

# Decision of Self-promotion: Theory and Experiment

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## **Abstract**

Given the importance of self-promotion in labour market, the decision-making process is not fully explored. This paper build the individual decision model for self-promotion, with the payoff from given payment rule setting payment based on self-reported value with adjustments, and the intrinsic preference of modesty and lying aversion which constraint the self-promotion. Intuitively, we found the negative relationship between self-promotion and marginal cost of modesty and lying, and possibility of underestimate when the marginal return of self-promotion from payment rule is too low. Based on the equilibrium, we found the fair payment rule which gives payment equal to agent's expected ability could take this underestimation into account. However, the presence of motivated belief which lead agent to be overconfident could result in more self-promotion and misperception of the fairness of the rule. To provide evidence for theoretical model, we plan to conduct a lab experiment with treatments of asking subjects to report signal or ability, introducing different rules in each treatment using strategy method, and elicit subject's belief and fairness perception at the same time.

# 1 Introduction

It's common in labour market and workplace that people give their self-evaluation to others under the motivation of potential benefit. They could be asked to report own ability or performance as in applications and interviews, while sometimes they have the opportunity to communicate own ability to others implicitly, such as presentations of own work or discussions with colleagues. How they evaluate themselves may influence their future payment, for example being hired, promoted or given wage scheme. With such motivation, this decision-making process turns into self-promotion ([Exley & Kessler, 2022](#)).

Self-promotion act as an important factor in labour market outcomes, as it predicts individual competence ([Jones et al., 1982](#)) and contributes to hiring and promotion decisions ([Kacmar et al., 1992](#); [Rudman & Glick, 2001](#)). Findings from experimental results shows the potential driving factors behind observed patterns of self-promotion: for example, female self-promotes less than male in tasks which stereotypically favoring men ([Exley & Kessler, 2022](#)), and people are held back from self-promotion on social media by modesty norm constraint ([Mancuso et al., 2019](#)). Self-promotion could also be conducted under a strategic consideration, even in an opposite direction that underestimating oneself to get rewarded ([Thoma, 2016](#)). However, there lacks systematic research into its decision process, taking intrinsic preference as well as strategic thinking into account. Given the strategic nature of labour market, an inclusive analysis of self-promotion decision-making could better explain the mechanism of this behavior and related evidence such as gender gap in self-promotion.

Same as the labour market game setting, self-promotion contains several parties, constituting the game between agent and principle and the competing game between agents. The agent considers potential payoff from their self-promotion decision and cost of doing it from intrinsic preference, and the principle (employers, evaluators) has an incentive to figure out the true ability/performance of agent

and rate or pay them accordingly. Nevertheless, the possibility of bias and discrimination from the evaluator’s side should also enter into the decision-making process (e.g. [Bohren et al., 2019](#); [Reuben et al., 2014](#)). The competition with peers have influence on self-evaluations as well, as documented by research that over-confidence is used as a strategy to deter competitors and avoid competition ([Charness et al., 2018](#); [Brilon et al., 2024](#)). As considering all the parties and games involved would complicate our investigation into the agent’s self-promotion decision, it’s necessary to simplify and isolate the question. In the first place, we focus on the agent’s decision environment without competition as the base of the whole picture. Then, we incorporate the principal’s behavior as payment rule, muting their strategies by setting the rule in advance. Out of consideration for accurate evaluation, the expectation of self-promotion and possible bias, the payment rule would make some adjustment based on the report. Finally, the research question of this paper is how will the agent make self-promotion decision facing an exogenous payment rule which includes adjustment on her promotion, with intrinsic preference and strategic thinking being considered.

We start with a common setting of agent reporting a signal she received about her ability, which simulates the self-evaluation process with imperfect information in reality. There is promotion motivation that agent will receive payment based on her reported value. We introduce an exogenous payment rule to determine the payment, simulating the evaluation process and the final payoff individual gets after self-promotion. The rule will give payment after adjustment on the reported value, which can be seen as an incorporation of the possible belief from the demand side, as real evaluators seldom totally take the self-promotion as a truth ([Thoma, 2016](#); [Bohren et al., 2019](#)). In this way, we are able to observe how agent respond the payment rule with self-promotion decisions, providing the strategic point of view. Additionally, the payment rule could also provide implication on the policy setting with regard to self-promotion.

In addition to the profit brought by payment rule, the agent also has intrinsic

preferences which will influence their self-promotion decision. One of them is the modesty norm constraint causing utility loss when agent self-promote (Mancuso et al., 2019; Moss-Racusin & Rudman, 2010; Smith & Huntoon, 2014). Additionally, as being modest by slightly under-representing one’s qualities could act as a strategy in communicating to avoid potential negative impact on one’s social image (Cialdini & De Nicholas, 1989), modesty norm not only acts as intrinsic motivation but also could be part of the strategic consideration. Thus, the strength of modesty norm constraint may make significant influence on the self-promotion decision: as showed by Mancuso et al. (2019), subjects’ self-promotion behavior increased greatly after relieving the modesty norm by attribute the self-promotion to the requirement by experimenter.

At the same time, agent bear cost of lying if her report deviates from the truth. It mostly comes from lie aversion (Kartik, 2009; López-Pérez & Spiegelman, 2013), given our one-shot setting. And the size of lying cost is determined from several perspectives: outcome, monetary payoff and ex ante probability for the report to be taken as truth (Gneezy et al., 2018). Finally, agents could form expectation of ability by updating belief on the signal, which give space for motivated beliefs. It is well documented that people motivated to form a belief of higher ability for potential profit or psychological satisfaction (Köszegi, 2006; Brunnermeier & Parker, 2005; Huffman et al., 2022). The expected ability in our case represents the self-confidence in literature<sup>1</sup>. As there is extensive research on self-assessment or self-confidence (which we will also review in Section 2), we need to clarify the relationship between those and this work. Self-confidence acts as a potential influencing factor on self-promotion, as to provide an anchor for decision, mostly take effect through the lying cost. And the main difference between self-assessment (the action used to elicit self-confidence in experiment research) and self-promotion is the presence of promotion motivation (Exley & Kessler, 2022), i.e. there is

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<sup>1</sup>In order to mitigate confusion, we will mainly use expected ability and motivated belief, instead of self-confidence and overconfidence.

positive external return from higher evaluation.

