

Career Concern and Tax Preparer Fraud

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This paper focuses on the effects of career concern on fraud among tax return preparers. A two-stage model is built to ascertain whether the propensity of tax preparers to cooperate with taxpayers in underpaying tax can be decreased if the revealed fraud behavior increases the probability of being audited by the tax agency in the following period. After solving the unique SPNE, this effect is shown to exist.

Key Words: Tax return preparers; Auditing; Career concerns and dynamic games.

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1. INTRODUCTION

Given the complexity of the law on tax reporting, taxpayers are usually uncertain about how much tax they should pay. As a result, professional tax preparers help them to identify their taxable income and prepare tax payments. However, the taxpayers have the inclination to pay less tax than

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they should and they are likely to pay the tax preparers bonuses to ensure underpayment. That collusion is an interesting focus of investigation, especially in the context of monitoring of tax agencies and competition among tax preparers. Given imperfect monitoring, the question is whether there are other incentives for the tax preparers to reduce the frequency of fraud. This paper focuses on the effect of career concern on tax preparers who aim at the sum of discounted revenues in multiple periods to ascertain whether consideration of future revenue will restrict current fraudulent behavior. To the best of our knowledge, no studies have discussed career concern effects in this context.

A large proportion of the literature on this tax-paying problem has studied the regulation on the taxpayers' under-reporting behavior. The seminar paper of Melumad, Wolfson and Ziv (1994) is a case in point, analyzing the design of tax credits which can provide incentives for taxpayer compliance. However, the authors assume that tax preparers are always honest in tax reporting and do not collude with taxpayers. Feltham and Paquette (2002) provide another example, focusing on the compliance of taxpayers with the tax collecting agency.

Without doubt, taxpayers' incentive to under-report is one of the major concerns of tax collecting agencies. Notwithstanding, tax preparers play an important role in tax reporting, because they are more familiar with the tax laws and can help the taxpayers to make favorable tax payments, rather than just reducing the tax income uncertainty. The role played by tax preparers is discussed extensively by scholars of jurisprudence, and fraudulent behavior is a hot topic in this literature. This is illustrated by the work of Camp (2007), Book (2008) and Lang (1996).

At the same time, in the economics literature, Philips and Sansing (1997) do consider collusion between taxpayers and tax preparers. They use a principal-agent model to analyze how the taxpayer induces the preparer to reduce tax uncertainty and produce a favorable tax report. The contingent contract designed by the taxpayer is the focus. But the intertemporal incentive on the tax preparer is not taken into account.

At the same time, career concern effects, or reputation effects, on the behavior of any player aiming at maximizing their long-run welfare have been discussed heatedly in the economic literature, since the formation of repeated game theory. Important contributions to that debate have been made by Holmstrom (1999), Levin (2001), and Cai and Obara (2009). In such studies, the current actions taken by long-run players affect their reputations, which in turn influences the expected payoffs in the future in the game. Hence, the players must make some adjustments on the basis of the one-stage best response to achieve larger total discounted payoffs. Holmstrom (1999) analyses the effect of career concern on managers' incentives, and Levin (2001) extends the individual career concern to a collective

reputation setting. Cai and Obara (2009) investigate the interrelationship between individual firm career concern and industrial integration.

In the reputation effects literature, it is common to set infinite horizons, as have Holmstrom (1999), Levin (2001), and Cai and Obara (2009). However, the tax agency can only monitor fraudulent behavior imperfectly, and under such a setting there are usually multiple Perfect Public Equilibria, which complicates further analysis of the equilibrium results. One way of resolving this is to seek the best equilibrium achieved by the cut-off strategy. A case in point is discussed by Cai and Obara (2009). However, we need to compare the fraudulent behavior in the dynamic setting with that under the static setting to identify the career concern effect, which is the most compelling when a unique equilibrium solution is achieved. Hence, we adopt a two-period setting and prove the existence of the unique SPNE.

The main result of this paper is demonstrated in Proposition 2 and its corollary, which shows that if the tax agency updates the probability of monitoring a tax preparer's report according to whether or not the tax preparer is caught frauding in the first period and punishes a frauding tax preparer by increasing the probability of auditing in the future, the preparer will charge a higher bonus for underpayment and reduce the market demand for fraudulent report. Thus, the career concern effect does exist for the tax preparer, as shown by this simple two-period dynamic model.

The identification of career concern effect is very important in monitoring tax preparation behavior. One-period monetary punishment has been intensively discussed in the literature in relation to this regulatory problem. It is true that this kind of fine can constrain tax preparers from committing fraud to some extent. But we show, for the first time, that other punishments can also work. This will provide insights when agencies are designing more effective tax enforcement mechanisms.

The remainder of this paper proceeds as follows. The setting of the model is presented in Section 2, with the stage-game timeline specified in detail. Section 3 begins with the benchmark case in which there is only one period and provides a solution for the unique equilibrium in this case, given certain regulatory conditions. It then focuses on the two-period setting and provides conditions for the existence and uniqueness of the SPNE. A comparison between the optimal solution in the first period of the dynamic model and that in the one-stage benchmark is made to show the existence of the career concern effects. Discussions and possible extensions are presented in Section 4. Section 5 concludes this paper.

2. THE MODEL

2.1. Taxpayers, Tax Preparers and the Tax Agency

There is a continuum of short-run taxpayers of measure 1 in each period. At the beginning of each period, it is exogenously determined by the nature that each taxpayer has high taxable income with probability, p ; and a low level of taxable income with probability, $1 - p$. If the income is high, the taxpayer has to pay tax, H ; and if the income is low, the taxpayer has to pay tax, L , with $H > L$. Suppose that $0 < p < 1$. Because of this uncertainty, the taxpayers must resort to professional tax return preparers to know their exact taxable income. For simplicity, consider one tax return preparer. Suppose that this preparer can correctly find the true tax liability of each client. The commission fee for identifying the true taxable income is f_t in each period t . This price is announced to the public. The marginal cost for taxable income identification is held constant at $c > 0$.

