Abstract
In this paper we consider amoral taxpayers who access amoral tax experts in order to evade taxes. Tax experts know the true audit probability, while taxpayers instead are aware of having a biased perception according to the rank dependent utility model. The market of tax preparation works under imperfect competition according to the conjectural variation approach. We show that according to the bias of taxpayers’ perception the tax preparer can suggest either a larger or a smaller evasion with respect to the one that the taxpayer would have implemented without the advice. It also turns out that sanctions on taxpayers are more effective than sanctions on tax advisors.

1 Introduction
Under the pressure of both the need of balancing the public budget and of a public opinion fed up with tax dodging, many countries and international organizations are launching interventions to fight aggressive tax planning, which can go from tax avoidance involving legal risks to standard tax evasion. In this paper we focus on the role of tax consultants in this field. In order to build on the previous literature, we will use the term evasion, which can be referred to all the cases in which the taxpayer makes choices involving a risk of punishment.

Both from an empirical and from a theoretical perspective it is widely held that firm’s financial officers, tax consultants, auditors, tax preparers etc. can have a relevant role in either preventing or fostering evasion. The ambiguous role that these intermediaries can play was pointed out, e.g., by Andreoni et al. (1998). Moreover, studies adopting the principal-agent model reached different conclusions about the relative effectiveness of sanctioning either the principal or the agent in order to redress their
behavior (Chen and Chu, 2005; Croocker and Slemrod, 2005; Biswas et al., 2013). More recently, applied research has tried to assess whether intermediaries differ in aggressiveness according to various characteristics, such as being also the firm’s auditors or not, possessing both auditing and tax skills, providing partial advise or taking a larger responsibility that involves signing the report etc. (McGuire et al., 2012; Klassen et al., 2016).

Lipatov (2012) resorts to a game theoretic approach to describe the interaction between taxpayers (firms) and the tax administration, where evasion can occur only with the advise of an accounting auditor-tax expert. Following Reinganum and Wilde (1986), Lipatov considers that in this game, besides pooling and separating equilibria, also a hybrid equilibrium can occur, involving that high profit firms separate and the low profit ones pool at zero reporting, which is likely to occur when a monopolist expert charges a medium or high mark-up. If there is competition in price in the specialist’s market instead, the absence of a mark-up implies that a pooling equilibrium with full evasion becomes likely. Sanctions on firms are more effective than sanctions on the specialist in moving the equilibrium out from full evasion, as the specialist - being the principal - can adapt to them more easily than the firm. If, on the contrary, evasion is low, trying to suppress the resort to the specialist’s tax advise by raising penalties is not effective, as a very small evasion by each firm would be too costly to detect and thus would never trigger an audit, while the specialist can still gain by serving a lot of clients. It is better then to raise the specialists’ costs by resorting to a more severe repression of irregular accounting.

While the Lipatov approach highlights the strategical interaction between the parties involved, the assumptions pertaining to the relationship between the taxpayer and the specialist are strong, as the taxpayer lacks the option of evading when filling in her tax report without resorting to an external advice (according to Klassen et al., 2016, around one out of two large corporations in the U.S. do not resort to external preparers and this correlates with a very aggressive behavior). Moreover, Lipatov clearly describes a subset of consultants, hopefully not representative of the whole profession, since his consultant never exerts a role of fostering tax compliance, while it is well known from the empirical literature (Erard, 1993) that also this case can occur. Lipatov also focuses on either monopoly or competition, while the market for specialists seems more likely to be oligopolistic.

In this paper we assume that evasion can occur also without the support of an expert and make simple hypotheses about the motivations that can justify the resort to a consultant. We assume that there are
taxpayers who are not confident in their ability at filling in a tax report involving tax evasion, because they have a biased perception of the audit probability\footnote{Such a bias can affect, besides individual taxpayers, also entrepreneurs and managers. Many empirical studies in behavioral economics confirm the role of psychological distortions also on the choices made by entrepreneurs and professionals.}. They can improve their lot by accessing tax preparers, who possess the correct information. The relationship that ensues, characterized by asymmetrical information, can be likened to that between the physicians and the patient, which has been studied in the literature on PID (physician-induced demand). In fact the tax preparer, as the physician, instead of acting as a "perfect agent", i.e., as an agent always choosing the optimal solution from the principal’s point of view, might manipulate the demand for her services in order to pursue her own goals. We thus aim at assessing if some form of demand inducement can occur with respect to tax evasion.