Furthermore, we try to extend the theoretical frame by considering the fair payment rule based on the self-promotion decision we obtained, as part of the implication for the labour market outcome of decision of self-promotion. The fair payment rule is defined as the rule which gives payment equal to agent's expected ability, which is to say, the perceived fairness of the rule by agents. Different from the most original model of gift exchange claiming that the higher wage is considered to be fairer (Akerlof, 1984), the model of Akerlof & Yellen (1990) based on psychological intuition is more related to the fairness concern in this paper. With the assumption of reference fair wage in worker's mind, their model suggests that the wage increase could exert more effort if it was approaching the "fair payment", while the pay rise above the fair standard has no effect on effort. Thus, finding the fair payment not only concerns the welfare from supply side, but also correlated with the efficiency of contract set by demand side. Though in a one-shot and slightly different context compared with effort provision, we look at how to decide the fair payment rule in the equilibrium and how it interacted with agent's preference and belief, to construct a more integrated frame of self-promotion decision in labour market.

We build the theoretical model to depict the story above. Our baseline model of self-promotion decision making consists of three parts: payoff based on report according to the rule, cost from violating modesty norm, and cost of lying. In baseline model the lying cost is measured in outcome dimension, the distance of the report from true signal or ability (Gneezy et al., 2018). The equilibrium solution shows that self-promotion decision decrease with marginal cost of modesty norm and lying, and when the marginal return of self-promotion from payment rule is too low, the agent may under-report to save cost, i.e. report a value lower than the true signal. And based on the equilibrium, we find that the fair payment depend on the agent's preference parameter, which has implication of the necessity of setting specific rule to ensure the equality of different groups of people.

Also, accounting for the possible under-report, the fair rule could compensate for agent with excessively high cost of modesty norm. We consider two different form of utility from motivated belief, and found the motivated belief leads to overconfident (higher expectation of ability), misperception of the fairness of the rule, and possibly inflated self-promotion. Finally, we analyze an alternative model with lying cost measured with additional monetary payoff, and the result shows in this way the deflation in the rule enter into the equilibrium solution. Agent reciprocates more deflation with higher self-promotion.

In the future, I plan to conduct controlled experiments to test the theory. We will use cognitive test to obtain the measure of ability, and provide noisy signal to subjects, eliciting their expectation at the same time. Then, subjects will need to report the signal/ability with being informed they will get paid by a certain rule on their report. There will be between-subject treatments with different form of model, and within-subject design of different parameters in the rule. More specifically, I will ask subjects to report their received signal in one treatment, and ask them to report their ability in another. In this way, we distinguish between two cases where motivated belief will play different role. Inside each treatment, we set different parameters of the rule through strategical methods, to explore the comparative statics of each model. Additionally, we will also elicit the perception of fairness to test related hypothesis.

This paper contributes in several aspects. First, we developed a comprehensive analytical framework of self-promotion by modelling the decision-making process, incorporating intrinsic and strategic factors that influence self-promotion into the model and analysing the impact and interference of each factor. Second, we employ a payment rule to illustrate an evaluation system that would take into account prospective self-promotion, then examine how individual would develop strategies in response of the rule, and how to design a fair payment rule in equilibrium, which has implication in evaluation scheme and policy setting. Third, we consider the irrational bias from motivated belief in self-promotion, providing more behavioral

explanation to self-promotion patterns.

The rest of this work organized as follows. In Section 2 we review research related to the evidence of self-promotion, and intrinsic as well as potential strategic motivations behind it. In Section 3, we present our theoretical model of self-promotion decision-making. We first show the general settings of the model, then analyze the equilibrium in the baseline model, followed by extensive discussion on fair payment rule and potential motivated belief. We also discuss an alternative model with different form of lying cost at the end of this section. Section 4 shows a preliminary experiment design, and we put future plan of this research in Section 5.

## 2 Literature Review

### 2.1 Evidence on Self-promotion and Self-assessment

Self-promotion has various definitions in economics, management and psychology research, with the key feature of signalling oneself with good image to others which could benefit oneself financially or socially in return. As [Rudman \(1998\)](#) pointed out, self-promotion included “pointing with pride to one’s accomplishments, speaking directly about one’s strengths and talents”. For example, self-promotion often appears in research using social media data in the form of individual showing own deed or work ([Mancuso et al., 2019](#); [Peng et al., 2022](#)). However, in this paper, we focus on a more general term of self-promotion, which is self-evaluation conveying ability or performance to others with promotion incentive. Self-promotion incentive means the evaluation is related with potential payment ([Exley & Kessler, 2022](#)), making it different with self-assessment.

[Exley & Kessler \(2022\)](#) systematically explore the self-promotion behavior using controlled experiments. They elicited quantitatively subject self-evaluation after subjects conducted a math and science task, and provide promotion incen-

tive by informing them that their evaluation would serve as reference of payment decision by potential evaluators. They found evaluation was significantly higher in the presence of promotion incentive. More importantly, they found evidence of the gender gap in self-promotion and self-assessment without incentive at the same time, where women provided answers lower than equally performing men. With supplement experiments they showed the gender gap could attribute to the man-typed task, and arose early in teenage.