Each taxpayer has the propensity to pay less tax, so there is an incentive for them to give the tax preparer a bonus to help them report low income instead of high income. Since the tax preparer will be punished by the tax agency if underpayment is detected, the tax preparer in turn expects bonuses. Suppose that the tax preparer sets the level of the bonus, b_t , along with the commission fee, f_t , in each period t . Unlike the commission fee, f_t , the level of bonus is not published. It is known only to the tax preparer and the taxpayer.

At the beginning of each period, the tax preparer designs the commission fee and bonus profile, (f_t, b_t) , but only the commission is announced to the public. Each taxpayer goes to the preparer's office and is shown the complete contract, (f_t, b_t) . If a taxpayer agrees to hire this tax preparer and requires tax underpayment if necessary, he / she will pay f_t to the preparer to identify the true taxable income; and if high income level is identified, he / she will pay b_t to the tax preparer for underpayment. If a taxpayer hires the preparer but does not require tax underpayment, he / she will just pay the commission fee, f_t , to the preparer. If a taxpayer does not choose to hire this tax preparer, it will pay e , the outside payment.

The tax agency collects taxes and randomly audits the tax preparer's report with probability γ in period t . If underpayment is found, both the taxpayer and the preparer will be punished. Suppose that each taxpayer with fraudulent behavior being detected will be fined R and the monetary punishment on the tax preparer will be S . For each case audited, the agency can find out the true taxable income at a probability of θ .

Although all of the taxpayers have the same distribution of taxable income and the same outside payoff, they have different abilities to resist the punishment of the tax agency. Suppose that the actual punishment to taxpayer i for underpayment is $x_i = R + r_i$, where R is the common

punishment to the fraudulent taxpayers and r_i is the individual-specific punishment, characterizing the individual resistance to the punishment. Suppose further that r_i distributes uniformly in the interval $[m, n]$ with $m < n$. The difference in resistance to punishment determines whether a taxpayer will buy the service offered by the tax preparer and ask for help in underpayment if high income is identified. Thus, both the commission-bonus profile and the individual resistance determine the market demand for the preparer's service.

As for the tax return preparer, if the tax agency detects that the tax preparer has helped the taxpayer to underpay, a fine of S will be levied for every revealed fraud case. The tax agency will also adjust the probability that it will audit the preparer in the next period, γ_{t+1} . The auditing probability next period will be increased if the tax preparer is found to fraud in the current period and will be decreased otherwise. To be specific,

$$\begin{aligned}\gamma_{t+1} &= \eta\gamma_t, \text{ if fraud behavior is detected at } t; \text{ and} \\ \gamma_{t+1} &= \kappa\gamma_t, \text{ otherwise with } \eta > 1 \text{ and } 0 < \kappa < 1.\end{aligned}\quad (1)$$

In this model, the probability of auditing in the first period, γ_1 , is exogenous.

The aim of the taxpayers is to minimize the expected total payment: the taxes paid to the tax agency, and the commissions and bonuses paid to the tax preparer. The target of the tax preparer in contrast is to maximize the expected discounted sum of the revenues. Let δ denote the discount rate of the preparer.

It must be noted that there is only one tax return preparer in this model. This simplification may seem a little unrealistic at first. But we focus on the behavior of a single tax preparer in order to identify the effect of career concern on fraud, separating from the influences of market competition. Thus, we give the taxpayers the right to choose whether to hire the tax preparer or not and simply let the outside payment, e , represent the total payment if tax identification is done by other tax preparers.

It should also be noted that in this model the behavior of the tax agency is simplified. Unlike other models in which the tax agency is a tax-return maximizer, which can strategically design the mechanism to ensure truthful tax payment, its policy on auditing and punishment are assumed to be exogenous here. Unrealistic as it is, this simple setting allows us to focus on the effect of this fraud-based auditing policy on the behavior of the tax return preparer, who is concerned about not only the expected revenue of the current period but also that of the future periods.

2.2. The Timeline

To make the model clearer, let us underscore the timeline of the stage game.

In each period t , the game proceeds step by step in the following way.

Step 1: The taxable income of each taxpayer is exogenously determined. However, the taxpayers only know that each of them will have high taxable income with probability p and low taxable income with probability $1 - p$. The tax agency will audit the tax reports made by the tax return preparer with probability γ_t , according to rule (1).

Step 2: The tax return preparer determines the profile of the commission fee and fraud bonus, (f_t, b_t) , according to the audit probability of the tax agency. The commission fee is known to the public but the bonus is known only to the taxpayers who go to the tax preparer for help.

Step 3: The taxpayers go to the office of the tax return preparer and are offered the profile, (f_t, b_t) . They then determine whether to hire the tax preparer or not.

Step 4: If a taxpayer decides to buy the service of the tax preparer, it will pay the preparer f_t and the tax preparer will identify the true taxable income at a constant marginal cost of $c > 0$.

Step 5: After the income level is known to the taxpayer and the preparer, the high income taxpayer will determine whether to underpay. If the taxpayer does decide to underpay, the preparer will help to report the low income, getting bonus b_t in return.

Step 6: The tax agency, after the taxable income has been reported, will audit the reports of the tax preparer with probability γ_t . The false reports will be revealed with probability θ . Taxpayers and the preparers will be punished if they are found to make underpayment.

