ_{in}	2	3	25	$\theta_n = 10$
STATUS	x_i	5	30	85	$\bar{x} = 40$
QUO	$T_{0,i}$	1.25	7.5	21.25	$T_0 = 30$
$t_0 = 0.25$	λ_0	10	10	10	
	$T_{0,i} - \lambda_0$	-8.75	-2.5	11.25	
	$x_i + \theta_{in}$	7	33	110	
REFORM	$T_{1,i}$	1.4	6.6	22	$T_1 = 30$
$t_1 = 0.2$	λ_1	10	10	10	
	$T_{1,i} - \lambda_1$	-8.6	-3.4	12	
	Vote	reject	support	reject	REJECT
BUDGET	$x_i + \theta_{in}$	7	33	110	
ENLARGEMENT	$T_{1,i}$	1.75	8.25	27.5	$T_1 = 37.5$
$t_1 = 0.25$	λ_1	12.5	12.5	12.5	
	$T_{1,i} - \lambda_1$	-10.75	-4.25	15	
	Vote	support	support	reject	SUPPORT

Table 1: Numerical example

tax revenue is equal to 30, which is redistributed lump sum ($\lambda_0 = 10$). As can be seen, voters 1 and 2 make a negative net contribution to the public budget (-8.75 and -2.5, respectively), whereas voter 3 is a net payer (11.25).

The elimination of the tax exemption θ_n would lead to a broadening of the individual tax bases to 7, 33 and 110, respectively, see the second row in the table. Due to the base broadening, the income tax rate necessary to finance the public budget of size 30 can fall to $t_1 = 0.2$. Individual tax payments change to 1.4, 6.6 and 22, respectively, whereas the lump-sum transfer remains at $\lambda_1 = \lambda_0 = 10$. Comparing net contributions, voter 1 rejects the reform proposal (as $-8.6 > -8.75$), although she uses tax exemption θ_n far below the average. This is so, because her tax base is also small, and she is relatively stronger affected from the base broadening than from the falling tax rate. In sum, the reform will be rejected by the majority. This political outcome is against the preference of voter 2, who has median taxable income and the median deduction amount.

Interestingly, a different type of tax reform could be implemented in this example. Suppose the tax rate remains at $t_1 = 0.25$ and the additional tax proceeds from eliminating θ_n are used to increase the size of the public budget. In this case, aggregate tax revenue increases to 37.5 and the lump-sum transfer to $\lambda_1 = 12.5$. Comparing this reform scenario with the initial status quo, we find that voters 1 and 2 would support whereas voter 3 would reject this reform. The proposal to abolish exemption θ_n in exchange for higher transfers would be politically successful in this example, unlike the reform proposal that involves a reduction of tax rates.[8]

3.3 Multiple deductions and the choice of the policy space

The voting outcome in the society depends on the joint distribution of θ_{in} and x_i, and on the specificities of the tax schedule via F and F_i. This implies, by the definition of taxable income x_i, that the political feasibility of a tax reform targeted at one single exemption depends on the joint distribution of gross income y_i and *all available* deductions: the one at stake, but also those *not* at stake. Think, for example, of a situation in which there are two initial write-off possibilities (θ_1 and θ_2) and the government suggests to eliminate θ_1. Individual voting decisions will be affected by how much a person uses θ_2. More specifically, a voter is less likely to support the cut of θ_1 in exchange for lower tax rates the more she uses θ_2, because $d(\tilde{\theta}_{i1})/dx_i > 0$ and $dx_i/d\theta_2 < 0$.

As shown by Barbaro and Suedekum (2006) in a simpler model with proportional taxation and uniform gross incomes, this interdependence can give rise to a mutual persistence of tax exemptions. For example, there are constellations in their model where neither θ_1 nor θ_2 can be abolished in isolation, but a "big" reform that aims at the simultaneous cut of both

[8] In the appendix we briefly analyze this type of "budget enlargement reform" within our theoretical model. Because of the higher relevance in recent real-world policy agenda we focus on the tax-cut-cum-base-broadening reform in the remainder of this paper, however.

exemptions is implementable.[9] In a different constellation either θ_1 or θ_2 can be cut initially, but once one deduction possibility is eliminated there is no longer a majority for cutting the other one. More generally, with multiple initial deductions the choice of the policy space (which deductions are at stake, or in which sequence are tax reforms suggested) will critically affect the voting outcome in the society, and no general statements about the feasibility of tax reforms are possible.

