Why is the Tax Evasion so Persistent?

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Abstract

Virtually all governments seek to fight tax evasion exploiting better and better technological devices. Despite of that the phenomenon still remains alive and kicking all around the world. The foregoing naturally arises the question in the title. This paper develops a simple model to provide some answers to this puzzling issue. Tax evasion is persistent because of the taxpayer's opportunistic behavior and the complex relationships linking it to the cost/quality of the institutional setting. More fundamentally, our model highlights that conditions required for steady state zero-tax evasion (no taxation and/or 100 % probability to be caught) are outside the strategies available for governments.

1 Introduction

A well-known anectode states that tax evasion is as old as taxation. By the same token one may also add that since taxation is as old as state, the same can be said for the tax evasion. The spyral "higher tax rates, higher tax evasion" is cited as one of the main reasons why the Roman Empire fell (Bernardi, 1970). According to the cross section evidence recently collected by La Porta and Shleifer (2008), these days the share of tax evasion varies, to mention the most conservative figures, from almost 30 per cent in poorest countries to up 8 % in richest economies. So, why is the tax evasion so diffuse and persistent?

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A recent strand of the research (Johnson et al., 1998 and 1999; Friedman et al., 2000) points out that poor countries may be locked into a bad equilibrium featured by a chronic and large tax evasion. Basically, the idea runs as follows. The efficiency of the public sector is connected with the tax evasion because the low quality of bureaucracy reduces the probability to detect tax dodgers and this increases, other things being equal, the optimal share of hidden income choosen by agents. Furthermore, bad governments offer few and low quality public services, making people less willing to pay for them. These studies underline that another stable equilibrium, opposite to the bad one, is possible. This is why this literature is sometimes referred to as the two-equilibria framework. Rich countries cluster in this second polar situation, which can be called "good equilibrium" because small hidden sectors, large fiscal revenues, high tax rates and honest/appreciated institutions consistently coexist. An interesting result of these works is that tax rates and tax evasion may be negatively correlated. This is in sharp contrasts with the standard result (Allingham and Sandmo, AS, 1972; Yitzhaki, 1974, and followers) that tax rate and tax evasion go hand in hand. However, possibly because the recent literature focuses especially on the bad equilibrium, two issues seem underrated. First, why should even rich countries accept a (relatively small but) non-zero tax evasion? Indeed, as mentioned, data shows that its share is not so trivial despite the fact that i) it raises issues about fair competition, fiscal equity, public budgets, etc., and that ii) there are available better and better technological devices to contrast the phenomenon. Second, why should rich countries share one single good equilibrium? In fact, it is straigtforward to observe that developed countries have very different fiscal and institutional settings, say Sweden and the US, which may trigger significantly disparate amounts of tax evasion.

We claim that some explanation on the persistence of the tax evasion may be found in the increasing complexity and needs of modern economic life in affluent societies, which, in turn, calls for complex and costly institutions. Tanzi and Schuknecht (2000) have emphasized that over one-hundred years ago most of today's industrial countries had levels of taxation of around 12 % of GDP. According to OECD figures, the 2005 tax burden for developed countries amounts to 36 %. There are structural reasons for these dynamics. Notwithstanding they were looking for reasons supporting worldwide tax reductions, Tanzi and Schuknecht (2000) have concluded that in order to sustain basic social objectives governments could manage something like the 30 percent of their GDPs. The increasing (as noted, possibly up to some limit) need of fiscal receipts is not the only secular trend featuring developed economic systems. Another one refers to regulations. According to Glaeser and Shleifer (2003), the American and European societies are much richer today than they were a century ago, yet they are also vastly more regulated. The structural factor behind this is that modern good, financial and labor markets inevitably need regulations to protect weaker agents, respectively consumers, savers and workers. Some authors have suggested that regulations may trigger tax evasion, too (Djankov et al. 2002 and 2003; Botero et al., 2004). Like taxes, they argue, regulations are just

