Incentives, Self-selection, and Social Norms in the Labor Contract: A Two-stage Field Experiment in the Philippines

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Abstract

This paper decomposes productivity difference between fixed wage (FW) contract and individual piece rate (IPR) contract into self-selection and incentive effects, using unique two-stage field experiment. We offered an option of switching to IPR contract for agricultural workers in the Philippines, whose default option has traditionally been FW contract, and we converted random half of those who opted for IPR contract back to the original FW contract. By comparing three groups, i.e., those who chose and worked under IPR contract, those who chose IPR but worked under FW contract, and those who chose and worked under FW contract, we find that the self-selection effect accounts for 60% of the productivity difference between the two types of contract. By combining with the data collected from lab-in-the field experiment, we find that the choice of IPR contract is associated with social norm parameters, namely, inequity aversion and kinship tax rate. Exploiting our random group assignment, we also find that the influence of social norm is particularly strong when the workers have high probability of repeated interaction with other group members, suggesting the presence of a community enforcement mechanism in agrarian villages.

Keywords: social norm, inequity aversion, kinship tax, community enforcement

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1 Introduction

One of the most important tenets in economics is among other things that individual behavior is influenced by both economic incentives and social norms, which was originally put forward by Adam Smith (1790). Economic incentives work through two mechanisms in labor contracts: first, individuals positively respond to the intensity of incentives (incentive effect); second, individuals who have distinct characteristics like permanent ability that determine their productivity sort themselves accordingly into different types of incentive schemes out of various options (self-selection effect). Disentangling these two effects is indispensable since they have different implications for efficiency: an incentive effect denotes a causal impact of an intensity of incentives on worker's effort level whereas a self-selection effect could simply be labor reallocation between options of contracts.

Social norms might shape these two effects. In fact, recent studies show that social preferences and social norms could prominently alter the way that people react to economic incentives (Bandiera, Barankay, & Rasul, 2005, 2009, 2010; Goto, Sawada, Aida, & Aoyagi, 2015). Few studies, however, unveil how these social incentives shape self-selection processes despite the fact that understanding those phenomena and their mechanisms are of importance to design optimal contracts in labor markets and to settle the policy debate on whether introducing variable payment schemes results in an increase of firm's productivity as a whole.

Dohmen and Falk (2011) is the exceptional and seminal work in providing the first experimental evidence on the roles of social preferences in sorting processes. They conduct a controlled laboratory experiment in which subjects are asked to select one of the contracts between the fixed payment and variable payments such as individual piece rate, revenue-sharing, or tournament and find that productivity gap between fixed and variable payments is largely driven by selection process and individuals' trust is positively correlated with the choice of individual piece rate. Their study provokes several open questions which are still left unanswered. First, how important is a self-selection effect compared to an incentive effect? To separately quantify both of effects requires us to develop new experimental design to create exogenous variation in self-selection process. Second, can we regard the correlation between social preferences and individual sorting behavior as the causality? To identify the causal relationship between social preferences and individual behavior is notoriously difficult due to endogeneity problems. Third, in order to ensure the external validity, we should accumulate additional experimental evidence for larger samples, more realistic workplaces, and more relevant social preferences such as fairness or sensitivity to social reputation than the controlled lab experiment by Dohmen and Falk (2011). Finally, if social preferences and norms are effective in workplaces, under what conditions do they emerge? Repeated interaction and informal enforcement mechanisms such as reputation seem to play significant roles in laboratory experiments (Bó, 2005; Bó & Fréchette, 2011), but, to the best of our knowledge, no empirical studies provide the answer for this question due to the difficulties to collect relevant data.

This paper is the first attempt to give answers to all of above questions. To do so, we developed and implemented the two-stage field experiment in the traditional rice-planting contract in the Philippines. We recruited a pool of rice-planting workers and organized them into several working teams, each of which consists of four to seven workers. In the first stage of the experiment, we offered two options of contracts for workers, i.e. fixed wage (FW) and individual piece rate (IPR), and each worker could choose one of them that he or she prefers. In the second stage, workers who chose IPR were randomly converted into FW with 50% probability. Then they were asked to plant rice seedlings in assigned plots together with own team members. These processes constitute one experimental session and our data includes 28 sessions. In addition, we carried out two types of lab-in-the-field experiments for all of participants in th field experiment, i.e. ultimatum game and kinship tax game to elicit inequity aversion (Fehr & Schmidt, 1999) and kinship tax rate (Squires, 2016), respectively.[1] These experiments are modified versions of standard ultimatum game and kinship tax game adopted by Beekman, Gatto, and Nillesen (2015); Boltz, Marazyan, and Villar (2015); Squires (2016) such that each subject is matched with *all* of subjects except for oneself. Therefore elicited individual preferences and kinship tax rate are varied with the matched partners.

Each stage in the experiment is well-designed to answer specific research questions. First, comparing productivity of those who chose FW in the first stage to those who chose IPR in the first stage but were converted into FW in the second stage allows us to accurately measure a self-selection effect. An incentive effect can also be quantified by comparing productivity of those who chose IPR but were converted to those who chose IPR but were not converted. Second, the random assignment of peers in every session, combined with the data of social preferences and kinship tax rate for each peer, permits us to identify the causal impacts of social norms on workers' choice decisions. Third, the randomized team formation procedure also makes it possible to utilize the fact that

[1] Kinship tax rate can be defined as the willingness-to-pay to hide own income from specified others. Hence, kinship tax rate reflects the strength of social pressure to redistribute one's own income to socially connected people.

seasonal workers temporally migrate to the survey villages. Specifically, we randomly assign the seasonal workers into teams which are composed by local workers. Since they are not socially connected each other at all and seasonal workers never return back to the same village at least for several years this creates exogenous variations in terms of the intensity of repeated interaction within a team. Then we examine the causal impacts of infinite repeated interaction on the emergence of social norms in worker's self-selection process. This can be considered as the first experimental investigation for the community enforcement mechanism suggested by Kandori (1992).

