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Employer's Reporting of Worker's Income, Incentive Contracts, and Tax Compliance

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This paper analyzes the role played by the firm in tax compliance. The IRS cannot observe the worker's income, and so the employer has to report the worker's income to the IRS. The IRS can audit the worker when there is a possibility of tax evasion. We argue that the report made by the employer can become a tool used to control the worker's incentive to work. Compared to the second-best contract, it is possible that the employer can promise to report a lower wage income and induce the worker to put forth more effort, when the IRS audits the worker less frequently. Both the employer and the worker may be better off under such a reporting system.

Keywords: income reporting, tax evasion, incentive contract
JEL classification: H26, H83, J41

1 Introduction

It is very often the case that employers are asked to report their employees' wage income to the government. That is, the information regarding the worker's income, which is usually unobservable to the government, is provided by a third party. This method is usually referred to as the "third-party reporting system." We call it the "employer's reporting" in this paper. On the other hand, there is a parallel method used to obtain the information

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regarding the worker's income, which mostly applies to those who are self-employed, namely, the "self-reporting system." In this case, the information from the third party may not be unavailable. In this paper, we plan to focus on the first type of reporting system. In particular, we analyze this system from the point of view based on the employer's motivation to provide the employees with the incentive to work.

Under self-reporting, the lack of information from a third party implies that tax evasion is less likely to be detected once the government decides to audit the workers. Therefore, it is often argued that the self-reporting system results in a higher tax evasion rate than that under the employer's reporting system. For example, according to Andreoni et al. (1998), in 1988 the average tax under-paid by those self-employed such as farmers is about four times more than the average for the entire population. This is mainly due to the lack of a checking and matching function via the employer's information, which will encourage the self-employed workers to become less tax compliant. Slemrod (2007) also states that it is evident that the extent of tax evasion in the case of the sole proprietor's income is very high compared to such income sources as wages and salaries. However, even though it is mostly agreed that such third-party information can help in ensuring tax compliance, we think there is still one very important aspect that has yet to be investigated in the literature, which concerns the role of the firm in providing the incentives for the employee to generate a high income through its reporting to the government, and its effect on tax compliance.[1]

On this issue, it is important to distinguish different sources of income. Registered income can easily be observed by the outsider or the government from the contracts. The tax is usually withheld from the wage payment directly. On the other hand, unregistered income can occur when the contracts are not easy to observe by the government, or when there is no contract for workers such as the self-employed. In this case, income has to be reported by either the employer or the employee himself to the government. The latter is indeed the case that we want to study in this paper.

This issue is critical if one can realize that it is not uncommon for a

[1] As stated in Slemrod (2007): "Theory is only beginning to address core issues such as the role of third-party reporting of information that facilitates enforcement of the taxation of wages and salaries, but helps little for self-employment income. Modeling these information flows – and the critical role played by firms – is an important item in the future research agenda."

firm and an employee to collude in coordinating the report regarding the employee's income to the government, such as in small family businesses. This is more likely to occur when the firm can maintain a double set of books, one for business purposes and the other for tax purposes. If the government can completely extract the true business records within such a firm, such a collusion may be broken down, so that there is no room for the firm to evade the tax for the employee.[2] On the contrary, when transparent business records are not available, the firm and the worker may be able to collude in the reporting, so that tax evasion becomes more likely to occur.[3]

The most important feature in this paper is that, when the firm has the opportunity to misreport the worker's income, it becomes a part of the incentive scheme for the worker to work harder. Since the government cannot directly observe the worker's income, it has to rely on the employer's report to decide the audit policy. However, since what the worker really cares about is the "real income" after considering the possibility of being audited, taxed and fined, unlike in the typical moral hazard problem, the firm now has two controllable variables to manipulate the worker's incentive to work: the nominal wage and the reported wage. The firm can make the worker work harder by promising to report a lower income, and the worker may be willing to accept this contract if the real income is high enough.

Since the firm and the worker may have the incentive to collude in evading the tax, the government may audit. Differing from the typical moral hazard problem, the contract offered by the firm has to take into account not only the incentive to work hard, but also the possibility of the worker being audited. Since the IRS tries to balance the marginal cost of enforcement and the marginal benefit from an audit, when it is more costly to audit the taxpayer, the IRS tends to be less likely to audit the taxpayer. In such a situation, the firm responds by lying about the worker's high income. The worker is thus induced to work harder since the firm under-reports his income. Both the firm and worker may be better off under this reporting system.

In comparing the employer's reporting system to self-reporting, it has been much more emphasized in the literature that the information provided

[2] See the discussion in Kleven et al. (2009).

[3] Gordon and Li (2009) point out that in many developing countries, firms tend use cash transactions and to avoid using the financial sector, so that it is harder for the government to identify their true taxable incomes.

by a third party can help in improving tax compliance. In this paper, we provide another angle to compare these two systems. Under self-reporting, it is the worker who reports his own income and the firm can no longer use its report to affect the worker's incentive. If we consider the case where the firm wishes to implement the second-best effort level, the agent will be induced to put fewer efforts under self-reporting. Since it is less likely that the agent can produce high output, the firm can be worse off, and the net tax revenue for the IRS can also be lower under self-reporting. This provides another rationale for the government to adopt the employer's reporting system.

Tax evasion has been an important issue in the literature, and researchers have analyzed many different aspects of it. Most of the literature follows the seminal study of Allingham and Sandmo (1972).[4] The theoretical literature on the issue regarding third-party reporting is, however, relatively scarce. Yaniv (1992) argues that if the employer and employees can collude, third-party reporting cannot help tax compliance. Kleven et al. (2009) consider a three-tiered agency model to explain why third-party reporting can improve tax compliance. They show that, if a firm has a large number of employees, the threat by any employee to reveal the true information to the government will make tax enforcement more effective. As for empirical studies, Alm et al. (2007) use experimental methods in finding that people who have more "non-matched" income tend to have a lower compliance rate. By also conducting experiments in Albania and the Netherlands, Gërxhani and Schram (2006) let people decide the type of income (registered or unregistered) and study their reporting behaviors. They find that people choose unregistered income more frequently and tax compliance increases with the audit probability.

This paper is also related to the income tax evasion literature which argues that the internal organization within the firms can affect their tax reporting decisions. For example, Crocker and Slemrod (2005) develop an agency model between a shareholder and a manager considering the possibility of tax evasion and show that penalties imposed on managers are more effective in reducing tax evasion. Chen and Chu (2005) also argue that when taking into account tax evasion, the firm's wage scheme will distort the worker's incentive to make more effort so that some inefficiency will result.

