Tax evasion, intrinsic motivation, and the evolutionary effect of a flat rate*

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Abstract

The paper studies tax evasion in an evolutionary setting. In addition to standard variables such as the fine they may have to pay if found guilty or the probability of being audited, individuals' attitudes toward tax evasion may also be affected by social interactions and tax morale. Individuals interact with other taxpayers and, doing so, they learn the payoff differential between paying and evading taxes. Moreover, expected payoffs may include reputational costs or rewards awarded by society after being audited. Finally, the way individuals see tax agencies and assess the quality of the public sector may play an important role in the creation of intrinsic motivation toward tax evasion/compliance.

The paper shows that (i) the social norms and the framework in which tax evasion may take place play a very important role and consequently (ii) policymakers should consider reforms that would increase social awareness and incentives rather than more (financially and politically) expensive standard fiscal instruments; (iii) an increase in tax morale could have positive effects in reducing tax evasion; (iv) introducing a flat rate system may have static and dynamic effects on tax evasion.

Keywords: tax evasion; flat vs. progressive tax; pro-social behavior.
JEL classification: H26, H30, C73.

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1 Introduction

Taxes play an essential role for the finances of a country. Tax revenues are the basic way a government can finance national expenditure and national services to the population. At the same time, taxes are a very important factor that affects the financial decisions of every household and business.

While some individuals may look at taxes as a natural way of contributing to society and pay for public services, it is also true that in general individuals resent having to pay taxes. The reason is twofold. A standard reason is a basic economic one. Taxes reduce the disposable income of individuals: if they could, they'd keep all their income and free ride the public system. Another reason is based on the relationship that individuals may have with the public sector and their government. If individuals consider public institutions corrupt or, at least, inefficient, then paying taxes is seen as a wasteful contribution to an investment with very low returns.

Regardless of the particular reason why individuals may decide to evade taxes, i.e. report a level of income lower than the one actually earned, tax evasion is an issue that almost every country has to face. Evading taxes is illegal. Yet, some individuals do evade, and governments need to consider auditing individuals and firms to identify cases of evasion.

In the attempt to explain why individuals evade taxes, the economic literature has traditionally framed this phenomenon as a gamble.[1] The key assumption is that no individual, if allowed, would want to pay taxes. Evading taxes then simply becomes a gamble that individuals may decide to play, depending on their degree of aversion to risk, the probability of being audited, and the extent of the possible penalty that may face if found guilty. See for example Allingham and Sandmo (1972), Yitzhaki (1974), Slemrond and Yitzhaki (2002).

[1] See Freire-Serén and Panadés (2013) for a review of the literature.

In recent years, the interest of economists (but also sociologists, psychologists and political scientists) has gradually focused away from the question "why do people evade taxes?" to the question "why do people pay taxes?". Indeed, there are still individuals who honestly comply even in environments in which tax evasion is pervasive. This observation has induced researchers to consider the existence of some forms of intrinsic motivation among tax payers. In every society there are individuals who believe that paying taxes is a citizenship duty. Paying taxes is a way to contribute to the society's welfare and individuals may obtain private utility from it. Following from this insight, the economic literature has recently recognized the possibility that tax morale may have an effect on tax compliance. For some individuals paying taxes may be morally good. This would be true in particular when citizens recognize that tax revenues are spent to provide merit good/services and improve the quality of life.

This approach also helps understand why some individuals are reluctant to pay taxes. For instance, this applies to situations in which people believe that the quality of public expenditure is inadequate, due to corruption, rent-seeking, and inefficiencies. Tax morale and levels of corruption and inefficiency in the public sector depend on the particular economic and cultural environment of a country. Cummings et al. (2009) find a significant correlation between tax morale and tax compliance in Botswana and South Africa. Indeed, while tax enforcement tools may enhance tax compliance, the effectiveness of such tools depends on the perception that citizens have on the quality of the public sector. Alm et al. (2010) study tax morale in Russia. For a study of the European Union see Frey (2003).

