Journal of Public Economics 96 (2012) 1–9

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

Majority voting and the welfare implications of tax avoidance☆

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ARTICLE INFO

Article history:
Received 14 July 2009
Received in revised form 2 July 2011
Accepted 6 July 2011
Available online xxxx

JEL classification:
H26
D72
D6

Keywords:
Tax avoidance
Welfare analysis
Majority voting
Median voter equilibrium

ABSTRACT

A benchmark result in the political economy of taxation is that majority voting over a linear income tax schedule will result in an inefficiently high tax rate whenever the median voter has a below-average income. The present paper examines the role of tax avoidance for this welfare result. For a right-skewed distribution of taxed income, we show that the political distortion from majority voting is increasing in the median voter's avoidance. Vice versa, keeping the decisive voter's avoidance constant, the political inefficiency is decreasing in the average level of avoidance in the economy.

1. Introduction

A benchmark result in the political economy of taxation is that majority voting over a linear income tax schedule will result in an inefficiently high tax rate whenever the median voter has a below-average income (Romer, 1975; Roberts, 1977; Meltzer and Richard, 1981). A substantial body of research builds upon this result. However, most contributions neglect the fact that the distribution of taxed incomes is shaped by taxpayers' activities to escape taxation. This is striking for two reasons: first, the magnitude of legal tax avoidance and illegal tax evasion is substantial. Lang et al. (1997) suggest that tax avoidance in Germany accounts for a loss of one third of income taxes actually paid. For the U.S., the income tax gap is estimated at a total of $345 billion — more than 15% of the estimated actual (paid plus unpaid) tax liability (Slemrod, 2007). Second, evasion and avoidance activities are quite heterogeneously allocated among the population. As a result, the distribution of true incomes differs substantially from the distribution of taxed incomes (Johns and Slemrod, 2010). When it comes to redistributive taxation, conflicting interests not only emerge between the rich and the poor, but also between those who avoid a lot of taxes and those who avoid little.

Despite the economic significance and the relevance for the political economy problem, only a few recent papers analyze the implications of tax evasion and avoidance on voting over taxes (Roine, 2006; Borck, 2009; Traxler, 2009a). However, none of these papers studies the welfare properties of the voting outcome. The present paper aims to close this gap in the literature. We examine whether tax avoidance aggravates or mitigates the political inefficiency that is introduced by majority voting.

Our analysis proceeds as follows. Section 2 introduces a model of avoidance in the spirit of Slemrod (1994). Individuals decide on costly but riskless activities that minimize their tax liability. For instance, taxpayers might shift income into untaxed fringe benefits, into preferentially-taxed capital gains, or into the future (e.g., via pension plans) (Slemrod and Yitzhaki, 2002). Although our analysis focusses on avoidance activities with a safe return, the model can be understood as a reduced form analysis of (illegal and thus) risky tax evasion in the spirit of Cowell (1990). In fact, one can easily show that our results generalize to the case of tax evasion.

Within the tax avoidance framework, we study majority voting over a linear income tax schedule with endogenous avoidance. We demonstrate that the median voter theorem is applicable and that the decisive voter is the taxpayer with the median taxed income rather than the median true income. Section 3 then compares the linear income tax scheme implemented by the median voter with the welfare-maximizing tax policy. We obtain a result which is analogous to the benchmark without avoidance: whenever the median voter's

☆ I am grateful to two anonymous referees and the editor, Wojciech Kopczuk, for many helpful comments. The paper further benefited from discussions with Felix Bierbrauer, Martin Hellwig and Joel Slemrod. I would also like to thank the Office of Tax Policy Research, University of Michigan, for the kind hospitality I enjoyed while working on this project. The usual disclaimer applies.
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0047-2727/$ – see front matter
doi:10.1016/j.jpubeco.2011.07.006

taxed income is below the average taxed income,[1] the political process will result in an inefficiently high tax rate. However, we also show that when this political distortion is decreasing, the less taxes the median voter avoids.

The intuition behind this observation is straightforward: with a right-skewed distribution of taxed income, the pivotal taxpayer considers marginal costs of taxation which are too low from a welfare-maximizing perspective. The less the pivotal taxpayer avoids, the higher is her effectively taxed income, and thus her private marginal costs from increasing the tax rate. With a lower level of avoidance, the median voter will favor a lower tax rate. This works into the opposite direction as the inclination to vote for 'too high taxes' (which is driven by a below-average true income) and thus reduces the inefficiency introduced by the majority voting.

A similar statement can be made for the average level of avoidance in the economy. Keeping constant the decisive voter's avoidance, the distortion introduced by majority voting is decreasing in the average level of tax avoidance. The reason for this result is that a higher level of avoidance reduces the marginal social costs of increasing the tax rate. Thus, the gap between the marginal social costs of taxation and the marginal costs considered by the decisive voter shrinks. Stated differently, avoidance brings the second-best tax rate closer to the tax rate implemented by the median voter.

The latter finding, which might appear counterintuitive from an optimal taxation perspective, requires two further clarifications. Note first that our welfare results are independent of the magnitude of taxpayers' *marginal* behavioral responses to taxation, which shape the elasticity of the tax base. This is the case, since the decisive voter takes into account exactly the same marginal responses to taxation as the welfare-maximizing planner. The crucial factor driving the welfare properties of the voting equilibrium will be only the distribution of the *level* of the effective tax base.

Second, our results are also independent of the *nature* of the behavioral responses that form the distribution of taxed income. Whether the latter distribution is shaped by tax avoidance, tax evasion, leisure choice, or other behavioral responses is not important for our results. To demonstrate this point, we show that our results generalize to the case of an endogenous labor–leisure decision in Section 4. Our analysis reveals that we can also interpret the consumption of leisure as a form of avoidance. In principle, we could therefore re-phrase our results in terms of leisure choice: when the political inefficiency is the lower, the lower is the median voter's foregone income due to the consumption of leisure.

These findings have several implications. First, we note that a sufficiently high level of tax avoidance may turn a right-skewed income distribution into a left-skewed distribution of taxed incomes. This would imply that majority voting results in an inefficiently low tax rate. Second, the inefficiency in the voting equilibrium is typically smaller for an avoidance pattern where high (true) income receivers and — in particular, for a more concave social welfare function — low (true) income receivers engage more heavily in tax avoidance than the middle class. As the observed distribution of taxed income is typically skewed to the right in modern economies (Gottschalk and Smeeding, 1997), the first observation seems mainly of theoretical interest. The latter point, however, seems quite relevant, as ample empirical evidence supports the case of a U-shaped avoidance pattern (Cox, 1984; Fratanduono, 1986; Johns and Slemrod, 2010).

Linking the literature on tax avoidance with the classical political economic work on voting over taxation (Romer, 1975; Roberts, 1977; Meltzer and Richard, 1981), our paper relates to Borck (2009), who considers tax evasion and risk-neutral taxpayers voting over redistribution, and Roine (2006), who studies majority voting on taxes when agents can make a discrete avoidance decision. In both studies, the median voter theorem is generally not applicable and a voting equilibrium may not exist. Traxler (2009a) introduces a reduced-form model of evasion that allows to apply the median voter result. The main lesson from these contributions is that evasion and avoidance may drive a wedge between the ranking of true and taxed incomes. In turn, this can shift the position of the decisive voter away from the median income receiver, which implies unusual patterns of redistribution (e.g., an 'ends against the middle' conflict). As noted earlier, none of these papers discusses the implications of avoidance or evasion for the welfare properties of the voting equilibrium.

