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Informal sector gouvernance and regulation

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Abstract

In this paper, we present a model of tax evasion in the presence of imperfect auditing. We show that there is a clear link between the degree of observability associated with respect to fiscal agency. We also show that the degree of observability is critical in determining the optimal regulation policies to be followed by the fiscal authorities. Our imperfect monitoring approach provides a new strategy for understanding the informal sector in developing countries, which can be interpreted as that group of economic activities characterized by low observability.

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1. Introduction

In their seminal contribution, Allingham and Sandmo (1972) examine the effects of a change in tax rate, penalties and audit frequency on tax evasion. The idea that a taxpayer may be tempted to report taxable income below its true value was later extended by Kolm (1973), Srinivasan (1973) and Cowell (1985) among others.[1] In all these models, however, the tax rate, as well as the penalty for evasion and the audit frequency are exogenous.

More recently, in order to characterize optimal-taxation mechanisms available to government authorities, strategic interactions between fiscal authorities and taxed economic agents have been included in the analysis using a principal-agent framework (see, among others, Townsend, 1979, Border and Sobel, 1987, Greenberg, 1984, Reinganum and Wilde, 1985). To better understand the complex relationships between governments, fiscal agencies and taxpayers, the theory of hierarchic collusion (Tirole, 1986, 1992) has also been used. Chander and Wilde (1992), for example, show that potential corruption of fiscal agencies by taxpayers leads to higher audit rates than when there is no corruption. Flatters and McLeod (1995) find that a certain degree of tolerance for collusion can be an efficient scheme given the constrained resources faced by the government. Finally, Besley and McLaren (1993) consider wage incentives designed to thwart bureaucratic collusion and show that the resulting efficiency wage may not be an appropriate choice.

In all these studies, the assumption that auditing is perfect, i.e. once the audit is carried out, there is perfect certainty regarding the income of audited taxpayers, is very restrictive given that the structure of taxation is largely a function of the information obtained regarding non-observable variables (see, e.g. Cowell, 1990, p.38).

The aim of this paper is to provide a simple model of tax evasion that accounts for the differences in taxation structures by stressing the role of observability. This allows us to propose a new approach to modelling the informal sector in developing countries. Indeed, in our information theoretical framework, the informal sector may be interpreted as the sector for which the degree of observability is very low.[2]

[1] For a comprehensive survey on tax evasion and its implications for policy analysis, see Slemrod and Yitzhaki (2001).

[2] On the informal sector in developing countries, see Rauch (1991) and the references cited therein

The rest of the paper is organized as follows. In section 2, we present a simple model of tax evasion with imperfect auditing and expose the optimal fiscal policy. The concluding comments are exposed in Section 3.

2. The Model

Consider a population of taxpayers characterized by their revenue y. Fiscal authorities cannot costlessly observe their revenue, but they know the cumulative distribution function (cdf) of revenues $G(y)$ and the associated density function $g(y)$, where the support is $[y_O, \bar{y}]$. Upon learning her type, the agent declares a revenue x to the fiscal authorities. If $x \leq y$, then $(y - x)$ is the magnitude of the individual's tax evasion. Imperfect auditing by the fiscal authorities is modelled as follows. Assume that agency spends $c > 0$ to audit a given individual. Then the agency will observe $y \in Y = [y_O, \bar{y}]$ with a probability: $p(\zeta) = \zeta q$, where $q \in [0,1]$ is the frequency of auditing and $\zeta \in [0,1]$ parameterizes the efficiency of the audit. In other words, $\zeta \in [0,1]$ parameterizes the degree of observability of the individual's type in question once the audit is undertaken. This parameter can be thought of as being a function of the sector or type of activity to which the audited individual belongs. In particular, it can be interpreted as a measure of the formality of the sector where the individual works, which is important in the context of developing countries where the informal sector is pervasive.

Suppose that all individuals are risk neutral and that there is no advantage of overestimating one's revenue. Then, an individual's expected utility after tax revenue is given by:

$$U(y,x) = (1-q)(y - \tau x) + q(1-\zeta)(y - \tau x) + q\zeta(y - \tau x - f(y-x)) \qquad (1)$$

where τx is the amount of taxes paid when no audit is undertaken or when the audit fails, where $0 \leq \tau \leq 1$ because taxation is proportional to declared revenue, and where $f(y-x)$ is the fine paid in the case of a successful audit. We assume that the penalty rate f is such that: $0 \leq f \leq 1$.

Given the fiscal policy $\langle \tau, q, f \rangle$, the taxpayer chooses an optimal declaration. Given informational constraint, the fiscal authority chooses its policy $\langle \tau, q, f \rangle$ so as to maximize its expected net fiscal revenue. Its maximization program is therefore:

$$\underset{\tau,q,f}{Max} \quad R = \int_Y \left[(1-q)(\tau x) + q(1-\zeta)\tau x + q\zeta(\tau x + f(y-x))\right] dG(y) - cq$$

st: (i) $0 \le \tau \le 1$

(ii) $0 \le q \le 1$

(iii) $\tau \le f \le F$

(iv) $x = Arg\, \underset{d \le y}{Max} U(y,d)$

Constraint (iii) involves the lower and the upper bound on the penalty rate $\tau \le f \le F$, where $F \le 1$. Constraint (iv), on the other hand, represents the incentives compatibility constraint, which takes into account the optimal behavior on the part of the taxpayer. We are now ready to state our first result.