The literature has explored another important aspect of taxpayers' behavior: the role of social norms and reputation. The way society sees the pro-social actions of an individual may have an important effect on the utility that the

individual obtains from performing a particular task. Charity, voluntary work and donations are examples of actions that may provide individuals with reputational benefits. Bénabou and Tirole (2006) show that standard financial incentives may be counterproductive when reputational effects induce motivated agents to reduce their pro-social effort, lest they are seen as greedy by the society. Likewise, reputation may play an important role when individuals consider reporting their income for tax purposes. This happens when being found guilty of tax evasion involves a social cost in addition to a standard fine. Similarly, if audited and found not guilty, the individual may enjoy a reputation of honesty and citizenship. When considering the effects of social norms and reputation, therefore, it is natural to think of the individuals' decisions in a dynamic setting. In other words individuals tend to face a reputation that has been formed in previous times.

To our knowledge, the first paper that considers intrinsic motivation, social norms and reputation in a dynamic setting with tax evasion is Belsley et al. (2015). The paper is a dynamic extension of Bénabou and Tirole (2006), in which individuals internalize in their utility the reputational benefit/cost of paying/evading taxes in the previous year. The authors assume that every year individuals decide whether to evade taxes. Their decision depends on their intrinsic motivation, the extent of the fine if found guilty, and on the reputational cost of tax evasion. The authors show that a change in tax enforcement creates a sudden reduction in the share of individuals who evade taxes. In addition, the share decreases monotonically in time. The reduction of tax evasion may also be reinforced by a social multiplier.

Similar to Belsley et al. (2015) we believe that, when studying the decision of individuals to pay/evade taxes, it is important to include social and reputational aspects; and that a dynamic approach is necessary to understand the way policy

reforms affect taxpayers' behavior. Belsley et al. (2015), however, do not provide an explicit description of the way social reputation may affect the utility of individuals, nor the way different tax systems or tax rates could induce taxpayers to evade.

Our aim is to provide policy implications and, to do so, we explicitly model the way reputational costs and benefits enter the utility of taxpayers. Indeed, governments and tax enforcement agencies can, at least in part, affect social norms and reputation. For example an efficient, transparent and fair auditing and judicial system, where payers can be quickly assessed and judged would favor the formation of a healthy environment, in which compliant taxpayers would not be unfairly assigned a social stigma, and tax evaders would suffer a significant reputational cost. Indeed, reporting the names of those found not guilty could also contribute to the creation of an honest reputation.

For the purpose of our investigation, we model a progressive tax system with two bands and two tax rates. This allows us to study the effect on the dynamics of tax evasion of a change in tax rates, and also of the introduction of a flat-rate system. We also study the effects of tax morale on tax compliance assuming that individuals may find fair/unfair to pay high taxes, depending on their attitude toward the public sector. These features help us acquiring a better understanding of the effects that have been produced by recent reforms in various countries, with a particularly important example provided by Russia, where in 2001 a progressive tax system was replaced a 13% flat tax rate. Interestingly Gorodnichenko et al. (2009) empirically showed that the reform produced a reduction in tax evasion. Our model can help explain this result.

In related contributions that study pro-social behavior, including Bénabou and Tirole (2006) and Belsley et al. (2015), the strength of the social norms is given by an exogenous parameter. By contrast, in our framework each society

has its own way of affecting reputation and individual's utilities. In particular, being an honest taxpayer in a country where tax evasion is the norm may create a larger reputational effect compared to the same behaviour in a country where honest reports are the norm. Similarly, being found guilty in a country where most of the population evades taxes is less costly in terms of reputation than being found guilty in a mostly honest country. Put differently, while in Belsley et al. (2015) individuals' reputation is affected by their decision to pay or evade taxes in the previous period, in our model the extent of the social cost/benefit on a dishonest/honest individual depends whether tax evasion is a widespread phenomenon in the society.