Beyond the political economy literature, our work is related to the growing strand of research on the welfare consequences of evasion and avoidance for the optimal taxation of income (see, e.g., Cremer and Gahvari, 1994, 1996; Slemrod, 1994; Kopczuk, 2001; Chetty, 2009). The present paper has a different scope, as we pursue a different research question. Instead of providing a general welfare discussion of tax avoidance, we only study its consequences for the welfare assessment of the political economy outcome. Our analysis thus focusses on the link between avoidance and the inefficiency introduced by the political process. This welfare analysis is new in the literature.

2. Majority voting and tax avoidance

We consider an economy that is represented by a continuum of taxpayers with unit mass. Each taxpayer has an exogenous income y, distributed according to a cdf $F(y)$. Income is taxed at rate t; however, taxpayers can engage in costly activities that reduce the tax liability by the amount a. The (non-tax-deductible) costs for avoiding taxes are given by $K(a, e, y)$. Next to a and y, these costs also depend on the government's expenditures on tax enforcement e, which subsumes any costly activities that broaden the tax base. Avoidance costs are increasing and strictly convex in a, $K_a \geq 0$, $K_{aa} > 0$. K_{ay}, which reflects how marginal avoidance costs vary across income, may be locally positive or negative. Preferences over consumption C are described by $U(C)$, $U' > 0 > U''$. The taxpayer's problem is

$$\max_a \; U(C) \;\; \text{s.t.} \;\; C = y + g - t(y-a) - K(a, e, y),$$

with g denoting a lump-sum transfer.

A few remarks regarding our modeling approach are in order at the outset. First, the analysis can also be interpreted as a reduced form model of risky tax evasion in the spirit of Cowell (1990). This also means that the basic mechanism underlying our results not only operates for legal (and safe) avoidance, but also for illegal (and risky) evasion.[2] Second, while we focus on an exogenously given income, the results derived in the following carry over to the case of endogenous labor supply.[3] More generally speaking, our main finding will be independent of the *nature* (e.g., adjustments in tax avoidance, evasion or changes in the labor supply) and *magnitude* of taxpayers' marginal behavioral responses to taxation, which shape the elasticity of the tax base. As we will show below, the decisive voter will take into account exactly the same marginal responses to taxation as the welfare-maximizing planner. The crucial factor driving the welfare properties of the voting equilibrium will be only the distribution of the effective tax base. Whether this distribution is shaped by tax

[1] With a concave welfare function, the welfare properties of the voting equilibrium are characterized by the comparison of the median voter's taxed income relative to the *normalized, welfare-weighted, average taxed income*. To improve readability, we refer to the average taxed income throughout the Introduction section. Similarly, by right-skewed distribution of taxed income we refer to the case where the median income is lower than the normalized, welfare-weighted average taxed income.

[2] For a careful discussion of reduced form modeling of evasion and avoidance, see Balestrino and Galmarini (2003). Their analysis, as well as Cowell's (1990), points out that an immediate generalization from the avoidance to the evasion context would require $K(.)$ to depend on t. A closer analysis of the extension of our results to the evasion context is provided in an earlier version of the paper (Traxler, 2009b).

[3] For a formal treatment of this issue, see Appendix A3.

avoidance, evasion, leisure choice, or other behavioral responses, will be irrelevant for our result.

Optimal avoidance a is characterized by the first-order condition[4]

$$K_a\left(a^*, e, y\right) = t. \tag{1}$$

The budget-balancing transfer is given by tax revenues net of enforcement costs,

$$g(e,t) = t\int Z(y)dF - e = t\,\overline{Z} - e, \tag{2}$$

where $Z(y) := y - a^*(y)$ captures the effectively taxed income of an agent with income y, avoidance $a(y)$ and $\overline{Z}$ denotes the average effective tax base in the economy.

Next, we turn to the taxpayers' voting behavior. An agent's most preferred is characterized by

$$\max_t \; U(C) \;\text{ s.t. } C = y + g(e,t) - t\left(y - a^*\right) - K\left(a^*, e, y\right)$$

with $g(e, t)$ from Eq. (2). Making use of the envelope theorem, we obtain the first-order condition

$$Z(y) = \frac{\partial g}{\partial t}. \tag{3}$$

The most preferred tax rate equalizes a taxpayer's marginal costs from an increase in the tax rate, captured by $Z(y)$, with the marginal benefits from a higher lump-sum transfer. Voters' preferences can be ranked according to their taxed income — the higher Z, the lower the preferred tax rate. The monotonicity of preferences in Z assures that the median voter theorem is applicable (see Appendix A1), and the pivotal taxpayer is the one with the median level of $Z(y)$. Denoting the distribution function of $Z = Z(y)$ by $H(Z)$, we arrive at

Proposition 1. *The tax rate that wins majority voting is given by* $\hat{Z} = \partial g / \partial t$, *where* $\hat{Z}$ *is the median level of taxed income in the economy,* $H\left(\hat{Z}\right) = 1/2$.

Proof. See Appendix A. □

Proposition 1 characterizes the political equilibrium when tax avoidance is possible. The outcome is similar to the standard median voter result (Romer, 1975; Roberts, 1977; Meltzer and Richard, 1981). The key difference is that the pivotal taxpayer is the agent with median taxed income $\hat{Z}$, which is not necessarily identical to the one with the median true income. As discussed in the literature, tax avoidance and tax evasion can drive a wedge between the ranking of true and taxed incomes (Roine, 2006; Borck, 2009; Traxler, 2009a). As a result, this can shift the position of the decisive voter away from the median true income receiver. In our framework, the decisive voter may differ from the median income receiver if Z were non-monotonic in y, i.e., if taxed income were locally decreasing in income.[5] While this can give rise to unusual coalitions supporting an equilibrium (e.g. a coalition of rich and poor), the conditions for and the implications of such a non-monotonicity are closely discussed in Traxler (2009a). Here we focus on assessing the welfare properties of the median voter equilibrium, which hold independently of whether or not the median voter corresponds to the taxpayer with median true income.

[4] Corner solutions are excluded by assuming $K_a(0, e, y) = 0$ and $\lim_{a \to y} K_a(a, e, y) = \infty$.

[5] This would be the case if an income increase were accompanied by a sufficiently strong increase in tax avoidance (driven by lower marginal avoidance costs, $K_{ay} < 0$) such that the effectively taxed income declines.