another cost for regular agents. Therefore, one may expect that tax evasion be as immanent as taxation and regulation burdens are. Only if tax dodgers face a zero tax rate or were sure to be detected, tax evasion would be zero regardless the tax rate and regulations level.
Against this framework we develop a simple model conceptualizing the connections relating taxation, regulations, detection probability and tax evasion. Due to the complex links between these variables an institutions-conditional Laffer curve emerge. As in the two-equilibria story and unlike the AS tradition, inefficient governments cannot afford to impose high tax rates and suffer from large tax evasion. On the other hand, more efficient rulers may impose higher tax rates and collect larger revenues only up to a certain "institutional threshold". Beyond this latter tax evasion starts rising again due to taxation and regulation burdens. It turns out that in developed economies standard results re-emerge. More specifically, our model predicts that a 100 % probability to track down hidden incomes cannot be achieved by policy makers. On the other hand, a zero tax rate does not appear a practicable solution to fight the tax evasion. To sum up, taxation, regulations, and efficiency of governments tax evasion may impinge on tax evasion with different weights. In any case a point remains: tax evasion seems to be an inescapable issue for every country.

2 The model

2.1 Aim and Definitions

To shed some light on our key question we take advantage of some of the suggestions stemming from both the AS tradition and the recent two-equilibria approach. We examine both fiscal authority's and taxpayers' behaviors in order to understand the relationships linking tax evasion and (some[1] of) its suggested determinants, namely the probability to detect tax dodgers, the tax rate and the level of regulations. Specifically, we point out the importance of institutional issues in pinning down the optimal share of tax evasion. We show that there are threshold values generating non linear associations among the variables under scrutiny and that some combination of these variables is unfeasible. One remarkable practical consequence of this is that is not possible to erase completely the tax evasion.

Throughout the paper we will use the following notations:

- r is the probability to detect a tax dodger and, accordingly, it varies in $[0, 1]$;
- $t \in [0, 1]$ is the tax rate;
- $y \in [0, 1]$ is the share of undeclared income on total income;

[1] Hidden production may be also due to the tax morale, to the complexity of the tax system, etc. (Andreoni et al., 1998).

- e is an index that measures the level of regulations. For homogeneity, e is assumed to belong to $[0, 1]$; (where $e = 0$=no regulation=disorder; $e = 1$ =dictatorship)
- $T \in [0, +\infty)$ is government revenues.

In our context regulations can be thought of as the level of social control of business (Glaeser and Shleifer, 2003). From the taxpayer's standpoint fulfilling regulations is costly and, therefore, they can be thought of as a tax in disguise. Accordingly, regulations affect positively the share of tax evasion. We assume all the following are well-behaved functions, so that all the partial derivatives involved throughout the paper exist.

2.2 The Private Sector

This section examines the optimal share of undeclared income from the taxpayer's point of view. As in the Allingham-Sandmo tradition, we limit the analysis to the agent's decision on how much income to conceal once that s/he, exogenously, has decided to operate. That is to say, work/consumption choices are precedent and separable from that on how much income to declare. We assume that publicly provided goods/services are not in the tax evaders' cost function. The logic is that many public goods/services are not excludible (e.g. roads), setting off free-riding behaviors. Moreover, most evaders declare at least some part of their incomes because of the increasing difficulties of hiding higher and higher share of incomes (see below). Therefore they are, from the Bureau's standoint, "observationally equivalent" to totally regular agent and, as such, eligible for public interventions. All the more when public benefits are means-tested. Unlike the recent literature, in our model only public money directly spent to increase the probability to uncover hidden incomes can modify the optimal portion of tax evasion chosen by taxpayers. By hiring new tax inspectors, for instance, governments may increase the expected penalty, shrinking tax evasion. This said, it is likely that the detection probability go hand in hand with the efficiency of the Bureau. Instead, we assume that regulations can be implemented for free[2]. Taxpayers' optimization is based on the tax rate, the probability to be caught and, borrowing from the recent literature, on regulations. We hypothesize that taxpayers take these variables as given and that they are indifferent in paying the same amount of different combinations of taxes, expected penalties, license fees, and the like. In other words, although agents optimize their disposable income according to the three mentioned variables, they accept passively any combination of the triplet (t, e, r) settled by the ruler.

