

Taxation with little administration

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Abstract

This paper proposes a tax scheme in the vein of the implementation literature under complete information. The tax scheme virtually obviates the need for tax administration. Besides little tax administration, three desirable properties characterize our proposed tax scheme. First, complementing the regular tax system with our scheme can be Pareto-improving. Second, our scheme eliminates the so-called “excess burden of tax evasion” as defined by Yitzhaki [Yitzhaki, S., 1987. On the excess burden of tax evasion. *Public Finance Quarterly* 15, 123–137]. Third, our scheme eliminates the usual excess burden of tax distortion. Caveats about our proposed scheme are also discussed. © 2000 Elsevier Science S.A. All rights reserved.

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1. Introduction

In principle, the taxpayer could be better off under an agreement whereby the taxpayer pays as much as the government currently collects, while the government ceases to audit.

Slemrod and Yitzhaki (1996, p. 181)

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In this paper we propose a tax scheme that accomplishes the principle described above. In fact, the tax scheme virtually obviates the need for tax administration.

The tax scheme proposed consists of two stages. In the first stage, the IRS (Internal Revenue Service) announces a fixed amount of tax revenue to be collected from a group of taxpayers. Given this announced amount, each taxpayer in the group is free to contribute as much or as little as he likes toward a group fund (unknown by the IRS). If the amount of voluntary tax contributions meets or exceeds the revenue target announced by the IRS, then the fund is handed over to the IRS and the game is over. Otherwise, tax contributions are returned to each taxpayer in the group and the game proceeds to the next stage. In this second stage, the taxpayers face a regular tax system characterized by statutory tax rates, audit probabilities, and fines for tax evasion. Each taxpayer pays taxes, or taxes plus fines, in the usual way. Under this two-stage scheme, it is shown that, if the revenue target is not too high (to be precisely defined later), equilibrium outcomes in the first stage will meet the target, obviating the need for the actual administration of the regular tax system in the second stage.

A key assumption underlying our proposed scheme is that the taxpayers in the group know enough about each other's relevant characteristics, even though the IRS does not. This is admittedly a strong assumption. It is emphasized, however, that the IRS could exploit the differential information between itself and the taxpayers within the group to improve welfare in case the assumption is met. The important feature of this paper is not in demonstrating that our proposed scheme would really work but in demonstrating how critical is the structure of information in the design of the tax system.¹

Our proposed tax scheme owes its innovation to Bagnoli and Lipman (1989). It is well known that a voluntary contribution to the provision of public goods typically results in inefficient allocation with underprovision. This suboptimal result is mainly due to the so-called free-rider problem: each agent considers only his own benefit and ignores the benefits accruing to other agents from his contribution. Bagnoli and Lipman reconsider the voluntary-contribution problem through two different institutional rules. First, the provision of public goods is discrete rather than continuous: an indivisible public good is either provided or not provided at all. Second, contributions are refundable if the total amount of the contributions falls short of the prescribed threshold. Bagnoli and Lipman demonstrate in their institutional setting that private provision need not be inefficient and, as a matter of fact, the set of non-cooperative equilibrium outcomes exactly coincides with the core of the cooperative game played among agents.

Our proposed tax scheme follows Bagnoli and Lipman's idea closely. In particular, we force taxpayers as a group to make an either-or choice between

¹The particular assumption that agents are well informed but that the social planner is not is actually the starting point of the voluminous literature on implementation under complete information (see Moore, 1992, for a survey).

meeting the revenue target and facing the regular tax system. Tax contributions are refunded if the amount of the contributions should fail to meet the target set by the IRS. To exclude the IRS from utilizing the information about individual contributions later, an additional assumption that the contribution fund is unknown to the IRS is imposed. We demonstrate in this framework that our proposed tax scheme achieves: (i) taxation with little administration and so a saving of the tax administrative cost, (ii) a Pareto improvement if the scheme complements the regular tax system, and (iii) the elimination of the excess burden of both tax evasion and tax distortion.

The rest of the paper is organized as follows. Section 2 introduces the basic model. Section 3 reports the findings from our proposed tax scheme. Section 4 extends the basic model to include leisure. Section 5 provides concluding remarks.

