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Guilty Conscience and Incentives

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Guilty conscience and incentives^{*}

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Abstract

There are two kinds of error on performance assessment, undervaluation and overvaluation. In overvaluation, workers are unwilling to correct their performance assessment because their wages decrease by doing that. In undervaluation, workers will correct their assessment, but managers are unlikely to accept workers' claims. This type of selfish behaviors causes guilty conscience if others trust them. Otherwise, they do not feel guilty conscience. Guilty conscience hinges on trust of others. I consider endogenous guilty conscience and optimal incentive, and show that a high-powered incentive scheme is desirable for conscientious or self-conscientious people, but is not for the middle type.

JEL Classification Numbers: D03, D82, J41.

Key Words: Performance assessment error, Guilty conscience, and Strategic information transmission

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1. Introduction

Performance assessment is crucial to an organization, which leads managers to attempt to assess accurately. Even so, assessment is not always accurate, and errors are inevitable. There are two kinds of error, undervaluation and overvaluation. In overvaluation, workers tend not to tell that they are over-evaluated, because their wages would be reduced on speaking up. In contrast, workers are willing to correct assessment on themselves in undervaluation. This time, however, managers may ignore workers' claims because accepting them increases wage payment. Thus, modification of wrong performance assessment is not easy to implement.

If wage payment is not contingent on worker performance, that is, a fixed payment scheme is offered, modification of wrong assessment is easy to implement. Workers would never hesitate to tell the truth in overvaluation, and managers would also accept the workers' claims in undervaluation without increasing wage payment. Unfortunately, a fixed payment scheme fails to give incentives to workers: There is a trade-off relationship between *ex ante* incentive to show high performance and *ex post* one to tell the truth. If worker incentive is a crucial factor, it seems that we fail to correct wrong assessment. That would be true if we were selfish and less-minded, but that is always not if we are not homo economicus but human being. In this paper, I consider a situation in which they feel guilty conscience when they take selfish action at the sacrifice of somebody's benefits, and investigate the effect of guilty conscience to worker incentive.

It is difficult to capture how we feel guilty conscience, thus various model settings can be available. Recent psychological game studies such as Dufwenberg and Gneezy (2000), Ellingsen and Johannesson (2004), and Gneezy (2005), which have comparatively different focus, show that we tend to take selfish action when we can get pecuniary benefits more by doing so. This means that a high-powered incentive scheme, which encourages a worker to show high performance, is likely to cause the worker's selfish behavior in overvaluation and the manager's rejecting the worker's claim in undervaluation. To prevent selfish behavior, a less-powered incentive scheme can be better. This is a well-known outcome that some distortions are inevitable when there is something uncontrollable through incentive schemes. For example, in the multitasks incentive model by Holmstrom and Milgrom (1991), a high-powered incentive scheme mainly associated with observable tasks (*e.g.*, quantities) is suboptimal as it fails to devote significant resource and care into unobservable but essential tasks (*e.g.*,

qualities). Similarly, Baker (1992) (2002) shows that a less incentive scheme should be offered when performance indexes are inaccurate. In the context of rank-order tournaments, as shown in Lazear (1989), a big prize of tournaments tends to induce workers to inflict on their colleagues rather than to put forth their effort for high performance. This paper also belongs to the literature stem from the strings of the studies.

Moreover, it is a crucial issue to consider under what circumstances we feel guilty conscience. Even if we take unjust action selfishly, we may not feel guilty conscience very much when other people around us do something similar. It is associated with others' behaviors or ethical circumstances around us. For example, Tennyson (1997) focuses on the U.S. data in 1991 on car insurance fraud and shows that attitudes toward insurance fraud is positively and significantly related to others' fraud attitudes. In the context of principal-agent relations, as pointed out in Huang and Wu (1994) and Charness and Dufwenberg (2006), guilty conscience is associated with what other parties expect. If you betray others even though they trust you, you will feel guilty conscience very much. On the contrary, unless others trust you, you are unlikely to suffer from guilty conscience. Guilty conscience is influenced by others' belief.

In my model, if a manager expects that a worker shows the truth with high probability, that is, the manager trusts the worker, the worker's selfish behavior is regarded as a serious betrayal, thus the worker incurs much psychological burden caused by guilty conscience. In contrast, if the manager expects that the worker is likely to show selfish behavior, the worker is unlikely to feel guilty conscience for his own selfish behavior. What they expect their other parties to do is associated with their behaviors and guilty conscience. The purpose of this paper is to consider how an optimal incentive scheme hinges on what they expect the behavior of others: Guilty conscience is endogenously concerned as social interaction. As recent studies like Mas and Moretti (2009) and Bandiera, Barankay and Rasul (2010) indicate that not only monetary incentive but also social one is of importance, it is also crucial to consider the effect of guilty conscience to worker incentive under the situation in which their guilty conscience is associated with belief of other parties.

