Collateral Tax Sanctions: A Way to Correlate Punishment with Ability

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Abstract

Suspension of driver's license, revocation of passport or professional licenses are used by the tax authority as a sanction for failure to comply with tax obligations and referred to as collateral tax sanctions. In his paper, I propose a new rationale for why it may be beneficial to use collateral tax sanctions for the purpose of tax enforcement. By affecting consumption and providing enforcement targeted to a group, collateral tax sanctions may allow the government to impose punishment correlated with individual's earning potential. Such punishment makes the effective tax rates also correlated with individuals' earning potential and, as a result, enables to achieve the redistribution of income more effectively. I show that using a collateral tax sanction increases social welfare when the earning potential of the poorest individual in the targeted group is sufficiently higher than the earning potential of the poorest individual in the rest of the population.

Keywords: collateral sanction, tax enforcement, ability, tag

1 Introduction

Recently, to improve tax compliance, tax authorities have used a new punishment instrument – collateral tax sanction, which is a revocation of a privilege provided by the government, imposed for a failure to comply with tax obligations. An examples of a collateral tax sanction is suspension of driver's licenses for tax noncompliance. Currently, three states – Louisiana,[1] California,[2] and New York state[3] – have established a driver's license suspension program which allows tax departments to suspend a driver's license from persons with delinquent tax liabilities.

Other examples of collateral tax sanctions used by some states are suspension of vehicle registration,[4] revocation of professional licenses,[5] and denial of hunting and gaming permits to residents who have failed to satisfy their tax obligations.[6] At the federal level under current and proposed laws, the failure to pay taxes owed may result in the loss of ability to obtain federal employment, apply for Federal Housing Authority mortgages, and enter contracts with the federal government. It also may result in revocation of passports, imprisonment, or deportation from the country.[7]

While collateral tax sanctions have become a popular tool of tax administration, they have not been extensively studied by economic scholars. The existing literature distinguishes monetary fine from non-monetary penalty, but finds monetary penalty to be a preferable instrument. Specifically, Becker (1968), Polinsky and Shavell (1984), and Andreoni (1991, 1992) and others show that monetary fines should always be exhausted before non-monetary penalties are imposed, because non-monetary penalties are generally more costly to administer.

A recent law paper by Blank (2014) argues that collateral tax sanctions can promote voluntary tax compliance more effectively than monetary fines. To support the statement, he proposes three arguments. First, collateral tax sanctions may be more salient to individuals.

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[1] See, e.g., Tax Topics, Louisiana Department of Revenue, Volume 24 Number 2 April 2004, available at http://www.revenue.louisiana.gov/forms/publications/tt(04_04).pdf. See also Suspension and Denial of Renewal of Drivers' Licenses (LAC 61:I.1355), Louisiana Department of Revenue, available at http://revenue.louisiana.gov/forms/lawspolicies/LAC61_I_1355.pdf

[2] See, e.g., California to Tax Scofflaws: Pay Up or Lose your Driver's (or CPA) License, AccountingWeb.com, Sept. 20, 2011, available at http://www.accountingweb.com/topic/tax/california-tax-scofflaws-pay-or-lose-your-drivers-license. See also Franchise Tax Board Meeting, September 5, 2012: Delinquent Taxpayer Accountability Act Informational Item available at https://www.ftb.ca.gov/law/meetings/attachments/090512/3.pdf

[3] See, e.g., States target tax scofflaws with incentives and shame, usatoday.com, Oct. 16, 2013 , available at http://www.usatoday.com/story/news/nation/2013/10/16/states-target-tax-scofflaws/2993447/. See also Summary of Budget Bill Personal Income Tax Changes Enacted in 2013, New York State Department of Taxation and Finance, Aug. 8, 2013, available at http://www.tax.ny.gov/pdf/memos/income/m13_4i.pdf

[4] See Jay Soled, Using Driving Privilege to Solve States' Fiscal Crises, 60 STATE TAX NOTES 841 (June 13, 2011)

[5] See, e.g., Wis. Stat. § 73.0301(d)(11) (revocation of law licenses); Min Stat. § 270C.72 (revocation of medical licenses).

[6] See, e.g., Louisiana Dep't of Wildlife and Fisheries, Hunting Licenses, available at http://www.wlf.louisiana.gov/licenses/hunting-licenses (last visited Oct. 22, 2012).

[7] See Blank (2014) for more details.

Second and third, they may provoke feelings of reciprocity or fear of the stigma of tax noncompliance. These arguments are appealing, but mainly drawn on the behavioral aspects of decision making and do not exhaust all economic reasons for why collateral tax sanctions may be an attractive tax administration tool.

This paper proposes a new economic rationale for the use of collateral tax sanctions. By affecting consumption and providing enforcement targeted to a group, collateral tax sanctions may allow the government to impose punishment correlated with individual's earning potential. Such punishment makes the effective tax rates also correlated with individual's earning potential and, as a result, enables to achieve the redistribution of income more effectively. The mechanism, by which a collateral tax sanction improves the redistribution of income, resembles Akerlof's tagging. Similar to a tag, which indicates a taxpayer's category, a collateral tax sanction reduces the cost of income redistribution and, therefore, increases social welfare. The cost of redistribution arises when a tax schedule depends on income and not on ability, because such a tax system distorts labor supply decisions.

For the described mechanism, it is essential that collateral tax sanctions affect consumption directly, that is not through affecting income. Indeed, in contrast to a monetary fine that reduces taxpayer's income, a collateral tax sanction prohibits consumption of a specific good or terminates a specific activity. Given that consumption baskets differ among individuals, only a group of individuals who have that specific good in their baskets are affected by the collateral tax sanction. For example, only people who have the international passport are affected by revocation of one. Therefore, a collateral tax sanction provides enforcement targeted to a group of taxpayers.

The group of taxpayers that is targeted by a collateral tax sanction can differ in their skill distribution from the group that is not affected by the collateral tax sanction. For example, revocation of an international passport mainly affects those who have opportunities to travel abroad and likely have a higher earning potential on average than those who does not have an international passport. This illustrates that collateral sanctions may allow the tax authority to correlate punishment with taxpayer's ability.

The next important link in the mechanism of the collateral tax sanctions is the connection between punishment and effective tax. The model in this paper shows that punishment for tax avoidance affects effective tax rate. Moreover, by targeting enforcement to a group of taxpayers, the tax authority rises the effective tax rate for that group. Thus, a collateral tax sanction leads to a higher effective tax rate for the targeted group of taxpayers and, as a result, helps to achieve a redistribution of income from the targeted group to the other group.