There are three main empirical results. First, a simple econometric analysis shows that the self-selection effect is more prominent by 1.6 times than the incentive effect in explaining the productivity gap between FW and IPR. Second, social norms shape a major part of the self-selection process. Guilt aversion and kinship tax can be obstacle for workers to opt for more remunerative option while enviousness pushes them to choose IPR to reduce an income disparity between teammates. Third, social norms are likely to emerge if workers conceive that community enforcement mechanisms such as infinite repeated interaction and informal reputation system are in effective.

This paper contributes several strands of the literature. First, this paper is closely related to the literature that separately identifies the selection and incentive effects in the workplaces. As the seminal work, Lazear (2000) quantifies worker-selection effects using non-experimental panel data collected in the large manufacturing factory in the U.S., as opposed to causal effects of financial incentives, and concludes that a half of the increase of productivity might result from the sorting into the piece-rates scheme by more able workers. Some recent papers utilizing experimental methods confirm the Lazear (2000)'s conclusion on the importance of selection effects (Guiteras & Jack, 2014; Leuven, Oosterbeek, Sonnemans, & Van Der Klaauw, 2011; Cadsby, Song, & Tapon, 2007). Among other things, the most relevant paper is Kim, Kim, and Kim (2017). They provide empirical evidence on how career and wage incentives affect labor productivity through worker selection and causal effect channels by the two-stage randomized controlled trial in Malawi. In their setting, the career incentives are the combination of a future job prospect and a recommendation letter while the wage incentives are a lump-sum salary and performance-based bonus payment. Our paper extends Kim et al. (2017) in three ways. First, we focus on more general and broadly-common incentive contracts which are the same schemes with Lazear (2000). Second, we implemented multiple experimental rounds in each of which workers were repeatedly asked to select out one of contracts from available options, which enables us to estimate how persistent the effect of the choice of contracts is and how much their behavior is path dependent. Third, we explore the role of social norms as key explanatory variables to determine the selection process on which Kim et al. (2017) shed less light.

Second, this paper compliments the another literature on the role of social norms in shaping economic behavior (see Festre (2010) for a comprehensive review). Specifically, our paper precisely identifies the causal impacts of social norms on the self-selection process in the agrarian labor contract. Third, this paper extends theoretical literature on cooperative behavior in the repeated game and informal enforcement mechanisms by investigating under what conditions social norms emerge in village communities. Exogenous variations of the repeated interaction and the availability of past history of matched players quantify the causality. Finally, this paper also contributes the methodology of field experiments by showing that a two-stage field experiment can parse out the selection process from incentive effects such as Ashraf, Berry, and Shapiro (2010), Karlan and Zinman (2009), and Kim et al. (2017), employing multiple stages of randomization.

The rest of paper is structured as follows. Section 2 sets up simple conceptual frameworks and proposes hypotheses. Section 3 describes the context and experimental designs. Section 4 and 5 explain the data and show descriptive statistics for key variables. Section 6 provides econometric strategies and empirical results. Section 7 concludes.

2 Conceptual Framework

This section provides simple conceptual frameworks to formalize how economic and social incentives such as inequity aversion and kinship taxation affect worker's behavior in the workplace.

2.1 Incentive and Self-selection Effects, and Social Preferences

2.1.1 Setup

Consider a group of N workers. Each worker i exerts $e_i \geq 0$ units of effort which determines her productivity. We assume that effort equals productivity in what follows. In FW, a worker's payoff is

$$w_i^{FW} = \begin{cases} F - \dfrac{\theta_i e_i^2}{2} & \text{if } e_i \geq e_0 \\ 0 - \dfrac{\theta_i e_i^2}{2} & \text{if } e_i < e_0 \end{cases} \tag{1}$$

where F is a fixed component which is common among all of workers who are under FW. The cost of effort is denoted by $(\theta_i e_i^2)/2$ in which θ_i indicates the inverse of the workers' innate ability and $\theta = (0, 1]$. Note that there is a minimum requirement of the outcome or the effort level e_0 at which a worker can get paid. On the other hand, the payoff in IPR is defined as

$$w_i^{IPR} = \phi(e_i) - \frac{\theta_i e_i^2}{2}, \tag{2}$$

where $\phi(e_i)$ is the incentive component which is proportional to a worker's productivity and here we define that $\phi(e_i) = a \times e_i$ for simplification in which a is a constant that can be interpreted as an intensity of incentive in this setup.

Assumption 1. *The minimum requirement of effort level is set at which the least abled worker can earn nothing or $e_0 = \sqrt{2F}$.*

Assumption 2. *A worker is always able to earn more money in IPR than in FW if she exerts the minimum requirement level of effort or $ae_0 > F$.*

Assumption 2 implies that IPR always gives a worker higher revenue than FW if we don't consider social preferences and kinship tax rate.

The game consists of three stages. In the first stage, a group of N workers are randomly organized into j sub-groups in which two workers i and k are involved. In the second stage, two types of compensation schemes mentioned above are proposed and workers are asked to single out a contract scheme from them. In the third stage, each agent decides simultaneously a level of effort, e_i and e_k, respectively. The choice of contract and the effort level are observable only between two agents and the principal.

In order to incorporate social norms and derive theoretical predictions, we suppose that the agents are heterogeneous in their preference of inequity aversion originally proposed by Fehr and Schmidt (1999) and the sensitivity to keep her own social reputation by complying the income redistribution arrangement in the community[2].

The predictions are derived by backward induction. We solve first the third stage of the game to deduce equilibrium efforts. Then we solve the second stage to analyze optimal self-selection of the agents depending on inequity aversion and kinship tax.