When we confront a conflict between the *ex ante* incentive to show high performance and the *ex post* incentive to tell the truth, a high-powered incentive scheme is suboptimal for the middle type worker, who is conscientious to some extent. They are between a self-conscientious worker, who does not feel guilty conscience seriously, and a conscientious worker, who feels guilty conscience very much. A conscientious worker

is more likely to tell the truth in overvaluation, thus a high-powered incentive scheme should be offered. On the other hand, a self-conscientious worker, who rarely tells the truth in overvaluation, will also face a high-powered incentive scheme. Although it seems that a less-powered incentive scheme should be offered to a self-conscientious worker to prevent the selfish behavior, it is not effective to induce the self-conscientious worker to tell the truth. The *ex ante* incentive to show high performance is only a key issue for them. Therefore, a high-powered incentive scheme is optimal for both a self-conscientious and a conscientious worker, although the reasoning is different. The same outcomes are applied to each type of managers. Especially, excessively high-powered incentive scheme is offered in the situation in which they are much more self-conscientious.

Additionally, it will be shown that when a manager is more self-conscientious than a worker, the distortion on worker incentive is more amplified, but it is likely to disappear as the worker is more conscientious. In contrast, with a more conscientious manager, the distortion regarding worker incentive is comparatively small, but it is likely to remain.

This paper is organized as follows. In section 2, a basic model is built to analyze the effect of guilty conscience to worker incentive. Although I focus on a simple linear scheme, it is too complicated to solve the model analytically, thus computer simulation will be conducted. In section 3, I consider an alternative setting of endogenous guilty conscience, but the main outcome is not influenced. Section 4 gives conclusion.

2. The model

1. Strategic information disclosure

I consider an employment relationship between a manager and a worker, where the worker is required to show high performance. The worker can contribute x in profit at the effort cost of $x^2/2$. The manager assesses the worker's contribution with error, $y = x + \varepsilon$, where ε is stochastically followed by a normal distribution $N(0, \sigma^2)$. The manager's assessment y including errors is verifiable to a third party, thus the worker's wage can be conditional on his performance assessment. If the worker receives a high performance assessment, he gets high wage. In this paper, it is assumed that the

manager offers a linear wage scheme, $w(y)=ay+b$, in which the piece rate and the fixed payment denoted as a and b , respectively.

A worker has informal evidence on his authentic performance, x . Although the worker's informal evidence is not verifiable to a third party, the manager realizes that the informal evidence is right: the worker cannot make any fake evidence.¹ That does not mean that the worker will always show his informal evidence: The worker can strategically choose whether to disclose his authentic performance. There are two cases to explore: [1] If the worker is underestimated as $x > y$, he is willing to show his authentic performance to require the decent wage $w(x)$. [2] If the worker is overestimated as $x < y$, he can keep silent and receive the higher wage $w(y)$ without showing it. Hiding informal evidence only happens in overvaluation.

Similarly to the worker, the manager will not always accept the worker's claim and pay the decent wage based on his authentic performance. The manager always accepts the claim whenever doing that reduces wage payment. In contrast, if wage payment increases by accepting the claim, she may ignore it. She can strategically make a decision on the acceptance. Therefore, in overvaluation, although the manager is willing to accept the worker's claim, the worker will keep silent. On the other hand, although the worker shows the informal evidence in undervaluation, the manager never accepts it. If they are selfish, any information transmission is not implemented. However, if they feel guilty conscience for their selfish behaviors, the result may be changeable.

In this model, it is crucial that the worker's informal evidence on his authentic performance is unverifiable. If it was verifiable, they could make an agreement on an incentive scheme based on the worker's claim, which would be like a self-reported scheme. If they could use a self-reported scheme, any problem would never appear. The reason is well-known as the full information disclosure theorem.² When the worker shows informal evidence, the worker would receive wage conditional on the evidence, otherwise he would get nothing. In this case, the worker would always show informal evidence on his authentic performance, thus they could avoid assessment error. In contrast, as concerned in this paper, if the worker's evidence is unverifiable, they cannot use any self-reported scheme. Even if the worker's informal evidence shows high

¹ If the worker's information is just a message, the manager is not convinced by the worker's message. This is a cheap talk case, which is out of my focus in this paper.

² See Grossman and Hart (1980), Grossman (1981), and Okuno-Fujiwara, Postlewaite, and Suzumura (1990).

performance, the manager will not pay the decent wage to the worker, as well-known as a hold-up problem.