There is, however, an important difference between a collateral tax sanction and a tag. Unlike a tag that allows the government to set a separate statutory tax for the tagged group, a collateral tax sanction allows the government to influence the effective tax for the targeted group, but not the statutory tax. Because collateral tax sanctions affect only the effective tax, they are more restrictive than tags and, therefore, less efficient. However, in practice collateral tax sanctions might be more feasible than tags for political reasons. Note also that unlike a tag, a collateral tax sanction imposes some real cost on the taxpayers and, therefore, reduces socal welfare. For example, suspension of an international passport restricts an individual's ability to travel, which likely decreases her utility.

The model in this paper aims to examine the welfare and redistribution consequence of the imposition of a collateral tax sanction for tax noncompliance. The model draws on the model in Cremer, Gahvari and Lozachmeur (2010), which analyzes gains and losses as a consequence of tagging, and inherits its assumptions that the social welfare function is Rawlsian and preferences are quasi-linear and have a constant elasticity of labor supply. In the model, there is a continuum of individuals who are characterized by their skills. By imposing a collateral tax sanction, the government can rise the effective tax rate in the targeted group of taxpayers. I show that as a result of this, the new optimal statutory tax rate decreases, which allows to increase the utility of the rest of population at the cost of decreasing the utility of taxpayers in the targeted group. The social welfare increases only when the earning potential of the poorest individual in the targeted group is sufficiently higher than the earning potential of the poorest individual in the rest of the population. In contrast, a tag improves social welfare even in the case when the supports of skill distributions for two groups are the same.

This paper proceeds as follows. Section 2 explains the mechanism through which a collateral tax sanction provides enforcement correlated with ability and as a result lead to a more efficient redistribution. Section 3 analyzes the welfare and redistribution consequence of the imposition of a collateral tax sanction. Section 4 discusses potential concerns and indirect effects of the use of collateral tax sanctions. Section 5 concludes.

2 From a Collateral Tax Sanction to a Tag

2.1 Collateral Tax Sanctions: In-kind Restriction that Affects a Subgroup of Taxpayers

By affecting consumption, collateral tax sanctions have differential effect on taxpayers. In contrast to a monetary fine that affects income, a collateral tax sanction restricts consumption of a certain good or activity. For example, suspension of a driver's license causes a delinquent taxpayer to stop driving; revocation of an international passport restricts the ability to travel abroad. Not everybody, however, has a driver's license or an international passport. Consumption baskets differ among individuals. Therefore, only a group of people who have the restricted good or activity in their consumption baskets are influenced by the collateral tax sanction. For example, only people who have international passports are affected by revocation of an international passport.

The group affected by a collateral tax sanction could have different characteristics than the unaffected group. One important characteristic for taxation and redistribution purpose, on which I focus in this paper, is earning potential or ability. The distribution of ability within the affected group could be different than within the unaffected group. For example, a revocation of boat registration or suspension of boating safety certificate as a sanction for tax evasion mostly affects wealthy people and fishermen. A revocation of international passport mainly affects those who have opportunities to travel abroad. In these examples, the people with boat certificate and people with international passport are likely to have higher earning potential that people without those documents.

To give more structure to this idea, assume that the government can use a collateral sanction that affects the consumption of a certain good. Refer to the group of individuals that do not have this good in there consumption basket as group 1. Refer to the group of individuals that do have this good in their consumption basket as group 2. Assume also that individuals are characterized by a skill level, w, (equal to the wage rate). Denote the distribution function of skill for the entire population by $F(w)$ and its corresponding density by $f(w)$. Denote also the distribution function for group i by $F_i(w)$ and the corresponding density by $f_i(w)$, where $i = 1, 2$. Assuming that these two groups of individuals have equal size, the distribution and the density for the entire population are related to the distribution and the density for the two groups according to:

$$F(w) = \frac{F_1(w) + F_2(w)}{2},$$

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It is helpful to think about group 2 as a group with higher on average skills level than in group 1. But, at this point, I do not impose any assumption on the distribution for these two groups.

By providing a differential effect on individuals, collateral tax sanctions allows the government to target enforcement to group 2. In its turn, targeted enforcement to group 2 enables rising the effective tax rate in group 2. In the following subsections, I explain in details how this works and why it is useful.

2.2 Collateral Sanctions and Effective Tax Rates

Here I show how collateral sanctions affect the size of effective tax rates. Effective tax rates usually differ from statutory tax rates. The taxpayers are able to avoid taxes and as result reduce the amount of taxes they pay, which makes effective tax rates lower than statutory tax rates. Thus, effective tax rates depends on statutory tax rates as well as on how costly it is to avoid taxes. The costs of avoidance depends, among other things, on the size of punishment for tax avoidance. Since a collateral tax sanction affects group 2 of taxpayers and does not effect the other group, it makes effective tax rate in group 2 higher.

To show this, I adapt the model used by Kopczuk (2001). Assume that individuals who are characterized by a skill level, w, enjoy leisure and consumption goods, C, which are financed from compensation received for providing labor, L, on the market. They can engage in avoidance that allows decreasing the amount of income, $I \equiv wL$, subject to taxation by A at the cost of $D(wL, A)$. The marginal tax rate is denoted by t and the lump-sum transfer is G. As a result, the budget constraint is

$$C = I + G - t(I - A) - D(I, A). \tag{1}$$

An individual chooses A to maximize consumption, that is

$$A^*(t, I) = \underset{A}{argmax}\, I - t(I - A) - D(I, A). \tag{2}$$

The optimal avoidance, $A^*(I, t)$ is determine by the FOC: $t = \frac{\partial D(I, A^*)}{\partial A}$. Having determined the optimal avoidance, we can rewrote the budget constraint as:

$$C = I + G - \rho(I,t)tI - D(I, A^*(I,t)), \quad (3)$$

where $\rho(I,t) \equiv 1 - \frac{A^*(I,t)}{I}$ is the share of statutory taxes that is paid to the government. I call ρ as net effective tax factor. I also define $\theta(I,t) \equiv 1 - \frac{A^*(I,t)}{I} + \frac{D(I,A^*(I,t))}{tI}$. I call θ as gross effective tax factor. It shows the share of paid taxes and cost associated with paying taxes out of statutory taxes.

For example, suppose that the cost of avoidance is proportional to the probability of being caught, $\alpha\frac{A}{I}$, which rises with avoided income and declines with true income, and proportional to the amount of avoided taxes, $t\pi A$, where $\pi > 1$ is gross penalty rate. That is, $D(I,A) = \alpha\pi t\frac{A^2}{I}$. In this case, the optimal avoidance is $A(I,t) = \frac{I}{2\alpha\pi}$, the net effective tax factor is $\rho = 1 - \frac{1}{2\alpha\pi}$, and the gross effective tax factor is $\theta = 1 - \frac{1}{4\alpha\pi}$.

Note that the difference between gross effective tax factor and net effective tax factor (i.e., $\theta - \rho$) shows the cost of avoidance as a share of statutory taxes. While a taxpayer spends θ dollars to pay her taxes, the tax authority receives only ρ dollars out of that amount.