3. ANALYSIS OF THE EQUILIBRIUM FRAUD RATIO

To ascertain whether the career concern effect exists is to determine whether or not the future revenue will affect the strategy of the long-run player. To identify such effects, a dynamic model is needed. However, it is necessary to use the one stage model as a benchmark. As for the time structure of the dynamic model, there are two kinds of models used in the economic literature. One is the finite-period model and the other is the infinite-horizon model, with the latter more complicated than the former. Here, we will show that a two-period setting is enough to identify the career concern effects.

In section 3.1 we will demonstrate the equilibrium design of the commission and bonus in a one-stage model. In section 3.2 we will present the main result of this paper, the determination of the commission fee and the

bonus in each period when the stage game is played twice. We shall compare the results in these two subsections and identify the career concern effects.

3.1. Benchmark: Fraud without Career Concern

In this subsection, we look at the case in which the stage game described in Section 2.2 is played just once. The solution of SPNE in this stage game can be summarized by the following lemmas and propositions. As only one period is considered, the subscripts representing different time periods are omitted.

LEMMA 1. *Given the commission and bonus profile, (f, b) , if a taxpayer with individual-specific punishment*

$$r_i \leq \frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R \quad (2)$$

purchases the service of the tax preparer, it will require for underpayment and pay bonus to the tax preparer for under-reporting when the income level is high.

Proof. See Appendix A. ■

Lemma 1 depicts the demand for fraud reporting given that a taxpayer will purchase the tax preparer's service. Considering the commission fee, we have the following lemma.

LEMMA 2. *All taxpayers will purchase the service offered by the tax preparer charging the profile, (f, b) , if*

$$f \leq e - L - p(H - L). \quad (3)$$

If this condition is violated, then taxpayers with individual-specific punishment

$$r_i \leq \frac{e - L - f - pb}{p\gamma\theta} - H + L - R \quad (4)$$

will purchase the service and will all pay the bonus to underpay their taxes if high income level is identified.

Proof. See Appendix A. ■

The above two lemmas characterize the market demand for the services of the tax preparer, based on the behavioral assumptions about the taxpayers.

Thus, the optimal commission-fee and fraud bonus profile, $(f^*(\gamma), b^*(\gamma))$ can be solved.

LEMMA 3. *When the fines, R and S , are high enough and the outside payment satisfies the following condition*

$$p(H - L) + c + L < e < p\gamma\theta(H - L + m + R + S) + c + L, \quad (5)$$

it is never optimal for the expected-revenue-maximizing tax return preparer to lose any taxpayer. That is,

$$f^* = e - L - p(H - L). \quad (6)$$

Proof. See Appendix A. ■

The result in Lemma 3 is quite intuitive: when the tax payment outside of the service of the tax preparer is low, it does not pay to lose any clients. Now imposing (5), the optimizing problem for the tax preparer is as follows:

$$\max_b e - L - p(H - L) - c + (b - \gamma\theta S)pq(b) \quad s.t. \quad b \geq 0, \quad (7)$$

where the share of the taxpayers who will pay the bonus to underpay their taxes when high income is identified by the tax preparer, $q(b)$, satisfies

$$q(b) = 1$$

if $\frac{(1-\gamma\theta)(H-L)-b}{\gamma\theta} - R > n$;

$$q(b) = \frac{1}{n - m} \left[\frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R - m \right]$$

if $m \leq \frac{(1-\gamma\theta)(H-L)-b}{\gamma\theta} - R \leq n$; and

$$q(b) = 0$$

if $\frac{(1-\gamma\theta)(H-L)-b}{\gamma\theta} - R < m$.

By applying the Kuhn-Tucker Theorem, we solve this constrained optimization problem and obtain the results in the proposition below.

PROPOSITION 1. *Given the condition that*

$$H - L < \frac{\gamma\theta}{1 - \gamma\theta}(2n - m + R + S) \quad (8)$$

and

$$H - L > \frac{\gamma\theta}{1 - \gamma\theta}(m + R + S) \tag{9}$$

as well as (5), the optimal commission fee and bonus profile, (f^*, b^*) , of this stage-game is

$$f^* = e - L - p(H - L)$$

and

$$b^* = b^*(\gamma) = \frac{1}{2}[H - L - \gamma\theta(H - L + R + m - S)]. \tag{10}$$

What's more, the strategy that the tax preparer chooses (f^*, b^*) and the taxpayers buy the service and underpay their taxes when the individual punishment is no larger than $\frac{(1-\gamma\theta)(H-L)-b}{\gamma\theta} - R$, whenever the income level is identified to be high by the preparer, constitute the SPNE in this stage game, given the policy of the tax agency.

Proof. See Appendix A. ■

Equation (10) shows that the probability of the tax agency's audit influences the value of the optimal bonus. Hence, if the fraudulent behavior of the current period can affect the audit probability in the next period, the tax preparer will adjust the commission fee and bonus profile in the current period. Thus, if the commission-bonus profile that maximizes the expected discounted sum of revenue in the dynamic setting differs from that in the stage game, (10), we can say that career concern effects exist.

3.2. Fraud with Career Concern

To capture the career concern effect, we must use a dynamic structure. There are two kinds of dynamic models, one is of infinite time periods and the other is of finite time periods. We can adopt the infinite-horizon setting as do many models on reputation effects. With imperfect public monitoring, it is natural to solve for the perfect public equilibrium. However, it is hard to deter multi-equilibrium in such a model setting. Hence, we use the finite-horizon model instead. In this section, we will show that a two-period model is enough to capture the career concern effect.