In this paper, the dynamic development of tax evasion in a country is described in terms of evolutionary dynamics. The game-theoretic evolutionary approach tries to explain how a particular characteristic of a population is updated over time (or, in other words, evolves) depending on the average fitness of the individuals. For example, if individuals feature a particular propensity (or, in other words, gene) to act in a certain way obtain on average higher pay-offs compared to another group of individuals with a different genetic predisposition, then we should expect that the genetic characteristics of the individuals of the first type (the fittest ones) will propagate in the population at the expenses of the type of individuals of the second type. To apply the evolutionary framework to our analysis, we assume that individuals are genetically geared toward either honest or dishonest behavior. Whether one or the other behavior survives in the society is determined by an evolutionary adaptation process, depending on the expected payoffs that individuals expect to earn.

Standard evolutionary games assume that individuals are able to compare their expected payoffs to the expected payoffs of the whole population and identify which behavior on average provides the highest pay-offs. This is somewhat

implausible when we consider the decision to evade taxes of an individual. It seems reasonable to imagine that an individual will be able to compare his/her payoffs with the payoffs of those individuals he/she has been in contact with. This is in line with those contributions in the literature that stress the importance of the way the network of relationships may influence individuals. In our model we consider a word of mouth process where in each period one individual meets another. If both individuals are of the same type (honest/dishonest) then they have no information to assess the advantages of choosing a different behavior. However, if an individual meets a taxpayer of a different type, then they both can learn and possibly decide to change their behavior.

The paper shows that (i) the social norms and framework where tax evasion may take place play a very important role and consequently (ii) policymakers should consider reforms that would increase social awareness and incentives rather, than more (financially and politically) expensive enforcement instruments; (iii) an increase in tax morale could reduce tax evasion more effectively; finally (iv) a flat rate may have static and dynamic effects on tax evasion.

The paper is organized as follows. Section 2 introduces the model. Section 3 describes important policy implications based on comparative statics and dynamic analyses. Section 4 concludes.

2 The model

Consider a population of tax payers. Suppose that there are only two possible levels of income, $Y_L < Y_H$, that can be earned by the tax payers. A fraction $\gamma \in [0, 1]$ represents the portion of the population with high income Y_H. The remaining portion of the population earns instead low income Y_L.

Tax payers are required to report their taxable income. Suppose that a progressive tax system is in place, with tax rates $0 < t_L < t_H < 1$. Agents

who report income Y_L pay taxes $t_L Y_L$, while agents who report income Y_H pay taxes $t_L Y_L + t_H(Y_H - Y_L)$. Low income earners have no incentive to report a level of income other than Y_L. High income earners, however, may be tempted to evade taxes, and report a level of income equal to Y_L. Let us define $r \in [0, 1]$ the fraction of high income agents who decide to evade taxes, and let us define $p \in [0, 1]$ the probability of being audited by the tax authority.

Of course, auditing does not apply to low income agents, since they truthfully reported their earnings. High income agents instead are affected by auditing. If they evade, auditing will always find them guilty. If they truthfully report their income Y_H, then they may enjoy a positive reputational effect: society appreciates their having complied with the law. Let us assume that if an individual is found not guilty of tax evasion then (s)he receives additional utility:

$$S_{honest} \equiv \zeta\{r + k[(\beta - r)\, r - r]\}$$

Let us assume that k can be either 0 or 1. Consider first the case in which $k = 0$. The honest tax payer obtains a positive utility ($r\zeta > 0$, with $\zeta > 0$) for being recognized as honest and this positive reputation effect increases as the share of dishonest agents increases. This case is described on the diagram at the top left corner of Figure 1. Suppose now that $k = 1$. The reputational effects of being found not guilty continue to depend on the level of r, but the relationship now is not monotonic. Indeed, if parameter $0 < \beta < 1$ and the number of dishonest individuals is sufficiently large (i.e. $r > \frac{\beta}{2}$), then the honest individual sees his (her) reputational benefit decrease in r. It becomes negative if $r > \beta$. This situation would describe societies in which dishonest behavior is widespread, and honesty is interpreted as a behavior against social norms. This case is described at the bottom left corner of Figure 1.