3. Welfare analysis

We now compare the political outcome with the tax rate that maximizes social welfare $\int W[U(C(y,\, a^*(y)))]dF$, with $W' > 0 \geq W''$. Taking into account the taxpayers' avoidance behavior and the budget constraint, the social planner's problem becomes

$$\max_t \int W\left[U\left(y + g(e,t) - tZ(y) - K\left(a^*(y), e, y\right)\right)\right]dF \qquad \text{s.t. (1) and (2).}$$

Making use of Eq. (1) and rearranging, we obtain the first-order condition

$$\int \psi(y) Z(y) dF = \frac{\partial g}{\partial t}, \tag{4}$$

$$\text{with} \quad \psi(y) := \frac{W'[U(.)]U'(.)'}{\overline{W'U'}} \quad \text{and} \qquad \overline{W'U'} := \int W'[U(.)]U'(.)dF. \tag{5}$$

In the following, we will denote the LHS of condition (4), the marginal social costs of increasing the tax rate, as $\overline{Z}_\psi$. Also note that the RHS of Eq. (4), the marginal social benefits from a higher lump-sum transfer, is exactly the same as in Eq. (3). The comparison with the majority voting outcome characterized in Proposition 1 then yields the following result[6]:

Proposition 2. *The tax rate in the voting equilibrium* (**a**) *is inefficiently high,* (**b**) *is inefficiently low,* (**c**) *corresponds to the second-best tax rate, iff* (**a**) $\hat{Z} < \overline{Z}_\psi$ (**b**) $\hat{Z} > \overline{Z}_\psi$ (**c**) $\hat{Z} = \overline{Z}_\psi$, *respectively.*

Proof. See Appendix. □

The proposition extends the standard result on the welfare properties of the median voter equilibrium to the case of tax avoidance. As noted above, the RHS of Eq. (3) is identical to the RHS of Eq. (4). The welfare-maximizing planner and the voters thus consider the same marginal benefits from increasing the tax rate. All behavioral responses to taxation which shape the elasticity of the tax base — in particular, changes in tax avoidance (see (A.1) in the Appendix) — thus equally affect the planner's and the voters' choice of the tax rate. This implies that differences in the tax base elasticity do not impact the relative welfare assessment of the voting equilibrium (relative to the second-best). The inefficiency introduced by majority voting, captured by $|\hat{Z} - \overline{Z}_\psi|$, only emerges from the difference in the marginal costs of increasing the tax rate considered by the planner and the pivotal taxpayer, respectively.

To illustrate this point, consider first the textbook scenario without avoidance and hence $Z(y) = y$. For any income distribution where the median voter's income falls below the ψ-normalized (welfare-weighted) average income, $\hat{y} < \overline{y}_\psi$, the pivotal taxpayer considers marginal costs of taxation that are below the marginal social costs. The political equilibrium will therefore be characterized by an inefficiently high tax rate. For the case with tax avoidance, we get the same result, as long as the decisive voter has a *taxed* income below the (normalized) average tax base, $\hat{Z} < \overline{Z}_\psi$ (case a). If the opposite holds true, i.e., if the median voter has a taxed income $\hat{Z} > \overline{Z}_\psi$ (case b), majority voting results in an inefficiently low tax rate. For $\hat{Z} = \overline{Z}_\psi$ (case c), the political process does not introduce any further inefficiency.

[6] We call a tax rate *inefficiently* low [high], if it is lower [higher] than the rate characterized by condition (4).

3.1. The welfare implications of avoidance

To analyze the role of tax avoidance for the welfare assessment of the voting equilibrium, it is useful to rewrite the condition for case (a) as

$$\overline{a}_{\psi}^{*} - a^{*}\left(\hat{y}\right) < \overline{y}_{\psi} - \hat{y}. \tag{6}$$

The LHS of the condition captures the gap between the (normalized) average level of avoidance, $\overline{a}_{\psi}^{*}$, and the amount avoided by the pivotal taxpayer, $a^{*}\left(\hat{y}\right)$. In the following, this will be called the 'avoidance gap'. The RHS of Eq. (6) measures the gap between the (normalized) average true income $\overline{y}_{\psi}$ and a decisive voter's true income $\hat{y}$, the 'income gap'.[7] As long as the avoidance gap is smaller than the income gap, the political process will result in an inefficiently high tax rate.

To understand the intuition behind condition (6), consider an economy where the decisive taxpayer's true income coincides with the normalized mean, $\hat{y} = \overline{y}_{\psi}$. Without tax avoidance, majority voting does not introduce any political inefficiency. However, if agents differ with respect to their avoidance behavior, this will typically drive a wedge between the marginal social costs and the voters' private costs of increasing taxes. Assume, for instance, that the decisive voter avoids less than the (normalized) average, $a^{*}\left(\hat{y}\right) < \overline{a}_{\psi}^{*}$. For $\hat{y} = \overline{y}_{\psi}$, this implies $\hat{Z} > \overline{Z}_{\psi}$, which means that she faces marginal costs from increasing the tax rate which are above the marginal social costs. The LHS of Eq. (6) would be positive and the condition would be violated. Majority voting would therefore result in an inefficiently low tax rate. If the median voter avoided more than the (normalized) average, condition (6) would be met and we would obtain the opposite result.

Now turn to the scenario of a right-skewed income distribution with $\hat{y} < \overline{y}_{\psi}$, i.e., a case with a positive income gap. If tax avoidance varies along the income distribution ($K_{ay} \neq 0$), the LHS of Eq. (6) will generally differ from zero. Whenever the decisive voter avoids less than the (normalized) average, the avoidance gap will be positive and tends to offset the political distortion that emerges for $\hat{y} < \overline{y}_{\psi}$. If the avoidance gap is larger than the income gap, condition (6) would be violated. Majority voting could then result in an inefficiently low tax rate, despite a distribution of true incomes with $\hat{y} < \overline{y}_{\psi}$.[8]

Corollary 1. *The inefficiency introduced by majority voting is cet. par. decreasing [increasing] in the (normalized) average level of avoidance, and cet. par. increasing [decreasing] in the median voter's level of avoidance, as long as* $\hat{Z} < \overline{Z}_{\psi}\left[\hat{Z} > \overline{Z}_{\psi}\right]$.

The intuition behind this observation is straightforward. Recall first that the political inefficiency, as captured by $\left|\hat{Z} - \overline{Z}_{\psi}\right|$, is driven by the difference in the voter's *private* and the *social* marginal costs of raising t. Note further that the marginal social costs, $\overline{Z}_{\psi}$, are decreasing in avoidance $\overline{a}_{\psi}^{*}$. For $\hat{Z} < \overline{Z}_{\psi}$, where majority voting results in an inefficiently high tax rate, the political inefficiency is therefore smaller, the higher the (normalized) average avoidance is in the economy: the second-best tax rate will be closer to the tax that wins the elections. The opposite result applies for $\hat{Z} > \overline{Z}_{\psi}$, when majority voting yields an inefficiently low tax rate. In this case, the political inefficiency is increasing in the (normalized) average level of tax avoidance.

Equivalent statements can be made for the avoidance behavior of the median voter. The more the pivotal taxpayer avoids, the lower are her marginal costs from an increase in the tax rate. When the median voter has a below (normalized) average true income, this will amplify the inclination to vote for 'too low taxes'. When taxes are inefficiently high, i.e., if $\hat{Z} < \overline{Z}_{\psi}$, the political inefficiency is therefore increasing in the decisive voter's level of avoidance. For the alternative case of an inefficiently low tax rate, $\hat{Z} > \overline{Z}_{\psi}$, the inefficiency is lower and the more the median voter avoids.

3.2. Redistributive concerns

Proposition 2 and Corollary 1 hold independently the curvature of the welfare function. However, redistributive concerns will clearly affect the weight $\psi(y)$ in Eq. (4) and therefore the level of $\overline{y}_{\psi}$ and $\overline{a}_{\psi}^{*}$. It is straightforward to show that $\psi(y)$ is strictly decreasing in income for $K_y < 1 - t$. Hence, the avoidance behavior of low income groups will get a larger weight than avoidance among the rich. With stronger social preferences for redistribution, the difference in weights will become more pronounced. Depending on the income-avoidance pattern this could either result in an increase or a decrease in $\overline{a}_{\psi}^{*}$. The point is best illustrated graphically.