[4]For surveys on both empirical and theoretical issues and studies, see Andreoni et al. (1998), Cowell (1990), Slemrod (2007), and Slemrod and Yitzhaki (2002).

The remainder of the paper is organized as follows. Section 2 introduces the model. Section 3 discusses the optimal contract and the equilibrium outcomes when the worker's income is observable to the IRS, while Section 4 analyzes those outcomes when the worker's income is unobservable. Section 5 provides an example to show the welfare comparison for each party and some comparative statics. Section 6 discusses another system based on self-reporting. Section 7 concludes the paper and proposes some possible extensions.

2 Basic model

There are three players in our model: an employer, a worker, and a tax authority (the IRS). The employer and the worker together form a firm. This firm is representative of many identical firms. The worker supplies effort to produce output. The employer owns the output produced but needs to compensate the worker with a wage income for his effort. Effort a is continuous, while output y is discrete, taking two possible values, y_H and y_L with $y_H > y_L$. The employer can observe output, but may not be able to observe effort. Thus, there is a moral hazard problem between the employer (principal) and the worker (agent).[5]

We assume that

$$\Pr(y_H|a) = p(a), \quad \Pr(y_L|a) = 1 - p(a),$$

where $p(a) \in [0, 1]$, $p' > 0$, $p'' \leq 0$. In words, $p(a)$ is the probability that the worker will produce the high output y_H, and this probability is increasing and concave in effort. Without loss of generality, we let

$$p(a) = a.$$

Clearly, $a \in [0, 1]$.

[5]Although simple, this is a workhorse model in the moral hazard literature; see Bolton and Dewatripont (2005). More importantly, Slemrod (1985) emphasizes that there is no clear consensus on the association between evasion and the income level. Feinstein (1991) finds empirically that income exerts a very small and insignificant effect on the amount of evasion. Slemrod (2007) concludes that tax noncompliance seems more related to other characteristics of taxpayers than their level of income. In view of the evidence, it would seem helpful to abstract from varying the income level in a simple model of tax compliance.

The employer offers a wage $w = w_H, w_L$ to the worker when the output is $y = y_H, y_L$, respectively. After the output is realized, the wage is paid to the worker. We also assume that the wage is the only source of the worker's income. The worker is a taxpayer, too. A proportional tax rate $t \in [0, 1)$ is imposed on wage income. A key assumption of our model is that wage income can be private information to the firm, which cannot be observed by the IRS without auditing. Thus, the worker may wish to evade the tax imposed, and the IRS may want to audit the worker to detect evasion.

The employer is obliged to report the worker's earned income to the IRS. We focus on the case where the worker collaborates with the employer on this reporting matter. We denote the report of the true income w by $\hat{w}$. The IRS simultaneously decides whether or not to audit the worker, as well as the audit probability, $\beta(\hat{w})$, if it decides to audit. If the IRS does not audit, the worker pays a tax $t\hat{w}$. If the IRS audits the worker, and finds out that the worker is an evader (i.e., $w \neq \hat{w}$), then he needs to pay $tw + ft(w - \hat{w})$, which means that the worker not only needs to pay the amount of the tax he evades, but he also faces a fine f imposed on the amount of evaded tax. Note that the fine is imposed on the worker, and not on the employer.

As is standard in the tax evasion literature,[6] the IRS's objective is to maximize the tax revenue collected (including taxes and fines), net of audit costs through auditing, which is

$$(1 - \beta)t\hat{w} + \beta\left[\rho\left(tw + ft\left(w - \hat{w}\right)\right) + (1 - \rho)t\hat{w}\right] - \varphi(\beta),$$

where ρ is the probability that the worker is detected as a tax evader when the IRS carries out an audit, and φ is the audit cost with $\varphi' > 0$, $\varphi'' > 0$, $\varphi'(0) = 0$. In the next section, we find out how ρ is endogenously determined.

The worker's objective is to maximize the expected after-tax income:

$$a\Big\{w_H - (1 - \beta)t\hat{w} - \beta\left[tw_H + ft(w_H - \hat{w})\right]\Big\} \\ + (1 - a)(1 - t)w_L - c(a),$$

where c is the cost of the worker's effort with $c' > 0$, $c'' > 0$. We focus on the interior solutions for a and so we assume that $c'(0) = 0$ and $c'(1) > y_H - y_L$ hold. Since the wage income has $w_H > w_L$, tw_L is the minimal amount of taxes that the worker must pay. Thus, if $w = w_L$, $\hat{w} = w_L$

[6]See, for example, Graetz et al. (1986).

must be true since there is no way for the worker to evade the minimal tax. However, if $w = w_H$, the worker may evade tax with $\hat{w} = w_L$ and so face the possibility of being audited and fined.

Since the worker is risk neutral, moral hazard is not an issue in spite of the nonobservability of effort. To capture the effect of information asymmetry, we impose the limited liability constraints.[7] That is, $w_H \geq 0$, and $w_L \geq 0$. Furthermore, we make the following technical assumption:

Assumption 1. $\varphi''' \geq 0$ and $c''' \geq 0$.

An example of $\varphi(\beta)$ and $c(a)$ satisfying the assumption specified is that $\varphi(\beta) = \beta^2/2$ and $c(a) = a^2/2$.

The employer's objective is to maximize the expected profit:

$$a\left(y_H - w_H\right) + (1-a)\left(y_L - w_L\right).$$

The employer offers a contract $(w(y), \hat{w}(y))$ or $((w_H, \hat{w}_H), (w_L, \hat{w}_L))$ to the worker.[8] The employer is assumed to commit to the reporting strategy $\hat{w}$ as well as the wage menu. Notice that the employer's profit is not directly affected by the report he submits. However, the report will affect the worker's incentive to work and hence the profit through the worker's choice of effort. We explore the employer's report as a part of the worker's incentive scheme in a stylized moral hazard problem, and its consequences for tax compliance and enforcement.

The timing of the game is as follows:

(1) The employer offers a contract $(w(y), \hat{w}(y))$ to the worker.

(2) The worker decides to accept the contract or not. If he accepts it, he then decides the effort level a.

(3) Once w is realized, the employer reports $\hat{w}$ to the IRS. The IRS simultaneously decides to audit or not, and selects an audit probability β if it decides to audit.[9]

[7] See Laffont and Martimort (2002), Chapter 4.

[8] We may consider other types of contract, such as the one that is contingent on whether the worker is audited or not. However, the main feature should remain the same: the employer tries to affect the real income that the worker obtains and then control his incentive to make effort.