By backward induction, we first solve for the optimal commission fee and bonus profile in the second period, (f_2^*, b_2^*) . As the taxpayers in the second period are new comers to the game, their demand function for tax identification and underpayment is similar to that of the taxpayers in the first period with only the auditing probability changed, which they take as given. And because the tax agency updates its audit probability, the tax return preparer must make optimization decisions according to the new

auditing probability, γ_2 . By (1), the new auditing probability is determined by whether underpayment is caught or not in period 1. Let p_1^C denote the probability that the tax preparer is caught defrauding in the first period. It is easy to see that it is a function of the commission-bonus-profile in period 1, (f_1, b_1) .

$$p_1^C = p_1^C(f_1, b_1). \quad (11)$$

Following from (1),

$$\gamma_2 = \eta\gamma_1 \text{ with probability } p_1^C; \quad (12)$$

$$\text{and } \gamma_2 = \kappa\gamma_1 \text{ with probability } 1 - p_1^C. \quad (13)$$

Applying the equilibrium results in Section 3.1, we have the following lemma.

LEMMA 4. *Given the condition that*

$$H - L < \frac{\kappa\gamma_1\theta}{1 - \kappa\gamma_1\theta}(2n - m + R + S) \quad (14)$$

and

$$H - L > \frac{\eta\gamma_1\theta}{1 - \eta\gamma_1\theta}(m + R + S) \quad (15)$$

as well as

$$e > p(H - L) + c + L \quad (16)$$

$$e < p\kappa\gamma_1\theta(H - L + m + R + S) + c + L \quad (17)$$

given the new auditing probability, γ_2 , the optimal commission-bonus profile in period 2, (f_2^*, b_2^*) , is

$$f_2^* = e - L - p(H - L) \quad (18)$$

and

$$b_2^* = \frac{1}{2}[H - L - \gamma_2\theta(H - L + R + m - S)]. \quad (19)$$

Proof. The proof is obvious by applying the results in Section 3.1. ■

The expected payoff of the second period from period 1's point of view is then

$$\begin{aligned}
 E_1[Rev_2] &= e - L - p(H - L) - c \\
 &+ \frac{p}{4\gamma_1\theta(n - m)} \cdot \frac{p_1^C}{\eta} [H - L - \eta\gamma_1\theta(H - L + R + m + S)]^2 \quad (20) \\
 &+ \frac{p}{4\gamma_1\theta(n - m)} \cdot \frac{1 - p_1^C}{\kappa} [H - L - \kappa\gamma_1\theta(H - L + R + m + S)]^2
 \end{aligned}$$

which is a function of (f_1, b_1) according to equation (11). Hence, the tax preparer must decide on the values of the commission fee and the bonus, (f_1, b_1) , to maximize the expected sum of the discounted revenues in the two periods.

LEMMA 5. *Given the condition that*

$$e < L + c + p\gamma_1\theta(H - L + m + R + S) + p\Delta \quad (21)$$

where

$$\begin{aligned}
 \Delta &= \frac{\delta p}{4(n - m)} \cdot \frac{1}{\kappa} \cdot [H - L - \kappa\gamma_1\theta(H - L + R + m + S)]^2 \\
 &- \frac{\delta p}{4(n - m)} \cdot \frac{1}{\eta} \cdot [H - L - \eta\gamma_1\theta(H - L + R + m + S)]^2 \quad (22)
 \end{aligned}$$

if the tax preparer sets a high commission fee in the first period so that

$$f_1 > e - L - p(H - L), \quad (23)$$

none of the taxpayers will choose to purchase the service in period 1 and the expected discounted revenue will be

$$\begin{aligned}
 E_1[Rev_1] + \delta E_1[Rev_2] &= \delta(e - L - p(H - L) - c) \quad (24) \\
 &+ \delta \frac{p}{4\kappa\gamma_1\theta(n - m)} [H - L - \kappa\gamma_1\theta(H - L + R + m + S)]^2
 \end{aligned}$$

Proof. See Appendix B. ■

We can see that in period 1, when $f_1 \leq e - L - p(H - L)$, all taxpayers will buy the service and the taxpayers with individual punishment no larger than

$$\frac{(1 - \gamma_1\theta)(H - L) - b_1}{\gamma_1\theta} - R$$

will pay the bonus to underpay their taxes when high income is identified. Hence, if the bonus for the underpayment b_1 is high, the demand for underpayment is zero and we can have $p_1^C = 0$. Then as long as $e - L - p(H - L) - c > 0$, the expected sum of discount revenue is larger than that in (24). Therefore, it is not optimal to have $f_1 > e - L - p(H - L)$, once (14)-(17) and (21) are satisfied. What's more, since the demand for underpayment in period 1 depends only on b_1 , given that the commission is low so that $f_1 < e - L - p(H - L)$, a small increase in commission can keep all the constraints to hold and increase the expected revenue. Hence, in the optimum, we can not have $f_1 < e - L - p(H - L)$ either. Therefore, to solve for the optimal commission-bonus profile, we only have to focus on the case where $f_1 = e - L - p(H - L)$.

PROPOSITION 2. *Under the conditions (14)-(17) and (21) as well as*

$$H - L > \frac{\gamma_1 \theta (m + R + S) + \Delta}{1 - \gamma_1 \theta} \tag{25}$$

And $n - m$, R and S are large enough to make all these conditions hold at the same time, there is a SPNE where all the short-run taxpayers buy the tax identification service and underpay their taxes when the individual punishment is no larger than $\frac{(1 - \gamma_t \theta)(H - L) - b_t}{\gamma_t \theta} - R$, if high income is identified by the tax preparer in each period t , and the tax return preparer charges profile, (f_t^*, b_t^*) , $t = 1, 2$, so that

$$f_1^* = f_2^* = e - L - p(H - L), \tag{26}$$

$$b_1^* = \frac{1}{2} [H - L - \gamma_1 \theta (H - L + R + m - S) + \Delta] \tag{27}$$

$$b_2^* = \frac{1}{2} [H - L - \gamma_2^* \theta (H - L + R + m - S)]. \tag{28}$$

Proof. See Appendix B. ■

The comparison of the results of the dynamic model and the static model is summarized in the following corollary.