The timing of their behaviors is as follows:

- [1] A manager offers a worker a liner scheme, $w(y)=ay+b$.
- [2] The worker decides how much contribution is made.
- [3] The manager assesses the worker's performance as y .
- [4] The worker makes a decision whether to show informal evidence on his authentic performance.
- [5] If the manager receives informal evidence, she chooses whether to accept it or not.

2. Guilty conscience

Overvaluation induces a worker to keep silent, and gives him higher wage more than the decent wage based on his authentic performance. However, an overvalued worker feels guilty conscience because he takes some benefits, which should belong to the manager, by keeping silent. Psychological burden caused by selfish behavior is given by c . The psychological burden is incurred by the worker only in overvaluation, and it is a constant and independent of the degree of overvaluation.

Although the worker can take a part of profit from the manager by keeping silent, keeping silent does not always lead to guilty conscience. If the manager expects the worker to keep silent, the worker is unlikely to feel guilty conscience. In this case, keeping silent is regarded as a kind of "preestablished harmony" between them, thus the worker does not feel guilty conscience in this case.³ In contrast, when the manager anticipates that the worker always tells the truth, the worker's taking a part of profit, which should belong to the manager, is just a betrayal, thus the worker faces a dilemma between monetary earnings and guilty conscience. Actually, Charness and Dufwenberg (2006) indicate that guilty conscience is not always caused by telling just a lie in their message game experiment, where players were likely to feel guilty conscience when they betrayed their partners even though their partners trust them.

Guilty conscience of a worker is associated with what his manager expects. In this paper, I follow the model setting of a psychological game by Huang and Wu (1994). I denote the probability as q with which the worker shows his informal evidence. The manager guesses probability q of the worker's telling the truth, thus psychological

³ I realize that this is controversial, but a poker game is often raised as an example to support this viewpoint. In a poker game, they play selfishly and deceive other players, but all players will not feel guilty conscience. Power games of politicians are also typical examples of its kind.

burden of the worker is associated with probability q , and is assumed as cq . This means that psychological burden of the worker is maximized when the manager expects the worker to always show the truth. As I show later, probability q can be endogenously derived by rationally thinking about their behaviors.

In the perspective of guilty conscience, the worker makes a decision whether to show his authentic performance. When it holds that $w(y) - cq \leq w(x)$, the worker will show his informal evidence, otherwise he does not. The result is given as the following lemma:

Lemma 1

A worker hides informal evidence on his authentic performance to receive the wage, $w(y)$, based on the manager's assessment in the case of $\varepsilon > cq/a$. Otherwise, he shows his authentic performance x to avoid psychological burden and receive the wage, $w(x)$.

Since performance assessment y is verifiable, the manager has to pay the wage $w(y)$ even if she realizes that the worker hides his authentic performance. Clearly, the worker is likely to confess as the piece rate a is smaller or the psychological burden c is larger. They can anticipates the critical point, cq/a , thus probability q is given at the equilibrium as the solution of $q = \int_{-\infty}^{cq/a} \phi(\varepsilon) d\varepsilon$, where $\phi(\varepsilon)$ is the density function of assessment error ε . The probability is always more than 1/2 because even an extremely self-conscience worker with $c=0$ shows her informal evidence in undervaluation. Hence, the solution q^* uniquely exists under a particular a and c , thus it is a function of a and c denoted as $q^*(a, c)$.⁴

Similarly to the worker, psychological burden of the manager is given by d . I also denote the conditional probability as p with which the manager accepts the worker's informal evidence when the manager receives it. Psychological burden of the manager is assumed as dp . Probability p is also endogenously derived by their behaviors. In the case of $w(y) + dp \leq w(x)$, the manager is willing to ignore the informal evidence.

Lemma 2

A manager always accepts the worker's claim in overvaluation. In undervaluation, she will accept it in the case of $\varepsilon \geq -dp/a$, otherwise reject.

⁴ A different setting of guilty conscience will be considered in the next section.

Similarly, the manager and the worker realize conditional probability p with which the manager accepts the worker's claim when the worker shows it. Since the worker shows the informal evidence in the case of $\varepsilon < cq/a$, the manager accepts it in the case of $-dp/a \leq \varepsilon < cq/a$. Probability p satisfies the equation: $p = \int_{-dp/a}^{cq^*/a} \phi(\varepsilon) d\varepsilon / \int_{-\infty}^{cq^*/a} \phi(\varepsilon) d\varepsilon$.

This equation is written as follows:

$$p = 1 - \frac{\Phi(-dp/a)}{q^*}. \quad \dots(1)$$

The solution uniquely exists and is a function of a and c denoted as $p^*(a, c)$.