[9] We assume that the audit policy only depends on the report $\hat{w}$. Potentially, if the IRS

3 Benchmark: The IRS can Observe the Worker's Income

In this section, we consider the benchmark case where the IRS can observe the worker's income. There is no need for the employer to report the worker's income, and neither will the IRS audit because there will be no tax evasion. That is, it is always the case that $\hat{w} = w$. This corresponds to the case where $\lambda = 0$ and $\beta = 0$, as will be defined in the next section.

There are two subcases to consider. The first case is where the agent's effort is observable to and verifiable by the employer. Therefore, there is no moral hazard problem between the employer and the worker. Typically, this case can be regarded as the *first-best* effort level. The second case is where the agent's effort is unobservable to the employer. Thus, there is a moral hazard problem. This case can be regarded as the *second-best* effort level.

3.1 When the Employer can Observe the Worker's Effort

The optimal contract is the solution to the following maximization problem:

$$\max_{\{w_H, w_L, a\}} \quad a\,(y_H - w_H) + (1-a)\,(y_L - w_L)\,,$$
$$\text{s.t.} \quad (1-t)\,[a w_H + (1-a) w_L] - c(a) \geq \underline{u}. \tag{1}$$

The inequality is the (IR) constraint, where $\underline{u}$ is the agent's outside option. Without loss of generality, we assume $\underline{u} = 0$. Since the (IR) constraint must be binding in the optimum, it is easy to see that the optimal contract must satisfy[10]

$$y_H - y_L = \frac{c'(a)}{1-t}. \tag{2}$$

If there is no limited liability constraint, then since the first-order condition for the agent to determine the optimal effort level is $(1-t)(w_H - w_L) =$

can observe the output y, it may be able to infer w and will then decide whether or not to audit. However, this is not how it typically works in reality. Thus, we will simply assume that the IRS cannot observe y, or even if it can observe y, it cannot use that information in determining its audit policy because of some noise, so that it cannot infer w accurately.

[10]Since the effort is observable and verifiable, the agent can be forced to choose this effort level; otherwise, any deviation can be detected by the principal and the court and he can be seriously punished. Thus, the wage is contingent on the effort level *per se*. This is a pretty standard treatment in the literature. See Bolton and Dewatripont (2005), Chapter 4, or Laffont and Martimort (2002), Chapter 4.

$c'(a)$, it follows that the optimal wage scheme to implement the optimal effort level in (2) is

$$w_H - w_L = y_H - y_L. \tag{3}$$

This is the first-best contract for the employer.

If there is a limited liability constraint, $w_H \geq 0$, and $w_L \geq 0$. It follows that the optimal wage scheme is such that $w_L = 0$, and w_H is such that (IR) is binding. The following proposition is immediate:

Proposition 1. When the worker's effort level is observable to the employer, and the worker's income is observable to the IRS, the optimal contract (w_H^f, w_L^f) is such that $w_H^f = (c(a^f))/(a^f(1-t))$, $w_L^f = 0$ and the optimal effort level a^f satisfies $y_H - y_L = (c'(a^f))/(1-t)$.

3.2 When the Employer cannot Observe the Worker's Effort

The second case is where the employer cannot observe the effort made by the worker. In this case, he has to provide the incentives for the worker to make effort. The solution to the following maximization can be regarded as the "second-best" contract, denoted by (w_H^s, w_L^s), and the implemented effort level, a^s:

$$\begin{aligned} \max_{\{w_H, w_L, a\}} \quad & a\,(y_H - w_H) + (1-a)\,(y_L - w_L)\,, \\ \text{s.t.} \quad & a \in \arg\max_{\tilde{a}\in[0,1]} (1-t)\,[\tilde{a}w_H + (1-\tilde{a})w_L] - c(\tilde{a}), \\ & w_H \geq 0, w_L \geq 0. \end{aligned} \tag{4}$$

The first constraint is the incentive compatibility (IC) constraint, and the second one is the limited liability (LL) constraint. The first-order condition from the (IC) constraint is

$$(1-t)\,(w_H - w_L) = c'(a). \tag{5}$$

Since there is a unique solution to the above equation, the (IC) constraint in (4) can be replaced with (5). On the basis of (4) and (5), it is straightforward to show that

$$w_L = 0. \tag{6}$$

It also follows that

$$w_H = \frac{c'(a)}{1-t}. \tag{7}$$

Substituting (7) into (4), the employer's maximization problem becomes

$$\max_a \; ay_H + (1-a)y_L - \frac{ac'(a)}{1-t}.$$

The following result is ready:

Proposition 2. Suppose that the worker's effort is unobservable to the employer, and the worker's income is observable to the IRS. Then the optimal contract (w_H^s, w_L^s) is such that $w_H^s = (c'(a^s))/(1-t)$, $w_L^s = 0$, where a^s satisfies $y_H - y_L = (c'(a^s) + a^s c''(a^s))/(1-t)$.

Comparing Propositions 1 and 2, the result here is similar to that in the typical moral hazard problem: the implemented effort level for the second-best contract is lower than for the first-best contract, i.e., $a^f > a^s$ (by Assumption 1), because the employer has to give up some rent to the worker.

4 Equilibria When the IRS cannot Observe the Worker's Income

In this section, we consider the case where the IRS cannot observe the worker's income. Therefore, the employer may misreport the tax income and the IRS may audit. We will derive the IRS's optimal auditing strategy, the employer's optimal contract offered, and the worker's optimal effort decision. Putting them together gives rise to the equilibria.

At first we characterize the IRS's best response to the contract offered by the employer. Then we analyze the equilibrium for two different cases as before: when the effort is observable, and when the effort is unobservable to the employer, respectively.