COROLLARY 1. *Given (15) and $\eta > 1 > \kappa > 0$, we have that $\Delta > 0$. Therefore, under the conditions in Proposition 2,*

$$\begin{aligned} b_1^* &> b^*(\gamma_1); \\ q_1^*(b_1^*) &< q(b^*(\gamma_1)) \end{aligned}$$

That is to say, in equilibrium, the bonus for underpayment service in period 1 is higher than that in the static model and the demand for this service is smaller in the dynamic setting as well.

Proof. See Appendix B. ■

Therefore, in this two-period model setting, the proportion of potential fraud cases in period 1 is less than that in the equilibrium when there is only one stage. In other words, because the increase in fraud behavior can decrease the expected revenue in the next period, the tax preparer offers a higher bonus for making fraudulent underpayments. As a result, the proportion of the clients who will ask for underreporting is reduced. That is to say, the career concern effects for the tax preparer does exist.

4. DISCUSSION AND EXTENSION

An important simplification in this model is that the tax preparer can truthfully identify the income level of the taxpayers and the taxpayers are nearly ignorant of its taxable income level except for the preterior distribution. In reality, however, there is no assurance that the tax preparer can fully identify the taxable income and that taxpayers do not have private knowledge about their taxable income. This kind of information asymmetry is simplified in this paper to reduce the complexity caused by the strategic information transition between the taxpayers and the tax return preparer. A good extension of the model would be to incorporate this effect and look at its interaction with career concern. A natural way to investigate this effect would be to use the “cheap talk” model. However, every “cheap talk” model has a “babbling equilibrium” where any information transition is nonsense. In this case, there is no incentive for the taxpayers to purchase the costly tax preparing service. Of course, we could look at other equilibrium in that kind of model. Another solution would be to use the relational contract model, in line with Levin (2003) and use the long-run corporation as a kind of incentive to ensure meaningful information transmission between the taxpayers and the tax return preparer.

Another possible extension would be to introduce a specific market structure for the tax preparer. In this model, the market structure is highly simplified. The strategy of a single tax preparer is considered, with the behavior of other tax preparers represented by an outside option payment. As most of the models tackling the tax preparer’s strategy I read assume perfect competition in this market, it would be interesting to look at the interaction of market structure and career concern of fraudulent operations. Enlightened by Cai and Obara (2009), it would also be helpful to investigate the boundary problem of the preparers.

Finally, the policy of the tax agency is assumed to be exogenous in this model. It would be interesting to investigate the optimal mechanism set by a strategic tax collecting agency.

5. CONCLUSION

By using a two-period dynamic model, we have shown that for a tax return preparer who aims to maximize the expected sum of the discounted revenue of both periods, it pays to reduce the number of fraudulent operations in the first period. Thus, besides the instant fines, punishment which will influence the payoff of the tax return preparer in the second period can also help to reduce fraud. Therefore, this career concern is important. Of course, detailed comparative static would be necessary to analyze the influence of different factors on the career concern effect, such as the difference between high and low taxable income (this is the intensity for the incentive to underpay), the discount factor of the preparer, and the discrepancy of taxpayers' individual resistance to punishment. Further investigation into the transfer of information between taxpayers and preparers and the market competition between tax preparers are possible extensions to this model.

APPENDIX A

Equilibrium in the Benchmark Case

A.1. THE PROOF OF LEMMA 1

Proof. It is easy to see that if taxpayer i with high income chooses to under-report its taxable income and pay tax, its expected payment will be

$$\begin{aligned} E[\text{Payment}] &= [1 - \gamma + \gamma(1 - \theta)](L + f + b) + \gamma\theta(H + R + f + b + r_i) \\ &= f + b + (1 - \gamma\theta)L + \gamma\theta(H + R + r_i). \end{aligned} \quad (\text{A.1})$$

However, if it chooses to report the true taxable income, the payment (there is no uncertainty in this case) will be

$$\text{Payment} = H + f. \quad (\text{A.2})$$

Hence, underpayment is profitable if and only if

$$f + b + (1 - \gamma\theta)L + \gamma\theta(H + R + r_i) \leq H + f.$$

By collecting terms, we have

$$r_i \leq \frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R. \quad (\text{A.3})$$

Thus, Lemma 1 is proved. ■

A.2. THE PROOF OF LEMMA 2

Proof. It is easy to see that the expected payment for a taxpayer with individual specific punishment r_i failing to satisfy (2), the expected payment when purchasing tax preparer’s service will be

$$\begin{aligned} E[\text{Payment}] &= (1 - p)(L + f) + p(H + f) \\ &= L + p(H - L) + f. \end{aligned} \tag{A.4}$$

However, the expected payment without the tax preparer’s service would be at most e . As a result, these taxpayers will accept the contract and purchase the preparer’s service if and only if

$$L + p(H - L) + f \leq e. \tag{A.5}$$

And for the taxpayers with individual punishment satisfying (2), the expected payment when choosing the service is at most $L + p(H - L) + f$. Hence, given (A.5), these taxpayers will also purchase the tax preparer’s service. Thus, we have the first half of Lemma 2. If (A.5) is violated, taxpayers with individual punishment failing to satisfy (2) will not hire the tax preparer, and will resort to other outside help. If a taxpayer with r_i satisfying (2), it will fraud at high income as long as it can afford the fixed commission fee. Thus, to elicit them to buy the service, the following inequality should be met

$$(1 - p)(L + f) + p(f + b + (1 - \gamma\theta)L + \gamma\theta(H + R + r_i)) \leq e.$$