Although there is less research on self-promotion, the literature on self-assessment is extensive. One strand is using self-assessment to measure self-confidence. [Exley & Nielsen \(2024\)](#) measured self-evaluations in subjective and objective form after subjects completed an incentivized math and science test, and found robust gender gap in self-confidence: female provided more pessimistic view than equally performed male. Before [Exley & Nielsen \(2024\)](#), there are extensive literature on the gender gap in confidence, as it is proven to be one of the explanations to the gender gap in labour market outcome: the confidence gap relates to gap in earning expectations and occupation choice ([Reuben et al., 2017](#)). [Bordalo et al. \(2019\)](#) provided a potential reason of the confidence gap: people tend to be more confident in the task which is stereotyped to favor them, and vice versa. Here, we may also locate one of the factors that influences self-confidence: the stereotype or norm.

In addition to observing and comparing self-confidence, a more documented behavioral phenomenon is bias in self-confidence: overconfidence and underconfidence. Overestimation of own ability or performance happens frequently even without the promotion incentive mentioned above. [Bordalo et al. \(2019\)](#) found a prevailing overconfidence: subjects generally overestimate own ability, particularly in difficult tasks, regardless of gender and task. Specifically, there are three forms of overconfidence according to [Moore & Healy \(2008\)](#): overestimation, overplacement and overprecision, referring to overestimation of one's absolute skill, relative skill and precision of one's evaluation, respectively. [Santos-Pinto & de la](#)



Rosa (2020) thoroughly reviewed overconfidence in labor market and summarized several economic explanations for overconfidence. One of the main explanations is bias in belief updating process. Gervais & Odean (2001) modelled the self-serving bias leading to overconfident by assuming agents overweight the success. Möbius et al. (2022) provided evidence for the bias in actual belief updating of own ability compared to Bayesian process using experiments. They found subjects overweight positive feedback and underweight negative feedback, while update less than Bayesian standard overall. Similarly, in a context with repeated feedback of performance, Huffman et al. (2022) obtained empirical results from managers that they were overconfident about future performance and had overly positive memories about past performance. However, experimental evidence showed that repeated feedback could even impact confidence in the same direction regardless of its informativeness (Murad & Starmer, 2021).

In addition to updating bias, people tend to intentionally “distort” self-confidence for strategic reasons. In interpersonal games, agents use overconfidence to change rival’s behavior to benefit themselves. For example in two-player tournaments with stated confidence, Charness et al. (2018) found male would inflate self-confidence when deterrence is strategically optimal and male and female would deflate confidence when lure is strategically optimal. They argued that overconfidence is not always harmful and causing imperfect decisions as it could be used as strategy. More related to our context with evaluators, Thoma (2016) shows that men strategically deflate their self-assessment to be rewarded by evaluators who prefer underconfident candidates while women do not. In intrapersonal games, overconfidence changes behavior of one’s future self to benefit one’s present self, mainly documented as model of motivated belief (Bénabou & Tirole, 2002), which is also reflected in our model as distorting belief updating process to obtain a higher expectation. Combined interpersonal and intrapersonal strategy, Schwardmann & Van der Weele (2019) used experiment to show people self-deceive into higher self-confidence when they are informed of the opportunity to deceive others for

profit.

There are also non-strategic benefits leading to overconfidence, some of which generated from psychology and sociology research. [Köszegi \(2006\)](#) models preference of a good self image, “ego utility”, which results in overconfidence given objective information about ability. Also, it is shown in [Ewers & Zimmermann \(2015\)](#) that overestimation of ability could arise out of desire for social approval.

To sum up, given the inadequate research on self-promotion but fundamental works on self-assessment and self-confidence instead, our work fill the gap of decision-making of self-promotion by theoretical model (and future experimental evidence), with the self-confidence being considered as one determinant in the process. Our results will provide explanation for the far exist empirical findings of self-promotion.

## 2.2 Intrinsic Motivations in Self-promotion

As intrinsic motivations of self-promotion have not been adequately examined in a systematic and comprehensive manner, we not only review research on self-promotion in this section, but also look at intrinsic motivations for similar context such as report performance and signalling.

[Mancuso et al. \(2019\)](#) suggests the intrinsic costs of self-promotion mainly result from violation of modesty norm, demonstrated in two aspects: underlying preference for modesty, and social image concerns from others’ disapproval. In experiment they loosened modesty constraint by reducing the social image cost, which result in increase of self-promotion behavior. The influence of modesty norm is also supported by psychological experiments: [Moss-Racusin & Rudman \(2010\)](#) provide evidence for the inhibiting impact of backlash on women’s self-promotion; [Smith & Huntoon \(2014\)](#) used misattribution source to relieve the discomfort from violating modesty norm and hence improve the self-promotion performance. Therefore, we adopt modesty norm cost on self-promotion as a “constraint of

bragging”, following the definition that being modesty means careful avoidance of bragging (Driver, 1990). And the potential presence of evaluator (though with limited action in our model) satisfies the condition of social image concern of modesty norm.

Apart from the underconfidence caused by modesty norm and social image concern (Thoma, 2016), there are other similar potential mechanism recorded in psychological and economics research, which would lead to low self-assessment. Kőszegi et al. (2022) argued that low and fragile self-esteem could lead to low self-assessment even though the objective ability is higher, documented as “impostor syndrome”. Moreover, self-sabotaging behavior is also used to explain for the behaviors contrary to the pursuit of self-interest and success. It refers to individual actions and decisions that prevent one’s success and attempt to improve his/her performance (Zhang, 2022). As classified by Akin (2012), the behavior like under-report belongs to behavioral self-sabotaging, which is more purposeful and observable. People tend to get involved in self-sabotaging behaviors when they have difficulty in adapting into the environment so they can use it as an excuse for their poor performance (Collie et al., 2019). Also, long-term self-sabotage incurs negative consequences including poor performance (Akin, 2012), which in our case, reporting a low ability and receive potentially lower payment.