More formally, given e, r, y and t, the income function is defined as $R(t, e, y)$ and the costs are $C(r, y)$.

Standard assumptions on the shape of the functions R and C are

$$R(t, e, 0) = 0;\ \frac{\partial R(t, e, y)}{\partial t} > 0;\ \frac{\partial R(t, e, y)}{\partial y} > 0;\ \frac{\partial R(t, e, y)}{\partial e} > 0;\ C(r, 0) = 0;\ \frac{\partial C(r, y)}{\partial y} > 0. \quad (1)$$

[2]Clearly (see the main text), regulations increases tax evasion so that they do have a (indirect) cost.

To treat the equilibrium situation, we define the difference function

$$\Phi(t,e,r,y) := R(t,e,y) - C(r,y).$$

We assume that the marginal revenue is greater than the marginal cost up to a certain threshold y^*. The idea is that, as the share of undeclared income raises, the costs of cheating increase at a faster rate than the payoffs. This is so because diverting a growing share of income is easier and easier to be detected[3] and, as argued by Cross and Shaw (1982), hiding income is a more and more costly activity. It turns out that the cost curve should cut that of the revenues from below. The critical share of undeclared income y^* represents the taxpayers' equilibrium, and we have

$$\begin{cases} \frac{\partial\Phi(t,e,r,y)}{\partial y} < 0, & \text{for } y < y^*; \\ \frac{\partial\Phi(t,e,r,y)}{\partial y} > 0, & \text{for } y > y^*; \\ \frac{\partial\Phi(t,e,r,y)}{\partial y} = 0, & \text{for } y = y^*. \end{cases} \tag{2}$$

Let us define

$$\Gamma(t,e,r,y) := \frac{\partial\Phi(t,e,r,y)}{\partial y} = \frac{\partial R(t,e,y)}{\partial y} - \frac{\partial C(r,y)}{\partial y}. \tag{3}$$

Since R and C are well-behaved functions we can apply the Implicit Function's Theorem, obtaining the existence of a unique function $z = y^*(t,e,r)$ that is continuous with respect to the arguments and such that:

$$\Gamma(t,e,r,y^*(t,e,r)) = 0. \tag{4}$$

The function $y^*(t,e,r)$ represents the taxpayers' optimal share of undeclared income at the equilibrium and it depends on the tax rate, regulation level and probability to be detected.

2.3 The State

In the previous section we have analyzed the private sector's equilibrium as a function of the exogenous triplet (t,e,r). We now turn the attention to the state, examining how it affects and it is affected by the triplet. Reversing the taxpayer's problem, where the only control variable is the share of undeclared income, here the aim is to analyse formally the links between all the involved variables taken y^* as exogenous. We do not conceptualize explicitly a welfare function. Needless to say, a developed Bureau may well be T-maximizing (a social democracy) or t-minimizing (a capitalistic system) depending on historical, cultural, etc. factors (La Porta et al., 1999; Guiso et al., 2003). Although the analysis of tax evasion in disparate environments is interesting and potentially addressed by our model (we occasionally say something about that), we focus on the difficulties encountered by any Bureau in choosing the triplet (t,e,r) in order to understand why the tax evasion is so persistent. In fact, our model emphasizes that some combination of the institutional indexes (r and e) is unfeasible. Also, the model points out that there are threshold values activating non

[3] For instance, due to the increasingly visible "consumption-declared income" gap

linear associations among the variables under scrutiny. In the following we explain step by step the rich relationships between the involved variables from the ruler's standpoint.

We model the quality of the institutional setting as depending on the levels of regulation, e, and the probability to be detected, r.