By collecting terms, we obtain equation (4). And because

$$f > e - L - p(H - L),$$

we have that

$$\begin{aligned} \frac{e - L - f - pb}{p\gamma\theta} - H + L - R &< \frac{H - L - b}{\gamma\theta} - H + L - R \\ &= \frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R. \end{aligned} \tag{A.6}$$

Therefore, all of the taxpayers purchasing the service of the tax preparer at (f, b) when $f > e - L - p(H - L)$, will require underpayment once high income is identified. ■

A.3. THE PROOF OF LEMMA 3

Proof. By the above lemma, when $f > e - L - p(H - L)$, the expected revenue of the tax preparer is

$$\begin{aligned} E[Rev] &= (f - c)q(f, b) + (b - \gamma\theta S)pq(f, b) \\ &= (f + pb - c - p\gamma\theta S)q(f, b), \end{aligned} \quad (\text{A.7})$$

where $q(f, b)$ is the number of taxpayers who buy the tax-preparing service at the charged price. We can see that

$$q(f, b) = 1$$

if $\frac{e-L-f-pb}{p\gamma\theta} - H + L - R > n$;

$$q(f, b) = \frac{1}{n - m} \left(\frac{e - L - f - pb}{p\gamma\theta} - H + L - R - m \right),$$

if $m \leq \frac{e-L-f-pb}{p\gamma\theta} - H + L - R \leq n$; and

$$q(f, b) = 0$$

if $\frac{e-L-f-pb}{p\gamma\theta} - H + L - R < m$.

The tax preparer will maximize (A.7) subject to

$$f > e - L - p(H - L). \quad (\text{A.8})$$

In addition $f, b \geq 0$. It is easy to see that it is never optimal to have the commission fee or the bonus so high that $q(f, b) = 0$. Because a decrease in the commission fee will achieve strictly positive expected revenue, instead of zero. We can also see that none of the vectors within the set

$$\left\{ (f, b) \mid \frac{e - L - f - pb}{p\gamma\theta} - H + L - R > n \right\}$$

can achieve an expected revenue higher than that attained when

$$\frac{e - L - f - pb}{p\gamma\theta} - H + L - R = n.$$

for a little increase in the commission fee can keep all the constraint be satisfied and strictly increase the expected revenue. Hence, we only have to focus on the case

$$m \leq \frac{e - L - f - pb}{p\gamma\theta} - H + L - R \leq n.$$

Then the expected revenue equals

$$E[Rev] = \frac{1}{n - m} \left(\frac{e - L - f - pb}{p\gamma\theta} - H + L - R - m \right) (f + pb - c - p\gamma\theta S).$$

By the Kuhn-Tucker Theorem, there are positive multipliers, $\alpha, \beta \geq 0$, such that

$$e - L + c - p\gamma\theta(H - L + R + m - S) - 2(f + pb) = -\alpha + \beta \quad (\text{A.9})$$

$$\alpha = 0 \text{ if } \frac{e - L - f - pb}{p\gamma\theta} - H + L - R < n;$$

$$\beta = 0 \text{ if } \frac{e - L - f - pb}{p\gamma\theta} - H + L - R > m.$$

We can see that when

$$e < p\gamma\theta(H - L + R + m + S) + c + L,$$

the left-hand side of (A.9) satisfies

$$\begin{aligned} & e - L + c - p\gamma\theta(H - L + R + m - S) - 2(f + pb) \\ & \geq e - L + c - p\gamma\theta(H - L + R + m - S) \\ & \quad - 2[e - L - p\gamma\theta(H - L + R + m)] \\ & = -e + p\gamma\theta(H - L + R + m + S) + c + L \\ & > 0. \end{aligned}$$

where the first inequality follows from the constraint that

$$\frac{e - L - f - pb}{p\gamma\theta} - H + L - R \geq m$$

Therefore, by the Kuhn-Tucker theorem, we must have that

$$\frac{e - L - f - pb}{p\gamma\theta} - H + L - R = m.$$

The expected revenue will then be zero. However, positive revenue can always be achieved when

$$f \leq e - L - p(H - L).$$

Hence, as long as $e - L - p(H - L) - c > 0$ is satisfied, it is not optimal to have $f > e - L - p(H - L)$. Besides, by Lemma 2, we have that when

(3) is satisfied, all of the taxpayers will buy the service, with the taxpayers having individual punishment low enough to meet with (2) being willing to pay the bonus if necessary. As this threshold for tax fraud is irrelevant to f , the optimal level of fixed commission fee is

$$f^* = e - L - p(H - L).$$

■

A.4. PROOF OF PROPOSITION 1

Proof. It is obvious that none of the points within the set

$$\left\{ b \mid \frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R > n \right\}$$

can attain an expected revenue larger than that achieved by the value of b satisfying $\frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R = n$. Furthermore, it is never optimal to charge too high a bonus such that $q(b) = 0$, because by slightly decreasing b , expected revenue can be strictly increased, given that

$$H - L - \gamma\theta(H - L + R + m + S) > 0.$$

Thus, we only have to focus on the case when $m \leq \frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R \leq n$. The object function of the original optimization problem in this case is

$$\max_b e - L - p(H - L) - c + (b - \gamma\theta S) \frac{p}{n - m} \left[\frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R - m \right].$$

Hence, by applying the Kuhn-Tucker theorem, there are two positive multipliers, α and β , such that

$$H - L - \gamma\theta(H - L + R + m - S) - 2b = (-\alpha + \beta)(n - m), \quad (\text{A.10})$$

where

$$\alpha \left[\frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R - n \right] = 0 \quad (\text{A.11})$$

and

$$\beta \left[\frac{(1 - \gamma\theta)(H - L) - b}{\gamma\theta} - R - m \right] = 0. \quad (\text{A.12})$$