In our model we focus on a reform proposal with one deduction θ_n at stake and all other deductions remaining constant. The focus on this simple scenario can be defended with three arguments. Firstly, Barbaro and Suedekum (2006) have already analyzed the interdependencies between exemptions at stake and exemptions not at stake in greater detail. Even though our model is more general since we allow for heterogeneous gross incomes and progressive taxation, similar examples could be constructed in our model. Secondly, the interpretation of θ_n as a single write-off possibility need not be taken literally. All results hold if θ_n is interpreted as a package of several exemptions that are all at stake, even if we do not analyze explicitly how exemptions outside this package affect the voting outcome.[10] Finally, many reform proposals in practise concentrate on one particular tax privilege so that the main interpretation of θ_n as a single exemption is not unrealistic. This interpretation also eases the empirical application of our model, to which we turn next.

[9] This possibility is likely to arise when the use of θ_1 and θ_2 is negatively correlated across voters, so that implicit logrolling warrants the support of the majority. A voter who intensively uses θ_1 does not accept an isolated cut of θ_1. However, if θ_2 is cut as well, and this voter makes little use of θ_2, then tax rates can fall sufficiently strongly.

[10] More formally, one could assume that a package of $m < n$ initial deductions is about to be eliminated, whereas $n - m$ exemptions remain untouched. In that case post-reform taxable income would be $y_i - \sum_{j=1}^{n-m} \theta_{i,j} = x_i + \theta_{i,n}^S$ where $\theta_{i,n}^S = \theta_{i,n} + \theta_{i,n-1} + ... + \theta_{i,n-m+1}$ denotes the total deduction amount for all exemptions at stake, and $\overline{\theta}_{i,n}^S$ is the average of this amount across all voters. A modified threshold deduction amount at which a voter is indifferent can then be derived in a straightforward way.

4 Empirical application

The voting equilibrium under the premise of progressive taxation cannot be characterized further without making more specific assumptions. One could turn to numerical simulations and explore whether actual deductions are below the respective critical level for the majority of voters when specific functional forms for the tax schedule and the joint distribution of θ_{in} and x_i are assumed. However, instead of presenting *arbitrary* examples, we will rather turn to an *empirical* example based on real world data. Specifically, we will simulate the voting outcome on a reform proposal that aims at the abolition of commuting cost deductions in Germany in exchange for a downward shift of the progressive marginal tax rate schedule.

Such reform proposals have been discussed widely over the last decades. Some specific proposals have been more "extreme" than others, because they also aimed at a flattening of the marginal tax schedule. These proposals faced particularly stiff opposition (exemplified by the *Kirchhof-proposals* in the German electoral campaign 2005) because they were conceived to benefit the high income classes in an undue way. The case analyzed in the theoretical model, where the marginal tax schedule shifts down proportionally, is actually representative for several other, more "modest" reform agendas that have been floating around the political market place.

4.1 Data set and computation of critical deduction amounts

Data are taken from the official micro survey of German tax declarations, "FAST98". This highly reliable data set is drawn from some 3 million tax declarations for the determination of the annual income tax 1997 in Germany, which accounts for a representative 10% survey of all tax payers. For each person, total income y_i is known, as well as the deduction amount for various tax exemptions including commuting costs, which serves to compute

the individual-specific variables θ_{in} and x_i. To calibrate the tax schedule (eq. (1)) we set $t_0 = .229$, which is equal to the starting tax rate valid in 1997. The individual progression effect F_i is computed in the following way: for every tax payer, we determine the actual total tax payment using the official schedule valid that year, and separate the proportional part $t_0 x_i$. The term $f(x_i)$ is then obtained by subtracting $t_0 x_i$ from the actual tax bill. We repeat this excercise for hypothetical post-reform taxable income when the deduction amount for commuting costs is added, $(x_i + \theta_{in})$. We again isolate the proportional part $t_0(x_{in} + \theta_{in})$ with an unchanged initial rate t_0, subtract this from the hypothetical post-reform total tax payment, and calculate $f\left(x_i + \theta_{in}\right)$. The individual progression effect F_i is then readily obtained for every person as $f(x_i + \theta_{in}) - f(x_i)$, and the average progression effect F is the arithmetic mean of F_i across all tax payers.