4.1 The IRS's best response

If $w = w_L$, then $\hat{w} = w_L$ must hold. On the other hand, if $w = w_H$, let $\hat{w} = w_L$ arise with probability λ and $\hat{w} = w_H$ arise with probability $1-\lambda$. The variable λ measures the extent of the tax evasion by the employer. Since auditing is costly and since either $\hat{w} = w_L$ or $\hat{w} = w_H$, it is clear that the IRS will audit the worker only if $\hat{w} = w_L$. Given the employer's reporting strategy above, we have

$$\rho = \frac{a\lambda}{a\lambda + (1-a)},$$

where the denominator denotes the probability that the employer will report $\hat{w} = w_L$, which consists of the honest situation where $w = w_L$ (i.e., $1 - a$) and the dishonest situation where $w = w_H$ but the employer reports w_L with the probability λ (i.e., $a\lambda$). ρ thus represents the probability of detecting tax evasion if the IRS carries out an audit. Substituting ρ into the IRS's objective yields the IRS's maximization problem from auditing $\hat{w} = w_L$:

$$\max_{\beta} \quad \beta \left\{ \frac{a\lambda}{a\lambda + (1-a)} \left[t w_H + f t \left(w_H - w_L \right) \right] + \frac{1-a}{a\lambda + (1-a)} t w_L \right\} + (1-\beta) t w_L - \varphi(\beta). \tag{8}$$

Taking the employer's choice of a and λ as given, the IRS's best response is implicitly determined by the first-order condition:

$$\varphi'(\beta) = \frac{a\lambda}{a\lambda + (1-a)} (1+f) t \left(w_H - w_L \right), \tag{9}$$

in which the IRS equates the marginal cost of enforcement (the left-hand side) with its marginal benefit (the right-hand side). This result is standard in the literature; see, for example, Graetz et al. (1986). However, unlike typically assumed, $w_H - w_L$ is endogenously determined rather than exogenously given in our model. In fact, as will be shown shortly, $w_H - w_L$ itself depends on both a and λ. This dependence leads to some novel features, as we show in the following.

4.2 When the Employer can Observe the Worker's Effort

The first case is where the worker's effort level can be observed by the employer. In equilibrium, the optimal contract offered to the worker is the best response to β, which is the solution to the following maximization problem:

$$\begin{aligned} \max_{\{w_H, w_L, \lambda, a\}} \quad & a \left(y_H - w_H \right) + (1-a) \left(y_L - w_L \right), \\ \text{s.t.} \quad & a \Big\{ w_H - \lambda \big[(1-\beta) t w_L + \beta \left(t w_H + f t \left(w_H - w_L \right) \right) \big] \\ & - (1-\lambda) t w_H \Big\} + (1-a)(1-t) w_L - c(a) \geq 0, \\ & w_H \geq 0, w_L \geq 0. \end{aligned} \tag{10}$$

Moreover, the IRS's optimal audit probability β should be the best response to the contract offered by the employer, which is (9). In the following result, we show that there are two types of equilibrium. Denote $(\bar{w}_H, \bar{w}_L, \bar{\lambda}, \bar{a}, \bar{\beta})$ and $(\bar{\bar{w}}_H, \bar{\bar{w}}_L, \bar{\bar{\lambda}}, \bar{\bar{a}}, \bar{\bar{\beta}})$ as the equilibrium outcomes, respectively:

Proposition 3. When the worker's effort level is observable to the employer, and the worker's income is unobservable to the IRS, there are two types of equilibrium, $(\bar{w}_H, \bar{w}_L, \bar{\lambda}, \bar{a}, \bar{\beta})$ and $(\bar{\bar{w}}_H, \bar{\bar{w}}_L, \bar{\bar{\lambda}}, \bar{\bar{a}}, \bar{\bar{\beta}})$, respectively:

(1) $\bar{w}_H = (c(\bar{a})/\bar{a}(1-t))$, $\bar{w}_L = 0$, and $\bar{\lambda} \in (0, 1)$, where $\bar{a}$ satisfies $y_H - y_L = (c'(\bar{a})/1-t)$ and $\bar{\lambda}$ satisfies $\varphi'(1/1+f) = (\bar{a}\bar{\lambda}/\bar{a}\bar{\lambda} + (1-\bar{a}))(1+f)t\bar{w}_H$. Moreover, $\bar{\beta} = (1/1+f)$.

(2) $\bar{\bar{w}}_H = (c(\bar{\bar{a}})/\bar{\bar{a}}[1-\bar{\bar{\beta}}(1+f)t])$, $\bar{\bar{w}}_L = 0$, and $\bar{\bar{\lambda}} = 1$, where $\bar{\bar{a}}$ satisfies $y_H - y_L = (c'(\bar{\bar{a}})/1-\bar{\bar{\beta}}(1+f)t)$. Moreover, $\bar{\bar{\beta}} \in (0, (1/1+f))$, which satisfies $\varphi'(\bar{\bar{\beta}}) = \bar{\bar{a}}(1+f)t\bar{\bar{w}}_H$.

Proof. See the Appendix. □

The intuition for the above result is as follows. The IRS balances the marginal cost of enforcement and the marginal benefit from an audit. When it is less costly to audit the taxpayer relative to the benefit from doing so (i.e., when the marginal cost $\varphi'(\cdot)$ is relatively small; see the discussion in Section 5), the equilibrium in Proposition 3–(1) arises, in which case the IRS audits the worker with a higher probability. The employer then responds by sometimes reporting the worker's income truthfully. On the other hand, when it is more costly to audit the taxpayer (i.e., when $\varphi'(\cdot)$ is relatively high), the equilibrium in Proposition 3–(2) arises, in which case it is less likely that the IRS will audit the taxpayer than in the first instance. Thus, the employer responds by always lying about the worker's income when $w = w_H$.

Comparing Propositions 1 and 3 yields some interesting implications regarding the effect of the IRS's unobservability of the worker's income. When the equilibrium in Proposition 3–(1) occurs, both the wage scheme and the effort level in the equilibrium are exactly the same as those in Proposition 1 (i.e., $\bar{a} = a^f$ and $\bar{w}_H = w_H^f$). Both the employer and the worker achieve the same utility levels as in the first best scenario.

When the equilibrium in Proposition 3–(2) occurs, the effort level $\bar{\bar{a}} > a^f$ since $\bar{\bar{\beta}} < (1/1+f)$, which follows $1 - \bar{\bar{\beta}}(1+f)t > 1-t$. That is, the employer under-reports the worker's income, which can induce the worker to work harder than at the first-best level. However, since the effort level is observable, the employer can choose a wage scheme such that the worker still receives the reservation utility 0. The firm's payoff is $\bar{\bar{a}}(y_H - y_L) - (c(\bar{\bar{a}})/1 - \bar{\bar{\beta}}(1+f)t) + y_L$, which can be higher than the first best, given that the induced effort level is higher.

On the other hand, the IRS is worse off when the worker's income is unobservable. Since the employer may under-report the tax income, not only does he tax revenue received become less, but the IRS also incurs an audit cost, so that the net tax revenue must become smaller.