If a high-income agent has reported income Y_L, is audited and is charged

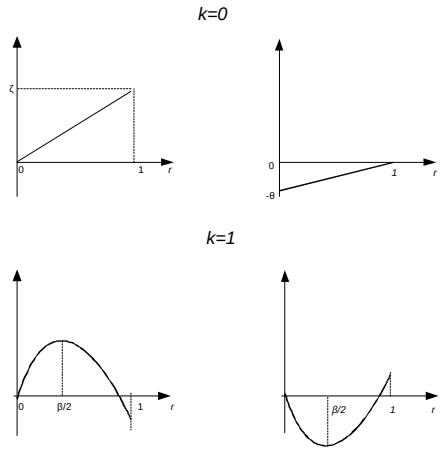

Figure 1: modeling of reputational effects

with tax evasion, (s)he will have to pay a fine equal to M on top of the increment in taxes $t_H\,(Y_H - Y_L)$. Being found guilty of tax evasion may have also a reputational effect on the utility of the tax evader. In this case the change in utility is

$$S_{dishonest} \equiv -\theta\{(1-r) + k[(\beta - r)\,r - (1-r)]\}$$

Consider once again first the case where $k = 0$. Being identified as a tax evader creates a reputational cost for the dishonest agent, a cost that increases as the share of honest agents increases. The reputational cost for the dishonest agent is equal to $(1-r)\theta$, with $\theta > 0$. This case is described by the diagram at the top right corner of Figure 1.

If $k = 1$, the social effect of dishonest behavior are no more monotonic in r. If the number of dishonest agents is very small ($r < \frac{\beta}{2}$), then the cost will increase in r. However, the cost will start shrinking once $r > \frac{\beta}{2}$, and will change sign for $r > \beta$. This situation would describe societies in which dishonest behavior is widespread, and being found guilty would not form the object of significant

social disapproval. This case is described by the diagram at the bottom right corner of Figure 1.

Let us now introduce the way intrinsic motivation, or in other words tax morale, can affect the utility of the taxpayers. Suppose that intrinsic motivation does not arise when individuals pay only taxes on the low income band. However, if individuals pay (or are forced to pay because of auditing) higher taxes, then intrinsic motivation may have effects on utility. In countries with positive tax morale, paying the high tax rate may be seen as a morally good way of helping the poor and producing merit goods. In countries with low tax morale, however, paying the high tax rate would be seen as unfair and wasteful.

Tax morale enters the utility function of (high income) taxpayers as

$$\alpha t_H \left(Y_H - Y_L\right)$$

where $\alpha < 0$ represents the case of negative tax morale, and $\alpha > 0$ provides the case with positive tax morale and intrinsic motivation.

In regard to reputation, the expected utility of the honest and dishonest agents can be written as follows. The (certain) utilities of a low income agent and a honest high income agent who is not audited are respectively

$$U_L = Y_L(1 - t_L)$$

and

$$U_{HN} = Y_L(1 - t_L) + (Y_H - Y_L)(1 - t_H + \alpha t_H)$$

If audited, the honest high income agent obtains

$$U_{HA} = Y_L(1 - t_L) + (Y_H - Y_L)(1 - t_H + \alpha t_H) + S_{honest}$$

otherwise

$$U_{DA} = Y_L(1 - t_L) + (Y_H - Y_L)(1 - t_H + \alpha t_H) - M + S_{dishonest}$$

Finally, the utility of dishonest high income agents if not audited is

$$U_{_{DN}} = (Y_H - Y_L t_L)$$

3 Comparative statics analysis

At the beginning of each period, all agents report their income and pay taxes. With probability p they are audited by the tax agency. After the auditing two agents are randomly selected and matched by nature from the whole population of earners. The two selected agents learn whether the agent they have been put in contact with has been audited and whether (s)he has been found guilty of tax evasion. The equilibrium level of tax evasion in the system (i.e. the situation where no taxpayer is willing to change behavior) is given when the expected utility of evading taxes equals the expected utility of paying honestly.