2. The basic model

2.1. The environment

Consider a group of taxpayers that “neighbor” on each other. The number of taxpayers in the group is $n < \infty$. Each taxpayer is characterized by an income level $Y \in (0, \infty)$, which is known by his “neighbors” but unknown to the IRS (without auditing). All taxpayers have identical preferences, which are assumed to be common knowledge. Although the IRS cannot identify the income associated with a particular taxpayer without auditing, it knows the income distribution of the group.

Taxpayers are assumed to be risk averse in the usual way. As to the risk attitudes of the IRS toward revenue, we exclude the possibility of risk loving. The IRS is normally assumed to be risk neutral toward revenue in the literature. However, as argued in Yang (1993), there are situations where assuming a risk-averse IRS may be more appropriate.

Let the regular tax system be represented by an income tax function $T(Y)$ with $T' > 0$, fine $F > 1$, and audit probability $p(\cdot) > 0$. Faced with the regular tax system, a taxpayer (characterized by Y_i) is assumed to report income $X_i (\leq Y_i)$ so as to maximize the expected utility:

$$EU(Y_i) \equiv (1 - p(\cdot)) \cdot U\{Y_i - T(X_i)\} + p(\cdot) \cdot U\{Y_i - T(X_i) - F[T(Y_i) - T(X_i)]\} \quad (1)$$

where $U(\cdot)$ is a von Neumann-Morgenstern utility function with $U' > 0$ and $U'' < 0$. The setup of Eq. (1) is in the tradition of decision under risk, and has been popular in the tax evasion literature since the seminal work of Allingham and Sandmo (1972) and Yitzhaki (1974). The setup assumes: (i) true income will be

discovered once the tax evader gets audited, and (ii) the caught evader will be fined, and a penalty is levied on the evaded tax, as is the case under most tax laws.

Given that $F > 1$, a taxpayer will engage in tax evasion whenever evasion is a favorable gamble to the taxpayer. This is because a risk averter takes no part of an unfavorable or barely fair gamble, but always takes some part of a favorable gamble (see Arrow, 1970, pp. 99–100). In what follows we assume that all taxpayers in the group will evade tax when facing the regular tax system.² This is a simplified assumption for ease of exposition. Our main results remain valid even if some taxpayers do not evade tax.

2.2. The tax scheme

The proposed tax scheme consists of two stages as described in the introduction. In the first stage, the IRS announces a fixed amount of tax revenue, \bar{R} , to be collected from the group. If the total contribution of the taxpayers amounts to the threshold level \bar{R} , the game is over. Otherwise, contributions are returned to each taxpayer in the group and the game proceeds to the next stage. In this second stage, the taxpayers face the regular tax system.

3. The analysis

3.1. Equilibrium outcomes

To solve the two-stage game, the method of backward induction is employed. We first ask: What if the amount of voluntary contributions should fail to meet the threshold set by the IRS?

When the amount of money contributed is less than \bar{R} , all taxpayers in the group face the regular tax system and, by assumption, they all choose to evade. However, a taxpayer who evades tax also exposes himself to audit risk. The maximal amount of money, β_i , that taxpayer i would be ready to hand over to the IRS for exemption from the regular tax system is defined implicitly by

$$U(Y_i - \beta_i) = EU(Y_i) \quad (2)$$

With the information about all the β_i 's at hand, we can proceed to analyze the first-stage game of voluntary tax contributions. According to our setup, taxpayer preferences are common knowledge and, furthermore, the IRS knows the income distribution of the group. This implies that the IRS is capable of calculating the sum $\sum \beta_i$,³ even though it has difficulty in identifying a particular β_i . If the IRS

²Let $p(\cdot) = p$, then tax evasion occurs if and only if $pF < 1$ (see Yitzhaki, 1987).

³The notation of summation always runs from 1 to n in this paper.

chooses an \bar{R} such that $\bar{R} > \sum \beta_i$, clearly there is no way to meet the revenue target through the voluntary contribution. To make the problem more interesting, we focus on the situation where $\bar{R} \leq \sum \beta_i$ throughout the rest of this paper.