4.3 When the Employer cannot Observe the Worker's Effort

Now we consider the case where the worker's effort level cannot be observed by the employer. Again, we impose the limited liability constraint. Given β, the employer considers the following maximization problem:

$$\begin{aligned} \max_{\{w_H, w_L, \lambda, a\}} \quad & a\,(y_H - w_H) + (1-a)\,(y_L - w_L)\,, \\ \text{s.t.} \quad & a \in \arg\max_{\tilde{a}\in[0,1]} \tilde{a}\Big\{w_H - \lambda\big[(1-\beta)tw_L \\ & \quad + \beta\,(tw_H + ft\,(w_H - w_L))\big] - (1-\lambda)tw_H\Big\} \\ & \quad + (1-\tilde{a})(1-t)w_L - c(\tilde{a}), \\ & w_H \geq 0, \quad w_L \geq 0. \end{aligned} \tag{11}$$

The first-order condition from the (IC) constraint is

$$[1 - \lambda\beta(1+f)t - (1-\lambda)t]\,(w_H - w_L) = c'(a). \tag{12}$$

Again, on the basis of (11) and (12), it is straightforward to show that

$$w_L = 0, \tag{13}$$

and

$$w_H = \frac{c'(a)}{1 - \lambda\beta(1+f)t - (1-\lambda)t}. \tag{14}$$

Substituting (14) into (11), the employer's maximization problem becomes

$$\max_{\{a,\lambda\}} \; ay_H + (1-a)y_L - \frac{ac'(a)}{1 - \lambda\beta(1+f)t - (1-\lambda)t}.$$

Taking the IRS's choice of β as given, it can be checked that the employer's optimal choice with respect to a and λ satisfies the following conditions:

$$y_H - y_L = \frac{c'(a) + ac''(a)}{1 - \lambda\beta(1+f)t - (1-\lambda)t}, \tag{15}$$

and

$$\lambda = \begin{cases} 1, & \text{if } \beta < \frac{1}{1+f}; \\ (0,1), & \text{if } \beta = \frac{1}{1+f}; \\ 0, & \text{if } \beta > \frac{1}{1+f}. \end{cases} \tag{16}$$

According to (14)–(16), we can see how the optimal contract reacts to β. When the IRS audits the worker more frequently (i.e., when β is higher), it is more likely that the employer reports the worker's income truthfully (i.e., λ is lower). On the other hand, when the audit probability is small (i.e., $\beta < (1/1 + f)$), the optimal effort level is decreasing in β. That is, the induced effort level becomes lower as the audit probability increases, because the employee's real income can be lower and so he has fewer incentives to make effort. When the audit probability is large (i.e., $\beta > (1/1 + f)$), the optimal a is independent of β because the employer will always report truthfully ($\lambda = 0$) and will never be audited. Thus, the effort level in the optimum is nonincreasing in β. The effect on the optimal wage is, however, ambiguous. On the one hand, since the optimal effort level can be lower when β is higher, the wage that is necessary to cover the effort cost is lower, too; however, since the IRS audits the worker more frequently, the employer needs to offer him a higher wage to compensate for the potential tax payment and fine. Therefore, whether the wage increases in β or not depends on the cost structure.

(9) plus (14)-(16) enable us to solve a, λ and β in equilibrium. If $\lambda = 0$, then from (9) we see that $\beta = 0$ will hold too. However, this cannot be an equilibrium since $\beta = 0$ would induce the choice of $\lambda > 0$ by the employer in response. We are left with either $\lambda \in (0, 1)$ or $\lambda = 1$ in equilibrium according to (16). The following result characterizes the equilibria in this case:

Proposition 4. Suppose that the worker's effort level is unobservable to the employer, and the worker's income is unobservable to the IRS. Then there are two possible types of equilibrium:

(1) $w_H^* = (c'(a^*)/1 - t)$, $w_L^* = 0$ and $\lambda^* \in (0, 1)$, where a^* satisfies $y_H - y_L = (c'(a^*) + a^* c''(a^*)/1 - t)$, and λ^* satisfies $\varphi'(1/1 + f) = (a^*\lambda^*/a^*\lambda^* + (1 - a^*))(1 + f)tw_H^*$. Moreover, $\beta^* = (1/1 + f)$.

(2) $w_H^{**} = (c'(a^{**})/1 - \beta^{**}(1 + f)t)$, $w_L^{**} = 0$ and $\lambda^{**} = 1$, where a^{**} satisfies $y_H - y_L = (c'(a^{**}) + a^{**}c''(a^{**}/1 - \beta^{**}(1 + f)t)$. Moreover, $\beta^{**} \in (0, (1/1 + f))$, which satisfies $\varphi'(\beta^{**}) = a^{**}(1 + f)tw_H^{**}$.

Proof. Suppose $\beta > (1/1 + f)$. Then according to (16), $\lambda^* = 0$. It follows that $\beta^* = 0$ based on (9), which contradicts $\beta > (1/1 + f)$. Therefore, in equilibrium, $\lambda^* > 0$.

Suppose $\beta = (1/1 + f)$. Then based on (15), the optimal effort level a^* is determined by $y_H - y_L = (c'(a^*) + a^*c''(a^*)/1 - t)$, and the optimal wage is determined by (14) after substituting a^*. In addition, based on (16), $\lambda^* \in (0, 1)$. The equilibrium λ^* is determined by (9) after substituting $a = a^*$ and $\beta = (1/1 + f)$.

Suppose $\beta < (1/1 + f)$. Then $\lambda^{**} = 1$ based on (16). Again, substituting this information into (15) yields the condition for the optimal effort level a^{**}. Moreover, the equilibrium β^{**} is determined by (9) after substituting $a = a^{**}$ and $\lambda = 1$. It yields the optimal w_H^{**} by substituting $a = a^{**}$, $\lambda = 1$ and $\beta = \beta^{**}$ into (14). □

Similar to Proposition 3, the equilibrium in Proposition 4–(1) arises as the employer reports the worker's high wage income honestly with a positive probability. In this case, the IRS will audit the worker with some positive probability. The equilibrium in Proposition 4–(2) arises in which the employer always lies about the worker's high wage income. Interestingly, the IRS will be *less* likely to audit the worker in this case as compared to the former case.

Moreover, we also have the following result:

Corollary 1. $a^{**} > a^* = a^s$.

Proof. According to Proposition 2, it can immediately be seen that $a^* = a^s$ and $w_H^* = w_H^s$. Moreover, since $\beta^{**}(1 + f)t < \beta^*(1 + f)t = t$, it can also immediately be seen that $a^* < a^{**}$ given that both $c'' > 0$ and $c''' \geq 0$. □

This result implies that in the equilibrium in Proposition 4–(1), the effort level is the same as the second-best effort level, while in the equilibrium in Proposition 4–(2), the effort level is higher than the second-best effort level.