Though not discussed in works on self-promotion and self-assessment, the lying cost is inevitable in the context of reporting private information. We mainly focused on and review research on pure lie aversion here given the one-shot setting of our model, leaving out the reputation considerations. Kartik (2009) modelled a disutility from misrepresenting the private information, i.e. the cost of lying. It results in a dead-weight loss of welfare in their Sender-Receiver model, for that Sender always claims to be a higher type than he is. López-Pérez & Spiegelman (2013) give robust empirical evidence for this pure lie aversion using controlled lab experiment. Thus, it is reasonable to refer that in our setting of self-promotion agent bears a cost of lying when she over- or under-report.

More comprehensively, [Gneezy et al. \(2018\)](#) modelled the size of lying cost in three dimensions: payoff dimension measured by monetary gains of lying, outcome dimension measured by distance between truth and agent's report, and likelihood dimension measured by the ex ante probability of agent telling truth. Through experiment they found some subjects choosing not to lie the maximum amount, providing evidence for the constraint of lying cost. Also, under the social identity concern people made more partial lies when their reports were not going to be observed than when they could be observed. In our model, we consider of the payoff dimension and the outcome dimension to depict lying cost with different models respectively. We plan to test the different dimension of lying cost with experiment from their features in optimal decision.

Furthermore, the moral cost of lying can be alleviated through reciprocity, or more specifically retaliating against unkind treatment ([Alempaki et al., 2019](#)). Their gave subjects lying opportunity after dictator game, and found that people punished small amount in dictator game with lying and rewarded bigger amount with truth-telling. The moral cost of lying vanished when the lie for retaliating is costly to the liar. It revealed the irrational potential and content-dependency of the lying cost. In our model, with lying cost in dimension of monetary payoff we manage to capture this reciprocity from agent's response of a deflation in the rule.

As the current literature in self-promotion mainly worked on modesty and underconfidence as the intrinsic factors, we introduce the lying cost from a similar context into the self-promotion decision-making process, with the consideration of different measures of the cost size. By doing this we further fill the behavioral constraints of self-promotion, and recognize the possible intuitive response of a deflation in the rule – increase of the self-promotion.

## 2.3 Strategic Concerns in Self-promotion

Strategic concerns we discuss in this section mainly refer to possible actions from the side of evaluators and potential response of agents in expectation of which. The most related research in this aspect is [Thoma \(2016\)](#), who looked at how self-assessment is perceived and further explored agent’s strategy towards this perception. In his lab experiment, the agent’s belief of relative performance was elicited, and then principle chose from two agents of equal performance based on agents’ stated self-assessments. This allowed principle to know whether the agent is over- or under-confident. [Thoma \(2016\)](#) distinguished pure preference and strategic consideration from principle’s side by designing treatments where principle have monetary incentive to choose the better agent or not: in one treatment principle just chose one agent to give a reward, while in another principle bet the chosen agent to win. The result showed that principles rewarded underconfident more frequently than overconfident ones, and more expected underconfident agents to win as well.

On the side of agents, [Thoma \(2016\)](#) compare non-strategic settings where agents could not gain from being chosen with the strategic one where they could. They found male strategically deflated the self-assessment to get rewarded, while female did not. Especially, female even downgraded their self-assessment in non-strategic settings, which possibly came from their norm constraint of higher level of modesty. Still, their findings suggested the presence of strategical self-assessment with expectation of the principle’s preference, and the strength of modesty norm constraint to hold back the strategy.

Even without the selection process, just presence of principal could restrict self-assessment through social expectations and possibility of being observed. In [Ludwig et al. \(2017\)](#) experiments, women underestimated their performance when the self-assessment could be observed by principle, while men did not. This negative effect prevailed in both individual task and competitive setting, and was

reduced when the performance is partly observed with noise. Through the elicited belief they attributed the gender gap to different social expectations that men are expected to be overconfident while women are not. This mechanism was concluded as shame aversion, the key of which is the publicity of one's announcement that may differ with the fact. Thus, to avoid potential disutility from shame agents take the strategy of making less confident statements about themselves or even shy away from such situations.

Ludwig et al. (2017) showed how different social expectation could result in behavior gap through intrinsic preference. More directly, in labour market, the expectation of how one will be treated by demand side significantly affect behavior of supply side. Here we briefly review the behavioral response other than self-assessment behavior. For example the expectation of being discriminated by employers makes worker perform less productive because they could not get the fair payment of their effort (Glover et al., 2017); expected discrimination also lead to a lower willingness of leadership by female afraid of the disapproval by members (Heursen et al., 2020) and female choosing the training decisions consistent with stereotypes (Reuben et al., 2022). Thus, the fairness is also a related factor which we should discuss in the research of self-promotion. Akerlof & Yellen (1990) proposed the model where agents have a reference fair payment in their mind. The increase in payment only induce higher effort if it alleviates the unfairness, which is to say, the increase is based on an underpaid level. Cohn et al. (2015) provided evidence for this theory by field experiment, where the payment rise mainly impact effort though eliminating perceived unfairness, i.e., reducing the negative reciprocity (retaliation) towards firm. Therefore, in our research the fairness payment is defined as the same value of expected ability, and we look at the impact of preference and belief in self-promotion decision on this perception of fairness.

Combined with research on self-assessment above, it is obvious that the strategy based on the possible evaluations is negligible in self-promotion, but there lacks

research which take the strategies into the decision-making system together with the intrinsic preference. Our work consider the strategical behavior by incorporate the behavior of evaluators into payment rule, and thus build the equilibrium of self-promotion in a tractable way.