Let α_i denote the amount of voluntary tax contributions by taxpayer i . The set of $(\alpha_1, \alpha_2, \dots, \alpha_n)$ such that $0 \leq \alpha_i \leq \beta_i$ for all i and $\sum \alpha_i = \bar{R}$ is the core of the cooperative contribution game played by the taxpayers in the group. On the other hand, the non-cooperative contribution game is in essence the same as the private provision of discrete public goods considered by Bagnoli and Lipman (1989). The discrete public good in question is meeting the revenue target set by the IRS so that all taxpayers in the group can be exempted from the regular tax system. Taxpayer i 's valuation of the public good is β_i , while the total cost of providing the public good is \bar{R} . It is feasible for each taxpayer to contribute an amount within his income (i.e., $\alpha_i \in [0, Y_i]$). This observation between our tax contribution game and Bagnoli and Lipman's public-goods contribution game enables us to apply their Theorem 1 directly.

Proposition 1. *Undominated perfect equilibrium outcomes of our non-cooperative tax contribution game will meet the revenue target set by the IRS and, moreover, the set of undominated perfect equilibrium outcomes exactly coincides with the core of the cooperative tax contribution game.*

Undominated perfect equilibrium is a refinement of Nash equilibrium. It is the trembling-hand perfect Nash equilibrium of a game after the removal of all dominated strategies (see Bagnoli and Lipman, 1989, for details).

Bagnoli and McKee (1991) perform a series of laboratory experiments to test the theoretical prediction of Bagnoli and Lipman (1989). The findings provide substantial support for the hypothesis that the public good will be provided and the contributions will sum to the cost of the public good. Bagnoli and McKee also cite many real-world examples in support of the success of voluntary contributions to the provision of discrete public goods. These examples all meet the two institutional rules in question: a target fund to be raised and the refund practice if the amount of the contributions should fail to reach the target. The examples range from raising money to hire a lobbyist at the state legislature (the Association of Oregon Faculties in 1979) to soliciting a specified amount of money for the election campaign (the New Democratic Party in Manitoba, Canada in 1980 and again in 1985).

Is it possible to find historical cases where the kind of tax system suggested here was used? The following are possible examples.

1. The Ottoman Empire (1300–1914) imposed the poll tax on non-Muslim subjects. The collection of such a tax relied heavily on the tax-farm system. In many instances however (particularly with non-Muslim communities in towns or on islands), agreements were made with the government to pay the poll tax

in a predetermined lump sum for the whole community. This fixed amount of taxes was usually collected through the local priest (see Inalcik, 1994).⁴

2. During the Ming dynasty in China (1368–1644), the population in the villages was organized into the so-called “*li-chia*.” Every 110 households formed a *li*. Each *li* was divided into 10 *chia*, and each *chia* consisted of 10 households. The remaining 10 households that were reckoned to be the largest and most affluent among the 110 took turns to be the *li* chief. Under the direction of the *li* chief of the year, a particular *chia* performed the local tax collection, and met all material and labor requisitions on behalf of the entire *li*. A new census was taken after the ten-year cycle and all *li-chia* were reorganized accordingly (see Huang, 1974, chapter 1).
3. During the rule of Chiang Ching-Kuo (son of Chiang Kai-Shek) in Taiwan, it is said that several businessmen as a group were asked to make a certain amount of tax contribution to ease the fiscal pressure now and then. These businessmen would face the possibility of audit by the tax authority if their contributions failed to achieve the given target.⁵

The above historical cases are not identical to our proposed tax scheme, but they may be regarded as examples that share some similarities.

3.2. Pareto-improving property

Let the regular tax system be in effect at the status quo. Furthermore, let there be a group of taxpayers who are well informed about each other as is assumed in this paper. Is there a way to increase tax revenue without lowering any taxpayer’s welfare? Complementing the regular tax system with our proposed scheme is an answer. We prove the claim in this subsection.