We then have all the ingredients to compute the individual-specific critical deduction amounts $\tilde{\theta}_{in}$, as defined in eq. (10). According to our theoretical model, a voter rejects (supports) the reform whose actual deduction amount is larger (smaller) than her respective threshold level. Hence, we compute $\Theta_{in} \equiv \theta_{in} - \tilde{\theta}_{in}$ for every individual. This variable Θ_{in} is denoted in € and measures the difference between the actual and the hypothetical annual deduction amount at which a voter is indifferent between the reform proposal and the status quo. Consequently, a voter rejects the reform if $\Theta_{in} > 0$ and she supports it if $\Theta_{in} < 0$. The predicted political outcome in the society as a whole can then directly be inferred from the distribution of Θ_{in} across voters.

In the practical calibration of our model we face the problem that German tax laws have several features that are not part of the theoretical model but which affect the data on individual tax declarations. Most notably this concerns tax-free basic income (*Grundfreibetrag*) and household taxation of married couples (*Ehegattensplitting*). We have implemented our model by treating every spouse as an individual taxpayer. Furthermore we hypothet-

ically increase the tax base of every person by the amount of the tax-free basic income and assume that the tax schedule actually starts at $x_i = 0$, as in our model. Both procedures tend to inflate taxable incomes and the critical deduction amounts $\tilde{\theta}_{in}$ evenly across the voting population, and thereby also the variable Θ_{in}. Since this is so, we do not report the distribution of the absolute values of Θ_{in}, but we scale down the distribution with the mean of $\tilde{\theta}_{in}$ across voters.[11]

4.2 Results

Figure 2 illustrates the density of $\left(\Theta_{in}/\bar{\tilde{\theta}}_{in}\right)$ for the case of commuting cost deductions in Germany in 1997. The median of this distribution, represented by the vertical solid line, is in fact positive at a value around 0.39. Since the scaling factor is around $\bar{\tilde{\theta}}_{in}$ =1866 € one can calculate that the "'median voter"' deducts some Θ_{in} = 727€ more per annum than she should deduct in order to accept an abolition of the commuting cost exemption. Hence, considering the hypothetical situation of a direct democratic vote over the proposal to abolish the tax deductability of commuting expenses in exchange for a parallel downward shift of the marginal tax rate schedule, our calibration exercise suggests that the majority of German tax payers would have rationally voted *against* this reform proposal in 1997. This is true, even though the majority of German tax payers has used this tax exemption far below the average, as shown above in figure 1.

The intuition for this finding can be understood by referring to the joint distribution of commuting cost deductions and overall taxable income in Germany 1997, which is illustrated in tables 2 and 3. Table 2 shows that a large part of the population (around 48%) have both, below-average taxable income and below-average commuting cost deductions. The other groups in

[11] Notice that this normalization does not affect the prediction whether or not an individual will vote in favour or against the reform proposal at stake (since $sign(\Theta_{in}) = sign\left(\Theta_{in}/\bar{\tilde{\theta}}_{in}\right)$ as $\bar{\tilde{\theta}}_{in} > 0$).