Let us now consider the effect of the collateral sanction in this setting. Assume that the cost of avoidance is higher for taxpayers in group 2 that are effected by a collateral tax sanction. Their cost of avoidance is $D_2(I,A)$ and $\frac{\partial D_2(I,A)}{\partial A} > \frac{\partial D_1(I,A)}{\partial A}$, where $D_1(I,A)$ is the cost of avoidance for taxpayers in group 1 (i.e., those who are not affected by the collateral sanction). Under this assumption, both net and gross effective tax factors are higher for group 2 than for group 1. Proposition 1 states this formally.

Proposition 1. *Assume $D_i(I,A)$ for $i = 1,2$ increases and strictly convex in A, $D_i(I,0) = 0$ for $i = 1,2$, and $\frac{\partial D_2(I,A)}{\partial A} > \frac{\partial D_1(I,A)}{\partial A}$. Then $\rho_2(I,t) > \rho_1(I,t)$ and $\theta_2(I,t) > \theta_1(I,t)$.*

Proof. The FOCs the determines the optimal avoidance levels $A_1(I,t)$ and $A_2(I,t)$ are $t = \frac{\partial D_1(I,A_1^*)}{\partial A}$ and $t = \frac{\partial D_2(I,A_2^*)}{\partial A}$. Because $D_i(I,A)$ for $i = 1,2$ strictly convex and $\frac{\partial D_2(I,A)}{\partial A} > \frac{\partial D_1(I,A)}{\partial A}$, these FOCs imply that $A_1^* > A_2^*$. Hence, $\rho_2 - \rho_1 = \frac{1}{I}(A_1^* - A_2^*) > 0$ and $\theta_2 - \theta_1 = \frac{1}{I}(A_1^* - A_2^*) - \frac{1}{tI}(D_1(A_1^*) - D_2(A_2^*)) = \frac{1}{I}[t(A_1^* - A_2^*) - (D_1(A_1^*) - D_1(A_2^*) + D_1(A_2^*) - D_2(A_2^*))] > \frac{1}{I}[t(A_1^* - A_2^*) - \frac{\partial D_1(A_1^*)}{\partial A}(A_1^* - A_2^*) + (D_2(A_2^*) - D_1(A_2^*)) = \frac{1}{I}[(D_2(A_2^*) - D_1(A_2^*)] > 0$, where $D_1(A_1^*) - D_1(A_2^*) < \frac{\partial D_1(A_1^*)}{\partial A}(A_1^* - A_2^*)$ because $D_1(\cdot)$ is strictly convex in A, and $(D_2(A_2^*) - D_1(A_2^*) > 0$ because $D_i(I,0) = 0$ $i = 1,2$, and $\frac{\partial D_2(I,A)}{\partial A} > \frac{\partial D_1(I,A)}{\partial A}$.

This proposition shows that a collateral tax sanction by making the enforcement targeted to a group of taxpayers rises the effective tax rate in this group. Because of this, collateral sanction resembles tagging. In the following subsection, I explain the connection between tagging and targeted enforcement.

2.3 Tagging and Targeted Enforcement

In his paper, Akerlof (1978) argues that conditioning taxes on a "tag" indicating the taxpayer's category increases social welfare, because this helps to mitigate the tradeoff between redistribution and efficiency. The redistribution achieved through income tax improves welfare. But, this gain in welfare comes at a cost: income tax creates inefficiency by distorting labor decisions. Tagging reduces the cost of income redistribution because it allows providing transfers only to tagged people and not to everybody, which in its turn allows reducing marginal tax rates. Thus, Akerlof's tagging is a way to improve the design of tax system by conditioning taxes based on some inherent characteristic correlated with earning potential.

The subsequent research on tagging has generalized Akerlof's model and explored who gains and loses as a result of tagging. In particular, Cremer et al. (2010) consider a model with a continuum of individuals who can be divided into two groups (referred to as l and h) with different ability distributions over the same support. They show that tagging always improves social welfare when the two groups have different distributions of skills. When the skill distribution in group h first-order stohastically dominates the distribution of skills in group l, then tagging implies redistribution from group h to group l (under Rawlsian social welfare ar a utilitarian social welfare function with decreasing weights in skills provided that preferences are quasi-linear). Additionally, they show that if the hazard rates (i.e., $\frac{f_i(w)}{1-F_i(w)}$ where $i = l, h$) in the two tagged groups do not cross, every individual in the group with lower average skills would benefit from tagging (assuming that preferences are quasi-linear and the social welfare function is Rawlsian).

The use collateral tax sanctions is to some extent similar to tagging. By providing targeted enforcement to some groups of taxpayers, collateral tax sanctions allow conditioning enforcement on characteristic correlated with earning potential. The difference is that they affect punishment for noncompliance rather than to taxes directly. However, as we saw in the previous subsection, the punishment plays a role in determining the effective tax rate. Thus, collateral tax sanctions is another way to condition taxes based on ability. If a collateral tax sanction affects some taxpayers more the other, then the former taxpayers have a higher effective tax rate. If a collateral tax sanction is correlated with ability, then the effective tax rate is correlated with ability.

While both collateral tax sanctions and tagging help to make redistribution between people with different earning potential more effective, the mechanisms by which they achieve this are different. When a tag is available, it allows the government to subdivide people on those with and without the tag and to choose separate taxes for each group. When a collateral tax sanction is used, the taxpayers in the group targeted by the collateral tax sanction have a higher effective tax rate, but the government still has to choose the same statutory tax rate for both groups. In some sense, a collateral tax sanction gives the government less flexibility than a tag.

The fact that a collateral tax sanction enables to alter the effective tax rate but not the statutory tax rate reduces the effectiveness of the collateral tax sanctions. For example, within the group that is targeted by the collateral sanction (group 2) there could be people who have relatively low earning potential, but since they are in this group they experience high effective tax rate and thus pay higher taxes than their equally-skilled counterpart in group 1. This makes the redistribution from group 2 to group 1 achieved through higher effective tax rate less efficient. Therefore, whether we want to have targeted enforcement or not depends on the skill distribution within each groups. In the following section, I investigate welfare application of imposing a collateral tax sanction and identify conditions when it is socially beneficial.

3 Welfare and Redistribution

Here I analyze the welfare and redistribution consequences of the imposition of a collateral tax sanction, which is modeled as an increase in effective tax rate in group 2, for reasons discussed in the previous section. To do this, I first derive the optimal income tax structure for the case when there is no collateral tax sanction and, thus, both groups of taxpayers have the same effective tax rates characterized by gross effective tax factor θ_0. Then, I consider the case when the government imposes the collateral sanction and raise the gross effective tax factor in group 2 from θ_0 to θ_2.