A comparative statics analysis of the equilibrium level of tax evasion provides useful insights.

First, since a higher tax rate makes evasion more profitable, tax evasion decreases if the high tax rate t_H decreases. This is intuitive. Yet, our result is in contrast to previous theoretical contributions that show that tax evasion tends

to decrease if the tax rate increases (see Yitzhaki (1974)). A consequence of this result is that, if the high tax rate is lowered to match t_L – a flat-rate system –, then *ceteris paribus* tax evasion decreases. Put differently, reforming and simplifying the system may induce an increase in tax compliance, as observed in Russia after the introduction of a flat rate in 2001.

Second, standard auditing instruments to fight tax evasion (i.e. p and M) may still be effective. However, these instruments usually come at a cost for every government. The cost is both financial, since auditing is in general expensive, and political, since a government that intends to harshly fight tax evasion may be seen as oppressive and greedy. For this reason, the way reputation and social benefits/costs affect individuals' behavior is very important. Tax compliance can be greatly enhanced by policies designed to increase efficiency, transparency and fairness, and to magnify the social and reputational effects of auditing. In a similar vein, policies and public campaigns that increase social awareness against tax evasion and toward pro-social behaviors may be a cheaper (financially and politically) and nonetheless effective alternative to auditing.

The comparative statics analysis above shows the short run expected effects of different policies on the equilibrium level of tax evasion. However, in general new policies have effects that tend to persist in time. It is important to have an understanding also of possible long run effects of a tax reform. We have described above the existence of an equilibrium level of tax evasion. One important question is related to its stability: what happens when the system is not in equilibrium? Will the generic trajectory converge to equilibrium r^* or not?

To study the dynamic effects of a tax reform, let us endogenize r, the fraction of high-income agents who decide to evade taxes, by considering the average payoff obtained by each strategy. It is reasonable to assume that at time t, the probability of being dishonest is approximated by the fraction r of dishonest

agents in the population at time t. Then, this probability is updated according to the expected utilities from the two possible behaviors (honest or dishonest), as specified below. In this way, an updated fraction of high income tax evaders at time $t+1$ is obtained. The dynamics of the probability of being dishonest is modeled by the *word of mouth* evolutionary model proposed by Dawid (1999).[2]

Suppose that at each (discrete) time period, two agents meet and compare their positions. If both agents have the same behavior (either both honest or both dishonest), they have the same utility and no need for switching behavior arises. However, if one honest taxpayer meets a dishonest taxpayer, each of individual could reconsider his/her behavior according to the utility obtained by the other agent. Thus, an honest agent may change her mind if she meets a dishonest agent, with a different utility. Clearly, the higher the difference is between the dishonest's and the honest's utility, the more likely the honest individual will become dishonest.

The study of the dynamic evolution of the level of tax evasion provides important insights regarding the long run effects of a tax reform.

First of all, regardless of the benefits/costs created by social norms and pro-social behavior, the system may reach corner solutions (i.e. extreme situations where all individuals either pay honestly or evade taxes) for sufficiently low or high values of the tax rate t_H. This is intuitive. If t_H is sufficiently low, then the expected pay-off of those individuals who honestly pay taxes is always higher compared to the pay-off of those who evade taxes. Evolutionary dynamics will take the system to a stable equilibrium in which all individuals would pay taxes

[2] Here we explain the evolutionary dynamics along the lines of the classical biological interpretation of replicator dynamics. However, with human beings the behavior of an agent can be updated even within the same generation, as one can change her mind (i.e. switch the kind of behavior) by observing the performance of other agents. A similar modeling structure as the one here proposed has been employed in evolutionary oligopolies to investigate competition where players have different information sets or different objective functions, see Bischi et al. (2015), Cerboni Baiardi et al. (2015), Droste et al. (2002), Hommes et al. (2011), Kopel et al. (2014), Lamantia and De Giovanni (2015).

and tax evasion disappears.