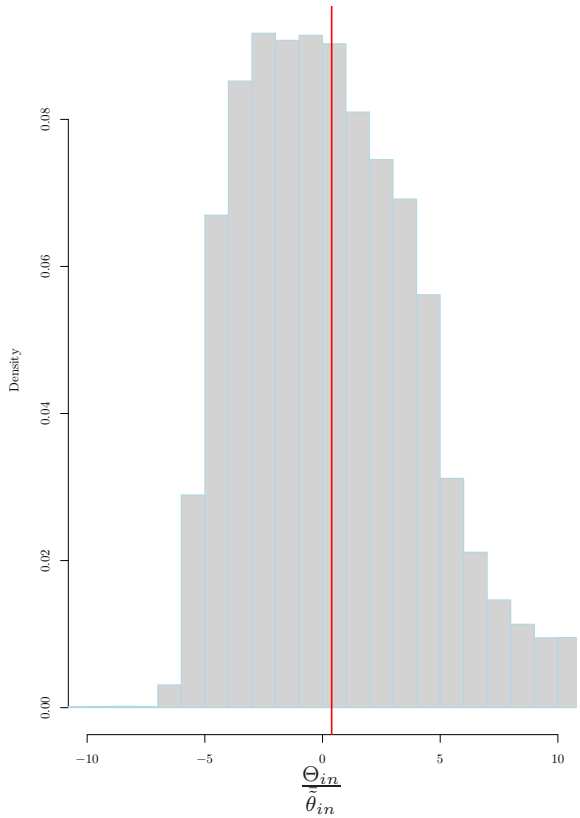

Figure 2: Density of $\frac{\Theta_{in}}{\tilde{\theta}_{in}}$ for the case of commuting cost deductions in Germany. Source: Own calculations based on "FAST 98"

the society (low income/ high deduction, high income/low deduction, high income/high deduction) are considerably smaller and account for only 15-19% of the total population each.

Table 3 reports the average (gross and taxable) incomes in the quartiles of the distribution of commuting cost deductions. This table shows that individuals in the lowest quartile (the population with the 25% lowest commuting cost deductions) earn considerably less on average than individuals in the highest quartile. Tables 2 and 3 consistently suggest that most German tax payers have both, below-average commuting deductions *and* below-average

	tax base below average	tax base above average
cd below average	48.3%	19.5%
cd above average	15.6%	16.6%

Table 2: Commuting deduction (cd) and taxable income. Source: "FAST 98"

	cd.q1	cd.q2	cd.q3	cd.q4
$\bar{y}$	36360	37360	38990	45100
$\bar{x}$	28760	29540	30550	34370

Table 3: Mean gross income ($\bar{y}$) and mean taxable income ($\bar{x}$) across commuting deduction (cd) quartiles. Source: "FAST 98"

taxable income. Furthermore, people who deduct little also tend to earn little. In the model we have shown that voters with low income will easier reject a tax-cut-cum-base-broadening reform than rich agents for given deduction amounts ($\partial\tilde{\theta}_{in}/\partial x_i > 0$, see appendix A). The empirical example in this section suggests that this general reluctance towards balanced-budget tax reforms that comes from the skewed income distribution can outweigh the effect that the majority makes little use of a particular tax exemption.

Our approach can be applied to other tax exemptions, and we have tested the prediction of our model for several further examples. For many items it is the case that the vast majority of taxpayers does not declare anything. When these write-off possibilities are eliminated the implied tax rate decline is mostly also very small, so that the values of θ_{in}, $\widehat{\theta}_{in}$ and $\left(\Theta_{in}/\bar{\tilde{\theta}}_{in}\right)$ are all heavily clustered around zero in the population. In short, many tax privileges are too small in the aggregate to exert any notable effect on the taxpayers.[12] Some interesting insights can still be grasped from this calibration

[12]Commuting costs are an exeption in this respect, since most voters actually declare some deductions. This makes this particular exemption appealing for the empirical application of our model.

exercise. For the case of tax allowances for homeowners (*Eigenheimzulage*), for example, our model predicts a negative median value of the distribution of $\left(\Theta_{in}/\tilde{\bar{\theta}}_{in}\right)$ in 1997. That is, the majority should vote in favour of the abolition of this particular tax privilege according to our model, and this deduction item has in fact been eliminated in the year 2006. A negative median is also found for the case of the general allowance for interest earnings (*Sparerfreibetrag*), a tax exemption that still exists but that has been reduced recently.