3. Effect of guilty conscience

From lemma 1 and 2, the behaviors of the manager and the worker are summarized given an incentive scheme as follows:

Proposition 1

[1] In the case of $\varepsilon < -dp^*/a$, the worker shows his informal evidence, but the manager rejects it. The worker receives the wage $w(y)$ specified by the manager's assessment. Since the manager rejects the worker's claim, she incurs the psychological burden, dp^* .

[2] In the case of $-dp^*/a \leq \varepsilon < cq^*/a$, the worker shows his informal evidence, then the manager accepts it. The worker receives the decent wage $w(x)$ based on his authentic performance.

[3] In the case of $cq^*/a \leq \varepsilon$, the worker hides his informal evidence, thus receives the wage $w(y)$ specified by the manager's assessment with the psychological burden, cq^* .

It is clear that the manager pays $w(y)$ in the case [1] and [3]. In the case [2], the manager's assessment is corrected. In this case, it is needed to confirm whether the manager offers the decent wage based on the worker's authentic performance, because the manager can offer a different wage that the worker may accept theoretically.

When the worker confesses his authentic performance in overvaluation and requires the decent wage $w(x)$ less than $w(y)$, the manager will pay $w(x)$.

Next, in undervaluation, $w(y) < w(x)$, I need to consider whether the manager offers a different wage from $w(x)$ or $w(y)$.

- i) If the manager offers a wage lower than $w(y)$ after receiving the worker's claim, the worker never accepts it. Thus, a wage payment lower than $w(y)$ is not offered.
- ii) Next, I confirm whether the manager pays a wage w' between $w(y)$ and $w(x)$. In this case, the manager's wage payment with psychological burden is given as $w' + dp$, which is more than that upon rejecting the worker's claim, $w(y) + dp$. Thus, the manager has no incentive of offering the wage w' . The decent wage, $w(x)$, is paid.
- iii) Obviously, the manager will not offer a wage higher than $w(x)$.

Thus, the decent wage $w(x)$ is optimal for the manager in the case of $-dp^*/a \leq \varepsilon < cq^*/a$. Eventually, wage payment is either $w(y)$ or $w(x)$.

Proposition 1 indicates that small assessment error is corrected regardless of overvaluation and undervaluation, but that big one is not. Thus, when the worker shows performance x , his expected payoff is given by

$$EU(x) \equiv ax + b + \int_{-\infty}^{-dp^*/a} a\varepsilon\phi(\varepsilon)d\varepsilon + \int_{cq^*/a}^{+\infty} (a\varepsilon - cq^*)\phi(\varepsilon)d\varepsilon - \frac{x^2}{2}.$$

The worker optimizes his performance level given an incentive scheme, thus the first order condition is simply given as $a = x$: The worker is more encouraged as he faces a higher piece rate.

Similarly, the expected profit of the manager is given as follows:

$$\Pi \equiv (1-a)x - b - \int_{-\infty}^{-dp^*/a} (a\varepsilon + dp^*)\phi(\varepsilon)d\varepsilon - \int_{cq^*/a}^{+\infty} a\varepsilon\phi(\varepsilon)d\varepsilon. \quad \dots(2)$$

The manager is willing to maximize the above expected profit (2) subject to the constraints on incentive compatibility and individual rationality of the worker. Incentive compatibility is given by $a = x$. It is also needed to hold as individual rationality that $EU(x) \geq 0$, where the worker's outside option is zero. The manager can minimize the fixed payment as long as the individual rationality is satisfied, thus the individual rationality is binding at the equilibrium. Hence, the expected profit of the manager is rewritten by

$$\Pi \equiv a - \frac{a^2}{2} - cq^* (1 - q^*) - dp^* \Phi(-dp^*/a). \quad \dots(3)$$

The optimal piece rate a^* maximizes the above expected profit. In this model, the worker and the manager are risk neutral, thus the manager can take all benefits of the worker through the sufficiently low fixed payment. As the result, the manager compensates the worker's psychological burden, thus the psychological burdens of the worker and the manager affect the piece rate. In a typical moral hazard model as a benchmark in which they do not feel guilty conscience: $c=d=0$, the optimal piece rate is given by $a^{BM}=1$.

First, I consider a situation of $c=d$, in which the manager is the same type as the worker in terms of guilty conscience. In general, this model is easy to understand, but too complicated to solve analytically, hence computer simulation will be conducted. The computer simulation shows the ambiguous relationship between psychological burden and incentives. As the four curves shown in figure 1 indicate, the optimal piece rates first increases a little, then drastically decreases, finally increases again, as psychological burden is serious. This feature is observed regardless of standard deviations of assessment error. The result is summarized as a proposition:

Proposition 2

- [1] High worker incentive is desirable for both conscientious and self-conscientious people. Especially, excessively high incentive is offered when they incur small psychological burden. In contrast, a less-powered one is better for the middle type, who are conscientious to a certain extent.
- [2] As the manager's assessment is inaccurate, a more high-powered incentive scheme should be offered for self-conscientious people, but a much less-powered one is desirable for conscientious people to a certain extent.