The expected tax revenue (including fines) collected from taxpayer i when the regular tax system is enforced equals

$$ER_i = (1 - p(\cdot)) \cdot T(X_i) + p(\cdot) \cdot \{T(X_i) + F[T(Y_i) - T(X_i)]\} \quad (3)$$

This in turn implies

$$Y_i - ER_i = (1 - p(\cdot)) \cdot [Y_i - T(X_i)] + p(\cdot) \cdot \{Y_i - T(X_i) - F[T(Y_i) - T(X_i)]\} \quad (4)$$

Applying Jensen’s inequality with $U'' < 0$ to (4) yields

$$\begin{aligned} U(Y_i - ER_i) &> (1 - p(\cdot)) \cdot U[Y_i - T(X_i)] + p(\cdot) \\ &\quad \cdot U\{Y_i - T(X_i) - F[T(Y_i) - T(X_i)]\} = EU(Y_i) \end{aligned} \quad (5)$$

From Eqs.(2) and (5), we observe that

⁴We are grateful to the referee for bringing the case of the Ottoman Empire to our attention.

⁵We are grateful to Yophy Huang for bringing this example to our attention.

$$\beta_i > ER_i \quad (6)$$

and so

$$\sum \beta_i > \sum ER_i \quad (7)$$

This result demonstrates that these well-informed taxpayers as a group would be ready to pay more than the total expected revenue of the regular tax system in order to “abolish” the system.

Now, for these well-informed taxpayers only, the regular tax system is replaced with our proposed tax scheme. As long as the IRS chooses a revenue target \bar{R} for the group such that $\sum ER_i < \bar{R} \leq \sum \beta_i$, then two results occur according to Proposition 1. First, the equilibrium outcomes of voluntary tax contributions will meet the target \bar{R} . Second, no taxpayer will contribute more than the valuation of exempting him from the regular tax system (i.e., $\alpha_i \leq \beta_i$ for all i). These two results together imply that the expected amount of revenue collected will increase at no extra expense to any taxpayer. In fact, if \bar{R} is chosen to be strictly less than $\sum \beta_i$, some taxpayers in the group will be better off as well. Since the IRS is assumed to be risk neutral or risk averse, the IRS itself must be better off. To sum up, we state:

Proposition 2. *Let the regular tax system be in effect at the status quo and, furthermore, let there be a group of taxpayers who are well informed about each other. Then, for these well-informed taxpayers, replacing the regular tax system with our proposed tax scheme can be Pareto-improving for both the taxpayers and the IRS.*

3.3. Welfare gain

Running the regular tax system involves costly administration. The IRS spent \$7.6 billion in 1995 enforcing all varieties of federal taxation (see OMB, 1995). Let $C(.) > 0$ denote the administrative cost to the IRS of raising taxes from a group of well-informed taxpayers under the regular tax system. Net of this cost, the net expected revenue of the regular tax system only equals

$$NER \equiv \sum ER_i - C(.) \quad (8)$$

The administrative cost above can be saved through complementing the regular tax system with our proposed tax scheme. This is because the only job that needs to be done by the IRS under our scheme is to announce the revenue target.

One can rewrite Eq. (5) as

$$U(Y_i - ER_i - \theta_i) = EU(Y_i) \quad (9)$$

where $\theta_i > 0$ is the risk premium that taxpayer i would be ready to pay in order to

eliminate the exposure to audit risk. Yitzhaki (1987) calls this risk premium the “excess burden of tax evasion.” It is an excess burden because θ_i represents a deadweight loss beyond what would be imposed if ER_i were somehow collected by a lump-sum tax. This excess burden can be eliminated under our scheme, since the IRS ceases to audit once the revenue target is met.

4. An extended model with leisure

Since income is a parameter in the basic model, taxation under the regular tax system does not allow for any deadweight loss caused by altering labor supply decisions. This section extends the basic model to include leisure so that the “excess burden” due to tax distortion is incorporated.

4.1. The extended model

The features of the extended model remain the same as those in the basic model, except for the following changes. There are two commodities: a consumption good c and labor l . All taxpayers have a common utility function denoted by $U(c, l)$ with $U_c > 0$, $U_l < 0$, and $U_{cc} < 0$. This common utility function is common knowledge. Each taxpayer is characterized by a wage rate $w \in (0, \infty)$, which is known by his “neighbors” but unknown to the IRS. The IRS knows the distribution of w , even though it has difficulty in identifying a particular taxpayer’s wage rate (without auditing). Taxpayer i supplies labor l_i and hence earns income $Y_i = w_i l_i$.