I also assume that the net effective tax factor is equal to share $\lambda \in (0, 1)$ of the gross effective tax factor (i.e., $\rho = \lambda\theta$). Therefore, when the effective taxes rises (i.e., θ rises), the taxes received by the tax authority raises as well (i.e., ρ rises). At the same time, when θ rises, the cost accosiated with paying/avoiding taxes rises too (i.e., $\theta - \rho = (1 - \lambda)\theta$ rises).

Following the approach used by Cremer et al. (2010). I assume that individials have identical preferences that depend on consumption, C, positively, and on labor supply, L, negatively. The wage rates, that represent the skill levels, are distributed on $[\underline{w}, \overline{w}]$ according to $F(w)$. Preferences are represented by the quasi-linear utility function

$$u = C - \varphi(L), \tag{4}$$

where φ is strictly convex. The social welfare criterion is Rawlsian (maxi-min), and it is being implemented through a purely redistributive income tax system.[8]

As before, I assume that tax system is linear, that is, it described by the marginal tax rate, t, and the lump-sum transfer, G. Based on the discussion in the previous section, I assume that an individual budget constraint is

$$C = I + G - \theta_0 tI, \tag{5}$$

where $\theta_0 < 1$ reflects that the effective tax rate is less than the statutory tax rate. Combining (4) and (5), we have $u = I + G - \theta_0 tI - \varphi(\frac{I}{w})$. Income, $I(w)$, that maximizes this utility is determined by the FOC:

$$(1 - \theta_0 t) = \frac{1}{w}\varphi'(\frac{I(w)}{w}). \tag{6}$$

Integrating the local incentive compatibility constraint, $\frac{\partial u}{\partial w} = \frac{I(w)}{w^2}\varphi'(\frac{I(w)}{w})$, we have

$$u(w) = \underline{u} + \int_{\underline{w}}^{w} \frac{I(s)}{s^2}\varphi'(\frac{I(s)}{s})ds, \tag{7}$$

where $\underline{u} = u(\underline{w})$ is the utility of the poorest individual. As Cremer et. al. (2010) note, the second term on the right-hand side of equation (7) shows the "information rent" one has to leave for an individual with $w > \underline{w}$ to reveal her type. By using FOC (6), the "information rent" can be expressed as $\int_{\underline{w}}^{w} \frac{I(s)}{s}(1 - \theta_0 t)ds$, which shows that for a given tax rate, t, an increase in θ_0 reduces "information rent".

Because "information rent" is positive, an individual with the lowest skill, $\underline{w}$, receives the lowest utility. Therefore, the Rawlsian social welfare problem is to maximize $u(\underline{w}) = I(\underline{w}) + G - \theta_0 tI(\underline{w}) - \varphi(\frac{I(\underline{w})}{\underline{w}})$ by choosing t and G, subject to the revenue constraint:

$$\int_{\underline{w}}^{\overline{w}} \lambda\theta_0 tI(w)f(w)dw = G + R, \tag{8}$$

where R is external revenue requirement. By deriving G from revenue constraint (8) and plugging it into the above social welfare function, we can reduces the social welfare problem

[8]The results can be generalized to a utilitarian social welfare function with decreasing weights in skills.

to choosing t to maximize

$$u(\underline{w}) = I(\underline{w}) - \theta_0 t I(\underline{w}) - \varphi(\frac{I(\underline{w})}{\underline{w}}) + \int_{\underline{w}}^{\overline{w}} \lambda \theta_0 t I(w) f(w) dw - R. \tag{9}$$

Maximize (9) and simplify the first-order condition to get

$$\frac{\theta_0 t_0}{1 - \theta_0 t_0} = \frac{\lambda \int_{\underline{w}}^{\overline{w}} I(w) f(w) dw - I(\underline{w})}{\lambda \int_{\underline{w}}^{\overline{w}} \epsilon(w) I(w) f(w) dw}, \tag{10}$$

where t_0 denotes the optimal tax rate for this case, and $\epsilon(w) = \frac{\varphi'(\frac{I}{w})}{\varphi''(\frac{I}{w})\frac{I}{w}}$ is equal to the inverse of the wage elasticity of labor supply for a w-type individual.

Equation (10) implies that the optimal marginal tax rate is proportional to the difference between average income multiplied by λ and the lowest income and inversely proportional to average weighted income when weights are equal to the corresponding elasticities.

For the tax rate, t_0, to be positive, we need to assume that $\lambda > \frac{I(\underline{w})}{\int_{\underline{w}}^{\overline{w}} I(w) f(w) dw}$.

3.1 Optimal tax with two groups

Consider now the case when the government imposes the collateral sanction and raise the effective tax factor in group 2 from θ_0 to θ_2. The effective tax factor in group 1 stays the same. For symmetry, I denote it by θ_1 ($\theta_1 = \theta_0$). The rest of the structure of the model is the same.

An individual in group i ($i = 1, 2$) maximizes now $u_i = I + G - \theta_i t I - \varphi(\frac{I}{w})$. Optimal income, $I_i(w)$, that maximizes group i's individual utility, u_i, is determined by the FOC:

$$1 - \theta_i t = \frac{1}{w} \varphi'(\frac{I_i(w)}{w}) \tag{11}$$

The government now maximizes $min\{\underline{u}_1, \underline{u}_2\}$, where $\underline{u}_1$ and $\underline{u}_2$ are the lowest utility in group 1 and group 2 correspondingly. Similar to equation (7), we can get $u_i(w) = \underline{u}_i + \int_{\underline{w}}^{w} \frac{I_i(s)}{s^2} \varphi'(\frac{I_i(s)}{s}) ds$, which shows that an individual with the lowest skill, $\underline{w}_i$, receives the lowest utility in group i, $\underline{u}_i$. Thus,

$$\underline{u}_i = u(\underline{w}_i) = I(\underline{w}_i) - \theta_i t I_i(\underline{w}_i) - \varphi(\frac{I_i(\underline{w}_i)}{\underline{w}_i}). \tag{12}$$

3.1.1 Skills Distributed Over the Same Support

When skills distributed over the same support (i.e., $\underline{w}_1 = \underline{w}_2 \equiv \underline{w}$ and $\overline{w}_1 = \overline{w}_2 \equiv \overline{w}$), an individual with the lowest skill in the second group (with $\theta_2 > \theta_0$) has lower utility than an individual with the lowest skill in the first group. The following lemma proves this result.