Fig. 1 plots the true income y (horizontal axis) against the taxed income $Z(y)$ (vertical axis) for two different avoidance technologies. A vertical deviation from the 45° line captures the amount of avoidance for a given income level. In the example depicted in the left panel, avoidance is increasing in income, such that avoidance is most prevalent among the top of the income distribution. In the second example, both the rich and the poor engage more actively in tax avoidance than the middle class.[9]

Consider the special case of a linear social welfare function and say that the decisive voter avoids less than the (normalized) average in both examples, i.e., $a^{*}\left(\hat{y}\right) < \overline{a}_{\psi'}^{*}$.[10] For this case there is a positive avoidance gap. This does not necessarily imply, however, that one gets a positive avoidance gap for the case of a concave welfare function. If the welfare function is concave, the amount of avoidance among the rich obtains a lower weight than the avoidance in the lower tail of the income distribution. Thus, for the avoidance pattern depicted in the left panel of Fig. 1, the avoidance gap will be smaller, once redistributive concerns are taken into account: $\overline{a}_{\psi}^{*} < \overline{a}_{\psi'}^{*}$. One might therefore get $\overline{a}_{\psi'}^{*} > a^{*}\left(\hat{y}\right) > \overline{a}_{\psi}^{*}$, i.e., a positive avoidance gap for a linear, but a negative avoidance gap for a concave welfare function. This ranking might turn around, if there is also avoidance among low-income receivers, as depicted in the right panel of Fig. 1. For this case, we could get a larger avoidance gap in the presence of redistributive concerns, $\overline{a}_{\psi}^{*} > \overline{a}_{\psi'}^{*} > a^{*}\left(\hat{y}\right)$, if the welfare weight on low income taxpayers' avoidance is sufficiently high.

The lessons to draw from these examples are clear-cut. As compared to an income–avoidance pattern with pronounced avoidance among the middle class, a pattern where taxpayers with intermediate incomes avoid fewer taxes than the poor and the rich, is morelikely to result in a positive avoidance gap. Hence, a higher level of tax avoidance will more strongly reduce the political inefficiency obtained for $\hat{Z} < \overline{Z}_{\psi}$ (see Corollary 1), if avoidance is

[7] As we do not rule out non-monotonicities in $Z(y)$,the income of the pivotal taxpayer does not necessarily equal the median income. Note further that $Z(y)$ is non-injective if Z is non-monotonic. In this case, there could be several income levels $\hat{y}_j$ and $\hat{y}_k$, $j \neq k$, for which $\hat{Z} = Z\left(\hat{y}_j\right) = Z\left(\hat{y}_k\right)$ holds. It is obvious that Eq. (6) holds for any $\hat{y}_k$ as long as it holds for $\hat{y}_j$. Therefore we treat $\hat{y}$ as if it were always unique.

[8] For the alternative scenario where the decisive voter avoids more than the (normalized) average, the LHS of Eq. (6) would be negative. The negative avoidance gap would further amplify the political inefficiency associated with the income gap. However, the empirical evidence discussed below suggests that this case is less plausible.

[9] The underlying avoidance technology in the first example satisfies $K_{ay} \leq 0\ \forall y$. In the second example, K_{ay} is positive for low income levels and turns negative starting with an intermediate income. In both examples, $Z(y)$ is monotonic in y such that the median income receiver corresponds to the agent with the median taxed income. See Traxler (2009a) for a discussion of cases with non-monotonicities.

[10] We use the subscript ψ' to indicate the welfare-weighted avoidance level for a linear welfare function ($W'' = 0$). In this case, the weighting term from Eq. (5) boils down to $\psi'(y) = U'(C(y, a^{*}(y)))/\bar{U}'$, which simply captures the curvature of the utility function.

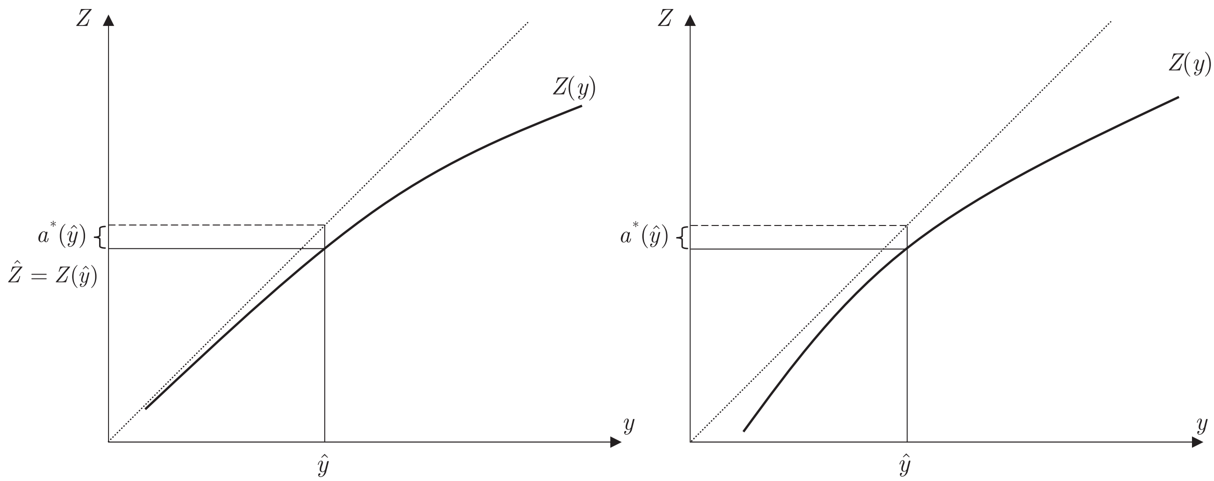

Fig. 1. Patterns of tax avoidance.

concentrated among the ends of the income distribution.[11] With a concave social welfare function, tax avoidance among low income groups is thereby particularly important in driving this effect.[12]

Given the importance of the avoidance–income pattern for the welfare properties of the political outcome, it is worth discussing empirical evidence on the distribution of tax avoidance. Little is known on the distribution of legal tax-minimizing activities, such as the usage of untaxed fringe benefits, tax-favored types of capital returns or the exploitation of tax loopholes (see Section 5 in Slemrod and Yitzhaki, 2002). A common conjecture is that higher-income receivers have access to more tax avoidance strategies. This view is supported by the evidence in Lang et al. (1997).