More precisely, we define a function

$$a : [0,1]^2 \to \mathbf{R},$$

such that $a(e,r)$ describes the institutional setting of a country with regulation level e and detection probability r. a is a continuous function with respect to e and r. Let a country with institutional index a_1 have a weaker institutional setting with respect to a country with institutional index a_2 if and only if $a_1 < a_2$.

It is worth recalling that r is assumed to be positively correlated with the efficiency of the Bureau. Therefore $a(e,r)$ is an increasing function of r.

In contrast, the behavior of a with respect to e is more complicated. The parameter e is non linearly linked to the bureaucratic structure of the state. The idea is that both disorder and dictatorship are weak institutional settings. More in general, we claim that above a certain critical value of e government activity becomes so intrusive (e.g., from the 'cradle to the grave') that the Bureau just cannot avoid over-regulating. For instance, public goods and services might be offered at prices lower than the market ones, giving rise to an excess of demand that needs to be regulated. In addition, the government's size may trigger over-regulations simply to justify its own presence. Therefore we assume that, for any $r \in [0,1]$, the institutional index $a(e,r)$ admits a global maximum in a critical threshold $e = \bar{e} \in (0,1)$. More formally:

$$\begin{cases} \frac{\partial a(e,r)}{\partial e} > 0, & \text{for } e < \bar{e}; \\ \frac{\partial a(e,r)}{\partial e} < 0, & \text{for } e > \bar{e}; \\ \frac{\partial a(e,r)}{\partial e} = 0, & \text{for } e = \bar{e}. \end{cases} \tag{5}$$

Substantially, relation (5) means that the maximum level of the institutional setting index can be obtained in countries with neither too light nor too heavy regulation frameworks.

Another important aspect to address is the dependence of the country's revenues T on the institutional index a and on the tax rate t, namely $T = T(a,t)$. The revenues T satisfies some logical conditions.

First, for any $a \in \mathbf{R}$, it results $T(a,0) = 0$. This is trivial since when the tax rate is zero, there can be no tax receipt.

Then, the behavior of T with respect to the tax rate is as follows:

$$\begin{cases} \frac{\partial T(a,t)}{\partial t} > 0, & \text{for } t < t^*; \\ \frac{\partial T(a,t)}{\partial t} < 0, & \text{for } t > t^*; \\ \frac{\partial T(a,t)}{\partial t} = 0, & \text{for } t = t^*. \end{cases} \tag{6}$$

Condition (6) implies that government revenues follow an institutions-conditional Laffer curve, t^* being the optimal Laffer tax rate.

It also turns out that, if $a_1 < a_2$, then $T(a_1, t) < T(a_2, t)$, for any $t \in (0, 1]$.

The function T well behaves so that we can apply the Implicit Function's Theorem: there exists a function $t^* = t^*(a)$ that is continuous in $\mathbf{R}$ and such that

$$\frac{\partial T(a, t^*(a))}{\partial t} = 0, \qquad \forall\, a \in \mathbf{R}. \tag{7}$$

The Implicit Function's Theorem and equation (7) allow us to think of the Laffer optimal tax rate t^* as a function of the institutional setting a. Following Friedman et al (2000), we assume that $t^*(a)$ is an increasing function. Also, conditional on any given a, we define the Laffer-optimal (maximum) revenue level $T^*_a := T(a, t^*(a))$. Since T is positively related to a, then T^*_a is increasing with respect to a as well.

As t^* maximizes the revenues T, it turns out that t^* minimizes y^*. Otherwise stated, tax evasion will be greater for any $t \neq t^*$. We will examine this particular, "minimum tax evasion", fiscal stance in the next section.

2.4 Tax evasion in a Lafferian state

In this section we limit the analysis to a situation in which a country, with an institutional setting a, levies the optimal tax rate $t^*(a)$ and reaches the maximum level of revenue T^*_a. Accordingly, the following analysis will be restricted to the optimal tax rate, $t = t^*$. What are the features of this peculiar "best case" fiscal framework?