> **Lemma 1**. *Assume preferences are quasi-linear and φ is strictly convex. There are two groups of individuals of equal size, each with a continuum of skills distributed over the same support $[\underline{w}, \overline{w}]$. The effective tax factor in group 2 is greater than the effective tax factor in group 1 (i.e., $\theta_2 > \theta_1$). Then, $\underline{u}_1 > \underline{u}_2$.*

Proof. According to (11), the FOCs for $\underline{w}$ is $1 - \theta_i t = \frac{1}{\underline{w}}\varphi'(\frac{I_i(\underline{w})}{\underline{w}})$, for $i = 1, 2$. Because φ is strictly convex and $\theta_2 > \theta_1$, these FOCs imply $I_2(\underline{w}) < I_1(\underline{w})$. By using (12), get $\underline{u}_1 - \underline{u}_2 = I_1(\underline{w})(1-\theta_1 t) - I_2(\underline{w})(1-\theta_2 t) - [\varphi(\frac{I_1(\underline{w})}{\underline{w}}) - \varphi(\frac{I_2(\underline{w})}{\underline{w}})]$. Because $\varphi(\frac{I_1(\underline{w})}{\underline{w}}) - \varphi(\frac{I_2(\underline{w})}{\underline{w}}) < \varphi'(\frac{I_1(\underline{w})}{\underline{w}})(\frac{I_1(\underline{w})}{\underline{w}} - \frac{I_2(\underline{w})}{\underline{w}})$ due to strict convexity of φ, $\underline{u}_1 - \underline{u}_2 > I_1(\underline{w})(1-\theta_1 t) - I_2(\underline{w})(1-\theta_2 t) - (1-\theta_1 t)(\frac{I_1(\underline{w})}{\underline{w}} - \frac{I_2(\underline{w})}{\underline{w}}) = (\theta_2 - \theta_1)t\frac{I_2(\underline{w})}{\underline{w}}$.

This lemma implies that the Rawlsian social welfare problem reduces to maximization of $u_2(\underline{w}) = I_2(\underline{w}) + G - \theta_2 t I_2(\underline{w}) - \varphi(\frac{I_2(\underline{w})}{\underline{w}})$ by choosing t and G, subject to the revenue constraint:

$$\int_{\underline{w}}^{\overline{w}} \lambda\theta_1 t I_1(w)\frac{f_1(w)}{2}dw + \int_{\underline{w}}^{\overline{w}} \lambda\theta_2 t I_2(w)\frac{f_2(w)}{2}dw = G + R. \tag{13}$$

By deriving G from revenue constraint (13) and plugging it into the expression for $u_2(\underline{w})$, the social welfare problem reduces to choosing t to maximize

$$u(\underline{w}) = I_2(\underline{w}) - \theta_2 t I_2(\underline{w}) - \varphi(\frac{I_2(\underline{w})}{\underline{w}}) + \int_{\underline{w}}^{\overline{w}} \lambda\theta_1 t I_1(w)\frac{f_1(w)}{2}dw + \int_{\underline{w}}^{\overline{w}} \lambda\theta_2 t I_2(w)\frac{f_2(w)}{2}dw - R. \tag{14}$$

Maximize (14) and simplify the first-order condition to get

$$\begin{aligned} &\tfrac{\theta_1 t}{1-\theta_1 t}\int_{\underline{w}}^{\overline{w}} \lambda\epsilon_1(w)I_1(w)\tfrac{f_1(w)}{2}dw + \tfrac{\theta_2 t}{1-\theta_2 t}\int_{\underline{w}}^{\overline{w}} \lambda\epsilon_2(w)I_2(w)\tfrac{f_2(w)}{2}dw = \\ &= \theta_1\int_{\underline{w}}^{\overline{w}} \lambda I_1(w)\tfrac{f_1(w)}{2}dw + \theta_2\int_{\underline{w}}^{\overline{w}} \lambda I_2(w)\tfrac{f_2(w)}{2}dw - \theta_2 I_2(\underline{w}) \end{aligned} \tag{15}$$

where $\epsilon_i(w) = \frac{\varphi'(\frac{I_i}{w})}{\varphi''(\frac{I_i}{w})\frac{I_i}{w}}$ is equal to the inverse of the wage elasticity of labor supply for a w-type individual in group i.

Intuitively, an increase in the effective tax factor in group 2 from θ_0 to θ_2 should redistribute income from group 2 to group 1, which is in this model is achieved through an adjustment in tax rate, t, and the lump-sum transfer, G. However, to be able to say how exactly they adjust, we need to impose additional assumptions.

To determine what happens to the welfare of individuals in each group, I assume that labor supply elasticity exhibits a constant wage elasticity. Thus, set $\varphi(L) = L^{1+1/\epsilon}$, where ϵ is the labor supply elasticity. Observe that the strict convexity of φ implies $\epsilon > 0$. This assumption leads to a closed-form solution for optimal incomes, for $i = 1, 2$, which are given by

$$I_i(w) = \left(\frac{1-\theta_i t}{1+1/\epsilon}\right)^{\epsilon} w^{1+\epsilon}.$$

The closed-form solution for $I_i(w)$ allows us to simplify the equation determining the optimal tax rate:

$$\begin{aligned} &\tfrac{\theta_1 t}{1-\theta_1 t}\epsilon\theta_1 \left(\tfrac{1-\theta_1 t}{1+1/\epsilon}\right)^{\epsilon} \lambda\hat{W}_1 + \tfrac{\theta_2 t}{1-\theta_2 t}\epsilon\theta_2 \left(\tfrac{1-\theta_2 t}{1+1/\epsilon}\right)^{\epsilon} \lambda\hat{W}_2 = \\ &= \theta_1 \left(\tfrac{1-\theta_1 t}{1+1/\epsilon}\right)^{\epsilon} \lambda\hat{W}_1 + \theta_2 \left(\tfrac{1-\theta_2 t}{1+1/\epsilon}\right)^{\epsilon} \lambda\hat{W}_2 - \theta_2 \left(\tfrac{1-\theta_2 t}{1+1/\epsilon}\right)^{\epsilon} \underline{W}, \end{aligned} \tag{16}$$

where $\hat{W}_i = \int_{\underline{w}}^{\overline{w}} w^{1+\epsilon} \frac{f_i(w)}{2} dw$ and $\underline{W} = \underline{w}^{1+\epsilon}$.

Note that formula (10) for $\theta_0 t_0$ in the case of constant labor supply elasticity reduces to

$$\theta_0 t_0 = \frac{\lambda(\hat{W}_1 + \hat{W}_2) - \underline{W}}{(1+\epsilon)\lambda(\hat{W}_1 + \hat{W}_2) - \underline{W}},$$

where I have used that $\int_{\underline{w}}^{\overline{w}} w^{1+\epsilon} f(w) dw = \int_{\underline{w}}^{\overline{w}} w^{1+\epsilon} \frac{f_1(w)}{2} dw + \int_{\underline{w}}^{\overline{w}} w^{1+\epsilon} \frac{f_2(w)}{2} dw$.