The other extreme is produced when t_H is sufficiently high. Now tax evasion may always be a profitable alternative to paying taxes honestly. Evolutionary dynamics would take the system to a stable equilibrium in which all individuals would evade taxes. These two extremes indicate how important it is to understand the long run as much as the short run effects of fiscal policies. Changes in tax rates may have short run positive effects on tax revenue collection, but they may also bring catastrophic long run effects in terms of tax evasion and, clearly, of tax revenues.

Second, for some configurations of the parameters an interesting and realistic configuration is produced. The system will converge to an interior equilibrium, where only a portion $r^* \in (0, 1)$ of the population decides to evade taxes. Such an equilibrium can be meaningful and stable only for intermediate values of t_H, and when the reputational costs of the social stigma associated to tax evasion are not too high. An intermediate t_H ensures that a portion of the population in equilibrium may find it profitable to evade, and the remaining portion may end up paying the full tax bill. At the same time, only a system in which social norms prioritize commending and nurturing honest behavior rather than naming and shaming tax evasion can reach a stable interior equilibrium. By contrast, if the social stigma of tax evasion were very high, then in the long run the system would converge to full compliance or full tax evasion, depending on the particular original value of r. In other words, whether the system will converge to compliance or to full tax evasion in the future depends on the current degree of tax evasion in the economy. This is an important caveat for policymakers. It implies that the same tax rates and policies put in place to modify social norms may have very different effects in different countries that currently face different degrees of tax evasion.

Third, we argued that, regardless of the benefits/costs created by social norms and pro-social behavior, a sufficiently low t_H would ensure low or no tax evasion in the long run. This line reasoning can be extended to allow for the introduction of a flat rate $t_H = t_L$. By simplifying the system and reducing progressivity, the authorities would ensure that a strictly positive portion of the population will comply with the tax laws. In addition, the rate of compliance will be higher, the lower the flat rate.

Finally, the positive effects of the introduction of a flat rate system may be reinforced by stronger intrinsic motivation among taxpayers. In particular, a flat rate implies that the high-income individuals will face a simpler and lighter system, which might enhance their intrinsic motivation.

4 Conclusions

The paper studied tax evasion in an evolutionary setting of word of mouth, in which taxpayers internalize take into account the effects of reputation and social interaction.

We have made the following important assumptions. First, social interactions are key in defining the learning, the benefits and costs related to tax evasion/compliance. Individuals learn and compare the expected pay-offs accruing from tax evasion/compliance through social interaction. This explains why the level of tax evasion in a population may evolve over time. Because of social interaction, individuals are punished or rewarded by the society if found respectively guilty and not guilty of tax evasion. Second, individuals may be intrinsically motivated toward paying taxes. Cultural characteristics and social norms affect intrinsic motivation and consequently tax evasion.

We have described the static and dynamic equilibrium of a model with progressive taxation and auditing. We have shown that the social norms and framework where tax evasion takes place may play a very important role. As a result, policymakers should consider adopting reforms that increase social awareness. In particular, standard recipes, such as increasing the probability of auditing or the size of the penalty when taxpayers are found guilty of tax evasion, may be less effective than improving the efficiency and transparency of the auditing and judicial systems. In addition, compared to the traditional recipes, social instruments tend to be less costly both financially (auditing and investigations are in general expensive) and politically.

The model also provided insights regarding the way tax rates may affect the level of tax evasion in the society. In particular, and in contrast with results reported in previous literature, tax evasion tends to decrease when the highest tax rate in a progressive system is lowered. If reducing the high tax rate may help reducing tax evasion, then introducing a flat rate may enhance compliance. In this sense, the paper offers an explanation of the startling results that followed the Russian 2001 tax reform.

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