4.2. The analysis

Faced with the regular tax system, a taxpayer (characterized by w_i) is assumed to report income $X_i (\leq Y_i)$ so as to maximize the expected utility:

$$EU(w_i) \equiv (1 - p(\cdot)) \cdot U[Y_i - T(X_i), l_i] + p(\cdot) \cdot U\{Y_i - T(X_i) - F[T(Y_i) - T(X_i)], l_i\} \quad (10)$$

The maximal amount of money, β_i , that taxpayer i would be ready to hand over to the IRS for exemption from the regular tax system is now defined implicitly by

$$U[w_i l_i^*(\beta_i) - \beta_i, l_i^*(\beta_i)] = EU(w_i) \quad (11)$$

where the left-hand side is an indirect utility function. After making the payment β_i so as to be exempted from the regular tax system, taxpayer i would choose the labor, l_i^* , that maximizes utility. This is the reason why l_i^* is specified as a function of β_i in Eq. (11).

With all the β_i ’s at hand, we can proceed with the analysis in the same way as

in the last section. There is an additional result, however. Let us define β_i^0 implicitly in terms of the following equality

$$U(w_i l_i^0 - \beta_i^0, l_i^0) = EU(w_i) \quad (12)$$

where l_i^0 is the labor chosen by taxpayer i under the regular tax system. Using (4) and applying Jensen's inequality with $U_{cc} < 0$ yields

$$U(Y_i^0 - ER_i, l_i^0) > (1 - p(\cdot)) \cdot U[Y_i^0 - T(X_i), l_i^0] + p(\cdot) \cdot U\{Y_i^0 - T(X_i) - F[T(Y_i^0) - T(X_i)], l_i^0\} = EU(w_i) \quad (13)$$

where $Y_i^0 = w_i l_i^0$. From Eqs. (12) and (13),

$$\beta_i^0 > ER_i \quad (14)$$

Since l_i^* is the labor that maximizes utility after the payment β_i is made, it is clear that

$$U(w_i l_i^* - \beta_i, l_i^*) = U(w_i l_i^0 - \beta_i, l_i^0) \quad \text{if } l_i^* = l_i^0; \quad (15.1)$$

$$U(w_i l_i^* - \beta_i, l_i^*) > U(w_i l_i^0 - \beta_i, l_i^0) \quad \text{if } l_i^* \neq l_i^0. \quad (15.2)$$

From Eqs. (11), (12) and (15), we obtain

$$U(w_i l_i^0 - \beta_i^0, l_i^0) = U(w_i l_i^* - \beta_i, l_i^*) = U(w_i l_i^0 - \beta_i, l_i^0) \quad \text{if } l_i^* = l_i^0; \quad (16.1)$$

$$U(w_i l_i^0 - \beta_i^0, l_i^0) = U(w_i l_i^* - \beta_i, l_i^*) > U(w_i l_i^0 - \beta_i, l_i^0) \quad \text{if } l_i^* \neq l_i^0. \quad (16.2)$$

As a result,

$$\beta_i = \beta_i^0 > ER_i \quad \text{if } l_i^* = l_i^0; \quad (17.1)$$

$$\beta_i > \beta_i^0 > ER_i \quad \text{if } l_i^* \neq l_i^0. \quad (17.2)$$

Intuitively, l_i^0 in Eq. (12) is a constrained labor supply while l_i^* in Eq. (11) is not. The utility derived from l_i^0 is therefore expected to be lower than that derived from l_i^* . To make the left-hand side of Eq. (12) equal to that of Eq. (11), it is logical to see that $\beta_i > \beta_i^0$. Alternatively, β_i acts like a lump-sum tax while β_i^0 is obtained under the income tax $T(\cdot)$ with tax distortion as a rule. The tax distortion is

reflected by changes in the choice of labor supply from l_i^* to l_i^0 . The gap between β_i and β_i^0 measures the usual excess burden of tax distortion, if there is any.⁶

4.3. Decomposing welfare gain

Suppose that revenue maximization is the objective of the IRS as assumed by Graetz et al. (1986) and many others. It is easy to see that the revenue-maximizing strategy for the IRS is to announce the revenue target $\bar{R} = \sum \beta_i$. The unique equilibrium of our game will then be $\alpha_i = \beta_i$ for all i : the IRS “exploits” all the surpluses and each taxpayer in the group merely retains the same level of utility as that under the regular tax system.⁷ This case is extreme, but it enables us to decompose the welfare gain of our proposed scheme cleanly.