If a worker is conscientious, he is almost always willing to show his authentic performance, even though he is over-evaluated. The manager rarely compensates the worker's psychological burden caused by keeping silent in overvaluation. Additionally, a conscientious manager will almost always accept the worker's claim, thus she also rarely bears her own psychological burden. When they are very conscientious with high c and d , they are unwilling to show selfish behaviors. Accordingly, the manager will offer a high-powered incentive scheme, which is almost identical to the benchmark case.

Actually, when c and d are sufficiently high, the manager anticipates that the worker is more likely to tell the truth in overvaluation, thus q will be convergent to 1. This indicates that the probability of keeping silent converges to zero. Similarly, as (1) shows, p and $\Phi(-dp/a)$ converges to 1 and 0, respectively. Therefore, when c and d are sufficiently high, the optimal piece rate is convergent to 1: $a^* \rightarrow 1$.

When the manager and the worker are conscientious to a certain extent, a high piece rate causes psychological burden because the worker is more likely to keep silent in overvaluation and the manager tends to ignore the worker's claim in undervaluation. Thus, in this case, as shown in figure 1, a less-powered incentive scheme is likely to be desirable.

Finally, I consider a situation with self-conscious people. Since a self-conscious worker hardly feels guilty conscience, that means very low c , information disclosure is rarely observed in overvaluation. The worker rarely suffers from guilty conscience, thus the manager does not compensate the worker's psychological burden very much. The similar thing is applied for a self-conscious manager, therefore a high-powered incentive scheme should be offered. Although this case is similar to the benchmark case, there is a noteworthy respect. As shown in figure 1, the optimal piece rate can be more than a^{BK} in the benchmark case when their psychological burden is small but positive. When the manager's psychological burden d is very small, the probability of the manager to accept the worker's claim is almost zero. In this case, if parameter d increases slightly, the manager can keep probability p^* to almost zero by increasing the piece rate: A higher piece rate decreases the expected psychological burden of the manager. Thus, a high-powered incentive scheme of which the piece rate is more than 1 can be desirable.

I can find another outcome. As standard deviation of the error distribution is large, a worker is likely to hide his informal evidence and a manager is likely to reject the worker's claim. This leads to more psychological burden incurred by the manager when they are conscientious to a certain extent, thus the manager is willing to reduce psychological burden by decreasing the piece rate enough. As standard deviation is large, the effect of guilty conscience is amplified, as shown in figure 1.

The above simulation is a case in which psychological burden is identical between a manager and a worker. Next, I consider a situation in which their psychological burdens are different. Optimal incentive schemes are given in figure 2 when psychological burden of a manager is fixed under a Normal distribution $N[0, 0.3^2]$. The optimal piece rate under $d = 1$ is higher than that under $d = 0.5$ because high

psychological burden keeps a manager from showing selfish behavior, thus a more incentive scheme is offered. The curve under $d = 0.3$ is a little complicated, because a high-powered incentive scheme is better for self-conscientious or conscientious people, but it is not for the middle type.

Finally, I compare worker incentive in the case of a more conscientious manager with that in the case of a more self-conscientious one. The outcome shown in figure 3 is under a Normal distribution, $N[0, 0.3^2]$. When a worker faces a more conscientious manager, $d=1.5c$, the optimal piece rate first increases much more than when a worker faces the same type manager, $d=c$. After that, the optimal piece rate in the case of $d=1.5c$ falls, then gets back to the benchmark level more quickly compared to that in the case of $d=c$. On the other hand, when a worker faces a more self-conscientious manager, $d=0.5c$, the optimal piece rate first increases, then decreases more moderately than when he faces the same type manager, $d=c$. The effect of guilty conscience is much more amplified with the self-conscientious manager ($d=1.5c$) than with the conscientious one ($d=0.5c$). It appears that the drop of the optimal piece rate is much more drastic with the self-conscientious manager ($d=1.5c$), but the effect is more likely to disappear as they feel guilty conscience. In contrast, with the conscientious manager ($d=0.5c$), the drop of the piece rate is mild, but tends to remain. The outcome is summarized as follows:

Proposition 3

When a manager is more self-conscientious than a worker, the optimal piece rate is unlikely to be distorted very much from the benchmark case, however, the distortion is likely to remain for the wide range of psychological burden of a worker.