Hence, if

$$H - L < \frac{\gamma\theta}{1 - \gamma\theta} (2n - m + R + S) \quad (\text{A.13})$$

and

$$H - L > \frac{\gamma\theta}{1 - \gamma\theta}(m + R + S), \tag{A.14}$$

the corner solutions can be eliminated. Under these conditions, the optimum is an inner solution satisfying

$$2b = H - L - \gamma\theta(H - L + R + m - S) \tag{A.15}$$

That is to say,

$$b^* = \frac{1}{2}[H - L - \gamma\theta(H - L + R + m - S)]. \tag{A.16}$$

And this bonus is strictly positive given the above conditions. ■

APPENDIX B

Equilibrium in the Two-Period Model

B.1. PROOF OF LEMMA 5

Proof. Suppose that $f_1 > e - L - p(H - L)$. Then in period 1 only the individual with

$$r_i \leq \frac{e - L - f_1 - pb_1}{p\gamma_1\theta} - H + L - R$$

will buy the service and ask the tax preparer to report low income if a high income level is identified. Then, the expected sum of discounted revenue for the tax preparer is

$$E_1[Rev_1] + \delta E_1[Rev_2] = (f_1 + pb_1 - c - p\gamma_1\theta S)q_1(f_1, b_1) + \delta E_1[Rev_2] \tag{B.1}$$

where $E_1[Rev_2]$ satisfies equation (20). We can see that

$$q_1(f_1, b_1) = 1,$$

and

$$p_1^C = p\gamma_1\theta$$

if $\frac{e - L - f_1 - pb_1}{p\gamma_1\theta} - H + L - R > n$;

$$q_1(f_1, b_1) = \frac{1}{n - m} \left(\frac{e - L - f_1 - pb_1}{p\gamma_1\theta} - H + L - R - m \right)$$

and

$$p_1^C = p\gamma_1\theta \frac{1}{n-m} \left(\frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R - m \right)$$

if $m \leq \frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R \leq n$; and

$$q_1(f_1, b_1) = 0$$

and

$$p_1^C = 0$$

if $\frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R < m$.

It is easy to see that when $\frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R > n$, $q_1(f_1, b_1)$ is irrelevant to (f_1, b_1) . Thus, $\delta E_1[Rev_2]$ is a constant in this optimization function, given that the conditions in Lemma 4 are satisfied. Therefore, a marginal increase in the commission can keep all the inequality constraints held and strictly increase the expected sum of revenues. So any profile in the set

$$\left\{ (f_1, b_1) \mid \frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R > n \right\}$$

can not be optimal. Similarly, all the points in the set

$$\left\{ (f_1, b_1) \mid \frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R < m \right\}$$

achieve the same value as the points, (f_1, b_1) , satisfying

$$\frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R = m.$$

Hence, we only have to look at the case where

$$m \leq \frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R \leq n.$$

In this case, the expected sum of revenues is actually a function of $f_1 + pb_1$. So define $g_1 = f_1 + pb_1$. The optimization problem can be termed as follows.

$$\begin{aligned} & \max_{g_1} (g_1 - c - p\gamma_1\theta S)q_1(g_1) + \delta[e - L - p(H - L) - c] \\ & + \frac{\delta p}{4\gamma_1\theta(n-m)} \cdot \frac{p\gamma_1\theta q_1(g_1)}{\eta} \cdot [H - L - \eta\gamma_1\theta(H - L + R + m + S)]^2 \\ & + \frac{\delta p}{4\gamma_1\theta(n-m)} \cdot \frac{1 - p\gamma_1\theta q_1(g_1)}{\kappa} \cdot [H - L - \kappa\gamma_1\theta(H - L + R + m + S)]^2 \end{aligned}$$

such that $m \leq \frac{e-L-g_1}{p\gamma_1\theta} - H + L - R \leq n$, where

$$g_1(g_1) = \frac{1}{n-m} \left(\frac{e-L-g_1}{p\gamma_1\theta} - H + L - R - m \right).$$

By the Kuhn-Tucker Theorem, we have two positive multipliers, α and β , satisfying

$$\begin{aligned} & e - L + c - p\gamma_1\theta(H - L + R + m - S) - 2g_1 + p\Delta \\ & = (-\alpha + \beta)(n - m), \end{aligned} \tag{B.2}$$

where

$$\begin{aligned} \Delta &= \frac{\delta p}{4(n-m)} \cdot \frac{1}{k} \cdot [H - L - \kappa\gamma_1\theta(H - L + R + m + S)]^2 \\ &\quad - \frac{\delta p}{4(n-m)} \cdot \frac{1}{\eta} \cdot [H - L - \eta\gamma_1\theta(H - L + R + m + S)]^2 \end{aligned}$$

with $\alpha[\frac{e-L-g_1}{p\gamma_1\theta} - H + L - R - n] = 0$ and

$$\beta \left[\frac{e-L-g_1}{p\gamma_1\theta} - H + L - R - m \right] = 0.$$

Hence, when the condition (21) holds, we have that

$$\begin{aligned} & e - L + c - p\gamma_1\theta(H - L + R + m - S) - 2g_1 + p\Delta \\ & \geq e - L + c - p\gamma_1\theta(H - L + m + R - S) \\ & \quad - 2[e - L - p\gamma_1\theta(H - L + m + R)] + p\Delta \\ & = -e + L + c + p\gamma_1\theta(H - L + m + R + S) + p\Delta \\ & > 0. \end{aligned}$$