### 3 Model

In this section we model the self-promotion behavior taking the payment rule as given. First we present the model setting which applying to all the cases in our theoretical part. Then we beginning with the baseline model where the agent making self-promotion decision considering the payoff from payment rule and the cost from being immodest and potential lying, with the lying cost measured in outcome dimension ([Gneezy et al., 2018](#)). After obtaining the equilibrium and discuss the comparative statics, we show the design of equilibrium fair payment rule based on the self-promotion strategy and its properties. Then, we discuss the potential motivated belief in decision making process, in which we consider belief motivated by simple “ego utility” ([Köszegi, 2006](#)) and by “self-deception” lowering lying costs ([Schwardmann & Van der Weele, 2019](#)). By doing this, the agents depart from the pure rationality in a way that may lead to suboptimal decisions sacrificing payoff<sup>2</sup>. Finally, we show an alternative model with lying cost measured in monetary payoff dimension, and discuss the same perspectives as in baseline model.

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<sup>2</sup>For example, in [Larkin & Leider \(2012\)](#) experiment overconfident worker chose an incorrect piece rate for compensation. [Hoffman & Burks \(2020\)](#) found truck driver’s overestimation of own ability lead to lower welfare.

### 3.1 Model Setting

#### 3.1.1 Agent

*Information.* Agent has ability  $a_i = \mu + \epsilon_i$ ,  $\epsilon_i \sim N(0, \sigma_\epsilon^2)$ , with the common knowledge of average ability  $\mu$ , but the specific ability is unknown. In addition, she receives a private signal for her individual ability  $s_i = a_i + e_i$  with noise  $e_i \sim N(0, \sigma_e^2)$ . Thus, follow the belief updating agent forms expectation of her ability:

$$E(a_i|s_i) = \alpha\mu + (1 - \alpha)s_i \quad (1)$$

where she assigns different weight on the mean and signal. Following Bayesian updating of normal distribution, the weight parameter  $\alpha$  should be

$$\alpha = \frac{\sigma_e^2}{\sigma_e^2 + \sigma_\epsilon^2} \quad (2)$$

Upon receiving the signal, agent need to report her signal (or ability) to evaluators noted as  $\rho_i$ , signalling her ability to the evaluators, and receive payments  $w$  based on the exogenous payment rule.

*Preference.* Given her decided report, the agent derives utility from payment based on the rule, while has disutility from violating modesty and honesty norm. The utility function writes:

$$U = w(\rho_i) - m(\rho_i) - h(\rho_i, s_i) \quad (3)$$

where  $w$  refers to the monetary payment brought by the report according to the rule. The second term refers to modesty cost positively related with value of report (higher  $\rho_i$ , higher cost), depicting the utility loss from violating the modesty norm. The last term is lying cost, determined by the report and signal, the form of which may vary with the dimension of measuring lying cost size ([Gneezy et al., 2018](#)).



### 3.1.2 Payment Rule

The evaluator decides the rule which determine the payment for agent based on her report in advance. As the beliefs from evaluators is not considered in our model, we only introduce the potential payment agent would get by self-promotion (reflecting job opportunity, wage decision etc.). The rule is determined considering the possible bias in the report regarding to the true ability:

$$w = g\rho_i - k \quad (4)$$

where  $g$  is *coefficient* in the rule,  $k$  is *deflation* in the rule, designed to offset the potential overestimation. However, in some cases  $k$  could be negative, that is, to compensate agents for a excessive low report, which we will discuss later.

## 3.2 Baseline Model

### 3.2.1 Equilibrium and Comparative Statics

In baseline model we consider the linear cost of modesty and honesty norm, with the lying cost measured in outcome dimension, i.e. the distance between true signal and the report  $|\rho_i - s_i|$ . Agent maximizes

$$g\rho_i - k - m\rho_i - \frac{h}{2}(\rho_i - s_i)^2 \quad (5)$$

where  $m, h > 0$ . F.O.C delivers

$$g - m - h(\rho_i - s_i) = 0 \quad (6)$$

and optimal reporting behavior is

$$\rho_i^* = s_i + \frac{g - m}{h} \quad (7)$$

**Proposition 1** (Equilibrium Self-promotion): When the payment is given by  $g\rho_i - k$ , then the optimal report behavior of agent will be  $\rho_i^* = s_i + \frac{g-m}{h}$ .

In equilibrium the agent reports true signal with an inflation part. Note that although it is intuitive for the inflation part to be positive as the self-promotion behavior shows, and in most cases it is, in some extreme cases the report could be below the true signal.

**Corollary 1** (Comparative statics)

1. Report decreases with  $m$  and  $h$ : higher marginal cost of modesty and lying lead to less self-promotion.
2. The deflation part  $k$  in the rule doesn't enter into the optimal behavior. A larger deflation only reduce agent's welfare.
3. There is positive self-promotion when  $g > m$ , truthful report of the signal when  $g = m$ , and under-report when  $g < m$ .

The case of  $g < m$  in Corollary 1 shows when payment rule discounts report too much that the marginal benefit from self-promotion is too little compared with the loss from modesty norm, thus the agent under-report to save costs. Also, we can consider there are two groups with different modesty norm:  $m' < m''$ . If the evaluator set the rule as  $g = m'$  without knowing this difference, the group with  $m''$  would have to under-report. Then with same signal there will be a gap of self-promotion, which have implication on the evidence of modesty gender gap (Moss-Racusin & Rudman, 2010; Smith & Huntoon, 2014; Mancuso et al., 2019) and self-promotion gender gap (Exley & Kessler, 2022).

### 3.2.2 Fair Payment Rule

In this section we consider how to determine a payment rule perceived fair by agent based on her optimal decision. In this way, we can further explore whether the properties of self-promotion behavior would affect the fairness of the policy, and how to make rules according to the self-promotion strategy.