In this paper the market for tax preparation is represented as an oligopoly according to the conjectural variation approach. It turns out that tax preparers can recommend either more or less tax evasion, according to the information bias of their clients. We also find out that sanctions on taxpayers are more effective than sanctions on tax preparers in reducing tax evasion. The intuition for this result is that - besides the decrease in the expected return of tax evasion deriving from higher sanctions that occurs anyway - when the taxpayer is the targeted agent the mark-up that the tax preparer can charge increases. As a consequence the equilibrium price in the market for "assisted" tax evasion increases and quantity moves in the opposite direction.

2 Taxpayers

The tax system is characterized by the following parameters: $t$, a proportional tax rate; $s$, a sanction rate (on the evaded tax); $p$, an exogenously given audit probability (which coincides with the probability of being fined, as an audit would reveal the true taxpayer’s income). The expected return from tax evasion is positive, that is

$$r = (1 - p(1 + s)) > 0$$

Taxes, however, can be evaded only by bearing a hiding cost $g(E)$, where $g : [0, I] \rightarrow \mathbb{R}_+$ is a strictly increasing convex function, twice differentiable with $g(0) = 0$ and $E$ is the unreported income. Hiding costs arise as evasion would be fully visible unless income is hided, e.g., by doctoring documents, moving assets in foreign jurisdictions, etc.

Consider $m$ identical amoral and risk neutral taxpayers, endowed with an exogenous income $I$. We focus on the case in which these tax-
payers are not self-confident, because they are aware of their limited ability in deciding in tax matters and have learnt from personal and other people experience that delegating an expert can improve their tax report. More specifically, it is assumed that they are plagued by a biased perception of the audit probability. They perceive a probability $\phi(p)$ instead of $p$, which, according to the rank-dependent utility approach, overweights extreme events in this way:

Assumption 1: The function $\phi : [0, 1] \rightarrow [0, 1]$ is differentiable, concave on $[0, a)$ and convex on $[a, 1]$, where $0 < a < 1$. Moreover, if $p = 1$ then $\phi(p) = 1$ and if $\phi(p) = 0$ then $p = 0$.

If a taxpayer decides to fill in the tax report without external support, she solves the following problem:

$$\max_{E \in [0, I]} [1 - \phi(p)(1 + s)] tE - g(E)$$

where $tE$ is the avoided tax if evasion is successful and $g(E)$ is the total cost. To rule out trivial cases, we will restrict our attention to the interior solutions only. The objective function is strictly concave due to the assumption about the convexity of $g(E)$. The F.O.C. is

$$[1 - \phi(p)(1 + s)] t - g'(E) = 0$$

Whenever $\phi(p) > p$, the chosen evasion is smaller than the optimal one, while the opposite holds if $\phi(p) < p$. Let us call $E^*$ the unique solution of this problem. By resorting to a comparative static analysis one also gets

$$\frac{\partial E^*(s, t)}{\partial s} = -\frac{\phi(p)t}{g''(E^*)} < 0$$

$$\frac{\partial E^*(s, t)}{\partial t} = \frac{[1 - \phi(p)(1 + s)] t}{g''(E^*)} > 0$$

3 Tax preparers

Instead of self-preparing the tax return, the taxpayer can entrust a tax preparer. Let us assume that there are $n$ identical amoral tax prepares, who are willing to accept a compensation for supporting taxpayers’ evasion. Tax preparers have an advantage over taxpayers: they have an unbiased perception of the probability of audit $p$, and so they can actually improve the report with respect to the self-made one.

The interaction between the parties unfolds in this way:

- the taxpayer asks the preparer to fill in and to sign her tax report, in such a way as to reduce as much as possible the tax payment;
- the preparer asks the taxpayer to reveal her true income and her own assessment of the optimal evasion, and inform the taxpayer that there are hiding costs that the taxpayer will have to bear to support the suggested report;
- the taxpayer, who, on the basis of her own past experience and of the information available from other people, expects that the terms of the deal will not be worse than those available in the market for tax preparation and that they will entail a (at least weak) net benefit, provides truthful information.