This result allows us to see how the employer can use the reporting strategy as a part of the incentive scheme offered to the worker. The employer's reporting on the worker's income can determine the "real income" received by the worker. In the second kind of equilibrium, the employer offers to report a lower wage income, and since the IRS will be less likely to audit the worker, the worker has even more of an incentive to work because the real income can be higher. Thus, by manipulating the reporting strategy, the firm may be better off.

5 An Illustrative Example

In this section, we use a simple example to illustrate the equilibrium we found in the above section. We assume that $c(a) = (1/2)a^2$. According to (14) and (15), the equilibrium wage satisfies

$$w_H^* = w_H^{**} = \frac{y_H - y_L}{2}. \tag{17}$$

That is, in this case, the wage does not vary with the effort level in equilibrium. Based on (15), the equilibrium effort level must satisfy

$$a = \frac{y_H - y_L}{2}\left[1 - \lambda\beta(1+f)t - (1-\lambda)t\right]. \tag{18}$$

Substituting (17) and (18) into (9), we can obtain the IRS's "reaction function" which only depends on the employer's strategy λ. We can denote this as $\beta^*(\lambda)$.

According to (18), given λ, the equilibrium level of a is decreasing in β. Moreover, given β, it is non-decreasing in λ if $\beta \leq (1/1+f)$. Based on these two relationships, we can derive the slope of $\beta^*(\lambda)$ as always being positive when $\beta \leq (1/1+f)$.

Substituting $\lambda = 1$ and $\beta = (1/1+f)$ into (9) and (18) gives us the boundary condition that can define the regime for which the equilibrium exists. When $\varphi'(1/1+f) \leq (1+f)t(1-t)(y_H - y_L/2)^2$, the equilibrium in Proposition 4–(1) occurs, i.e., $\lambda^* \in (0, 1)$, and $\beta^* = (1/1+f)$. On the other hand, when $\varphi'(1/1+f) > (1+f)t(1-t)(y_H - y_L/2)^2$, the equilibrium in Proposition 4–(2) occurs, i.e., $\lambda^{**} = 1$, and $\beta^{**} \in (0, (1/1+f))$.

It can be seen that, the lower that $y_H - y_L$ or f is, the more likely it is that the second kind of equilibrium will occur. This result is intuitive:

given the audit cost, when $y_H - y_L$ or f is lower, the benefit from auditing the worker is smaller, so that the IRS audits less frequently, which induces the employer to under-report the worker's income. On the other hand, the second kind of equilibrium can also occur when t is either too low or too high. This is again intuitive: when the tax rate is too low, the benefit from auditing is also small. On the other hand, when the tax rate is too high, the worker has less of an incentive to work, and the effort level can be so low that the probability of producing a high output is small. Since the government can collect tax revenue only when $w = w_H$, it means that the tax revenue (which is $\beta(a\lambda/a\lambda + (1-a))(1+f)tw_H$) is also very small.[11] Thus, the IRS is less likely to audit the worker.

5.1 The Effect of the IRS's Unobservability

Comparing Propositions 2 and 4 yields some interesting implications regarding the effect on the welfare due to the IRS's being unable to observe the worker's income:

Proposition 5. Suppose that the worker's income is unobservable to the IRS, and that the worker's effort level is unobservable to the employer. Moreover, assume that $c(a) = (1/2)a^2$. Then both the employer and the worker can achieve the same or higher utilities than those for the second-best contract. The net tax revenue is, however, lower than that based on the second-best contract unless the fine rate is sufficiently high.

Proof. For the second-best contract, $w^s_H = (y_H - y_L/2)$, and $a^s = ((1-t)(y_H - y_L)/2)$. The employer's utility is $a^s(y_H - y_L) - a^s w^s_H + y_L = ((1-t)(y_H - y_L)^2/4) + y_L$, which are the same as those in the equilibrium in Proposition 4–(1). Thus, the employer achieves the same utility level in this case. When the equilibrium in Proposition 4–(2) occurs, it is straightforward that, since the worker can work harder, the firm's payoff, $([1 - \beta^{**}(1+f)t](y_H - y_L)^2/4) + y_L$, is also higher than that for the second-best contract.

For the worker, his utility based on the second-best contract is $a(1-t)w_H - c(a) = ((1-t)^2(y_H - y_L)^2/8)$. The worker achieves the same utility when the equilibrium in Proposition 4–(1) occurs. When the equilibrium in Proposition 4–(2) occurs, the worker's utility is $a^{**}[1 - \beta(1+f)t]w^{**}_H -$

[11] This result is similar to the Laffer curve effect.

$c(a^{**}) = ([1 - \beta^{**}(1 + f)t]^2(y_H - y_L)^2/8)$, which is again greater than that for the second-best contract.

For the IRS, the net tax revenue in the equilibrium is $\beta(a\lambda/a\lambda + (1 - a))(1 + f)tw_H - \varphi(\beta)$; while for the second-best contract, the net tax revenue is tw_H. Since both the audit probability and the probability of detecting a tax evader are less than 1, and there also occurs an audit cost, the net tax revenue is lower than that for the second-best contract unless the fine rate f is sufficiently high. □

5.2 The Effect of Moral Hazard

According to Proposition 3, we can check $\bar{w}_H = \bar{\bar{w}}_H = (y_H - y_L/2)$, $\bar{a} = (1 - t)(y_H - y_L)$, $\bar{\bar{a}} = [1 - \bar{\bar{\beta}}(1 + f)t](y_H - y_L)$. A condition for the equilibrium in Proposition 3–(1) to exist is that $\varphi'(1/1 + f) < \bar{a}(1 + f)t\bar{w}_H = (1 + f)t(1 - t)((y_H - y_L)^2/2)$. Otherwise, since $a > (a\lambda/a\lambda + (1 - a))$, there is no $\bar{\lambda} \in (0, 1)$ that can satisfy (9), in which $\varphi'(1/1 + f) = (\bar{a}\bar{\lambda}/\bar{a}\bar{\lambda} + (1 - \bar{a}))(1 + f)t\bar{w}_H$ has to hold. Similarly, a condition for the equilibrium in Proposition 3–(2) to exist is that $\varphi'(1/1 + f) > \bar{a}(1 + f)t\bar{w}_H = (1 + f)t(1 - t)((y_H - y_L)^2/2)$. Since $\bar{\bar{a}} > \bar{a}$ and $\varphi'(\beta) < \varphi'(1/1 + f)$ when $\beta < (1/1 + f)$, this condition can ensure that there is a $\bar{\bar{\beta}} \in (0, (1/1 + f))$ which satisfies (9), that is, $\varphi'(\bar{\bar{\beta}}) = \bar{\bar{a}}(1 + f)t\bar{\bar{w}}_H$.