Substituting for the optimal  $\rho_i$  we obtain in equation (7) in the payment rule we have the equilibrium payment

$$w = gs_i + \frac{g}{h}(g - m) - k \quad (8)$$

Further, we consider a payment rule as “fair” if it ensures the agent receives a payment equal to his expected ability conditional on  $s_i$ :

$$gs_i + \frac{g}{h}(g - m) - k = \alpha\mu + (1 - \alpha)s_i \quad (9)$$

By making this equation work for all  $s_i$ , we can solve for the coefficient and deflation part

$$g = 1 - \alpha \quad (10)$$

$$k = \frac{1 - \alpha}{h}(1 - \alpha - m) - \alpha\mu \quad (11)$$

**Proposition 2** (Fair Payment Rule): The equilibrium fair payment rule  $w = (1 - \alpha)\rho_i + \alpha\mu - \frac{1-\alpha}{h}(1 - \alpha - m)$  always gives payment equal to agent’s expected ability.

The first two terms is the expected ability if the agent could be trusted to report  $\rho_i = s_i$ , and the last term is the adjustment based on the potential inflation in agent’s self-promotion. Note that the presence of this adjustment doesn’t mean the agent receive a biased result or treated unfairly, instead it’s taking the endogenous strategy into consideration that makes the exogenous rule fair for all  $s_i$ . Now we discuss the property of the adjustment.

**Corollary 2** (Properties of Fair Payment Rule):

1. Facing same report, the fair payment rule gives more payment to agent with higher  $m, h$ .
2. If the payment rule is same for two groups with different parameters, then at least one group will perceive the rule unfair.

3. The fair payment rule accounts for the underestimation and compensate for it when the agent’s modesty cost is excessively high ( $m > 1 - \alpha$ ).

First, as the last term of fair rule reflects the adjustment on agent’s potential deviation from her signal, its change mirrors the comparative statics of  $\rho_i^*$ . With higher norm cost the agent self-promotes less in the report, which thus suggests higher ability.

Second, the fairness of the rule is based on the correctly set parameters. Consider again the example of two groups with different value of  $m$ : a necessary condition for both groups to receive a fair payment is to specify parameter  $k$  in the rule. If the fair payment rule is set with  $m'$ , group with a higher modesty norm cost will receive payment lower than expected ability:

$$w - E(a_i|s_i) = \frac{1 - \alpha}{h}(m' - m'') < 0 \quad (12)$$

Third, the adjustment is not always downward. If  $m > 1 - \alpha$ , the adjustment part is positive, suggesting that evaluators actually increase the payment based on the report. The fair payment compensates agent for the underestimation her makes due to excessive modesty. It lines with the experimental findings by [Thoma \(2016\)](#) that underconfident agents were rewarded by principle more often than overconfident agents and also were more often expected to win, providing theoretical explanation to some extent.

### 3.2.3 Motivated Belief

When forming beliefs about own ability, people tend to be overconfident regardless of all other strategy considerations, for they could derive “ego utility” from positive views about themselves ([Kőszegi, 2006](#)). In our case, they may distort own expectations in the updating process to believe in a higher ability. While we call this distortion motivated belief here, it is also consistent with the theoretical and experimental evidence of overconfidence. Before the analysis, we summarize the

necessary assumptions for the motivated belief from our model setting, according to the theory of motivated belief (Bénabou & Tirole, 2002).

**Assumption 1:**  $\alpha$  is formed by agent instead of given.

Although the distribution is common knowledge, meaning that Bayesian updating coefficient  $\alpha$  could be calculated, usually individuals cannot do Bayesian updating precisely as showed in experiments (Exley & Nielsen, 2024). Also, people tend to recall information which would against their benefit with less accuracy (Brunnermeier & Parker, 2005). Thus, although they may have all the information to do updating correctly,  $\alpha$  could still be “uncertain” for them, which is the first step of motivated belief. This also contains another assumption:

**Assumption 2:** Agent can choose belief about  $\alpha$ .

**Assumption 3:** Agent receives direct utility from her belief about ability.

As there is no material utility for expected ability itself in baseline model, we introduce a simple representation of psychological utility from it.

$$g\rho_i - k - m\rho_i - \frac{h}{2}(\rho_i - s_i)^2 + b(\hat{\alpha}\mu + (1 - \hat{\alpha})s_i) - \frac{z}{2}(\hat{\alpha} - \alpha)^2 \quad (13)$$

where we use  $\hat{\alpha}$  to represent the distorted belief of agent, while  $\alpha$  is the correct Bayesian updating weight. For better calibration we also include a constraint for motivated belief: otherwise agent will raise or reduce  $\alpha$  to the extreme value. Intuitively, this constraint could be driven by the cost of too much self-deception, as higher aspiration would risk higher disappointment, which in line with the social psychological findings (Lockwood & Kunda, 1997; LeBoeuf & Estes, 2004). As this added term would not influence the optimal choice of  $\rho_i$ , we could analyze last two terms independently. Agent choose  $\hat{\alpha}$  to maximize the utility from building a good self image:

$$b(\hat{\alpha}\mu + (1 - \hat{\alpha})s_i) - \frac{z}{2}(\hat{\alpha} - \alpha)^2 \quad (14)$$

with the solution

$$\hat{\alpha} = \alpha + \frac{b}{z}(\mu - s_i) \quad (15)$$

Then it's obvious that for the agent receiving signal below average, they will raise  $\alpha$  to put more weight on mean and less weight on signal. For workers better than average, they will reduce  $\alpha$  to put more weight on signal.

**Proposition 3:** When agent obtains utility from good self image of a higher expected utility, they will motivated the weight as  $\hat{\alpha} = \alpha + \frac{b}{z}(\mu - s_i)$  with direction depending on the signal relative to average ability.