- T^* decreases with respect to the undeclared level of income y^*, as it naturally should be.
- Since $t^* = t^*(a)$ is continuous and increasing, then it is also invertible. Therefore, there exists a function g such that

  $$t^* = t^*(a) \Leftrightarrow a = g(t^*). \tag{8}$$

  A standard analytical argument gives that g is continuous and increasing.
- As for the dependence of y^* on regulation e and detection probability r, we argue that there exists a function y^*_1 such that

  $$y^*(t^*, e, r) =: y^*_1(t^*(a(e, r)), a(e, r)). \tag{9}$$

  The function y^*_1 can be thought of as decreasing with respect to the institutional setting parameter a.

From (8) and since t^* is increasing with respect to a, it turns out that only countries with a high-quality institutional settings a can afford to impose a large optimal tax rate threshold $t^*(a)$. As

Friedman et al. (2000) put it, only good governments can sustain high tax rates. Nevertheless, this Bureau enjois a small optimal share of undeclared income because of the high expected penalty facing its taxpayers. This outcome is in stark contrast with the positive correlation between t and y^* highlighted by the standard approach to tax evasion. In particular, our theoretical model points out that for the maximum level of institutional setting, $\bar{a}$, the share of undeclared income is minimized. However, we will show that the institutional setting level $\bar{a}$ cannot be attained. As a consequence, the theoretical minimum level of undeclared income is outside the strategies available to the government. As such, it is not a practicable equilibrium of the economic system.

A further mathematical implication of the connections between a and y_1^* is the invertibility of y_1^* as a function of a. There exists a decreasing function $m : [0, 1] \to \mathbf{R}$ such that

$$y^* = y_1^*(t^*(a), a) \Leftrightarrow a = m(y^*). \tag{10}$$

Condition (10) has a deep as well as logic significance: an increase in the share of undeclared income, y^*, worsens the institutional setting of a country.

2.5 Zero Tax Evasion as an Unfeasible Equilibrium

In this section we go through the arguments of a to show that self-consistent, feasible, triplets do not allow to obtain a situation with zero tax evasion. We keep analysing the "best case", that is the lafferian state.

Fix $e \in [0, 1]$ and define the function

$$f_e : [0, 1] \to [0, +\infty), \qquad \text{such that} \qquad f_e(r) := T^*_{a(e,r)} = T(a(e, r), t^*(a(e, r))). \tag{11}$$

As stated above, the optimal revenue T_a^* is continuous and increasing with respect to a; moreover, $a = a(e, r)$ is a continuous and increasing function with respect to r. Thus, the function f_e defined in (11) is continuous and increasing, and this implies its invertibility. More formally, there exist

$$f_e^{-1} : [0, +\infty) \to [0, 1]$$

such that

$$f_e(r) = T_a^* \Leftrightarrow r = f_e^{-1}(T_a^*). \tag{12}$$

f_e^{-1} is continuous and increasing. Consider now the optimal regulation threshold $\bar{e}$ as defined implicitly in (5).

Fix $r \in [0, 1]$ and define the function

$$f_{1,r} : [0, \bar{e}] \to [0, +\infty), \qquad \text{such that} \qquad f_{1,r}(e) := T^*_{a(e,r)} = T(a(e, r), t^*(a(e, r))). \tag{13}$$