Comparing Propositions 3 and 4, we can see how the moral hazard problem within the firm affects the players' behavior.

Proposition 6. Suppose that the worker's income is unobservable to the IRS, and the worker's effort level is unobservable to the employer. Moreover, assume that $c(a) = (1/2)a^2$. Then compared to the case where the effort is observable, in equilibrium: (1) The audit probability is lower and the probability of misreporting is higher. (2) Both the total utility of the employer and the worker and the net tax revenue are lower.

Proof. (1) When $\varphi'(1/1 + f) \leq (1 + f)t(1 - t)(y_H - y_L/2)^2$, then the equilibrium in Proposition 3–(1) and Proposition 4–(1) occurs. That is, $\bar{\beta} = \beta^* = (1/1 + f)$. Since $\bar{w}_H = w_H^*$, and $\bar{a} > a^*$, the equilibrium $\bar{\lambda}$ and λ^* must be such that $\bar{\lambda} < \lambda^*$ so that (9) holds for both cases. When $(1 + f)t(1 - t)(y_H - y_L/2) \geq \varphi'(1/1 + f) > (1 + f)t(1 - t)(y_H - y_L/2)^2$, then the equilibrium in Propositions 3–(1) and 4–(2) occurs. Thus $\beta^* < \bar{\beta} = (1/1 + f)$ and $\bar{\lambda} < \lambda^* = 1$. The statement is obviously true. When

$\varphi'(1/1+f) > (1+f)t(1-t)(y_H - y_L/2)$, then the equilibrium in Propositions 3–(2) and 4–(2) occurs. Again, since $\bar{\bar{w}}_H = w_H^{**}$, and $\bar{\bar{a}} > a^{**}$, the equilibria $\bar{\bar{\beta}}$ and β^{**} must be such that $\bar{\bar{\beta}} > \beta^{*}$ so that (9) holds for both cases.

(2) As we have shown, when the effort level is observable, the first-best effort level can be achieved, in which the total utility of the employer and the worker is $((1-t)(y_H - y_L)^2/2) + y_L$ or $([1-\bar{\bar{\beta}}(1+f)t](y_H - y_L)^2/2) + y_L$, which is always greater than what the employer can obtain when effort is unobservable. On the other hand, the worker enjoys some information rent when the effort is unobservable. However, as a whole, the total utility of the employer and the worker is lower when effort is unobservable.

For the IRS, the net tax revenue in the equilibrium is $\beta(a\lambda/a\lambda + (1-a))(1+f)tw_H - \varphi(\beta) = \beta\varphi'(\beta) - \varphi(\beta)$ according to (9). It is easy to see that $\beta\varphi'(\beta) - \varphi(\beta)$ is increasing in β since $\varphi'' > 0$. However, we have argued in the above that the audit probability is lower when the effort level is unobservable. Therefore, the net tax revenue is lower. □

6 Self-Reporting

Another parallel system is that which relies on the worker self-reporting his own income. Under this system, the employer can no longer use his report to affect the worker's incentive. Instead, the worker must decide the reporting strategy after the outcome or the wage is realized. When $w = w_L$, it is clear that the worker will report $\hat{w} = w_L$. When $w = w_H$, let us then consider a similar situation where the worker reports $\hat{w} = w_L$ with probability λ_r and $\hat{w} = w_H$ with probability $1-\lambda_r$. Given this strategy, the payoff is $(1-t)w_H$ if $\hat{w} = w_H$, and $w_H - (1-\beta)tw_L - \beta[tw_H + ft(w_H - w_L)]$ if $\hat{w} = w_L$. In equilibrium, $\lambda_r = 1$ if $\beta < (1/1+f)$, $\lambda_r \in (0,1)$ if $\beta = (1/1+f)$ and $\lambda_r = 0$ if $\beta > (1/1+f)$. This is similar to (16) under the employer's reporting.

The IRS's maximization problem is similar to (8). Thus, its optimal auditing strategy is similar to equation (9), which is $\varphi'(\beta) = (a_r\lambda_r/a_r\lambda_r + (1-a_r))(1+f)t(w_H - w_L)$.

For the employer, when he offers the contract to the agent, unlike the previous system, he cannot evade the tax for his employee, and so his contract will not incorporate those variables regarding the reporting and the IRS's auditing behavior. Thus, the agent's utility is based on the after-tax income or the real income, and so the employer considers the following maximization problem:

$$\max_{\{w_H, w_L, a\}} \quad a\,(y_H - w_H) + (1-a)\,(y_L - w_L)\,,$$
$$\text{s.t.} \quad a \in \arg\max_{\tilde{a}\in[0,1]} (1-t)\big[\tilde{a}w_H + (1-\tilde{a})w_L\big] - c(\tilde{a}),$$
$$w_H \geq 0, w_L \geq 0.$$

It can be easily shown that the solution satisfies

$$w_H = \frac{c'(a)}{1-t}, \;\; w_L = 0, \;\; \text{and} \;\; y_H - y_L = \frac{c'(a) + ac''(a)}{1-t}.$$

Let a_r^* be the equilibrium effort level, and λ_r^* (or λ_r^{**}) be the equilibrium probability of the worker reporting $\hat{w} = w_L$. Clearly, we are considering the case where the employer wishes to implement the second-best effort level $a_r^* = a^s$. Therefore, the equilibrium wage for high output is the same as the one in Proposition 4–(1), w_H^*. Similarly, there are two possible types of equilibrium: (1) $\lambda_r^* \in (0,1)$, where $\varphi'(1/1+f) = (a_r^*\lambda_r^*/a_r^*\lambda_r^* + (1-a_r^*))(1+f)tw_H^*$ and $\beta_r^* = (1/1+f)$, and (2) $\lambda_r^{**} = 1$ and $\beta_r^{**} \in (0,\ (1/1+f))$, where $\varphi'(\beta_r^{**}) = a_r^*(1+f)tw_H^*$.

The first case is the same as that in Proposition 4–(1), and thus the two systems give rise to the exactly same equilibrium outcomes. The second case is different from that in Proposition 4–(2). As we have shown before, $a^{**} > a^s$, which means that the agent will work less harder under self-reporting. This is clearly because the employer cannot use its reporting to motivate the agent to put more efforts anymore.

We can use the illustrative example in the previous section to compare the welfare under these two systems. Again, in equilibrium, $a_r^* = ((1-t)(y_H - y_L)/2)$ and $w_H^* = (y_H - y_L/2)$. Moreover, we can see that $\beta_r^{**} < \beta^{**}$, which means that the IRS will audit the worker less frequently under the self-reporting system. This is because the high output is produced less possibly, so that the benefit of an audit is reduced.