3. Alternative setting of guilty conscience

It is controversial under what circumstances and how people feel guilty conscience. In this model guilty conscience of a worker is associated with what a manager expects the worker to show his informal evidence. The manager anticipates probability q with which the worker shows informal evidence, and the probability is crucial to guilty conscience of the worker: The probability is regarded as the degree of trust in this model.

While the setting is reasonable, an alternative setting is conceivable. Guilty

conscience of a worker may be associated with what a manager expects the worker to do in overvaluation. Suppose that the probability on the worker's behavior, which is anticipated by the manager and associated with guilty conscience of the worker, is given

as solutions $q^\#$ of $q = 2 \int_0^{cq/a} \phi(\varepsilon) d\varepsilon$. This is the conditional probability with which the

worker shows his informal evidence in overvaluation. In this setting, there can be two solutions: 0 and a positive solution. Even if psychological burden c of the worker is huge, the worker may not show his informal evidence in overvaluation. If the manager expects the worker not to tell the truth in overvaluation, the worker does not feel guilty conscience at all. As the result, even the worker with huge psychological burden c will not show his authentic performance, thus the manager's belief on the worker's behavior is consistent with what the worker actually does. If probability p on the manager's

behavior is also given as the solutions $p^\#$ of $p = 2 \int_{-dp/a}^0 \phi(\varepsilon) d\varepsilon$, we see the similar

outcome on guilty conscience of the manager. Accordingly, there are two states: One is that both the manager and the worker never trust each other, and the other is that they trust other parties to some extent as concerned in section 2.

In this setting of guilty conscience, the expected profit of the manager is similarly given by

$$\Pi \equiv a - \frac{a^2}{2} - \frac{1}{2} cq^\#(1-q^\#) - \frac{1}{2} dp^\#(1-p^\#).$$

When the manager and the worker do not trust each other, the worker never shows his informal evidence in overvaluation and the manager rejects the worker's claim in undervaluation: $q^\# = p^\# = 0$. In this case, the optimal incentive is clearly $a^*=1$.

On the other hand, if they anticipate that the probabilities are positive, that is, they expect their other parties to take conscientious actions to some extent, we have the outcome similar to section 2. The optimal incentive under a Normal distribution

$N[0, 0.3^2]$ is shown in figure 4 when the manager is the same type to the worker: $c = d$.

There is a discontinuous part represented by the dot lines on the optimal curves. When the psychological burdens, c and d , are small, the probabilities, q and p , are positive near zero. If the psychological burdens increase slightly from this, increase in the piece

rate induces them to take selfish action, but it keeps probabilities q and p near zero. Thus, the optimal incentive is over 1. As the result, the manger can avoid the psychological burden caused by their selfish behaviors. The excessively high-powered incentive scheme seems to give the worker more earnings through the selfish behavior, but the manager can take it back by decreasing the fixed payment b sufficiently. Therefore, worker incentive increases first as the psychological burden increases. However, as excessively high worker incentive increases, it leads to distortion seriously, then it is not negligible. After the psychological burden reaches a particular level, they face a situation in which a less-powered incentive scheme is better than the excessively high-powered one. Thus, there is the discontinuous part on optimal incentive schemes as shown in figure 4, and it hinges on the setting of guilty conscience.

The outcome is similar to section 2: High worker incentive is desirable for both conscientious and self-conscientious people. Especially, excessively high incentive is offered when they incur comparatively small psychological burden. In contrast, a less-powered one is better for the middle type, who are conscientious to a certain extent. Additionally, as the manager's assessment is inaccurate, a more high-powered incentive scheme should be offered for self-conscientious people, but a much less-powered one is desirable for conscientious people to a certain extent.

4. Conclusion

I have considered opportunistic modification on performance assessment when guilty conscience is associated with whether people trust others. Since it is very complicated to specify optimal schemes in the general case, I have focused only on a risk-neutral and linier payment scheme case. Although I gave sacrificed the generality, it is obtained the explicit relationship between incentives and guilty conscience. This paper presents the following implications:

- As a high-powered incentive scheme is offered, selfish behaviors are likely to appear: In overvaluation workers tend to hide their authentic performance, and in undervaluation managers are likely to ignore workers' claims. A high-powered incentive scheme is suboptimal they are conscientious to a certain extent.
- If they are very conscientious, their selfish behavior is unlikely to appear, thus psychological burden hardly distorts the incentive scheme: A high-powered incentive scheme is desirable.