2.1.2 Worker's optimal response

Fixed Wage. We define the degree of i's disadvantage $\Delta_i^{\alpha,FW}$ in the payoff toward k as follows:

$$\Delta_i^{\alpha,FW} = \left\{P_k(\theta_k) w_k^{IPR} + (1 - P_k(\theta_k))\, w_k^{FW}\right\} - w_i^{FW} \tag{3}$$

[2]These are two key components of moral sentiments as originally shown in Smith (1790).

and i's advantage is $\Delta_i^{\beta,FW} = -\Delta_i^{\alpha,FW}$, where $P_k(\theta_k)$ is the probability that player k opts for IPR, which is a function of individual permanent ability.

The utility function for player i in FW is a following:

$$U_i^{FW}(e_i) = \begin{cases} (1-\tau_i)w_i^{FW} - g\left(\Delta_i^{\alpha,FW}(e_i)\right), & \text{if } \Delta_i^{\alpha,FW} > 0, \\ (1-\tau_i)w_i^{FW} - h\left(\Delta_i^{\beta,FW}(e_i)\right), & \text{if } \Delta_i^{\beta,FW} > 0, \end{cases} \tag{4}$$

where τ_i is a kinship tax rate obligated by i for k and $\tau = [0,1)$. Two functions g and h reflect the disutility coming from enviousness and guilt aversion, respectively.[3] Note that this specification is based on non-linear inequity aversion which is a generalized form of Fehr and Schmidt (1999). Therefore, assume that $\partial g(\cdot)/\partial\Delta_i^{\alpha,FW} > 0$, $\partial^2 g(\cdot)/\left(\partial\Delta_i^{\alpha,FW}\right)^2 < 0$, $\partial h(\cdot)/\partial\Delta_i^{\beta,FW} > 0$, and $\partial^2 h(\cdot)/\left(\partial\Delta_i^{\beta,FW}\right)^2 < 0$. Hence $g' = \partial g(\cdot)/\partial e_i > 0$ and $h' = \partial h(\cdot)/\partial e_i < 0$.

With these assumptions and if $\Delta_i^{\alpha,FW} > 0$, player i exerts exactly e_0 since putting additional effort does not produce anything but incurs costs under FW and also enlarges the degree of one's disadvantage, which brings additional disutility through a function $g(\cdot)$. Then, the Nash equilibrium effort for player i is $e_i^{*FW}\big|_{\Delta_i^{\alpha,FW}>0} = e_0$ given player k's effort level.

Next, if $\Delta_i^{\beta,FW} > 0$, again assuming that worker i chooses her effort taking the effort of others as given, the Nash equilibrium effort of worker i solves $(1-\tau_i)\left(-\theta_i\, e_i^{*FW}\big|_{\Delta_i^{\beta,FW}>0}\right) = h'\left(e_i^{*FW}\big|_{\Delta_i^{\beta,FW}>0}\right)$. Hence, $1-\tau_i = \dfrac{\partial h(\cdot)}{\partial\Delta_i^{\beta,FW}}$.

So in this case, putting more effort in a task decreases the difference in the payoff between i and k by reducing i's advantage although it will also incur effort costs. Worker i balances them out and as a result she might exert a larger amount of effort than e_0 even without any monetary incentive.

Individual Piece Rate. Like under FW, first we define $\Delta_i^{\alpha,IPR}$ as follows:

$$\Delta_i^{\alpha,IPR} = \left\{P_k(\theta_k)w_k^{IPR} + (1-P_k(\theta_k))\,w_k^{FW}\right\} - w_i^{IPR}, \tag{5}$$

and $\Delta_i^{\beta,IPR} = -\Delta_i^{\alpha,IPR}$. The utility function for player i in IPR is a following:

$$U_i^{IPR}(e_i) = \begin{cases} (1-\tau_i)w_i^{IPR} - l\left(\Delta_i^{\alpha,IPR}(e_i)\right), & \text{if } \Delta_i^{\alpha,IPR} > 0, \\ (1-\tau_i)w_i^{IPR} - m\left(\Delta_i^{\beta,IPR}(e_i)\right), & \text{if } \Delta_i^{\beta,IPR} > 0, \end{cases} \tag{6}$$

[3] We drop the term $\tau_k\left\{P_k(\theta_k)w_k^{IPR} + (1-P_k(\theta_k))\,w_k^{FW}\right\}$, which denotes the expected transfer sent by k to i in order to keep the setting as simple as possible without loosing generality.

where $g\left(\Delta_i^{\alpha,FW}\right) = l\left(\Delta_i^{\alpha,IPR}\right)$ if and only if $\Delta_i^{\alpha,FW} = \Delta_i^{\alpha,IPR}$ and the same assumption are applied for $h(\cdot)$ and $m(\cdot)$. We know that $\left(1 - \tau_i + \dfrac{\partial l}{\partial \Delta_i^{\alpha,IPR}}\right) > 0$ and $\left(1 - \tau_i - \dfrac{\partial m}{\partial \Delta_i^{\beta,IPR}}\right) > 0$.[4]

If $\Delta_i^{\alpha,IPR} > 0$, the Nash equilibrium effort level is determined in satisfying

$$\left(1 - \tau_i + \frac{\partial l}{\partial \Delta_i^{\alpha,IPR}}\right)\left(\phi_i' - \theta_i\, e_i^{*IPR}\big|_{\Delta_i^{\alpha,IPR}>0}\right) = 0. \tag{7}$$

Hence, $\phi' = \theta_i\, e_i^{*IPR}\big|_{\Delta_i^{\alpha,IPR}>0}$ should hold under above assumptions.

Intuitively, this implies that the equilibrium effort level is determined without any influence of social preferences and it depends only on the intensity of incentives and individual ability. In other words, guilt aversion, enviousness, and kinship tax do not play any role in this case.

Similarly, if $\Delta_i^{\beta,IPR} > 0$, the Nash equilibrium effort level is determined in satisfying

$$\left(1 - \tau_i - \frac{\partial m}{\partial \Delta_i^{\beta,IPR}}\right)\left(\phi_i' - \theta_i\, e_i^{*IPR}\big|_{\Delta_i^{\beta,IPR}>0}\right) = 0. \tag{8}$$

Hence, $\phi_i' = \theta_i\, e_i^{*IPR}\big|_{\Delta_i^{\beta,IPR}>0}$ holds. This equilibrium effort level is the same with the case that $\Delta_i^{\alpha,IPR} > 0$.