While we cannot derive the close form solution for tax rate, t, as can be seen from (16), we can determine the sign of its change. Differentiate (16) w.r.t. θ_2 and estimate the derivative $\frac{\partial t}{\partial \theta_2}$ at $\theta_2 = \theta_0$ to get

$$\left.\frac{\partial t}{\partial \theta_2}\right|_{\theta_2=\theta_0} = \frac{t_0}{\theta_0(\hat{W}_1 + \hat{W}_2)} \left[-\hat{W}_2 - \frac{\theta_0 t_0 \epsilon \hat{W}_1 \underline{W})}{(\lambda(\hat{W}_1 + \hat{W}_2) - \underline{W})^2}\right] < 0.$$

When the effective tax factor in group 2 increases, the statutory tax rate, t, decreases. This implies that taxes paid by taxpayers in group 1 decreases. However, taxes paid by taxpayers in group 2 increases, because $\left.\frac{\partial \theta_2 t}{\partial \theta_2}\right|_{\theta_2=\theta_0} = \frac{t_0 \hat{W}_1(\lambda(\hat{W}_1+\hat{W}_2)-(1-\theta_0 t_0)\underline{W})}{\hat{W}_1+\hat{W}_2} > 0$.

The closed-form solution for $I_i(w)$ allows us also to derive the expression for $\underline{u}_i(w)$ and $u_i(w)$ for $i = 1, 2$:

$$\underline{u}_i = (1+\frac{1}{\epsilon})^{-\epsilon}\left(\theta_1 t(1-\theta_1 t)^{\epsilon}\lambda\hat{W}_1 + \theta_2 t(1-\theta_2 t)^{\epsilon}\lambda\hat{W}_2 + \frac{1}{1+\epsilon}(1-\theta_i t)^{1+\epsilon}\underline{w}^{1+\epsilon}\right) - R, \quad (17)$$

$$u_i = \underline{u}_i + (1+\frac{1}{\epsilon})^{-\epsilon}\frac{1}{1+\epsilon}(1-\theta_i t)^{1+\epsilon}(w^{1+\epsilon} - \underline{w}^{1+\epsilon}). \quad (18)$$

By differentiating the above utilities w.r.t. θ_2, we can determine how an increase in the effective tax factor in group 2 affects the utility of individuals in each group. In doing this, remember that $\frac{\partial \underline{u}_2}{\partial t} = 0$, because t is chosen to maximize $\underline{u}_2$. The derivatives of the utilities w.r.t. θ_2 are

$$\left.\frac{\partial \underline{u}_2}{\partial \theta_2}\right|_{\theta_2=\theta_0} = (1+\frac{1}{\epsilon})^{-\epsilon} t_0(1-\theta_0 t_0)^{\epsilon}\left[-\frac{\hat{W}_1 \underline{W}}{\hat{W}_1 + \hat{W}_2}\right] < 0,$$

$$\left.\frac{\partial u_2}{\partial \theta_2}\right|_{\theta_2=\theta_0} = \left.\frac{\partial \underline{u}_2}{\partial \theta_2}\right|_{\theta_2=\theta_0} + (1+\frac{1}{\epsilon})^{-\epsilon}(1-\theta_0 t_0)^{\epsilon}\left(-\left.\frac{\partial \theta_2 t}{\partial \theta_2}\right|_{\theta_2=\theta_0}\right)(w^{1+\epsilon} - \underline{w}^{1+\epsilon}) < 0,$$

$$\left.\frac{\partial \underline{u}_1}{\partial \theta_2}\right|_{\theta_2=\theta_0} = (1+\frac{1}{\epsilon})^{-\epsilon} t_0(1-\theta_0 t_0)^{\epsilon}\left[\frac{\hat{W}_2 \underline{W}}{\hat{W}_1 + \hat{W}_2}\right] > 0,$$

$$\left.\frac{\partial u_1}{\partial \theta_2}\right|_{\theta_2=\theta_0} = \left.\frac{\partial \underline{u}_1}{\partial \theta_2}\right|_{\theta_2=\theta_0} + (1+\frac{1}{\epsilon})^{-\epsilon}(1-\theta_0 t_0)^{\epsilon}\theta_0\left(-\left.\frac{\partial t}{\partial \theta_2}\right|_{\theta_2=\theta_0}\right)(w^{1+\epsilon} - \underline{w}^{1+\epsilon}) > 0.$$

These derivatives imply that everyone in group 2 receives a loss in their welfare and everyone in group 1 receives a gain in their welfare as a result of an increase in the effective tax factor in group 2. Because the Rawlsian social welfare function in this case is equal to $\underline{u}_2$, the social welfare decreases. The following proposition summarizes these results.

Proposition 2. *Assume preferences are quasi-linear and the social welfare function is Rawlsian.* Assume that $\lambda > \frac{\underline{w}^{1+\epsilon}}{\int_{\underline{w}}^{\overline{w}} w^{1+\epsilon} f(w)dw}$. *There are two groups of individuals of equal size, 1 and 2, each with a continuum of skills distributed over the same support* $[\underline{w}, \overline{w}]$. *Assume that the wage elasticity of labor supply is constant and identical for the group 1 and 2. Then, an increase in the effective tax factor in group 2 leads to:*

i) a decrease in the tax rate, which allows the government to redistribute income from group 2 to group 1.

ii) an increase in the utility for each individual in group 1.

iii) a decrease in the utility for each individual in group 2.

iv) a decrease in the Rawlsian social welfare function.

3.1.2 Skills Distributed Over Different Supports

Consider now the case when skills are distributed over the different supports: in group 1 over $[\underline{w}_1, \overline{w}_1]$ and in group 2 over $[\underline{w}_2, \overline{w}_2]$, where $\overline{w}_1 < \overline{w}_2$. In this case, it is not necessary that the utility of an individual with the lowest skill in group 2, $u_2(\underline{w}_2)$, is lower than the utility of an individual with the lowest skill in group 1, $u_1(\underline{w}_1)$. The following lemma shows that when $\overline{w}_2$ is sufficiently larger than $\overline{w}_1$, it is the opposite, $u_1(\underline{w}_1) < u_2(\underline{w}_2)$.

> **Lemma 2**. *Assume preferences are quasi-linear and φ is strictly convex. There are two groups of individuals of equal size, each with a continuum of skills distributed over different supports: in group 1 over $[\underline{w}_1, \overline{w}_1]$ and in group 2 over $[\underline{w}_2, \overline{w}_2]$, where $\overline{w}_2$ is sufficiently larger than $\overline{w}_1$. Specifically, $(1-\theta_2)\underline{w}_2 > (1-\theta_1)\underline{w}_1$. The effective tax factor in group 2 is greater than the effective tax factor in group 1 (i.e., $\theta_2 > \theta_1$). Then, $\underline{u}_1 < \underline{u}_2$.*