While the service that the preparer performs is illegal, both the parties involved are interested in fulfilling their obligations (that is giving a useful advise and paying the corresponding compensation respectively) since both can threaten the other party of acting as whistle-blowers with respect to the tax administration. Moreover, the tax preparer is also interested in preserving her reputation in the field, and this implies that in equilibrium the taxpayer’s expectations must be confirmed.

4 The market for tax preparation

The benefit the representative taxpayer receives from resorting to the representative tax preparer is given by:

\[ B(\overline{E}) = rt\overline{E} - g(\overline{E}) - [rtE^* - g(E^*)] \]

where \( \overline{E} \) is the evasion chosen by the tax preparer on behalf of her client, \( r = [1 - p(1 + s)] \), while the term in brackets refers to the opportunity cost the taxpayer incurs while renouncing to self-preparation. Note that such opportunity cost is calculated by using the true probability \( p \) to assess the gains that the taxpayer would have obtained from the “biased” evasion \( E^* \). Actually the service of the preparer can be considered as an experience good, that is, due to information asymmetry, the taxpayer can assess it only \textit{ex-post} by observing the outcome, and comparing it with the outcome arising \textit{ex-post} under self-reporting, which is conditional on the true probability \( p \). As in equilibrium expectations must be fulfilled, we refer to a situation in which the taxpayer has learnt to expect \textit{ex-ante} a benefit equivalent to \( B(\overline{E}) \). The taxpayer’s demand price for the services of the tax preparer is given by the marginal benefit that she receives, that is by

\[ \frac{\partial B(\overline{E})}{\partial \overline{E}} = rt - g'(\overline{E}) \]

The demand price is decreasing in quantity as \( g'(\overline{E}) > 0 \).

\footnote{It is assumed that whistle-blowing does not entail a monetary compensation and thus is never preferred to the implementation of the agreement.}
The market for tax preparation is a Cournot oligopoly, in which $n$ tax preparers, with $n < m$, compete in the amount of $E_i$, that is in the amount of tax evasion that each tax preparer $i$ suggests to her clients. Each tax preparer has a market share of $\theta = \frac{m}{n}$; tax preparers conjecture that their competitors would not react if they varied $E_i$, so that $\frac{\partial E}{\partial E_i} = \frac{1}{n}$. It is interesting to note that the conjectural variation approach can also be interpreted as describing a form of imperfect collusion among suppliers (Escrihuela-Villar, 2015). The latter interpretation on the one hand avoids the critiques raised to the conjectural variation approach, with reference to its problematic game-theoretic foundations, while on the other it seems particularly suitable for a market in which suppliers need often to be officially registered, so that the entrance of new firms is restricted and the existing ones form a natural interest group, which is likely to be characterized by some degree of collusion.

The taxpayer’s demand price can be conceived as the marginal willingness to pay as a function of the average amount of evasion suggested on the market, that is:

$$P(E) = \frac{\partial B(E)}{\partial E} = r - q'(E)$$

(3)

where

$$E = \frac{\theta}{m} \sum_{i=1}^{n} E_i$$

(4)

Consumers pay for the improvement $(E_i - E^*)$, which might consist either in an increase or a decrease of the evaded amount with respect to $E^*$, according to whether $\phi(p) > p$ or $\phi(p) < p$ occurred. The tax preparer suggests a reduction in tax evasion (i.e., $(E_i - E^*) < 0$) when the evasion the taxpayer would have chosen is too large in view of the true probability $p$ and would entail ex-post a negative marginal net benefit. Since the tax preparer is not a perfect agent, however, the evasion she suggests is not the optimal one, which would entail $P(E) = 0$, but it is still too large, so that $P(E) < 0$. The total payment $P(E)(E_i - E^*)$ is at any rate positive also in this case.$^3$

Tax preparers must also provide their clients with a net consumer rent at least equal to the benefit of self-preparing the tax report, that is, taxpayers’ participation in equilibrium is conditional on the following