Incentive Effect. By comparing the optimal effort level between FW and IPR for two cases, theoretical prediction is derived for incentive effects:

Prediction 1. *If $\Delta_i^{\alpha,FW} > 0$ and $\Delta_i^{\alpha,IPR} > 0$, the incentive effect takes non-negative value. If $\Delta_i^{\beta,FW} > 0$ and $\Delta_i^{\beta,IPR} > 0$, the incentive effect is positive if $\theta_i < \bar{\theta}_i \equiv \dfrac{a^2}{2F}$.*

Derivation of the prediction is in Appendix A.

The above prediction implies that there exists the positive incentive effect in the setting where player i feels envy on other player's expected return. However, in a case that if $\Delta_i^{\beta,FW} > 0$ and $\Delta_i^{\beta,IPR} > 0$ only the worker who exceeds the threshold of ability can positively respond to the incentive.

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[4]The former assumption is straightforward with the assumptions $\tau = [0, 1)$ and $\dfrac{\partial l}{\partial \Delta_i^{\alpha,IPR}} > 0$. The latter condition is derived from the Assumption 2.

2.1.3 Worker's Selection Process

Next, we analyze the second stage in which a worker opts for either FW or IPR given her and her partner's optimal effort level. Worker i compares the utility in IPR and FW and she always chooses the contract which produces higher utility. Here we introduce the specific form of non-linear inequity aversion without loosing generality. $l\left(\Delta_i^{\alpha,IPR};\alpha_{1i},\alpha_{2i}\right) = \alpha_{1i}\Delta_i^{\alpha,IPR} - \alpha_{2i}\left(\Delta_i^{\alpha,IPR}\right)^2$ and $g\left(\Delta_i^{\alpha,FW};\alpha_{1i},\alpha_{2i}\right) = \alpha_{1i}\Delta_i^{\alpha,FW} - \alpha_{2i}\left(\Delta_i^{\alpha,FW}\right)^2$. The parameters α_{1i} and α_{2i} determines the preference of envy. In terms of guilt aversion, $m\left(\Delta_i^{\beta,IPR};\beta_{1i},\beta_{2i}\right) = \beta_{1i}\Delta_i^{\beta,IPR} - \beta_{2i}\left(\Delta_i^{\beta,IPR}\right)^2$ and $h\left(\Delta_i^{\beta,FW};\beta_{1i},\beta_{2i}\right) = \beta_{1i}\Delta_i^{\beta,FW} - \beta_{2i}\left(\Delta_i^{\beta,FW}\right)^2$. The parameters β denotes the preference of guilt aversion. This specification is consistent with the empirical strategy in this paper inspired by Bellemare, Kröger, and Van Soest (2008).

The difference of utility is as follows if $\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW} > 0$:

$$\begin{aligned} U_i^{IPR}(e_i^{*IPR}) - U_i^{FW}(e_i^{*FW}) &= (1-\tau_i)\left(\phi_i\left(e_i^{*IPR}\right) - \frac{\theta_i\left(e_i^{*IPR}\right)^2}{2}\right) - l\left(\Delta_i^{\alpha,IPR};\alpha_{1i},\alpha_{2i}\right) \\ &- (1-\tau_i)\left(F - \frac{\theta_i\left(e_i^{*FW}\right)^2}{2}\right) + g\left(\Delta_i^{\alpha,FW};\alpha_{1i},\alpha_{2i}\right) \end{aligned} \quad (9)$$

And if $\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW} > 0$

$$\begin{aligned} U_i^{IPR}(e_i^{*IPR}) - U_i^{FW}(e_i^{*FW}) &= (1-\tau_i)\left(\phi_i\left(e_i^{*IPR}\right) - \frac{\theta_i\left(e_i^{*IPR}\right)^2}{2}\right) - m\left(\Delta_i^{\beta,IPR};\beta_{1i},\beta_{2i}\right) \\ &- (1-\tau_i)\left(F - \frac{\theta_i\left(e_i^{*FW}\right)^2}{2}\right) + h\left(\Delta_i^{\beta,FW};\beta_{1i},\beta_{2i}\right) \end{aligned} \quad (10)$$

Now, we can examine the impacts of social norms and other important factors such as individual ability on the self-selection process. We define $\Delta_i^U = U_i^{IPR}(e_i^{*IPR}) - U_i^{FW}(e_i^{*FW})$. Worker's self-selection process is described in the following prediction:

Prediction 2. *First,* $\left.\frac{\partial\Delta_i^U}{\partial\alpha_{1i}}\right|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0}$ *is always larger than zero. Second,* $\left.\frac{\partial\Delta_i^U}{\partial\beta_{1i}}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0}$ *is smaller than zero if* $\theta_i < \bar{\theta}_i \equiv \frac{a^2\beta_{2i}}{2(1-\tau_i) - \beta_{1i} + 2\beta_{2i}(2F-G)}$. *Third,* $\left.\frac{\partial\Delta_i^U}{\partial\theta_i}\right|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0}$ *takes negative values if* $\theta_i < \bar{\theta}_i \equiv \frac{a}{\sqrt{2F}}$. *Fourth,* $\left.\frac{\partial\Delta_i^U}{\partial\theta_i}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0}$ *takes always positive value. Fifth,* $\frac{\partial\Delta_i^U}{\partial\tau_i}$ *is always negative in any case.*

Detailed procedures to derive this prediction is in Appendix A.