We already know that the added term in utility function has no impact on equilibrium. However, it could impact perception of the fairness payment. We first look at agent with  $\mu < s_i$ , who will shrink  $\hat{\alpha}$ :  $\hat{\alpha} < \alpha$ . Substituting  $\alpha$  and  $\hat{\alpha}$  into optimal report and payment rule, respectively. We have

$$w - E(\hat{a}_i | s_i) = (\alpha - \hat{\alpha})(\mu - s_i) + \frac{(1 - \alpha)(1 - \alpha - m) - (1 - \hat{\alpha})(1 - \hat{\alpha} - m)}{h} < 0$$

which means the payment is perceived unfair that it is less than the expected ability. For those with  $\mu > s_i$  who will magnify  $\alpha$ , the sign of  $\bar{w} - E(a_i | s_i)$  is uncertain. At least it suggest that the workers receiving signals above average would perceive the predetermined fair payment rule unfair due to motivated beliefs. Like in model of [Fang & Moscarini \(2005\)](#) where overconfidence can lead the principal to prefer a non-differentiation policy, it may be sub-optimal to set the fair payment rule according to the equilibrium parameters when the motivated belief exist.

**Corollary 3:** When motivated belief exists, the equilibrium would not change, but it is impossible to find a payment rule that is perceived as fair by all the workers.

Next, we consider an alternative way to model motivated belief. Suppose agent is not asked to report her signal, but her expected ability. In this way, the lying cost will be measured based on expected ability instead, which make it possible

for motivated belief to influence report decision. We explain how it works in detail below. Now agent maximizes

$$g\rho_i - k - m\rho_i - \frac{h}{2}(\rho_i - E(a_i|s_i))^2 - \frac{z}{2}(\hat{\alpha} - \alpha)^2 \quad (16)$$

where  $E(a_i|s_i) = \hat{\alpha}\mu + (1 - \hat{\alpha})s_i$ . This utility function satisfying three assumptions mentioned above, also including the cost of motivated belief. The optimal reporting behavior is

$$\rho_i^* = s_i + \hat{\alpha}(\mu - s_i) + \frac{g - m}{h} \quad (17)$$

Keep  $g, k$  unchanged, the payment depends only on  $\rho_i$ . Therefore, agent is motivated to maximize  $\rho_i$  with respect to  $\hat{\alpha}$ . Following the similar procedure we have the solution for motivated belief

$$\hat{\alpha} = \alpha + \frac{1}{z}(\mu - s_i) \quad (18)$$

Therefore, when  $s_i < \mu$ , agent is motivated to increase  $\alpha$  for higher payoff; when  $s_i > \mu$ , agent is motivated to reduce  $\alpha$  to minimize loss. This is consistent with motivated belief from above mentioned psychological utility. In both cases the motivated belief leads to a higher  $\rho_i$ .

**Proposition 4:** When the lying cost depend on expected ability, agent self-promotes more due to motivated beliefs.

### 3.3 Outcome-determined Lying Cost

Now we consider lying cost in the monetary payoff dimension. According to [Gneezy et al. \(2018\)](#), it depends on the gains of lying. In our case, agent will only bear cost of lying if the payment induced by report does not equal to her expected ability. Thus agent maximizes

$$g\rho_i - k - m\rho_i - \frac{h}{2}(g\rho_i - k - E(a_i|s_i))^2 \quad (19)$$

F.O.C delivers

$$g - m - gh(g\rho_i - k - \alpha\mu - (1 - \alpha)s_i) = 0 \quad (20)$$

with optimal solution

$$\rho_i^* = \frac{g - m}{g^2h} + \frac{k + \alpha\mu + (1 - \alpha)s_i}{g} \quad (21)$$

**Proposition 5:** When the lying cost depend on the difference between payment and expected ability, the optimal report behavior will be  $\rho_i^* = \frac{g-m}{g^2h} + \frac{k+\alpha\mu+(1-\alpha)s_i}{g}$ .

In this case the deflation  $k$  in the rule enters into the equilibrium solution.  $\rho_i$  increase with  $k$ , meaning that agent respond to deflation by the evaluator with inflation in report. This model suggests the reciprocal behavior in self-promotion: consider a evaluator with taste-based discrimination as in [Bohren et al. \(2019\)](#), who then set the payment rule towards certain group with a direct deduction in payment,  $k' > k$ . Expecting the discrimination, agent would respond with a increase of self-promotion by  $x < k'$ .

The condition for payment equal to expected ability is  $g = m$ ,  $k$  does not defined. When  $g > m$ ,  $w > E(a_i|s_i)$  and vice versa. Substituting in the optimal report, we have  $\rho_i^* = \frac{k+\alpha\mu+(1-\alpha)s_i}{m}$ . The parameter  $h$  doesn't exist because the fair payment rule always ensures the payment equal to expected ability, and in this way there is no lying cost generated in decision making, which measured by the distance between payment and expected ability.

There is also potential for motivated belief in this case as the expected ability enters into the lying cost as in equation (16). As the solution for motivated belief is same with second case in Section 3.2.3, we will not discuss it again here.

**Corollary 4:** When the lying cost depend on the difference between payment and expected ability:

1. Agent respond to more deflation,  $k$ , in the rule with higher self-promotion.



2. The fair payment rule only need marginal profit of self-promotion to be equal to marginal cost of modesty, i.e.,  $g = m$ .

## 4 Experiment Design and Hypotheses

To test the theoretical model, we plan to conduct controlled lab experiments. Subjects need to do the self-promotion decision as shown above in the model. The main procedure is same across treatments: subject has to complete a cognitive test (e.g. Raven’s Advanced Progressive Matrices Test, [Raven & Court, 2003](#)) as a measure of their ability, and they will receive feedback of their score in a range as the noisy signal for their ability, as well as the average score of all subjects in the same session. For example, the subject gets 8 answers right, she will receive a feedback randomly picked from the range [6,10]. Then we will elicit their belief of own score.