We know more about the distribution of illegal tax evasion. It is argued that richer taxpayers also have better access to evasion technologies which are closely related to receiving unmatched income.[13] Bloomquist (2003) reports that middle-income taxpayers have the highest share (above 90%) of third-party reported income. Following the evidence from Kleven et al. (2011), this implies that middle-income taxpayers have only limited opportunities to escape taxation. In a comprehensive analysis of micro-data from the National Research Program, Johns and Slemrod (2010) show that misreporting of income (as a fraction of true income) is increasing in true income. This evidence supports a pattern as depicted in the left panel of Fig. 1. When refundable tax credits are taken into account, Johns and Slemrod document a U-shaped relationship between adjusted gross income and misreporting. Based on random audit data, Cox (1984) and Fratanduono (1986) also find a U-shaped relationship between income and evasion — with the smallest amount of evasion among taxpayers around the median income level. The existence of a shadow economy that is mainly frequented by low-income taxpayers might further contribute to a U-shaped pattern (Schneider and Enste, 2000). This supports the pattern depicted on the right panel of Fig. 1. Finally, note that the stronger behavioral responses at the top and the high tax responsiveness at the bottom of the income distribution that is discussed in the taxable income literature (see, among many others, Gruber and Saez, 2002; Kopczuk, 2005; Saez et al., forthcoming), lend further support to this case.

4. Extensions

4.1. Generalization to other behavioral responses[14]

Our analysis builds upon a simple model of costly tax avoidance. It is important to note, however, that our results generalize to other forms of behavioral responses to taxation, most importantly to the case of endogenous labor supply. To see this point, we consider the standard model of labor supply (see Appendix A3). In order to demonstrate that our argument is not specific to our simple avoidance model, we assume for the moment that there is no scope for tax avoidance. It is straightforward to show that a median voter equilibrium with endogenous labor supply is characterized by

$$\hat{w}\left(1-\ell^*\left(\hat{w}\right)\right) = \frac{\partial g}{\partial t}, \tag{7}$$

where $\hat{w}$ is the median voter's wage rate (or skill), $1-\ell^*$ denotes her (individually optimal) labor supply and ℓ^* is leisure.[15] The welfare-maximizing tax rate is now given by

$$\int \psi(w)\left[w\left(1-\ell^*(w)\right)\right]d\Phi(w) = \frac{\partial g}{\partial t}, \tag{8}$$

with $\Phi(w)$ denoting the cdf of w and $\psi(w)$ the welfare weight, defined analogously to $\psi(y)$ from Eq. (5).

The structure of Eqs. (7) and (8) closely resembles the one from conditions (3) and (4), respectively. One can easily derive the analog to the inequality $\hat{Z} < \overline{Z}i$, which can be expressed as

$$\overline{w\ell^*}_{\psi} - \hat{w}\ell^*\left(\hat{w}\right) < \overline{w}_{\psi} - \hat{w}, \tag{9}$$

with $\overline{w\ell^*}_{\psi} := \int \psi(w)\, w\ell^*(w) d\Phi(w)$. This new condition for an inefficiently high tax rate in the voting equilibrium is very similar to the one from Eq. (6). In fact, one can again interpret the LHS of Eq. (9) as an 'avoidance gap' and the RHS as an 'income gap'. Here, the expression on the RHS measures the gap between the (normalized) average wage and the median voter's wage. For the hypothetical case

[11] This statement assumes that the median voter is in the 'middle' of the income distribution. Note, however, that the decisive voter does not necessarily correspond to the median (true) income receiver if $Z(y)$ is non-monotonic in y (see footnotes 1 and 2).

[12] For the case of endogenous labor supply discussed below, the discussion would have to be re-stated in terms of the allocation of foregone labor income $w\ell^*(w)$ along the wage- (skill-) distribution. As this distribution is conceptually difficult to measure (the leisure choice also depends on the agents' taste, which is again heterogeneously distributed among the taxpayers), the following discussion focuses on the tax avoidance–income pattern.

[13] The IRS estimates the underreporting rate to be 54%, 8.5%, and 4.5% for income types subject to 'little or no', 'some', and 'substantial' information reporting, respectively (Slemrod, 2007, p. 30). It is thus not surprising that only 1% of wage and salaries, but 57% of nonfarm proprietor income, were not reported in 2001.

[14] I am grateful to Wojciech Kopczuk for pointing out this generalization.

[15] Of course, $\partial g/\partial t$ is different now, as the term includes labor supply (rather than avoidance) responses to taxation.

of zero leisure, this corresponds to the income gap as defined above — the gap between the average and the median voter's potential income for $\ell = 0$. Turning to the LHS of Eq.(9), note that choosing a positive amount of leisure similarly reduces the tax base as picking a positive level of avoidance: the taxpayer avoids paying taxes on $w\ell^*(w)$. In this sense, the LHS captures an avoidance gap, the difference between the (normalized) reduction in the potential tax base (relative to $\ell = 0$) and the median voter's foregone labor income.

The discussion reveals that the logic from Corollary 1 generalizes to the case of endogenous labor–leisure choice. We could therefore restate Corollary 1 in the following way: for a right-skewed distribution of taxed incomes, the political inefficiency from majority voting is cet. par. increasing in the median voter's foregone labor income due to her consumption of leisure. On a more general note, the discussion also highlights that our argument is not at all specific to costly tax minimizing behavior as captured in our basic model. In the end, our analysis is about the distribution of the effectively taxed income and its decomposition in a 'true' (or 'potential') income distribution and a distribution of activities that reduce the tax base. Whether the latter takes the form of tax avoidance, tax evasion, or leisure choice (or other behavioral responses) is not relevant for our findings.

4.2. Endogenous enforcement

Although our results generalize to behavioral responses beyond tax avoidance, it nevertheless appears interesting to study the endogenous choice of tax enforcement, a policy instrument that is specific to the avoidance context.[16] To do so, we return to our baseline model from Section 2 and consider sequential majority voting where taxpayers first vote over the tax rate and then, at a second stage, decide on tax enforcement e. Avoidance costs $K(.)$ are assumed to be increasing and convex in enforcement, $K_e>0$, $K_{ee}>0$, and $K_{ae}>0$ for $a>0$. To facilitate the exposition, we focus on the case where $Z(y)$ is monotonically increasing in y.[17]

Let us consider the new voting problem. At the second stage, voters treat the tax rate as given and their most preferred level of enforcement is defined by

$$\max_e \ U(C) \ \text{s.t.}\ C = y + g(e,t) - t\left(y - a^*\right) - K\left(a^*, e, y\right),$$

with a^* and $g(e, t)$ from Eqs. (1) and (2), respectively. The first-order condition to this problem is

$$K_e\left(a^*, e, y\right) = \frac{\partial g}{\partial e}, \tag{10}$$

where we substituted Eq. (1). The condition equates the voter's marginal costs of tightening enforcement with the marginal benefits from higher revenues that translate into a higher transfer g. It is straightforward to show that the single-crossing condition holds (see Appendix A1). It follows that the decisive voter is the one with the median value of K_e, $\hat{K}_e$. If K_e is *monotonic* in y, the decisive voter will correspond to the median (true) income receiver, $\hat{K}_e = K_e\left(a^*\left(\hat{y}\right), e, \hat{y}\right)$. Below we will only consider the case where the marginal costs from enforcement are *monotonically increasing* in income,

$$K_{ey} + K_{ae}\frac{\partial a^*}{\partial y} \geq 0. \tag{11}$$

Assuming that K_{ey} is sufficiently large (not too negative), the condition will hold for $\partial a^*/\partial y \geq 0$ as $K_{ae}>0$. Hence, if avoidance is globally non-decreasing in true income (as for the avoidance pattern depicted in the left panel of Fig. 1), the median (true) income receiver will be pivotal. We summarize these observations in