Proof. According to (11), the FOCs are $1-\theta_i t = \frac{1}{\underline{w}_i}\varphi'(\frac{I_i(\underline{w}_i)}{\underline{w}_i})$, for $i = 1, 2$. Because φ is strictly convex and $(1-\theta_2)\underline{w}_2 > (1-\theta_1)\underline{w}_1$, these FOCs imply $L_2(\underline{w}_2) < L_1(\underline{w}_1)$. Then, $u_2(\underline{w}_2) - u_1(\underline{w}_1) = I_2(\underline{w}_2)(1-\theta_2 t) - I_1(\underline{w}_1)(1-\theta_1 t) - [\varphi(L_2(\underline{w}_2)) - \varphi(L_1(\underline{w}_1))] > I_2(\underline{w}_2)(1-\theta_2 t) - I_1(\underline{w}_1)(1-\theta_1 t) - (1-\theta_2 t)\underline{w}_2(\frac{I_2(\underline{w}_2)}{\underline{w}_2} - \frac{I_1(\underline{w}_1)}{\underline{w}_1}) = ((1-\theta_2 t)\underline{w}_2 - (1-\theta_1)\underline{w}_1)I_1(\underline{w}_1) > ((1-\theta_2)\underline{w}_2 - (1-\theta_1)\underline{w}_1)I_1(\underline{w}_1)$, where I have used that $\varphi(L_2(\underline{w}_2)) - \varphi(L_1(\underline{w}_1)) < \varphi'(L_2(\underline{w}_2))\,(L_2(\underline{w}_2) - L_1(\underline{w}_1))$.

Note that condition $\overline{w}_1 < \overline{w}_2$ does not produce any problem for incentive compatibility to hold, that is an individual in group 2 with type $\overline{w}_2$ would not want pretend to be type $w < \overline{w}_2$, because statutory tax rate in the same for both groups. Another words, t is chosen so that incentive compatibility is satisfied, and therefore there is no incentive to pretend to be another type.

Because $\underline{u}_1 < \underline{u}_2$, the Rawlsian social welfare function is equal now to $\underline{u}_1 = G + I_1(\underline{w}_1)(1-\theta_1 t) - \varphi(\frac{I_1(\underline{w}_1)}{\underline{w}_1})$. Using the same calculation strategy as in the previous subsection and assuming that the wage elasticity of labor supply is constant, we can derive the equation determining the optimal tax rate, which is

$$\begin{aligned} &\tfrac{\theta_1 t}{1-\theta_1 t}\epsilon\theta_1\left(\tfrac{1-\theta_1 t}{1+1/\epsilon}\right)^{\epsilon}\lambda\hat{W}_1 + \tfrac{\theta_2 t}{1-\theta_2 t}\epsilon\theta_2\left(\tfrac{1-\theta_2 t}{1+1/\epsilon}\right)^{\epsilon}\lambda\hat{W}_2 = \\ &= \theta_1\left(\tfrac{1-\theta_1 t}{1+1/\epsilon}\right)^{\epsilon}\lambda\hat{W}_1 + \theta_2\left(\tfrac{1-\theta_2 t}{1+1/\epsilon}\right)^{\epsilon}\lambda\hat{W}_2 - \theta_1\left(\tfrac{1-\theta_1 t}{1+1/\epsilon}\right)^{\epsilon}\underline{W}_1, \end{aligned} \tag{19}$$

where $\underline{W}_1 = \underline{w}_1^{1+\epsilon}$. Equation (19) differs from equation (16) only in the very last term in the formula.

To determine the sign of the change in the tax rate as a result of an increase in the effective tax factor, differentiate (19) w.r.t. θ_2 and estimate the derivative $\frac{\partial t}{\partial \theta_2}$ at $\theta_2 = \theta_0$ to get

$$\left.\frac{\partial t}{\partial \theta_2}\right|_{\theta_2=\theta_0} = \frac{t_0\hat{W}_2}{\theta_0(\hat{W}_1+\hat{W}_2)}\left[\frac{-(\lambda(\hat{W}_1+\hat{W}_2)-2\underline{W}_1)-\theta_0 t_0(1+\epsilon)\underline{W}_1}{(\hat{W}_1+\hat{W}_2-\underline{W}_1)}\right].$$

For $\left.\frac{\partial t}{\partial \theta_2}\right|_{\theta_2=\theta_0}$ to be negative, it is sufficient to have $\lambda(\hat{W}_1+\hat{W}_2)-2\underline{W}_1 = \lambda\int_{\underline{w}_1}^{max\{\overline{w}_1,\overline{w}_2\}} w^{1+\epsilon}f(w)dw - 2\underline{w}_1^{1+\epsilon} > 0$.[9] This implies that the average skill level should be sufficiently higher than the lowest skill level. If so, the optimal tax rate decreases with an increase in the effective tax factor, implying that taxes paid by taxpayers in group 1 decreases. The taxes paid by taxpayers in group 2, however, increases, because $\left.\frac{\partial \theta_2 t}{\partial \theta_2}\right|_{\theta_2=\theta_0} = \frac{t_0}{\hat{W}_1+\hat{W}_2}\left(\hat{W}_1 + \frac{\epsilon\theta_0 t_0\hat{W}_2\underline{W}_1^2}{(\hat{W}_1+\hat{W}_2-\underline{W})^2}\right) > 0$.

The expression for $\underline{u}_i(w)$ and $u_i(w)$ for $i = 1, 2$ are now:

$$\underline{u}_i = (1+\frac{1}{\epsilon})^{-\epsilon}\left(\theta_1 t(1-\theta_1 t)^{\epsilon}\lambda\hat{W}_1 + \theta_2 t(1-\theta_2 t)^{\epsilon}\lambda\hat{W}_2 + \frac{1}{1+\epsilon}(1-\theta_i t)^{1+\epsilon}\underline{w}_i^{1+\epsilon}\right) - R, \tag{20}$$

$$u_i = \underline{u}_i + (1+\frac{1}{\epsilon})^{-\epsilon}\frac{1}{1+\epsilon}(1-\theta_i t)^{1+\epsilon}(w^{1+\epsilon} - \underline{w}_i^{1+\epsilon}). \tag{21}$$

By differentiating the above utilities w.r.t. θ_2, we can determine how an increase in the effective tax factor in group 2 affects the utility of individuals in each group. In doing this, remember that now $\frac{\partial \underline{u}_1}{\partial t} = 0$, because t is chosen to maximize $\underline{u}_1$. The derivatives of the utilities w.r.t. θ_2 are

[9] Note that this condition is easily satisfied if $\underline{w}_1$ is close to zero.