After the test and belief elicitation, subjects are informed of the exact payment rule and that they have to report their signal/ability to receive the payment by entering a number in computer. This procedure will repeat several rounds, and we will randomly choose some of them to give payment.

We conduct two between-subject treatments. The main difference between them is that in one treatment (note as SG), subject is asked to report thei feedback they received, while in other treatment (note as AB), they are asked to report their ability (how many correct answers they think they have got). The two treatments correspond to the baseline model and the model in which motivated belief is going to impact report decision.

Inside each treatment, we will have within-subject treatments of rules with different parameters ( $g$  and  $k$ ) using strategic methods. To be more specific, we set three level of rules: the *Base* serving as the benchmark, the *Discounting* with a lower  $g$ , and the *Deflation* with a higher  $k$ . The order of three within treatments will be randomized. They are used to test comparative static about payment rule

on the self-promotion decision. Subjects should submit their reports under each scenario, and we will randomly pick one to realize their payoff. After reporting under each rule, we elicit subject’s perception of the fairness of the rule.

Besides the cognitive test and reporting task which give us the main variables, we also plan to measure the lying aversion (the cost  $h$ ) using the cheating game (Gneezy et al., 2018), where subjects randomly see a number and report privately. With various payment on the rewarded number, we can obtain the marginal cost from turning point. At the end subjects are asked to complete a questionnaire for demographics information, including the question about modesty cost. The procedure is shown as Figure 1.

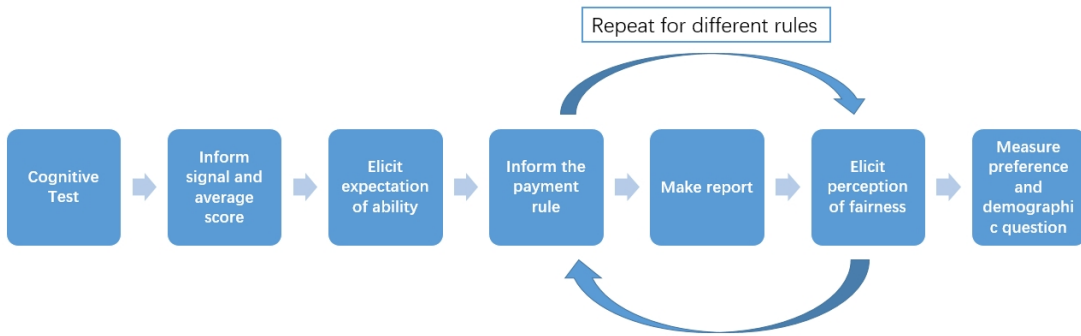


Figure 1: Experiment procedure

Based on results of the model and experiment design above, we describe testable hypotheses. First we use *Base* and *Discounting* to test the comparative statics. Hypothesis 1 comes from Proposition 1 and Hypothesis 2 is from Corollary 1.

**Hypothesis 1:** Compared with *Base*, subject with same feedback reports lower value in *Discounting* treatment.

**Hypothesis 2:** There is subject who reports value lower than the feedback she received in *Discounting* treatment.

We use the *Deflation* to test between the baseline model and the outcome-determined lying cost model. According to Corollary 1 and Corollary 4, if Hypothesis 2a is accepted while Hypothesis 2b is rejected, the baseline model is supported, otherwise the outcome-determined lying cost model could reflect the self-promotion decision making better.

**Hypothesis 3a:** Subject with same level of feedback reports same value in *Base* and *Deflation* treatment.

**Hypothesis 3b:** Subject with same level of feedback reports higher value in the *Deflation* treatment than *Base*.

Next we test the presence of motivated belief through comparison between SG and AB treatment. According to Corollary 3 and Proposition 4, we give Hypothesis 4. Further, we develop Hypothesis 5 to test for the distortion of motivated belief on the perception of fairness of the rule.

**Hypothesis 4:** Subjects who receive feedback below average ability will report higher value in AB treatment than in SG. Subjects who receive signal above average ability will report lower value in AB treatment than in SG.

**Hypothesis 5:** Subjects who receive signal above average ability will perceive the rule unfair.

Finally, we briefly describe the plan for data analysis. The variables we obtain from experiment include the report value which represents self-promotion behavior as key variable, belief variables such as expectation of ability and the perception of fairness, individual character variables like ability, signal and elicited lying aversion, and demographics (gender, age, major etc.) as control variables. For data analysis we will consider both non-parameter methods such as comparison between treatments, and regressions such as the relationship between report and parameters of the rule. The results will be mainly developed following the frame of our hypotheses.

## 5 Possible Extensions

The possible extension in the experiment is also considered. As documented in [Ludwig et al. \(2017\)](#), being observed (as overestimating) brings shame and constraint individual self-assessment behavior. [Gneezy et al. \(2018\)](#) also showed that with social identity concern, individuals lied more when they could not be observed than the observation from experimenter existed. The presence of real evaluator which observes the report, even though without action, could better simulate the real world. We consider a progressive design. The first one is subjects do the report facing the rule given by computer, and their report will not be observed by human evaluator. In the second one there is human evaluator matched with each worker and observe the report, but the payoff is still determined by the given rule, while the evaluator has no action. The last one introduce human evaluator to do the evaluation, using the strategic method where evaluator should decide for payment for each possible report value in advance. By comparing the three treatments, we are able to enhance our understanding of the modesty and honesty norm constraint on self-promotion behavior while observing the main decision-making process as above, and analyze the difference between human interaction and response to the rule.

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