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$^3$This is tantamount as saying that the total payment is $P(E) |E_i - E^*|$. We disregard the case of an evasion $E_i^*$ smaller than the optimal one but entailing a not lower gross return for the taxpayer than $E_i$. The large correction of the taxpayers’ plan $|E_i^* - E^*|$ on which the payment would be due in this case renders its attractiveness unlikely.
constraint:

\[ [rTE_i - g(E_i)] - [rTE^* - g(E^*)] - P(E) (E_i - E^*) \geq 0 \]  \hspace{1cm} (5)

where the first term is the expected benefit arising from the tax preparer report, the second term is that arising ex-post from self-preparation, and the third term is the due payment.

**Lemma 1** The participation constraint (5) is never binding.

**Proof.** Let us consider first the case in which \( E^* < E \). After substituting into (5) from (3) and with reference to the market equilibrium in which \( E = E_i \) we get

\[ g'(E)(E - E^*) - [g(E) - g(E^*)] \]

According to the Lagrange Theorem, since \( g(E) \) is a continuous and derivable function defined on \([0, I]\), there exist a \( k \in (E^*, E) \) such that

\[ g'(k)(E - E^*) = g(E) - g(E^*) \]

Convexity of \( g(E) \) and the fact that \( E^* < E \) imply that

\[ g'(E)(E - E^*) > g'(k)(E - E^*) = g(E) - g(E^*) \]

Whenever \( \overline{E} < E^* \), then \( (E - E^*) \) is a negative number. Let us rewrite the constraint as

\[ g(E^*) - g(E) - g'(E) \left| (E - E^*) \right| \]

As in the previous case, there exist a \( k \in (E, E^*) \) such that

\[ g'(k) \left| (E - E^*) \right| = g(E^*) - g(E) \]

convexity of \( g(E) \) and the fact that \( \overline{E} < E^* \) imply that:

\[ g'(E) \left| (E - E^*) \right| < g'(k) \left| (E - E^*) \right| = g(E^*) - g(E) \]

so the participation constraint (5) is never binding.

The intuition is that, as long as the tax preparer charges the taxpayer only for the improvement \( (\overline{E} - E^*) \) she delivers, participation is always beneficial for the latter.
The market equilibrium when $\phi(p) > p$

Whenever $\phi(p) > p$ the profit of a tax preparer is

$$\pi_i(E_i) = (P(E) - c)(E_i - E^*)\theta$$

where $E_i$ is the evasion chosen on behalf of her representative client by tax preparer $i$ and $c$ is the constant marginal cost incurred by the tax preparer. The F.O.C for profit maximization of the tax preparer is

$$\pi'(E_i) = \left[ P + \frac{\partial P}{\partial E} \frac{\partial E}{\partial E_i} (E_i - E^*) - c \right] \theta = 0$$

$$P + \frac{\partial P}{\partial E} \frac{1}{n} (E_i - E^*) - c = 0$$

Moreover the second order condition is

$$\pi''(E_i) = \left[ 2 \frac{\partial P}{\partial E} \frac{\partial E}{\partial E_i} + \frac{\partial^2 P}{\partial E^2} \left( \frac{\partial E}{\partial E_i} \right)^2 (E_i - E^*) \right] \theta$$

which, by substituting the price according to (3) respectively become:

$$r - g'(E) - \frac{1}{n} g''(E)(E_i^* - E^*) - c = 0$$

$$-2g''(E) + g'''(E) \frac{1}{n} (E_i^* - E^*) < 0$$

The second order condition can be fulfilled also when $g'''(E) > 0$, and thus the demand for the tax preparer services can be either concave or convex, while, however, the degree of convexity compatible with the satisfaction of the second order condition is limited.