Intuitively, first, if the worker's earnings is always lower than the worker k's expected earnings the increase of the enviousness parameter facilitates the worker to opt for IPR. Second, the increase of guilt aversion discourages the worker to choose IPR if the worker's ability exceeds the threshold, conditioned that the worker's payoff is always higher than the others' one. Third, if $\Delta_i^{\alpha,IPR}, \Delta_i^{\alpha,FW} > 0$ and the individual ability is higher than the threshold the increase in the ability pushes workers to choose IPR. Fourth, if $\Delta_i^{\beta,IPR}, \Delta_i^{\beta,FW} > 0$ the increase in the ability always leads to the higher preference toward FW. Finally, the higher kinship tax can be an obstacle toward choosing IPR.

2.1.4 Self-selection Effect

Now we are prepared to discuss the self-selection effects caused by social norms and individual ability. the self-selection effect created by a variable x in this study setting is defined as marginal impact of x on effort level in FW which is multiplied by marginal impact of x on the tendency to choose IPR.[5]

Enviousness. The self-selection effect caused by enviousness is expressed as below:

$$\begin{aligned} Selection^{envy} &= \underbrace{\left.\frac{\partial e_i^{*FW}}{\partial \alpha_{1i}}\right|_{\Delta_i^{\alpha,FW}>0}}_{=0} \left.\frac{\partial \Delta_i^U}{\partial \alpha_{1i}}\right|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0} \\ &= 0. \end{aligned} \tag{11}$$

Interestingly, although as the degree of enviousness increases the probability to choose IPR goes up this tendency does not produce any impact on the productivity since the parameter of enviousness will not affect the optimal effort level at all.

[5]The marginal impact of the variable x on the effort level should be evaluated under FW rather than IPR since the field experiment was designed to quantify the self-selection effect by comparing the productivity between the worker who chose FW in the second stage and the worker who chose IPR in the second stage but was forcefully converted into FW in the third stage.

Guilt Aversion. The self-selection effect caused by guilt aversion is expressed as below:

$$
\begin{aligned}
Selection^{guilt} &= \left.\frac{\partial e_i^{*FW}}{\partial \beta_{1i}}\right|_{\Delta_i^{\beta,FW}>0} \left.\frac{\partial \Delta_i^U}{\partial \beta_{1i}}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} \\
&= \underbrace{\frac{1}{2\beta_{2i}\theta_i}\left\{\left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}}-F+G\right)\frac{2}{\theta_i}\right\}^{-1/2}}_{>0} \left.\frac{\partial \Delta_i^U}{\partial \beta_{1i}}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0}. \qquad (12)
\end{aligned}
$$

The sign of the self-selection effect through guilt aversion depends on the sign of the marginal impact of this preference on the tendency to opt for IPR.

Individual Permanent Ability. The self-selection effect stemming from the individual permanent ability is as follows if $\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0$:

$$
\begin{aligned}
Selection^{ability} &= \underbrace{\left.\frac{\partial e_i^{*FW}}{\partial \theta_i}\right|_{\Delta_i^{\alpha,FW}>0}}_{=0} \cdot \left.\frac{\partial \Delta_i^U}{\partial \theta_i}\right|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0} \\
&= 0. \qquad (13)
\end{aligned}
$$

Since a worker minimizes her effort level in FW and reaches to the minimum acceptance level e_0, then although more abled workers are involved in IPR this does not matter to the productivity. On the other hand, if $\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0$,

$$
\begin{aligned}
Selection^{ability} &= \left.\frac{\partial e_i^{*FW}}{\partial \theta_i}\right|_{\Delta_i^{\beta,FW}>0} \left.\frac{\partial \Delta_i^U}{\partial \theta_i}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} \\
&< 0. \qquad (14)
\end{aligned}
$$

This is because that

$$
\left.\frac{\partial e_i^{*FW}}{\partial \theta_i}\right|_{\Delta_i^{\beta,FW}>0} = -\left\{\left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}}-F+G\right)\frac{2}{\theta_i}\right\}^{-1/2}\left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}}-F+G\right)\theta_i^{-2}<0,
$$

and

$$
\left.\frac{\partial \Delta_i^U}{\partial \theta_i}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} > 0. \qquad (15)
$$

Kinship Tax. As in individual permanent ability, the increase in kinship tax does not affect worker's productivity in FW at all since the optimal effort level in FW is constant, which leads to the null selection effect when $\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0$. On the other hand, if $\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0$,

$$
\begin{aligned}
Selection^{tax} &= \left.\frac{\partial e_i^{*FW}}{\partial \tau_i}\right|_{\Delta_i^{\beta,FW}>0} \left.\frac{\partial \Delta_i^U}{\partial \tau_i}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} \\
&< 0. \qquad (16)
\end{aligned}
$$

This inequality comes from

$$\left.\frac{\partial e_i^{*FW}}{\partial \tau_i}\right|_{\Delta_i^{\beta,FW}>0} = \frac{1}{2\beta_{2i}\theta_i}\left\{\left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}} - F + G\right)\frac{2}{\theta_i}\right\}^{-1/2} > 0. \tag{17}$$

This equation implies that if a worker is imposed higher social reputation tax it prevents her from choosing IPR and it also leads to higher productivity.

Consequently, the following prediction is derived:

Prediction 3. *First, any change in enviousness produces none of impact on productivity through self-selection process or* $Selection^{envy} = 0$*. Second, the self-selection effect caused by guilt aversion or* $Selection^{guilt}$ *is negative if* $\theta_i < \bar{\theta}_i \equiv \dfrac{a^2\beta_{2i}}{2(1-\tau_i) - \beta_{1i} + 2\beta_{2i}(2F-G)}$ *and positive otherwise. Third, individual ability does not affect worker's productivity through selection at all if* $\Delta_i^{\alpha,IPR}, \Delta_i^{\alpha,FW} > 0$ *but it negatively does if the opposite is true. The increase in kinship tax negatively affects worker's productivity through selection if* $\Delta_i^{\beta,IPR}, \Delta_i^{\beta,FW} > 0$ *and has none of effect if otherwise.*

2.2 Social Norms and Community Enforcement Mechanisms

This subsection presents a conceptual framework to understand what sort of enforcement mechanisms can be behind cooperative behavior in the study setting. Here, the behavior is considered as being cooperative if people are obedient to social norms and otherwise as being non-cooperative. In this case, a social norm is defined as the specification of desirable behavior which is evaluated based on whether fairness among community members and social obligation to redistribute own income within her social networks are satisfied. If a person deviates from a social norm then she will be sanctioned by loosing her reputation or physical punishments.