$$\frac{\partial \underline{u}_1}{\partial \theta_2}\bigg|_{\theta_2=\theta_0} = (1+\frac{1}{\epsilon})^{-\epsilon} t_0(1-\theta_0 t_0)^{\epsilon}\left[\frac{\hat{W}_2 \underline{W}_1}{\hat{W}_1+\hat{W}_2}\right] > 0,$$

$$\frac{\partial u_1}{\partial \theta_2}\bigg|_{\theta_2=\theta_0} = \frac{\partial \underline{u}_1}{\partial \theta_2}\bigg|_{\theta_2=\theta_0} + (1+\frac{1}{\epsilon})^{-\epsilon}(1-\theta_0 t_0)^{\epsilon}\theta_0\left(-\frac{\partial t}{\partial \theta_2}\bigg|_{\theta_2=\theta_0}\right)(w^{1+\epsilon}-\underline{w}_1^{1+\epsilon}) > 0,$$

$$\frac{\partial \underline{u}_2}{\partial \theta_2}\bigg|_{\theta_2=\theta_0} = (1+\frac{1}{\epsilon})^{-\epsilon}\frac{t_0(1-\theta_0 t_0)^{\epsilon}}{\hat{W}_1+\hat{W}_2}\left[-\hat{W}_1\underline{W}_2 - \frac{(1-\theta_0 t_0)\hat{W}_2\underline{W}_1^2(\underline{W}_2-\underline{W}_1)}{\lambda(\hat{W}_1+\hat{W}_2)(\lambda(\hat{W}_1+\hat{W}_2)-\underline{W}_1)}\right] < 0,$$

$$\frac{\partial u_2}{\partial \theta_2}\bigg|_{\theta_2=\theta_0} = \frac{\partial \underline{u}_2}{\partial \theta_2}\bigg|_{\theta_2=\theta_0} + (1+\frac{1}{\epsilon})^{-\epsilon}(1-\theta_0 t_0)^{\epsilon}\left(-\frac{\partial \theta_2 t}{\partial \theta_2}\bigg|_{\theta_2=\theta_0}\right)(w^{1+\epsilon}-\underline{w}_2^{1+\epsilon}) < 0.$$

These derivatives imply that everyone in group 2 receives a loss in their welfare and everyone in group 1 receives a gain in their welfare as a result of an increase in the effective tax factor in group 2. Because the Rawlsian social welfare function in this case is equal to $\underline{u}_1$, the social welfare increases. The following proposition summarizes these results.

Proposition 3. *Assume preferences are quasi-linear and the social welfare function is Rawlsian. There are two groups of individuals of equal size, each with a continuum of skills distributed over different supports: in group 1 over* $[\underline{w}_1, \overline{w}_1]$ *and in group 2 over* $[\underline{w}_2, \overline{w}_2]$*, where* $\underline{w}_2$ *is sufficiently larger than* $\underline{w}_1$*. Specifically,* $(1-\theta_2)\underline{w}_2 > (1-\theta_1)\underline{w}_1$*. Assume that the wage elasticity of labor supply is constant and identical for the group 1 and 2. Assume the average skill level is sufficiently higher than the lowest skill level. Presicely, assume that* $\lambda \int_{\underline{w}_1}^{max\{\overline{w}_1,\overline{w}_2\}} w^{1+\epsilon} f(w)dw - 2\underline{w}_1^{1+\epsilon} > 0$*. Then, an increase in the effective tax factor in group 2 leads to:*

i) a decrease in the tax rate, which allows the government to redistribute income from group 2 to group 1.

ii) an increase in the utility for each individual in group 1.

iii) a decrease in the utility for each individual in group 2.

iv) an increase in the Rawlsian social welfare function.

In this case, an increase in the effective tax factor in group 2 increases social welfare and allows the government to redistribute income from group 2 to group 1. Recall that, in this case, group 2 is assumed to consist of individuals with relatively higher earning potentials than those in group 1 and that an increase in the effective tax factor in group 2 represents the imposition of collateral sanction. Putting these facts together, we see that the imposition of collateral sanction, similar to tagging, enables to achieve a better redistribution. However, in contrast to a tag that improves social welfare even in the case when the supports of skill distributions for two groups are the same, a collateral tax sanction improves social welfare only when the poorest individual in the group targeted by the sanction has sufficiently higher earning potential than the poorest individual in the other group.

4 Some Concerns

One might wonder why we need collateral tax sanctions if we have tags. In practice, it might be easier to implement collateral tax sanctions than tags for political reasons. If we want to tax based on ability, then we might want to tax based on possession of international passport. But, it might be impossible to do, because it is illegal to restrict your right to travel. But, in case when a person violates the law, it could be legal to use broader instruments and revoke the passport.

Not all collateral tax sanctions, however, work as a tag. That is, not all of them are correlated with taxpayers earning potential. For example, suspension of a hunting license may be not a good instrument for imposing punishment that is correlated with ability. Possession of a hunting license more likely reflects individual preferences.

As have been discussed, an impotant feature of collateral tax sanctions is that their impossition affects consumption directly. Moreover, it forces the consumption of a certain good/activity to be reduced to zero. How pronounced the effect of such a restriction depending on the individual preferences. Certainly, some collateral tax sanctions could be very restrictive and could affect taxpayer's utility a lot.

A sanction that produces high utility cost has its benefits and downsides. On the one hand, it could be effective if it produces high deterrence effect. That is, it creates strong incentives for a tax delinquent to pay the tax debt in order to avoid the sanction, so that many taxpayers wound pay their debts and would not be subject to the sanction. On the other hand, if the produced deterrence affect is low, then many taxpayers would be subject to the sanction. Hence, the sanction would substantially reduce the social welfate.

It is also necessary to acknowledge that this paper explores only one channel through which collateral tax sanctions affect people. There are many other channels. In addition to affecting avoidance behavior, some collateral tax sanctions might actually discourage labor supply. For example, suspension of a driver's or professional license may impose some restriction on people's ability to earn money. Second, whenever there exists a shadow economy, collateral sanction might stimulate some shadow consumption. The size of those effects is unclear and empirical work is needed to estimate it.

5 Conclusion

This paper analyzes a collateral tax sanction – a revocation of a privilege provided by the government, imposed for a failure to comply with tax obligations. The paper proposes a new rationale for why it may be beneficial to use collateral tax sanctions for the purpose of tax enforcement. Collateral tax sanctions might be a way to impose punishment correlated with taxpayer's ability and, as a result, increase social welfare by making the redistribution of income through tax system more efficient. In other words, a collateral tax sanction might work as a tag. It does this by affecting consumption rather than income, which makes the enforcement targeted to a group of taxpayers. When earning potentials in the targeted group is higher than in the rest of the population, the social welfare is raised by the imposition of the collateral tax sanction that helps to redistribute income from the former to the latter group.

The paper develops a model that explores the welfare and redistribution consequence of the imposition of a collateral tax sanction for tax noncompliance. In the model, individuals are heterogeneous in their skills. By imposing a collateral tax sanction, the government can rise the effective tax rate in the targeted group of taxpayers whose skilles are higher on average than in the rest of the population. I show that as a result of this, the new optimal statutory tax rate decreases, which allows to increase the utility of the rest of population at the cost of decreasing the utility of taxpayers in the targeted group. The social welfare increases only when the earning potential of the poorest individual in the targeted group is sufficiently higher than the earning potential of the poorest individual in the rest of the population.

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