T_a^* is continuous and increasing with respect to a and $a = a(e, r)$ is continuous and increasing with respect to e in $[0, \bar{e}]$. Thus, $f_{1,r}$ is invertible, and there exists an increasing function

$$f_{1,r}^{-1} : [T^*_{a(0,r)}, T^*_{a(\bar{e},r)}] \to [0, \bar{e}]$$

such that

$$f_{1,r}(e) = T^*_a \Leftrightarrow e = f^{-1}_{1,r}(T^*_a). \tag{14}$$

A very similar argument gives that, if we fix $r \in [0,1]$ and define

$$f_{2,r} : [\bar{e}, 1] \to [0, +\infty), \qquad \text{such that} \qquad f_{2,r}(e) := T^*_{a(e,r)} = T(a(e,r), t^*(a(e,r))), \tag{15}$$

then there exists a decreasing function

$$f^{-1}_{2,r} : [T^*_{a(1,r)}, T^*_{a(\bar{e},r)}] \to [\bar{e}, 1]$$

such that

$$f_{2,r}(e) = T^*_a \Leftrightarrow e = f^{-1}_{2,r}(T^*_a). \tag{16}$$

The true meaning of the formalized relations between Laffer-optimal revenues and regulations can be stated as follows: an increased level of revenues implies that the country is improving its bureaucratic apparat so that e is approaching $\bar{e}$, the "Laffer-optimal" regulation level.
Most importantly, the relationship between the couples (optimal revenue T^* - detection probability r) and (optimal revenue T^* - regulation e) formalized in (12), (14) and (16), allows us to state the existence of a relationship between e and r. Specifically, there exists a function $h : [0,1] \to [0,1]$ such that $r = h(e)$ and

$$\begin{cases} h'(e) > 0, & \text{for } e < \bar{e}; \\ h'(e) < 0, & \text{for } e > \bar{e}; \\ h'(e) = 0, & \text{for } e = \bar{e}. \end{cases} \tag{17}$$

Our model has an important implication, formalized in the following result.

Lemma 1. *The level $r = 1$ cannot be reached.*

Proof. Let us fix $e \in [0,1]$ and assume $r = 1$. Formula (17) assures that $e = \bar{e}$. Hence we get $a(e,r) = a(\bar{e}, 1) = \bar{a}$. From (8) and since the tax rate is increasing with respect to the institutional setting parameter a, we have that $t^* = t^*(\bar{a})$ is the maximum level of Lafferian tax rate. This means that the undeclared income $y^*(t^*)$ reaches its maximum level, since $y^*(t^*)$ is increasing. The analysis of the Laffer revenue T^* points out that two inconciliable situations should coexist:

- T^* must reach its maximum level as function of $t^*(\bar{a})$ (see formula (6)).
- $T^* = T^*(y^*)$ must reach its minimum level, since the level of the optimal Laffer revenue decreases with respect to y^*.

We have an evident contradiction, and the result is completely proved. □

Another situation in which the tax evasion can be reduced to zero is when the ruler sets the tax rate equal to zero. Although clearly this is too extreme a case, our model allows to conceptualize it.

If a country applies a tax rate $t = 0$, then (8) gives that the institutional setting of the country is $a = g(0)$. Since g is an increasing function, then $g(0) = \bar{a} = 0$. As expected, $t = 0$ is incompatible with functional values of the other variables of the model.

3 Concluding Remarks

The existing literature on tax evasion typically deals with its measurement, causes, consequences and remedies. Much less analysed, at least explicitely, is why the tax evasion is so persistent. Yet, everybody seems to agree that tax evasion is as old as taxation.

Following both traditional and recent indications, we conceptualize the relationships between taxation, institutional setting and tax evasion to point out some unfeasible combinations which may hamper stable zero-tax-evasion conditions. Just to mention, as argued by Becker, with no taxation there is no tax evasion. Clearly, as trivially as Becker, we could claim that without taxation there is no state: a situation which may be seen as throwing the baby with the bad water. More realistically one can think that, as tax rates must be necessarily greater than zero, only a 100 % probability to be caught may induce individuals to declare all their incomes. Unfortunately our model shows that, given the links between the involved variables, this situation is unattainable. So, tax evasion is as immanent as taxation and regulation burdens are. It may be large in poor institutional settings, as recently suggested, and relatively lower and more depending on tax rates in more advanced systems, as traditionally argued. What is surer is that any economic system seems to be obliged to live with an ineradicable, natural, share of tax evasion.

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