If formal enforcement mechanisms are dysfunctional or do not exist, two types of informal enforcement mechanisms are employed to execute desirable behavior. The first one is *personal enforcement* in which non-cooperative behavior is punished by the victim through quick and substantial retaliations. The second one is *community enforcement*, where a new pair of players is formed in every rounds and non-cooperative behavior against a current partner triggers retaliations by other players who belong to the same community. In the study setting, only the latter mechanism is applicable since players interact with varying partners over time which in turn makes personal enforcement unavailable.

Formally, consider the infinitely repeated matching game. The set of players is partitioned into two sets. In each stage, the player who belongs to the first set is matched with the player who belongs to the second set and they play a two-player stage game. Uniform random matching is applied and this procedure is repeated infinitely. There are two possible enforcement mechanisms in the our setting. First, assume that each player observes only the history of action profiles in the stage games which he has played. This case can be called *no information processing* where a player knows nothing about the identity of partners or what has gone on in the rest of the community (i.e. other pairs of players in the stage game). Kandori (1992) shows the existence of "contagious equilibrium" where the trust is attached to the community as a whole, which means that even a single defection by a community member causes the break down of trust in the whole community, and a player who is matched with the player with non-cooperative behavior starts cheating all of her partners from the next round. This results in the contagion of the defection in the whole of community. In order to avoid the case that the future payoffs are destroyed by this contagion process of defection, a player never deviates from the equilibrium path if her discount rate is close to one (Theorem 1 in Kandori (1992)).

Second, assume that local information is available and information processing is decentralized, which are characterized by *local information processing* and the equilibrium being *straightforward*. In local information processing, each agent carries a label regarding the state and the necessary information is transmitted by this label, which can be interpreted as reputation among social networks. A player can observe at least his own and his partner's labels before taking an action when two players are matched at time t. Then two players' next states are determined by only this two players' actions and original labels. An equilibrium in which each label is sufficient statistic that should summarize all relevant information for agents' decision making is called straightforward.[6] Kandori (1992) proves the Folk Theorem satisfying above two properties which are combined with other some properties.[7]

In sum, to behave in accordance with social norms can be sustained by the community enforcement under two mechanisms: the (contagious) equilibrium without and with local information processing. Obviously, the infinite repeated interaction is one of the most important necessary conditions for both of Kandori (1992)'s Theorem 1 and 2 to hold. On the other hand, the availability of the state information of the matched players is also of vital importance as a necessary condition for Kandori (1992)'s Theorem 2. If the community can sustain cooperative behavior without knowing partners' states rela-

[6]See Defenition 1 and 2 in Kandori (1992) for formal definitions of those properties.

[7]First, the equilibrium should be independent of the matching rule and the size of population. Second, the equilibrium should be stable and simple.

tively unstable contagious equilibrium is the background mechanism as proved in Kandori (1992).

The present paper's experiment design allows me to identify (1) whether the community enforcement works and (2) if so which mechanisms are effective, that is, the equilibrium with or without reputation among social notworks. This identification relies on the exogenous variations in terms of infinite repeated interaction and the availability of the information on the past history of partners which can be utilized in econometric estimations.

Prediction 4. *According to both Theorem 1 and 2 in Kandori (1992), the possibility of infinite repeated interaction among teammates is a necessary condition for the contagious equilibrium (both of without and with local information processing) under which we should be able to observe either positive or negative impacts of social norms on a contract choice (i.e. impacts of social norm-guided behavior on a self-selection process). Therefore without this infinite repeated interaction the community cannot sustain social norms due to deviations from the equilibrium.*

Prediction 5. *Conditioned on the positive possibility of infinite repeated interaction among teammates, if either positive or negative impacts of social norms on a contract choice is observed in the case that partners' reputation or the past history is not available at all then contagious equilibrium without local information is being realized such that Theorem 1 in Kandori (1992) holds.*

Prediction 6. *Conditioned on the positive possibility of infinite repeated interaction among teammates, if either positive or negative impacts of social norms on a contract choice is observed in the case that partners' reputation or the past history is available then contagious equilibrium with local information is being realized such that Theorem 2 in Kandori (1992) holds.*

3 Design of Experiments

We analyze behavior of rice planting workers in two rural villages in the Central Luzon in the Philippines during the 2016 dry season. There are four data sources. The first one is the two-stage field experiment to identify the incentive and self-selection effects. The second one is the lab-in-the-field experiments to elicit worker's social norms. The third one is the household questionnaire survey to capture the economic and social characteristics of workers. The fourth one is the social network survey in which the complete social networks within the communities are depicted.

3.1 Context

In a season of rice planting, the arrangement and management of daily workers for planting seedlings are indispensable since it will affect the timing to fill water in a paddy field before land protection, which determines crucially a yield level in a coming harvest season. However, it is virtually impossible that a farmer by himself organizes a plenty of workers to complete a rice planting task properly. Therefore, there are loosely-tightened organizations which are managed by local supervisors. The structure of these organizations and labor contracts with farmers are as follows. First, a farmer requests a supervisor to arrange a pool of workers (approximately twenty workers per hectare) and pays a certain amount of cash which is proportional to an area of a paddy field. Second, a local supervisor takes the responsibility to complete rice planting and sends workers to the contracted field in a given day. Third, after finishing a task, a local supervisor shares a payment with workers who participated in it. So the amount of payment per person is usually fixed at 100PHP to 120PHP and common among all workers. Now we discuss below some key features to understand the main theoretical and empirical results.