If case (1) happens in the equilibrium under the self-reporting system, every player obtains the same payoff under these two systems. If case (2) occurs in the equilibrium, the firm's payoff remains to be $((1-t)(y_H - y_L)^2/4) + y_L$, which is lower than that in Proposition 4–(2) under the employer's reporting system. This is intuitive because there is one less tool available for the firm to influence the agent's incentives. On the other hand, the worker's utility is $a_r^*[1-\beta_r^{**}(1+f)t]w_H^* - c(a_r^*) = ([1+t-2\beta_r^{**}(1+f)t](1-t)(y_H-y_L)^2/8)$, which can be either higher or lower than that in Proposition 4–(2). It is less likely that he will receive a high wage since he works less harder; however, he will also be audited by the IRS less frequently. Thus, the overall effect for the worker is ambiguous.

For the IRS, as we have argued before, the net tax revenue, $\beta_r^{**}a_r^*(1+f)tw_H - \varphi(\beta) = \beta\varphi'(\beta) - \varphi(\beta)$, is increasing in β. Since $\beta_r^* = \beta^*$ and $\beta_r^{**} < \beta^{**}$, the net tax revenue under the self-reporting system cannot be higher than that under the employer's reporting system. Therefore, the IRS generally prefers the employer's reporting system. This advantage provides a rationale for the government to use this system.

We summarize the above results in the following proposition:

Proposition 7. Assume that $c(a) = (1/2)a^2$. Compared to the employer's reporting system, under the self-reporting system: (1) the equilibrium effort level and the audit probability cannot be higher. (2) The employer's payoff and the net tax revenue cannot be higher. (3) The worker's utility can be either higher or lower.

7 Concluding Remarks

This paper considers that the report made by the employer can become an incentive scheme. It is possible that the employer can induce the worker to work harder, as long as he can report a lower income and the worker is audited by the IRS less frequently.

We can at least make two extensions to the basic model. First, in the basic model, the firm does not bear the responsibility for tax evasion, in that if the worker gets caught, the fine is completely imposed on the worker. It is possible to consider a rule where the firm is also fined when tax evasion is detected. The direct effect would be that the employer will be more likely to send the truthful information; however, this does not mean that the tax revenue will increase as well, but rather means that the difference between the "true" income and "reported" income may decrease. Thus, it is possible that every one will be worse off when the effort level and the output are both reduced too much.

Second, we can also consider bringing some competition into the model. One direction is to introduce another worker to the firm. In the setup with one principal and one agent, they will always collude in reporting. However, if there are more agents, the collusion may break down, since each employee has the option to report cheating to the government by revealing the other agent's true income. The firm thus has to consider a more sophisticated mechanism that takes into account such an opportunity. It would be very interesting to see whether or not the results are similar to those of Kleven et al. (2009), in which it is argued that third-party reporting is quite successful in tax enforcement when there are many employees.

Appendix

Proof of Proposition 3. Since the (IR) constraint must be binding, we can rewrite it as

$$w_H - w_L = \frac{c(a) - (1-t)w_L}{a[1 - \lambda\beta(1+f)t - (1-\lambda)t]}. \tag{A.1}$$

By substituting it into the objective function, we have

$$\max_{\{w_L, a, \lambda\}} \quad ay_H + (1-a)y_L - \frac{c(a) - (1-t)w_L}{[1 - \lambda\beta(1+f)t - (1-\lambda)t]} - w_L. \tag{A.2}$$

The first-order conditions for interior solutions with respect to w_L, a, and λ are, respectively,

$$1 = \beta(1+f), \tag{A.3}$$

$$y_H - y_L = \frac{c'(a)}{[1 - \lambda\beta(1+f)t - (1-\lambda)t]}, \tag{A.4}$$

$$0 = [\beta(1+f) - 1][c(a) - (1-t)w_L]. \tag{A.5}$$

(A.5) implies that when $\beta = (1/1+f)$, $\lambda \in (0, 1)$. On the other hand, when $\beta < (1/1+f)$, the optimal $\lambda = 1$; when $\beta > (1/1+f)$, the optimal $\lambda = 0$.

Consider $\beta > (1/1+f)$. Then the optimal $\lambda = 0$. However, according to the IRS's best response (9), $\beta = 0$. Thus, there is no equilibrium in this case. Therefore, in equilibrium, $\beta \leq (1/1+f)$. According to (A.3), the optimal w_L is at the corner, that is, $w_L = 0$.

Consider the case $\beta = (1/1+f)$. Then $\lambda \in (0, 1)$. According to (A.4), it is easy to see that the optimal choice of effort $\bar{a}$ satisfies

$$y_H - y_L = \frac{c'(\bar{a})}{1-t}.$$

The optimal wage is such that the (IR) constraint is binding, so that $\bar{w}_H = (c(\bar{a})/\bar{a}(1-t)$ according to (A.1). Finally, the optimal $\bar{\lambda}$ is determined by the IRS's best response in (9) by substituting $a = \bar{a}$, $w_H = \bar{w}_H$, $w_L = 0$ and $\bar{\beta} = (f/1+f)$.

Suppose that $\beta < (f/1+f)$. Then the optimal $\bar{\bar{\lambda}} = 1$. Substituting this into (A.4), it can be checked that the optimal $\bar{\bar{a}}$ satisfies

$$y_H - y_L = \frac{c'(\bar{a})}{[1-\beta(1+f)t]}.$$

The optimal wage is such that the (IR) constraint is binding, so that $\bar{\bar{w}}_H = (c(\bar{a})/\bar{a}[1-\beta(1+f)t])$. Lastly, the equilibrium $\bar{\bar{\beta}}$ is determined by the IRS's best response in (9) by substituting $a = \bar{\bar{a}}$, $w_H = \bar{\bar{w}}_H$, $w_L = 0$ and $\lambda = 1$.

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雇主申報員工薪資制度下之誘因契約設計

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本文考慮員工薪資是由雇主申報給政府的情況。政府不能觀察到員工的眞正薪資, 必須透過稽查方能得知。由於稽查有成本, 政府不會永遠稽查員工。因此雇主可以透過誘因契約的設計, 幫助員工低報其應負的稅額。由此雇主可以誘使員工更加努力工作, 進而提高產量。我們也發現, 比起另一個現行的制度, 即由員工自行申報其薪資, 這個制度可能帶給雇主更高的利潤, 給政府更高的稅收。

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