In order to fulfill the stability condition for the market, the marginal profit of a representative firm must decrease with the sum of its own output plus the conjectured output response of rival firms. If this condition is met, a deviation from the equilibrium by a firm which increased production would entail, when conjectures are fulfilled, a market reaction that would imply a profit reduction, thus restoring the equilibrium. Let us check this condition:

$$\sum_{i=1}^{n} \left[ P + \frac{1}{n} \frac{\partial P}{\partial E} (E_i - E^*) - c \right] \frac{1}{n} = \left[ P + \frac{1}{n} \frac{\partial P}{\partial E} (E_i - E^*) - c \right]$$

It turns out that in the simple case considered in this paper the stability condition - to be obtained by deriving (7) with respect to $E_i$ - coincides with the second order condition for the single firm.
The quantity produced in equilibrium is implicitly defined by the first order condition:

\[ E_i^* = n \left( P(E^*) - c \left( \frac{\partial P(E^*)}{\partial E} \right)^{-1} \right) + E^* = nq^* + E^* \quad (8) \]

where the term in the square brackets is the same for each \( i \), so the total evasion will be \( E^*_T = mnq^* + mE^* \) and the average evasion will be \( E^* = nq^* + E^* \), so in equilibrium \( E_i = E \).

Through the first order condition we can also express the equilibrium price as equal to the marginal cost \( c \) times the mark-up \( \mu \):\(^4\)

\[ P(E^*) \left[ 1 - \frac{1}{n \eta} \left( 1 - \frac{E^*}{E^*} \right) \right] = c \quad (9) \]

\[ P(E^*) = c \left[ 1 - \frac{1}{n \eta} \left( 1 - \frac{E^*}{E^*} \right) \right] = c \mu \quad (10) \]

The result in (10) is synthesized in the following Lemma.

**Lemma 2** The equilibrium price is decreasing in the absolute value of the elasticity \( \eta \) and in the number of tax preparers, while it is increasing in the percentage difference between the suggested evasion and the evasion amount the representative taxpayer would have chosen without advice.

**5.0.1 Comparative static**

Let us consider the possibility of extending the threat of punishment to the tax preparer, who now risks an expected penalty of \( pFtE_i \) whenever her clients are audited, that is audits always reveal also her responsibility. The profit function of the tax preparer then becomes:

\[ \Pi_i(E_i) = \left[ (P(E) - c)(E_i - E^*) - pFtE_i \right] \theta \]

The F.O.C. is:

\[ \pi'(E_i) = P + \frac{\partial P(E)}{\partial E} \frac{1}{n} (E_i - E^*) - c - pFt = 0 \quad (11) \]

By applying the implicit function theorem to (11) one gets

\[ \frac{\partial E_i^*(s, F)}{\partial F} = - \frac{pt}{|\pi''(E_i^*)|} < 0 \quad (12) \]

\(^4\)A sufficient condition for \( \mu > 1 \) is as usual that \( |\eta| > 1 \).
where $\pi''(E_i) < 0$ is still given by (6). It is clear that the sanction reduces tax evasion.

An alternative possibility is that of increasing the sanction rate of the taxpayer. In this case, the self prepared report would be affected, according to (1), in this way

$$\frac{\partial E^*(s, F)}{\partial s} = -\frac{\phi(p)t}{g''(E^*)} < 0$$

The consultant, however, would be affected indirectly, through the change in the taxpayer’s demand. To assess the effect on tax evasion, we must again apply the implicit function theorem to the F.O.C. for the tax preparer profit maximization, which can be suitably rewritten as:

$$\pi'(E^*_i, s) = r(s) - g'(E^*_i) - \frac{1}{n} g''(E^*_i) [E_i - E^*(s)] - c - pFt = 0.$$  

We get:

$$\frac{\partial E^*_i(s, F)}{\partial s} = -\left[ p + \frac{1}{n} g''(E^*_i) \phi(p) \right] \frac{t}{|\pi''(E^*_i)|}$$  

(13)

**Proposition 1** Whenever $\phi(p) > p$, increasing the sanction on the taxpayer is more effective than increasing the sanction on the tax preparer.

**Proof.** By comparing (12) to (13) it turns out that they have the same denominator but (13) has a numerator which is larger in absolute value.