Key Feature 1: Team Production. In the field site, a pool of workers is assigned into sub-groups each of which consists of four to six workers. Each sub-group is responsible for one to two paddy fields and the members of each sub-group are supposed to plant together and not allowed to work with other members who belong to different sub-groups. The workers' primary task is merely to plant seedlings. The only choice variable of workers is how much effort to exert into planting in this context. As each worker plants in distinct rows, her productivity is independent of the effort of other teammates in the same sub-group. So there are no externalities between workers arising from the production technology as well as the payment scheme which is a fixed wage contract. There are two sessions in a day, that is, the morning and the afternoon. In every session sub-groups are reorganized.

Key feature 2: The Characteristics of Task. The task of rice planting is remarkably simple, that is, merely to plant seedlings in a straight way. This characteristics has three advantages. First, the outcome or productivity which can be defined as the length of planted lines in a unit of meter per 10 min is easily and accurately observed by other teammates, local supervisors, and experimenters. Second, the rice planting is not the multi-task problem (Holmstrom & Milgrom, 1991) which includes the trade-off between quantity and quality. Umekage, Inoue, and Watabe (1966) demonstrates the rice planting is too simple to manipulate the quality of task.[8] Third, the simpleness implies that there are no learning effects even between the beginner and the veteran, which means that the different productivity reflects the difference in individual effort levels.

Key feature 3: The Coexistence of Local and Seasonal Workers. A local supervisor has generally the responsibility to manage two types of pools of workers. Local workers live in the same village with a local supervisor and the others come to and temporally stay the village only during a planting season. Seasonal workers migrate from the various villages and usually they never come back to the same village. This is because they can get permission to migrate to the given village only for a single season and which villages they will migrate to in a coming next season depends on the referral prepared by the current local supervisor. The current local supervisor introduces them to the another supervisor who works for and manages a different pool of worker's organization in a different village. Usually, local workers have no interaction with seasonal workers both in the daily life and in the workplace. This situation provides the exogenous variation in terms of the possibility of repeated interaction among teammates by mixing those workers randomly. We use this variation to empirically prove the existence of community enforcement mechanisms in the workplace.

3.2 Field Experiments

We implement the two-stage field experiment which is aimed at identifying both incentive and self-selection effects at the same time in the workplace. We explain the procedures and the structure of this field experiment. Fist, the experimenter and the local supervisor recruit workers who participate in an experimental session. Second, the experimenter gives the instruction and confirms their agreement to take part in the experiment. Third,

[8] Umekage et al. (1966) carries out experiments to identify the effect of various transplanting methods on the growth habits of rice plants by comparing two methods: planting rice seedlings in a horizontal direction and in a vertical direction (which is the normal method). They find that the difference in the yields between the plots is not significant at the 5% level. Moreover, according to the local supervisor, not only the speed but also the quality of planted rice can be easily observed and verified by checking the misalignment and lodging of seedlings. Hence, we believe that multi-task problems are not necessarily serious in our experiments.

the experimenter randomly forms sub-groups or teams which are each composed by four to six workers. Note that this randomized team formation doesn't distinguish local and seasonal workers and then we have an exogenous variation in terms of the proportion of local (or seasonal) workers within a team. During an experimental session which takes 30 min workers are required to plant seedlings in an assigned plot with teammates and are prohibited to work with the other workers who belong to different teams.

Figure 1 shows the structure of the two-stage field experiment. In the first stage, the experimenter proposes two types of contracts (i.e. FW or IPR) to the workers. Then the workers choose one of the contracts under which they prefer to work. In the second stage, the experimenter randomly converts some workers who opt for IPR to FW with 50% probability. To minimize the disappointed effect in which the workers put less effort compared to the case that workers are not allowed to choose any contract by themselves and are randomly assigned into FW, the experimenter clearly explains the procedures and the possibility of forceful conversion. Then workers engage in the rice planting task and the enumerators measure individual productivity which is defined as the length of planted lines per 10 min.[9] After an experimental session the workers get paid immediately based on their contract and productivity. The information on the individual payment and the contract choice is shared among teammates but strictly confidential to the other workers.

Actual payment schemes are as follows: the payment in the fixed wage scheme is fixed at 40PHP and the one in the individual piece rate scheme is that 5 times the productivity. Note that this setting satisfy the assumption given in the conceptual framework.

3.3 Lab-in-the-field Experiments

Three types of lab-in-the-field experiments were carried out in July 2016. Those are ultimatum game, kinship tax game, and risk game. Subjects were recruited from the pool of participants in the field experiment. Three experiments took almost a day. Two pools of workers who are managed by different local supervisors participated differently in the lab-in-the-field experimental session. Detailed design for each experiment is described below.[10]

[9]The enumerators trace concurrently all movement for each worker inside the plot where he is in charge of by drawing the traffic lines on the working sheet. In order to assure the precision of measurement of productivity the experimenter conducted pilot experimental session to train the enumerators. Additionally, the experimenter uses a video camera to capture all of traffic lines of each worker and confirms that there is no difference in individual productivity among the different methods.

[10]In terms of risk game, we adopted the identical design with Holt and Laury (2002).

3.3.1 Ultimatum Game

We conduct a modified version of ultimatum game which is aimed at structurally estimating proposers-and-responders-specific preferences for inequity aversion. It is worth noting that although previous experimental studies usually provide a single parameter for inequity aversion that are common for all subjects our experimental design allows us to structurally estimate parameters differing among not only proposers but also their responders matched in the game.

In this game, a proposer is endowed with 100PHP and asked to decide how much to share with a responder. The proposer's choice set is discretized to eight allocations:

$$A \in \{(100, 0), (85, 15), (70, 30), (55, 45), (45, 55), (30, 70), (15, 85), (0, 100)\},$$

where the first and second amounts denote the offer for a proposer and a responder, respectively.

We purposefully rule out the equal sharing case to force proposers to commit themselves to offering either more or less than the equal split, which should increase the efficiency of our structural estimates. A responder could decide whether to accept or reject a proposer's offer. Here, the strategy method is adopted, which means that a responder is asked to answer for each of the eight allocations. Note that in our design all subjects are required to play as both roles. In addition, a proposer should answer on her offers for each of possible responders which consists of all workers who are invited to the experiments. In the same manner, a subject is also ordered to answer on her decisions as a responder for each of possible proposers. In other words, each subject is matched as both of a proposer and a responder with all subjects.