Lemma 1. *The level of enforcement that wins majority voting at the second stage, $\tilde{e}(t)$, is given by $\hat{K}_e = \partial g / \partial e$, where $\hat{K}_e$ is the median level of $K_e(a^*(\tilde{e}, t, y), \tilde{e}, y)$ for a given t. If Eq.(11) holds, the median voter corresponds to the taxpayer with median (true) income, $\hat{K}_e = K_e\left(a^*\left(\tilde{e}, t, \hat{y}\right), \tilde{e}, \hat{y}\right)$.*

At the first voting stage, taxpayers vote over t, taking into account that their choice affects the second stage outcome, $\tilde{e}(t)$. Implicitly differentiating Eq. (10), one obtains — under the assumption that first-order effects dominate — the plausible case of $\partial\tilde{e} / \partial t > 0$ (see Appendix A1). Thus, the level of enforcement elected at the second stage is increasing in the tax rate. From the voters' problem

$$\max_t \ U(C) \text{s.t.}\ C = y + g(\tilde{e}(t), t) - t\left(y - a^*\right) - K\left(a^*, \tilde{e}(t), y\right)$$

one arrives at the following first-order condition

$$Z(y) + \left(K_e\left(a^*, \tilde{e}(t), y\right) - \frac{\partial g}{\partial e}\right)\frac{\partial \tilde{e}}{\partial t} = \frac{\partial g}{\partial t}. \tag{12}$$

As compared to first-order condition (3) from our baseline model, the new condition includes an additional term on the LHS that captures the marginal private costs of tightening enforcement net of the marginal gains due to an increase in the lump-sum transfer. As discussed in Appendix A, the assumption that K_e is increasing in true income is sufficient for the single-crossing condition to hold. We then arrive at the following result:

Proposition 3. *Assume that Eq. (11) is satisfied and $Z(y)$ is monotonically increasing in y. The policy that wins sequential majority voting, $\hat{t}$ and $\tilde{e}(\hat{t})$, is characterized by*

$$\text{(i) } Z\left(\tilde{e}\left(\hat{t}\right), \hat{t}, \hat{y}\right) = \frac{\partial g\left(\tilde{e}\left(\hat{t}\right), \hat{t}\right)}{\partial t} \quad \text{and (ii)} K_e\left(a^*\left(\tilde{e}\left(\hat{t}\right), \hat{t}, \hat{y}\right), \tilde{e}\left(\hat{t}\right), \hat{y}\right) = \frac{\partial g\left(\tilde{e}\left(\hat{t}\right), \hat{t}\right)}{\partial e},$$

with $Z\left(\tilde{e}\left(\hat{t}\right), \hat{t}, \hat{y}\right) = \hat{y} - a^*\left(\tilde{e}\left(\hat{t}\right), \hat{t}, \hat{y}\right)$ and $F\left(\hat{y}\right) = 1/2$.

Proof. The Proof follows from Lemma 1 and the steps applied in the proof of Proposition 1. □

The proposition describes a majority voting equilibrium, where the taxpayer with the median true income is pivotal in both voting stages. From Lemma 1 we know that the median voter at the second stage implements the level of enforcement that satisfies Eq. (10). Note further that, under our assumptions on $Z(y)$ and Eq. (11), the LHS of Eq. (12) is monotonic in y. The decisive voter at the first stage therefore corresponds to the median true income receiver. Substituting Eq. (10) evaluated at $\hat{y}$ into Eq. (12), the condition for the most preferred tax rate boils down to $Z\left(., \hat{y}\right) = \partial g / \partial t$. This is just a special case of the condition from Proposition 1, with $\hat{Z} = Z\left(., \hat{y}\right)$ (which follows from assuming $Z(y)$ to be monotonic in y). Hence, with respect to the tax rate, the sequential majority voting equilibrium characterized in Proposition 3 has the same structure as the equilibrium for the benchmark case with exogenous enforcement.

[16] Apart from tax enforcement, there might be other policy instruments the government can use to influence the distribution of taxable income (Slemrod and Kopczuk, 2002; Slemrod and Traxler, 2010).

[17] Extending the analysis to the general case where $Z(y)$ might be locally decreasing in y (see footnote 1) is straightforward, however, it would considerably lengthen the discussion.

Next, we compare the new voting equilibrium with the welfare-maximizing policy. Following the same steps as above, we obtain the first-order conditions for the welfare-maximizing tax cum enforcement policy,

$$t : \int \psi(y) Z(e, t, y) dF = \frac{\partial g(e,t)}{\partial t} \tag{13}$$

$$e : \int \psi(y) K_e \left(a^*(e, t, y), e, y \right) dF = \frac{\partial g(e,t)}{\partial e}, \tag{14}$$

with $\psi(y)$ as defined above. Condition (13) closely resembles the former condition (4). The second condition (14) requires the welfare-maximizing level of enforcement to equate the (normalized) average marginal costs of increasing enforcement with the marginal revenue gains. Let $\overline{Z}_\psi(e,t)$ and $\overline{K}_{e\psi}(e,t)$ denote the LHS of (13) and (14) as a function of e and t, respectively. We can then state

Proposition 4. *The tax rate and tax enforcement in the voting equilibrium characterized in Proposition 3 correspond to the second-best policy, if and only if* $K_e\left(a^*\left(\tilde{e}\left(\hat{t}\right), \hat{t}, \hat{y}\right), \tilde{e}\left(\hat{t}\right), \hat{y}\right) = \overline{K}_{e\psi}\left(\tilde{e}\left(\hat{t}\right), \hat{t}\right)$ *and* $Z\left(\tilde{e}\left(\hat{t}\right), \hat{t}, \hat{y}\right) = \overline{Z}_\psi\left(\tilde{e}\left(\hat{t}\right), \hat{t}\right)$.

Proof. The results follow immediately from Proposition 3 and Eqs. (13) and (14). □

The proposition implicitly states that sequential majority voting will introduce an inefficiency, whenever the decisive voter considers marginal costs of enforcement or taxation that differ from the marginal social costs of increasing e or t, respectively. In contrast to Proposition 2, however, it turns out to be quite cumbersome to derive conditions under which the level of taxation or enforcement will be inefficiently high or low. While it appears tempting to derive simple conditions by comparing *separately* conditions (i) and (ii) from Proposition 3 with conditions (13) and (14), respectively, such a comparison would not be conclusive. This is due to the two-dimensional nature of the problem and the fact that sequential majority voting distorts both policy choices *simultaneously* if one or both conditions from Proposition 4 are violated.[18]

For the same reason, one cannot derive any simple comparative static statements as those from Corollary 1.[19] To see this point, consider the case of $\hat{Z} < \overline{Z}_\psi$ from Corollary 1, where taxation was inefficiently high and increasing in the median voter's level of tax avoidance. This result followed from the fact that, cet. par., the decisive taxpayer voted for higher taxes and the more she avoided. Does this also apply in the case of sequential majority voting? Condition (i) from Proposition 3 seems to suggest that the answer is yes: with a higher level of avoidance, the median voter faces lower costs of increasing the tax and indeed favors a higher tax rate. At the same time, however, the pivotal taxpayer will vote for a lower level of tax enforcement, as her marginal costs of enforcement are increasing in avoidance ($K_{ae} > 0$; see condition (ii) from Proposition 3). A change in the level of tax enforcement, in turn, will effect $\partial g / \partial t$ (which provides voters with an incentive to vote for a lower tax rate as $\partial^2 g / (\partial e \partial t) > 0$) as well as the level of avoidance itself. Hence, there are now several different effects which typically point into different directions. For the case of endogenous enforcement, it is therefore ambiguous whether the political distortion of the tax rate is increasing in the median voter's level of avoidance.[20]

While in general Corollary 1 does not extend to the case of sequential majority voting, one could in principle derive conditions that allow for an unambiguous assessment of the impact of tax avoidance on the welfare properties of the new voting equilibrium. As the derivation of these conditions requires an involved analysis of many possible scenarios, this analysis seems beyond the scope of the present paper and is left for future research.