- In contrast, if they are self-conscious, workers will hide true information and managers ignore workers' claim. However, since the effect of psychological burden is negligible, a high-powered incentive scheme is also desirable. Especially, when they are almost perfectly selfish people with small but positive psychological burden, the optimal piece rate is higher than when they feel no guilty conscience.
- As worker performance assessment is inaccurate, the effect of guilty conscience is amplified.
- When a manager is more conscientious than a worker, the optimal piece rate is likely to be distorted very much from the benchmark case, however, the distortion tends to disappear as guilty conscience is serious. In contrast, when a manager is less conscientious than a worker, the distortion of the piece rate is likely to be small, but comparatively remain.

Usually, we think that companies with conscientious people are desirable, but this paper concludes that it is difficult to distinguish a company with conscientious people by payment schemes: Similar incentive schemes are likely offered at both a company with conscientious people and one with self-conscious one. If there is an extremely high-powered incentive scheme in a company, you may find the company and people cruel and bitter.

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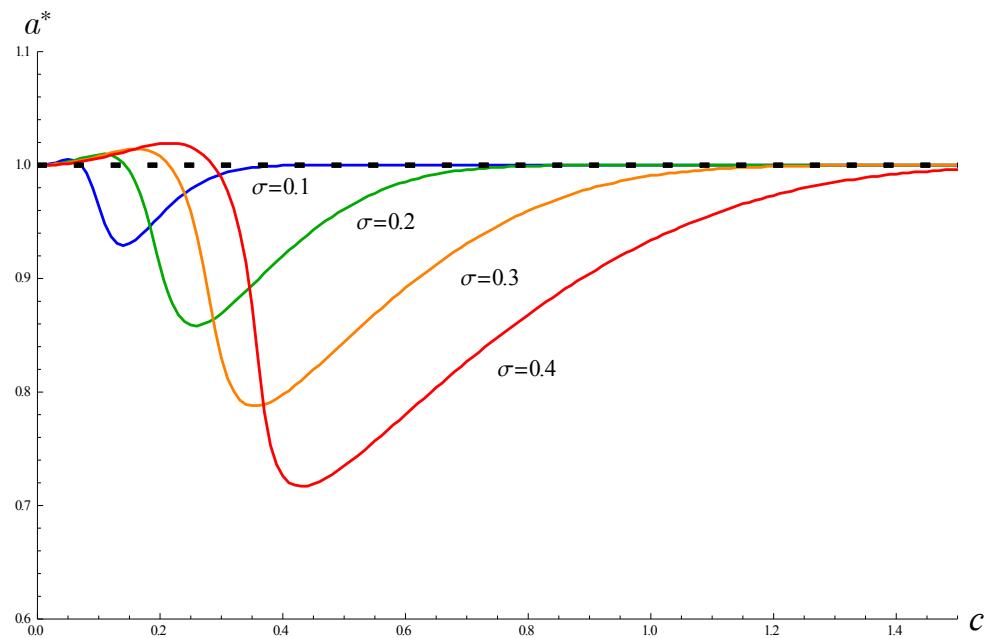


Figure 1

The relationship between the optimal piece rate and guilty conscience under $c=d$

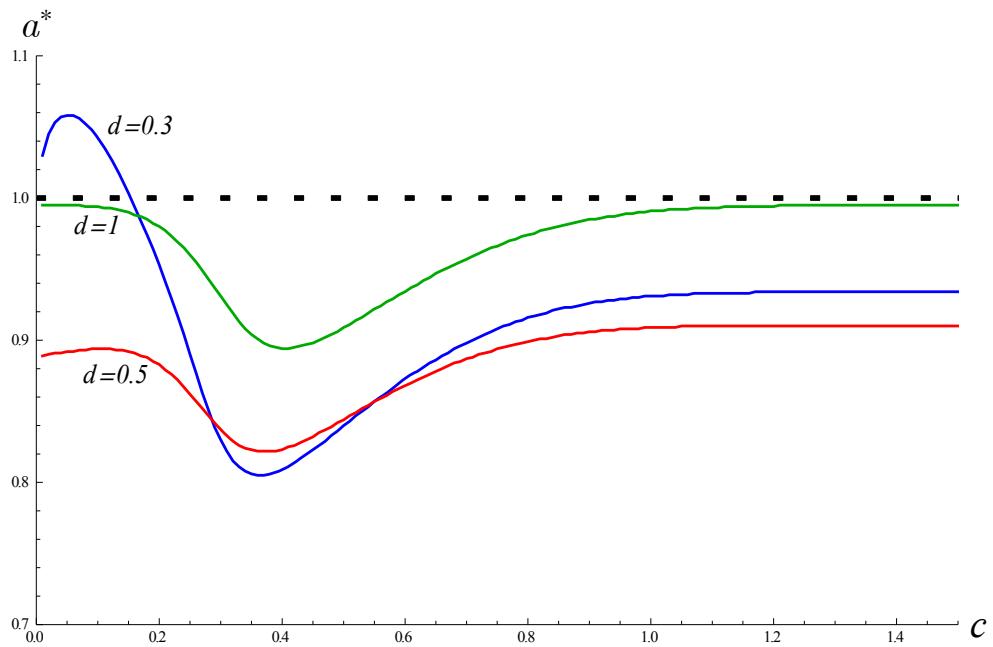


Figure 2

The optimal piece rate under standard deviation 0.3 and fixed manager's psychological burden