Proposition 1:

Given the policy $\langle \tau, q, f \rangle$, the optimal declaration by the taxpayer is given by :

i) $x = 0$ if $\zeta < \dfrac{\tau}{qf}$

ii) $x = y$ if $\zeta \ge \dfrac{\tau}{qf}$

Proof:

The optimization problem faced by the agent is given by the choice of a tax declaration which solves:

$$\underset{d}{Max} U(y,d) = (1-q)(y - \tau d) + q(1-\zeta)(y - \tau d) + q\zeta(y - \tau d - f(y-d))$$

The first order condition is equal to:

$$\frac{\partial U(y,d)}{\partial d} = -\tau + q\zeta f \Rightarrow$$

$$x = 0 \Leftrightarrow \zeta qf < \tau, x = y \Leftrightarrow \zeta qf \ge \tau$$

(Q.E.D)

Proposition 1 reveals that there exists a threshold level of observability parameterized by $\zeta \in [0,1]$ for which taxpayers are induced to reveal their true revenue. Consequently, there will exist individuals or sectors in the economy, for which observability is low (as, for example, in the informal sector in developing countries), and will therefore not declare any revenue. The following proposition gives the optimal fiscal policy of the government.

Proposition 2:

$\exists \zeta^o \in [0,1]$ such that the optimal fiscal policy is given by :

$\forall \zeta < \zeta^o, q^* = 0$

$\forall \zeta = \zeta^o, 0 < q^* < 1, f^* = F, and\ \tau^* = q^* \zeta F$

$\forall \zeta > \zeta^o, q^* = 1, f^* = F, and \quad \tau^* = \zeta F$

Proof:

Since Proposition 1 has derived the optimal behavior of the taxpayers, we can reformulate the optimization problem faced by the fiscal agency as follows:

$$\underset{\tau,q,f}{Max}\, R^+ = q\zeta f E(y) - cq$$

$$(PA^+): \text{ st: } \begin{array}{l} \tau > q\zeta f \\ 0 \le \tau \le 1 \\ 0 \le q \le 1 \\ \tau \le f \le F \end{array}$$

where $E(y) = \int_Y y dG(y)$

$$\underset{\tau,q,f}{Max}\, R^- = \tau E(y) - cq$$

$$(PA^-): \begin{array}{l} \tau \le q\zeta f \\ 0 \le \tau \le 1 \\ 0 \le q \le 1 \\ \tau \le f \le F \end{array}$$

First, note that $f = F$ is optimal since it induces a truthful report. In (PA^{-}):

$\frac{\partial R^{-}}{\partial \tau} = E(y) > 0 \Rightarrow \tau = q\zeta f$, whence

$\underset{q}{Max}\, R^{-}(q) = (q\zeta F)E(y) - cq$. Moreover, if :

$\zeta > \zeta^{o} = \frac{c}{E(y)F}$, then $q^{*} = 1$, which implies that : $\tau = \zeta F \;\; \forall \zeta < \zeta^{o}$, on other hand , $q^{*} = 0$. Finally, for $\zeta = \zeta^{o} = \frac{c}{E(y)F} \Rightarrow q^{*} \in]0,1[$ and $\tau = q^{*}\zeta F$.

(Q.E.D).

Proposition 2 states that the optimal policy not only depends on the average revenue and on the cost of auditing, but also on the type of economic activity under consideration, parameterized by its degree of observability $\zeta \in [0,1]$. The first part of the proposition implies that it will never be in the interest of the fiscal authorities to audit individuals in the informal sector, where ζ is relatively low. Moreover, the last two parts of the proposition show that, in case of audit, the level of taxation depends on the degree of observability associated with the sector in question. This provides a potential explanation for the heterogeneous taxation rates observed across countries (Dudley and Montmarquette, 1987), or across sectors within a given country (Virmani, 1988). In that case, the imperfect monitoring and observability issues may explain the differential choice between direct and indirect taxes (Cowell, 1990).

3. Conclusion

In this paper, we have presented a simple model of tax evasion with imperfect auditing. We have shown that there is clear link between the degree of observability associated with a given taxpayer (or activity) and that taxpayer's optimal declaration strategy with respect to fiscal authorities. We have also shown that the degree of observability is critical in determining the optimal policies to be followed by the fiscal agency.

Our theoretical information-based approach on imperfect auditing potentially provides a new approach to modelling the informal sector in developing countries. Rauch (1991) uses an argument based on Lucas's (1978) model of the equilibrium size-distribution of firms to establish a cut-off value in the distribution of entrepreneurial talent below which individual choose to operate in the informal sector, often defined to be the sector of the economy where firms engage in tax evasion. While it may be the case that in some developing countries informal-sector entrepreneurs are of lower productivity than those operating in the formal sector, this does not appear to be an empirical regularity. Indeed, in many developing countries, it is widely believed that the informal-sector entrepreneurs are the most productive. Moreover, it is often the case that the formal sector is characterized by state-owned entreprises (SOEs) where managers are chosen not because of their high productivity but of the outcome of rent seeking activities. Our approach, based on the observability of the fiscal agency, may provide an additional explanation of informal sector activities in developing countries.

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