5. Conclusion

This paper has studied the role of tax avoidance for the welfare assessment of majority voting over a linear income tax schedule. Taxpayers differ with respect to their true income as well as their level of avoidance. Hence, there are two layers of heterogeneity which can drive a wedge between the tax rate preferred by the median voter and the welfare-optimal policy. For a right-skewed distribution of taxed incomes, the decisive voter will still implement an inefficiently high tax rate. However, this inefficiency will be smaller, the fewer taxes the median voter avoids. Keeping constant the taxed income of the pivotal taxpayer, the political inefficiency is decreasing in the average level of avoidance in the economy. The latter result is particularly relevant for the empirically plausible case where taxpayers on both ends of the income distribution engage more intensively in tax-minimizing behavior than the middle class. Given the magnitude of tax avoidance, this argument seems to deserve more attention in the political economic analysis of taxation.

While our analysis rests on a simple model of tax avoidance, it is important to note that our results generalize to other forms of behavioral responses to taxation — most importantly to the case of endogenous labor supply. The welfare properties of the voting equilibrium are determined by the distribution of the effectively taxed income. In the end, our analysis is about the decomposition of this distribution into a 'true' or 'potential' income distribution and a distribution of activities that reduce the tax base. Whether the latter takes the form of tax avoidance, tax evasion, or leisure choice (or other behavioral responses) is not relevant for our findings. In this sense, our results are quite general. For a two dimensional voting problem, though, where the tax rate and the level of tax enforcement are determined by sequential majority voting, the impact of tax avoidance for the welfare assessment of the political inefficiency is in general ambiguous.

Our framework may serve as a starting point for several extensions. One could include an occupational choice decision in the model, which would allow to endogenize heterogenous avoidance costs. Such an extension would also provide a framework to study the extent to which tax authorities should concentrate their enforcement activities on different occupational and different income groups, respectively (for a related approach, see Macho-Stadler and Perez-Castrillo, 1997). With two layers of heterogeneity — heterogenous incomes and heterogenous tax avoidance — tax enforcement becomes crucial for horizontal and vertical equity considerations (Kopczuk, 2001). The analysis presented in this paper points to potential congruences and conflicts between redistributive targets and allocative costs of tax enforcement within a political economic framework.

From an empirical perspective, it would be interesting to compare the magnitude of the gap between the median and the mean incomes for the observed, taxed income, as well as for the hypothetical case without any tax avoidance or evasion. While the

[18] To illustrate the problem, consider the case where the median voter's private marginal costs of tightening enforcement are below the social marginal costs for the elected tax rate $\hat{t}$, $K_e\left(., \hat{t}, \hat{y}\right) < \overline{K}_{e\psi}\left(., \hat{t}\right)$. This implies that sequential majority voting will result in an enforcement level that is 'too high' *for the chosen level of taxation*. Without knowing whether $\hat{t}$ is above or below the welfare maximizing tax rate, however, this does not automatically imply that the level of enforcement is above the second-best level of enforcement — which is characterized jointly by Eqs. (13) and (14).

[19] In addition, it is hard to imagine a cet. par. increase in the median voter's avoidance (or the normalized average level of avoidance) when enforcement is endogenous.

[20] This ambiguity also carries over to the statement from Corollary 1 regarding the impact of the (normalized) average level of avoidance. The basic intuition for this is that not only the welfare-maximizing tax rate but also the welfare-maximizing enforcement policy changes with the level of avoidance in the economy.

obvious difficulties to measure tax-minimizing behavior severely complicate this task, the data on the distribution of taxed and true income used by Johns and Slemrod (2010) seem to be a good starting point. Such an analysis would also allow us to address the implications of evasion and avoidance for the optimal tax rate, as pointed out by Chetty (2009).

Appendix A

A1. Second-order and single-crossing conditions

From Eq. (2) we obtain

$$\frac{\partial g(e,t)}{\partial t} = \overline{Z} - t\int \frac{\partial a^*}{\partial t} dF \tag{A.1}$$

and

$$\frac{\partial^2 g(e,t)}{\partial t^2} = -\int\left(2\frac{\partial a^*}{\partial t} + t\frac{\partial^2 a^*}{\partial t^2}\right) dF < 0. \tag{A.2}$$

As $\partial a^*/\partial t > 0$, $\partial^2 a^*/\partial t^2 \geq 0$ is sufficient for the condition to hold.

The second-order condition to Eq. (3) is

$$S^t := \frac{\partial a^*}{\partial t} + \frac{\partial^2 g(e,t)}{\partial t^2} b 0. \tag{A.3}$$

While the first term is positive, the second is strictly negative. Given that the latter expression dominates, the condition holds and voters' preferences are single-peaked. But even if the second-order condition is violated, the median voter theorem can nevertheless be applied, as the single-crossing condition always holds (Gans and Smart, 1996). To see this, we derive the marginal rate of substitution,

$$\left.\frac{dg}{dt}\right|_{U=\overline{U}} = -\frac{\partial U / \partial t}{\partial U / \partial g} = Z(y).$$

Hence, voters' preferences over the (g, t) space are monotonic in $Z(y)$.

The second-order condition to Eq. (4) is given by

$$\int\left[W''(.)(U'(.))^2 A^2 + W'(.)U''(.)A^2 + W'(.)U'(.)S^t\right] dF < 0 \tag{A.4}$$

with $A := \partial g/\partial t - Z$. The condition holds due to Eq. (A.3) and $W'' \leq 0$, $U'' < 0$.

Turning to the case of endogenous enforcement studied in Section 2, note first that $\partial g(e,\ t)/\partial e = -t \int \partial a^*(y)/\partial e\ dF - 1$ and, assuming $\partial^2 a^*(y)/\partial e^2 \geq 0$,

$$\frac{\partial^2 g(e,t)}{\partial e^2} = -t\int \frac{\partial^2 a^*(y)}{\partial e^2} dF \leq 0. \tag{A.5}$$

The second-order condition to the voters' second stage problem, the voting over e, is

$$S^e := \frac{\partial^2 g}{\partial e^2} - K_{ee} - K_{ae}\frac{\partial a^*}{\partial e} < 0. \tag{A.6}$$

From Eq. (A.5) and $K_{ee} \geq 0$ we know that the first two terms are negative. Since $K_{ae} > 0$ and $\partial a^*/\partial e < 0$, the third term is positive. Hence, the condition will only hold if the latter term is dominated by the first two. If Eq. (A.6) does not hold, the median voter theorem nevertheless applies, as the single-crossing condition always holds: taking t as given, it is trivial to show that voters' preferences over the (g, e) space are monotonic in $K_e(.)$.