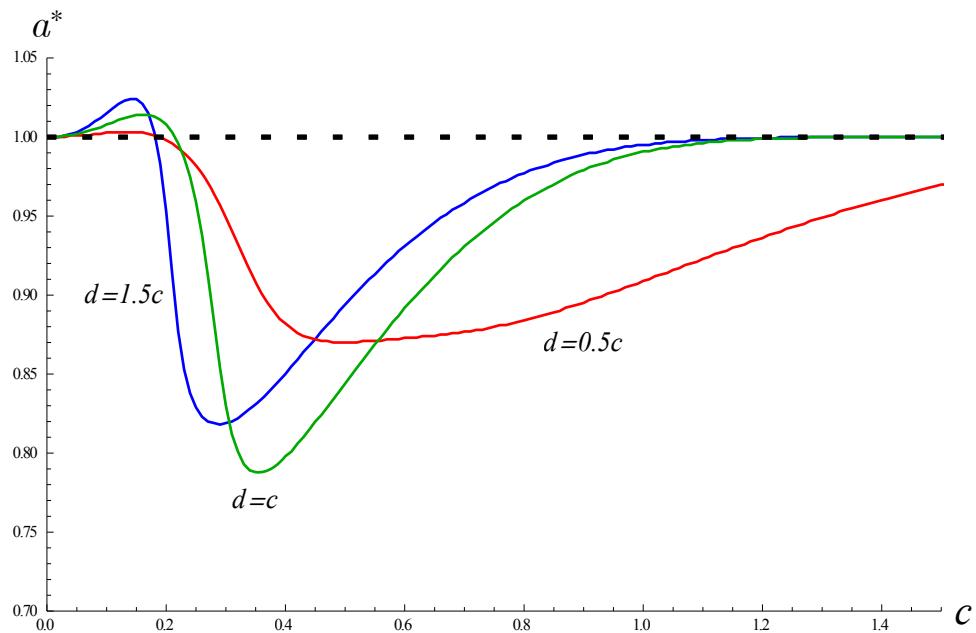


Figure 3

The optimal piece rate under standard deviation 0.3 when the manager is a different type from a worker

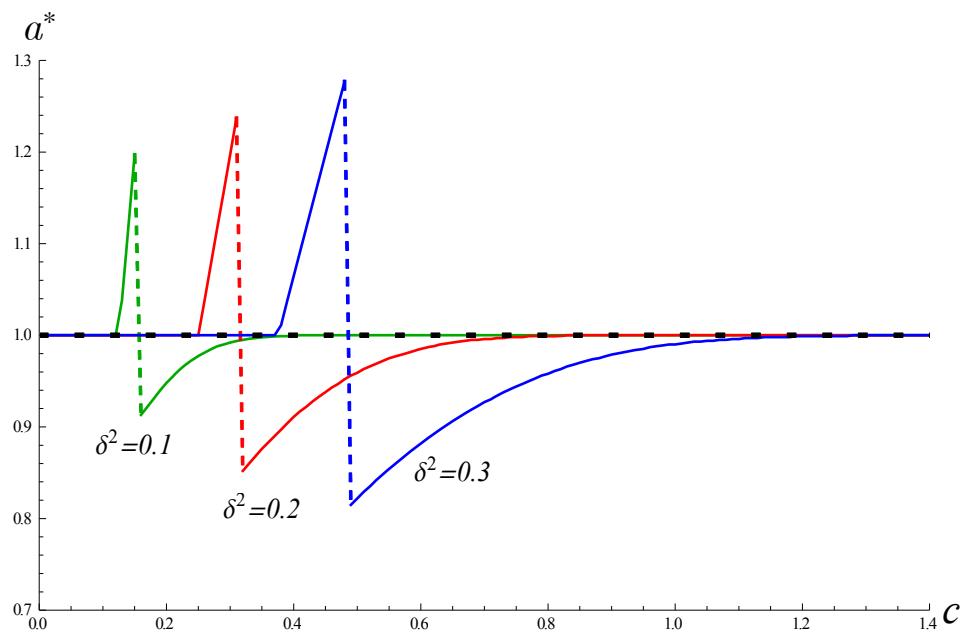


Figure 4
The optimal piece rate under $c=d$