Notice also that the difference between (13) and (12) is increasing in $\phi(p)$ and in $g''(E)$. The intuition for Proposition 1 can be that, as long as the extra-sanction is placed on the taxpayer alone, she faces a larger danger in reporting without assistance, due to her bias in assessing the probability of an audit, so that the tax preparer can increase her degree of exploitation. In other words, as a larger sanction implies a lower value of $E^*$, i.e., of the preferred "stand alone" report, then *ceteris paribus* the denominator of the mark-up [see equation (10)] decreases and thus the price that the tax preparer can charge increases, with a negative effect on the amount of evasion. Moreover, notice that the term involving $E^*$ in (10) multiplies the one including the elasticity of demand. From (13) we also see that the effect of a higher sanction on the taxpayer is larger the larger is $g''(E)$, which governs the elasticity of evasion demand. Whenever such demand is convex, i.e., $g''(E) > 0$ - or, in other words, whenever according to the theory of taxation overshifting would be in order - in our framework the effectiveness of the sanction on the taxpayer with respect to that on the tax preparer becomes larger.
6 The market equilibrium when \( \phi(p) < p \)

To be written.

7 Extensions

The model presented in Section 4 can be extended in order to consider taxpayers endowed with different incomes. Let us redefine evasion as

\[
E = \beta I
\]

where \( 0 \leq \beta \leq 1 \) is the share of hidden income. Let us also redefine

\[
g(E) = f(\beta) \beta I = \zeta(\beta) I
\]

where \( \zeta(\beta) \) has the same properties of \( g(E) \). In this framework the problems considered in the previous Sections can be suitably reformulated, in order to reach results for \( \beta \) which parallel those obtained for \( E \) for each given \( I \). In this framework all the choices so far considered can be rescaled according to each taxpayer’s income, so that the optimal evasion amounts can be expressed as percentage shares of \( I \), without affecting the results.

Let us also consider the case in which

\[
p_g = rv_g
\]

where \( p_g \) represents the probability of detection for a group \( g = 1, \ldots, G \) of taxpayers, while \( r \) represents the percentage of all the taxpayers which are routinely visited by tax auditors, on the basis of a program set by the Tax Agency according to its budget, while \( v_g \) represents the visibility of information pertaining to group \( g \) of taxpayers, so that the larger \( v_g \) the larger the actual probability of detection of hidden income during a visit. For example the accounts of firms working as subsidiaries of other firms are usually more easily checked, as also information deriving from the other firm can be used to assess them. In this case different groups of taxpayers can differ in their \( p_g \) value. Each tax preparer can be active in all the \( g \) markets. As \( \phi(p_g) > p_g \) at small \( p_g \) levels, while the opposite occurs at high \( p_g \) levels, the tax preparer will induce a lower compliance than the one the taxpayer would have realized without advice in the former case and a larger compliance in the latter.

As long as there are also taxpayers who fill confident about their perceptions and are actually fully informed about the probability of detection\(^5\), they will report without third party assistance. These reports,

\(^5\)It is assumed that they cannot communicate such information to those who have biased perceptions, as they do not possess the credibility of professional tax preparers.
**ceteris paribus**, will involve a larger evasion than those filled-in by a tax preparer whenever \( \phi(p_g) > p_g \), since the tax preparer in order to extract a rent always suggests an evasion smaller than the optimal one - even if larger than the one her client would have chosen without advice. The opposite case arises when \( \phi(p_g) < p_g \), that is whenever the tax preparer partially corrects the overconfidence of the taxpayer. Since in this case too the correction is not full, evasion remains larger than the optimal one, i.e., than the one chosen under unbiased self-preparation of the report. To sum up, let us call \( E^* \) the evasion chosen by an unbiased taxpayer, while \( E^* \) is evasion devised by a taxpayer with a biased perception of the probability of detection and \( \bar{E} \) is the evasion suggested in the market for tax preparation. Then \( \phi(p_g) > p_g \to E^* > \bar{E} > E^* \), while \( \phi(p_g) < p_g \to E^* > \bar{E} > E^* \).

As the Tax Agency only observes \( \bar{E} \) and \( E^* \), it can notice that tax preparation has ambiguous effects with respect to tax compliance. Such ambiguity is thus likely to induce the Tax Authority at avoiding to condition its decision about the frequency and deepness of audits on the fact that the report was signed by a tax preparer or not. If, however, tax preparers specialize in assisting groups of taxpayers biased in a specific direction, then targeting the taxpayers whose report was signed by an evasion-prone tax preparer can be worthwhile.

## 8 Conclusion

To be written.

## References