5 Conclusion

In this paper we have developed a simple theoretical model that shows why certain tax exemptions are not voted down in democratic societies, even though they are primarily used by a minority of the population. The mechanism of the model relies on fundamental budget logic in the most basic political economy model with direct democracy and rational voting. Confronting our model with real world data on tax deductions for commuting expenses in Germany, we show that this exemption would not have been abolished in a hypothetical direct democratic vote, even though the distribution of commuting cost deduction is skewed to the right. This empirical application emphasizes the relevance of our argument.

The mechanism described in this paper is not the single causal explanation why commuting expenses have not been voted down in Germany for such a long time. Other influences like the power of lobby groups, or incomplete information are surely also relevant to understand this phenomenon. However, we like to stress that fundamental budget logic alone can at least add to the understanding why certain tax privileges are so difficult to abolish in practise. This fact has been ignored in the previous literature. The main contribution of this paper is to point at this simple mechanism, and to provide affirmative empirical evidence.

A Appendix

A.1 Threshold deduction level for tax-cut-cum-base-broadening reform

To ensure that the critical deduction amount $\tilde{\theta}_{in}$ is actually positive we impose two restrictions. Firstly, we require that $t_0\bar{x} - F > 0$ so that the denominator of (10) is positive. Secondly, we assume that

$$x_i\left(t_0\bar{\theta}_n + F\right) - F_i\left(\bar{x} + \bar{\theta}_n\right) > 0 \quad \Leftrightarrow \quad 0 < \frac{F_i}{x_i} < \frac{t_0\bar{\theta}_n + F}{\bar{x} + \bar{\theta}_n} \tag{11}$$

Econonmically, both restriction impose an upper bound on the degree of tax progression that prevails in this economy, because neither F_i nor F can become too large. Differentiating the critical level $\tilde{\theta}_{in}$ from (10), we have

$$\frac{d\tilde{\theta}_{in}}{dx_i} = \frac{t_0\bar{\theta} + F - F_i'(\bar{x} + \bar{\theta})}{t_0\bar{x} - F} \tag{12}$$

The first parameter restriction spelled out above, $(t_0\bar{x} - F) > 0$, ensures that the denominator of (12) is positive. Secondly, the assumptions that $f' > 0, f'' > 0, f''' < 0$ imply that F_i is an increasing and strictly concave function in x_i. From (11) and from strict concavity ($\frac{F_i}{x_i} > F_i' = \frac{dF_i}{dx_i}$) it then follows immediately that the numerator of (12) is also positive, and thus that $\frac{d\tilde{\theta}_{in}}{dx_i} > 0$.

A.2 Budget enlargement reform

Suppose the government uses the additional tax revenue that is generated by the cut of θ_n for increasing the lump-sum transfer rather than for lowering tax rates. Using (1) and (5), an individual is indifferent between this "budget

enlargement reform" and the status quo if

$$\begin{aligned} t_0 x_i + f(x_i) - \lambda_0 &= t_0 \cdot (x_i + \theta_{in}) + f(x_i + \theta_{in}) - \lambda_1 \Leftrightarrow \\ \lambda_1 - \lambda_0 &= t_0 \theta_{in} + F_i \end{aligned} \tag{13}$$

The increase of lump-sum transfers that satisfies the balanced-budget constraint of the state is given by

$$\lambda_1 - \lambda_0 = \int_0^1 \left[T_0(x_i + \theta_{in}) - T_0(x_i) \right] \, di = t_0 \cdot \bar{\theta}_n + F > 0 \tag{14}$$

Hence, using (13) and (14), a voter is indifferent between the status quo and this type of tax reform if her deduction θ_{in} is equal to the following threshold level:

$$\tilde{\theta}_{in}^{BE} = \bar{\theta}_n + \left(\frac{F - F_i}{t_0} \right). \tag{15}$$