Applying the implicit function theorem on Eq.(10) evaluated at $\hat{K}_e$ leads us to

$$\frac{\partial \tilde{e}}{\partial t} = \frac{1}{S^e}\left(\hat{K}_{ae}\frac{\partial \hat{a}^*}{\partial t} - \frac{\partial^2 g}{\partial e \partial t}\right) = \frac{1}{S^e}\left[\hat{K}_{ae}\frac{\partial \hat{a}^*}{\partial t} + \int\left(\frac{\partial a^*}{\partial e} + t\frac{\partial^2 a^*}{\partial e \partial t}\right) dF\right], \tag{A.7}$$

where, in a slight abuse of notation, we write $\hat{K}_{ae}$ and $\hat{a}^*$ to indicate that these terms are evaluated at the median voter's values of avoidance and true income. What can we say about the sign of $\partial \tilde{e} / \partial t$? Note first that $K_{ae} > 0$ and $\partial a^*/\partial t > 0$, which means that the first term in the squared brackets is positive. In contrast, the expression under the integral in the squared brackets will be negative, as long as the first-order effect, $\partial a^*/\partial e < 0$, dominates $\partial^2 a^*/\partial e \partial t$. Hence, the sign of Eq. (A.7) seems ambiguous. However, the analysis of several simple examples for $K(.)$ suggests that the negative first-order effect dominates the other terms in the squared bracket. For this case, we get $\partial \tilde{e} / \partial t > 0$. One example of an avoidance costs function for which this can be easily demonstrated is $K(.) = a^2 e^2/2y$ and thus $a^* = ty/e^2$. For this functional form, we also get $\partial^2 a^*/\partial e \partial t \leq 0$, $\partial^2 a^*/\partial e^2 \geq 0$ (see Eq. (A.5) above) and the monotonicity condition (11) is fulfilled, too.

Finally, we study the second-order condition to the taxpayers' voting problem at the first stage, the voting over t. From Eq.(12) we get

$$S^{te} := \underbrace{\left(\frac{\partial a^*}{\partial t} + \frac{\partial a^*}{\partial e}\frac{\partial \tilde{e}}{\partial t}\right)(1 - K_{ae})}_{I} + \underbrace{\frac{\partial^2 g}{\partial t^2} + 2\frac{\partial^2 g}{\partial e \partial t}\frac{\partial \tilde{e}}{\partial t}}_{II}$$

$$+ \underbrace{\left(\frac{\partial^2 g}{\partial e^2} - K_{ee}\right)\left(\frac{\partial \tilde{e}}{\partial t}\right)^2}_{III} + \underbrace{\left(\frac{\partial g}{\partial e} - K_e\right)\frac{\partial^2 \tilde{e}}{\partial t^2}}_{IV} < 0.$$

If $K_{ae} > 1$ and if the overall effect of a higher tax rate on avoidance (captured in the first bracket term) is positive, term *I* will be negative. The same applies to term *II* if $\partial^2 g/\partial t^2 < 0$ dominates. Term *III* is unambiguously negative due to Eq. (A.5) and $K_{ee} > 0$. The sign of the last terms is ambiguous (unless for the median voter). If the negative terms dominate, the voting problem at the first stage will be concave. If concavity is violated, voters' preferences would be still monotonic in y, if K_e is monotonically increasing in y (i.e., if Eq. (11) holds). As we focus on the case where $Z(y)$ is monotonic in y, the statement follows immediately from

$$\left.\frac{dg}{dt}\right|_{U=\overline{U}} = -\frac{\partial U / \partial t}{\partial U / \partial g} = Z(y) + K_e\left(a^*(\tilde{e}, t, y), \tilde{e}, y\right)\frac{\partial \tilde{e}}{\partial t}. \tag{A.8}$$

A2. Proofs

Proof of Proposition 1. Let $\hat{t}$ denote the tax rate preferred by the agent with taxed income $\hat{Z}$. Consider a vote between $\hat{t}$ and any tax rate t' with $t' b \hat{t}$. The higher tax rate $\hat{t}$ will be clearly preferred by all agents with $Z \leq \hat{Z}$. Hence, the fraction of the population that prefers t' over $\hat{t}$ is smaller than $H\left(\hat{Z}\right) = 1/2$. From this follows that no tax rate lower than $\hat{t}$ can defeat $\hat{t}$ by an absolute majority. The same argument implies that no tax rate higher than $\hat{t}$ can win a majority vote against $\hat{t}$. □

Proof of Proposition 2. Given that $\hat{Z}$ and $\overline{Z}_\psi$ are strictly positive, there has to hold $\partial g/\partial t > 0$ for the voting equilibrium as well as for the welfare-maximizing tax rate. With Eq. (A.2), Proposition 2 then follows from the comparison of Eqs.(3) with (4), with the first condition being evaluated at $Z(y) = \hat{Z}$. □

A3. Endogenous income

Let us consider the case of endogenous labor supply. An exogenously given skill (wage) w is distributed according to a cdf $\Phi(w)$. Each agent is endowed with one unit of time that she allocates between leisure, ℓ, and work, $1-\ell$. Labor income is then given by $y = w(1-\ell)$. We follow Slemrod (1994), assuming that the avoidance costs are a function of a, e and w, $K(a, e, w)$. Preferences over consumption C and leisure are described by $U(C, \ell)$. The taxpayer's problem is now

$$\max_{a,\ell} \; U(C,\ell) \;\; \text{s.t.}\, C = (1-t)w(1-\ell) + g + ta - K(a,e,w).$$

Optimal avoidance and labor supply are characterized by the first-order conditions

$$t = K_a\left(a^*, e, w\right), \tag{A.9}$$

$$-U_C(.)(1-t)w + U_\ell(.) = 0 \tag{A.10}$$

(we focus on interior solutions). The budget balancing lump-sum transfer g is now given by

$$g(e,t) = t\int Z(w)d\Phi - e,$$

where $Z(w) = w\left(1-\ell\,(w)\right) - a^*(w)$ captures the effectively taxed income of an agent with skill w, labor supply $1-\ell\,(w)$ and avoidance $a^*(w)$. A taxpayer's voting problem is

$$\max_{t} \; U(C,\ell) \;\; \text{s.t.}\, C = (1-t)w\left(1-\ell^*(w)\right) + g(e,t) + ta\,(w) - K\left(a^*(w), e, w\right),$$

and the first-order condition becomes

$$U_C(.)\left(-Z(w) + \frac{\partial g}{\partial t}\right) = 0, \tag{A.11}$$

where we have substituted for Eqs.(A.9) and (A.10). In Section 4.1, when we have assumed away evasion, condition (A.11) boils down to $w(1-\ell^*(w)) = \partial g / \partial t$. The latter first-order condition evaluated for the median voter, the agent with median taxed income $w(1-\ell^*(w))$, leads to Eq. (7).

A quantitative difference to the basic avoidance model presented in Section 3 is that $\partial g/\partial t$ now includes a term reflecting the labor elasticity which was absent before. However, as pointed out in the main text, the expression is the same in the decisive voter's first-order condition as well as in the condition characterizing the welfare-maximizing tax rate. An extended model which includes both an endogenous labor supply and the avoidance decision therefore deliver the same qualitative results as the basic model from Section 3.

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