Thus, by the Kuhn-Tucker theorem, it must be that $\frac{e-L-f_1-pb_1}{p\gamma_1\theta} - H + L - R = m$, which means that the number of clients of the tax preparer is zero in the first period. The discounted revenue is

$$\begin{aligned} & E_1[Rev_1] + \delta E_1[Rev_2] = \delta(e - L - p(H - L) - c) \\ & + \delta \frac{p}{4\kappa\gamma_1\theta(n-m)} [H - L - \kappa\gamma_1\theta(H - L + R + m + S)]^2. \end{aligned}$$

■

B.2. PROOF OF PROPOSITION 2

Proof. When $f_1 = e - L - p(H - L)$, the expected discount revenue is

$$\begin{aligned} & E_1[Rev_1] + \delta E_1[Rev_2] \\ &= e - L - p(H - L) - c + (b_1 - \gamma_1 \theta S) p q_1(f_1, b_1) \\ & \quad + \delta E_1[Rev_2](p_1^C(f_1, b_1)) \end{aligned} \tag{B.3}$$

where $E_1[Rev_2]$ is given by (20), $q_1(f_1, b_1)$ is the number of taxpayers who require underpayment service if high income level is identified, and $p_1^C(f_1, b_1)$ is the probability that the tax preparer is caught fraud in the first period. It is easy to see that

$$p_1^C(f_1, b_1) = p \gamma_1 \theta q_1(f_1, b_1).$$

And in this case, the demand for underpayment service in the first period does not depend on the commission. Hence, we can simply write

$$q_1(f_1, b_1) = q_1(b_1) \text{ and } p_1^C(f_1, b_1) = p_1^C(b_1)$$

By the discussion in Section 3.1, we can see that

$$q_1(b_1) = 1,$$

if $\frac{(1-\gamma_1\theta)(H-L)-b_1}{\gamma_1\theta} - R > n$;

$$q_1(f_1, b_1) = \frac{1}{n-m} \left[\frac{(1-\gamma_1\theta)(H-L)-b_1}{\gamma_1\theta} - R - m \right],$$

If $m \leq \frac{(1-\gamma_1\theta)(H-L)-b_1}{\gamma_1\theta} - R \leq n$;

$$q_1(f_1, b_1) = 0,$$

If $\frac{(1-\gamma_1\theta)(H-L)-b_1}{\gamma_1\theta} - R < m$. It is obvious that any values of the bonus in the set

$$\left\{ b_1 \mid \frac{(1-\gamma_1\theta)(H-L)-b_1}{\gamma_1\theta} - R > n \right\}$$

cannot attain higher expected sum of discount revenue than that when b_1 is taken smaller such that we get an equality $\frac{(1-\gamma_1\theta)(H-L)-b_1}{\gamma_1\theta} - R = n$. Similarly, any point in the set

$$\left\{ b_1 \mid \frac{(1-\gamma_1\theta)(H-L)-b_1}{\gamma_1\theta} - R < m \right\}$$

can not get larger expected revenue than that achieved by b_1 with

$$\frac{(1 - \gamma_1\theta)(H - L) - b_1}{\gamma_1\theta} - R = m.$$

Hence, we only have to focus on the case where $m \leq \frac{(1 - \gamma_1\theta)(H - L) - b_1}{\gamma_1\theta} - R \leq n$. Then by the Kuhn-Tucker Theorem, there are two positive multipliers, α and β , such that

$$H - L - \gamma_1\theta(H - L + R + m - S) - 2b_1 + \Delta = (-\alpha + \beta)(n - m)\frac{1}{p}. \tag{B.4}$$

Under the conditions that

$$H - L < \frac{\gamma_1\theta(2n - m + R + S) + \Delta}{1 - \gamma_1\theta} \tag{B.5}$$

$$H - L > \frac{\gamma_1\theta(m + R + S) + \Delta}{1 - \gamma_1\theta} \tag{B.6}$$

where (B.5) can be implied by (14) and (15), it is impossible to have corner solution. So the optimal bonus b_1^* is an interior solution.

$$b_1^* = \frac{1}{2}[H - L - \gamma_1\theta(H - L + R + m - S) + \Delta] \tag{B.7}$$

In addition, because the expected discount revenue is a concave function of b_1 , the first-order condition is sufficient.

Obviously, the optimal expected discounted revenue is larger than that achieved when

$$f_1 = e - L - p(H - L)$$

and

$$\frac{(1 - \gamma_1\theta)(H - L) - b_1}{\gamma_1\theta} - R = m,$$

which is larger than the expected discounted revenue attained when

$$f_1 > e - L - p(H - L)$$

as long as

$$e > L + p(H - L) + c.$$

Hence, b_1^* in (B.7) is the optimal solution to the whole problem. **■**

B.3. PROOF OF COROLLARY 1

Proof. Given (15),

$$\begin{aligned} H - L - \kappa\gamma_1\theta(H - L + R + m + S) &> 0 \\ H - L - \eta\gamma_1\theta(H - L + R + m + S) &> 0 \end{aligned}$$

Since $\eta > \kappa > 0, \Delta > 0$. It follows directly that

$$b_1^* > b^*(\gamma_1). \quad (\text{B.8})$$

Because under the conditions of Proposition 2, in equilibrium, the number of the taxpayers who will require underpayment if high income is identified in the first period is determined by the following formula in either the static model or the dynamic one,

$$\begin{aligned} q_1(b_1) &= \frac{1}{n-m} \left[\frac{(1-\gamma_1\theta)(H-L) - b_1}{\gamma_1\theta} - R - m \right], \\ q(b(\gamma_1)) &= \frac{1}{n-m} \left[\frac{(1-\gamma_1\theta)(H-L) - b(\gamma_1)}{\gamma_1\theta} - R - m \right] \\ q_1(b_1^*) &< q(b^*(\gamma_1)). \end{aligned} \quad (\text{B.9})$$

■

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