Voters with actual deduction $\theta_{in} > \tilde{\theta}_{in}^{BE}$ reject and voters with $\theta_{in} < \tilde{\theta}_{in}^{BE}$ support this reform. As can be seen, the threshold $\tilde{\theta}_{in}^{BE}$ again depends on x_i (via F_i) so that the voter with median deduction amount θ_{in} need not be decisive for the voting outcome under progressive taxation, in general. However, in contrast to the tax-cut-cum-base-broadening-reform it is now the case that $\frac{\partial \tilde{\theta}_{in}^{BE}}{\partial x_i} = -F_i'/t_0 = -\left(f'(x_i + \theta_{in}) - f'(x_i) \right)/t_0 < 0$, i.e., voters become *less* willing to accept this type of reform the higher their taxable income x_i is.

References

Barbaro, S., Kaul, A., 2007. Income tax avoidance and tax equity: The case of Germany. Discussion Paper, University of Mainz.

Barbaro, S., Suedekum, J., 2006. Reforming a complicated income-tax system: The political economics perspective. European Journal of Political Economy 22, 41–59.

Besley, T., Coate, S., 2003. On the public choice critique of welfare economics. Public Choice 114, 253–273.

Borck, R., Wrede, M., 2005. Political economy of commuting subsidies. Journal of Urban Economics 57, 478–499.

Buchanan, J. M., Tullock, G., 1962. The calculus of consent. The University of Michigan Press, Ann Arbor.

Creedy, J., François, P., 1993. Voting over income tax progression in a two-period model. Journal of Public Economics 50, 291–298.

Cukierman, A., Meltzer, A. H., 1991. A political theory of progressive income taxation. In: Meltzer, Allan, H., Cukierman, A., Richard, S. F. (Eds.), Political Economy. Oxford University Press, Ch. 5, pp. 76–108.

Fernandez, R., Rodrik, D., 1991. Resistance to reform: Status quo bias in the presence of individual-specific uncertainty. American Economic Review 81, 1146–1155.

Gans, J. S., Smart, M., 1996. Majority voting with single-crossing preferences. Journal of Public Economics 59, 219–237.

Kaplow, L., 1992. Income tax deductions for losses as insurance. American Economic Review 82, 1013–1017.

Kaplow, L., 1998. Accuracy, complexity, and the income tax. Journal of Law, Economics, and Organization 14, 61–83.

Konrad, K. A., 2004. Inverse campaigning. The Economic Journal 114, 69–82.

Kopczuk, W., 2005. Tax bases, tax rates and the elasticity of reported income. Journal of Public Economics 89, 2093–2119.

Lang, O., Nöhrbaß, K.-H., Stahl, K., 1997. On income tax avoidance: the case of Germany. Journal of Public Economics 66, 327–347.

Meltzer, A. H., Richard, S. F., 1981. A rational theory of the size of government. Journal of Political Economy 89, 914–927.

Meltzer, A. H., Richard, S. F., 1983. Test of a rational theory of the size of government. Public Choice 41, 403–418.

OECD, 2001. Economic Survey Germany. OECD, Paris.

Pestieau, P. M., 1975. Progressive tax reform and majority voting. Public Choice 21, 69–78.

Profeta, P., 2007. Political support and tax reforms with an application to Italy. Public Choice 131, 141–155.

Richter, W., 2006. Efficiency effects of tax deductions for work-related expenses. International Tax and Public Finance 13, 685–699.

Roberts, K. W. S., 1977. Voting over income tax schedules. Journal of Public Economics 8, 329–340.

Roine, J., 2005. The political economics of not paying taxes. Public Choice 126, 107–134.

Romer, T., 1975. Individual welfare, majority voting and the properties of a linear income tax. Journal of Public Economics 4, 163–185.

Slemrod, J., Kopczuk, W., 2002. The optimal elasticity of taxable income. Journal of Pulic Economics 84, 91–112.

Traxler, C., 2006. Voting over taxes: The case of tax evasion. Munich Discussion Papers in Economics 2006-27.

Tullock, G., 1959. Problems of majority voting. Journal of Political Economy 67, 571–579.

Van Velthofen, B., Van Winden, F., 1991. A positive theory of tax reforms. Public Choice 72, 61–86.