If we define the risk premium as in Eq. (9), then from Eqs. (12) and (13)

$$U(w_i l_i^0 - ER_i - \theta_i, l_i^0) = U(w_i l_i^0 - \beta_i^0, l_i^0) = EU(w_i) \quad (18)$$

This result leads to

$$\beta_i^0 = ER_i + \theta_i \quad (19)$$

and hence

$$\sum \beta_i^0 = \sum ER_i + \sum \theta_i \quad (20)$$

Using Eq. (20),

$$\sum \beta_i = \sum (\beta_i - \beta_i^0) + \sum ER_i + \sum \theta_i \quad (21)$$

Employing the definition of *NER* in Eq. (8), we finally obtain

$$\sum \beta_i - NER = C(.) + \sum \theta_i + \sum (\beta_i - \beta_i^0) \quad (22)$$

Now, let $\bar{R} = \sum \beta_i$ so that complementing the regular tax system with our scheme causes no change in any taxpayer’s level of utility in equilibrium. This implies that all the welfare gains or losses of the economy can be measured by the change in tax revenue. The left-hand side of Eq. (22) represents the increase in tax revenue by complementing the regular tax system with our scheme. The right-hand side of Eq. (22) shows the sources of such an increase. These sources include: (i) the

⁶The Confederate government in the American Civil War passed a law in 1863 imposing a tax upon “the salaries of all salaried persons serving in any capacity whatever, except upon the salaries of all persons in the military or naval service” (see Seligman, 1914, p. 485). This law to some extent offered the taxpayer a choice between being drafted or paying for another person being drafted. This choice in a sense is analogous to the choice in our tax scheme: choosing between a lump sum tax or paying the regular way. We are grateful to the referee for suggesting this analogy.

⁷Following the standard practice in the principal-agent model, agents (taxpayers) are assumed to choose the course of action the principal (IRS) desires if they are indifferent between courses of action.

saving in the tax administrative cost, $C(\cdot)$, (ii) the elimination of the excess burden of tax evasion, $\Sigma \theta_i$, and (iii) the elimination of the excess burden of tax distortion, $\Sigma(\beta_i - \beta_i^0)$. To sum up, we have:

Proposition 3. *Suppose that the IRS is risk neutral and that a group of taxpayers are well informed about each other. Given the regular tax system imposed on the group, there exists a scheme of ours whose welfare gain over the regular tax scheme can be measured precisely by the saving in the administrative cost of taxation and the elimination of the excess burden of both tax evasion and tax distortion.*

5. Concluding remarks

Chu (1990) proposes a related tax scheme which focuses on individual taxpayers rather than taxpayers as a group. Each taxpayer faces an option: either pay a fixed amount of taxes set by the IRS and thus be exempted from a tax audit, or face the regular tax system with the possibility of a tax audit. Chu shows that the regular tax system can be Pareto-improved by a marginal introduction of his proposed tax scheme. Chu's scheme is applicable to a large group of taxpayers, since it does not require that taxpayers be well informed. However, if some of those taxpayers choosing to face the regular tax system are well informed about each other, then Chu's scheme could be Pareto-improved further by the introduction of our scheme.

The tax scheme proposed in this paper has the same vein as the implementation literature under complete information. The strong information requirement will, of course, limit the applicability of the scheme. Perhaps there are villages in developing countries where it is possible for each resident to make a good guess as to the income of the others. However, the rare observation of the kind of tax system suggested here indicates to some extent how strong the information assumption is and how difficult it would be to be able to use "voluntary" taxes in the real world. In the end we would like to emphasize once again: The important feature of this paper is not in demonstrating that our proposed scheme would really work but in demonstrating how critical is the structure of information in the design of the tax system.

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