As Bellemare et al. (2008) discussed, in order to precisely estimate parameters for inequity aversion, we should collect the data on proposers' subjective probability distributions over the actions of responders rather than relying on the assumption that a proposer has rational expectations. The beliefs of proposers are elicited with a series of subjective probability questions. Subjects are asked what the probability that each responder accepts each offer would be.[11]

Decision-making is incentivized by real money: after all decision is made by subjects an experimenter randomly form the pairs and relevant transfers are exercised, which is clearly mentioned in the instruction session.

[11] To be able to account for framing effects, proposers are randomly divided into groups that are asked for either their subjective acceptance or rejection probabilities for all offers.

3.3.2 Kinship Tax Game

In order to directly measure kinship tax rates for each subject, we adjust the existing laboratory experiments which are used in Beekman et al. (2015), Boltz et al. (2015), and Squires (2016).

In our experiment the Becker-DeGroot-Marschak (BDM) mechanism is adopted to elicit willingness-to-pay (WTP) to hide income from a social network or to escape social pressure that obligates individuals to commit informal income redistribution. The rate of this WTP to a total endowment is defined as the individual kinship tax rate. The BDM method that operates much like a second-price auction against an unknown or random price might be more suitable in our particular context than the method of take-it-or-leave-it (TIOLI) offers in which single randomized prices are assigned to each individual. This is because although TIOLI has a simple structure to understand and implement it provides limited information which only includes a subject's dichotomous decision-making on whether or not a subject buys a certain good at the assigned price, while the BDM mechanism elicits subject's exact WTP for a good. This precise measure of WTP is necessary to quantify the impacts of kinship tax on the decision-making regarding the contract choices.

In our design, there are three sizes of initial endowment, i.e. 40PHP, 120PHP, and 360PHP, and two distinct framing as to where the endowment come from, i.e. earned and windfall income. Therefore all subjects are asked to play six different kinship tax games. Since the structure of the game is identical between three sizes of initial endowment we will give detailed explanations for the two types of framing in terms of income sources.

The Earned-income-framing. There are three procedures in this framing. First, the experimenter gives a detailed instruction in a common room. All subjects are informed that they would have a chance to earn a reward which is equal to for example 120PHP by completing the task within the experiment. The task is simple such that all subject could easily understand, which is to sort the cards in order of increasing number within certain minutes.[12] If she could successfully complete the task then she would get a reward, but

[12] In the card sorting task, a subject could get paid if she is able to sort twenty cards in order of number within a reference time. A reference time was stratified by age, educational attainment, and sex of each subject so as to set the probability to complete the task at 50 percent within each cohort. The contents and the reference time are clearly mentioned before their decision with regard to WTP.

an amount of a reward was supposed to be announced in public.[13] The experimenter demonstrates how to play the card sorting game and how to reveal an amount of rewards.

Second, after an instruction, the enumerators call each subject to the decision rooms that are isolated each other such that a subject can not observe other subjects' decision and vice versa. she is asked for her maximum WTP to hide the income from other participants. In other wards, she is required to answer how much cost at maximum she could afford to make her income confidential.[14]

Third, after the elicitation of WTP, she engages in the task. If she successfully completes it the price is randomly drawn by the experimenter. If the random price is lower than or equal to her WTP she is able to buy the right to hide the income at that random price otherwise she would pay nothing and her income would be disclosed to the partner. If she fails to accomplish the task she is not permitted to get any reward.

The Unearned-income-framing. The instruction is identical to the last framing except that income would be coming from the lottery in this framing. Instead of doing the task the lottery is drawn by a subject after the elicitation of WTP. The probability to win the prize is fifty percent. If she could win the prize the price to hide income is randomly picked up by the experimenter. Then the same procedures with the last framing are applied. In order to avoid learning and ordering effects the sequence of two framing is randomized within a session.

This kinship tax experiment has several features that previous studies does not explicitly deal with. First, unlike other kinship tax games, our experiment is designed to draw out payers-and-receivers-specific kinship tax rates. This means that potential tax payers are asked to answer their WTP to hide income from each matched partner. This enables me to estimate WTP varied with the $N_j - 1$ matched partners where N_j is the number of participants in a session j.

Second, Boltz et al. (2015) and Squires (2016) that adopt some sort of BDM mechanism might not be able to eliminate biases in estimating WTP due to the following reasons: (a) subject's behavior can possibly be distorted by the sets of choices in their designs since they show that the peaks in the distribution of individual WTP are at the endpoints of possible choices regardless of the actual tax rates at those points:[15] (b) the multiple choice

[13]Precisely, her reward would be disclosed to each matched participant in a given session in a way that the partner could identify both her name and an amount of a reward.

[14]WTP could be answered by a unit of 1 Centavo which is equal to 0.01PHP.

[15]Boltz et al. (2015) demonstrates that conditional on positive WTP more than fifty percent of their sample chooses the corner solution which is equal to 12.5% kinship tax rate. Squires (2016) specifies that

list design which is the most common method in existing literature might underestimate true WTP since some subjects should fall in a range of choices and in this case WTP is calculated as the lower bound. To minimize these biases we ask the exact amount of WTP for each subject which is not discretized by the certain choice set and we do not explicitly set the endpoint. In addition to this, we also conduct the same experiment with Squires (2016) to replicate his results and compare with the ones being observed in our design.

Third, the most critical issue in the literature is the problem of the pseudo-zero tax rate. In a design where WTP to deviate secretly from the income redistribution norms is defined as kinship tax rate, the subject who considers paying the tax to the others as duty would answer zero WTP since she feels obligated to commit this arrangement.[16] Therefore even though the WTP should strictly be positive for this subject the BDM mechanism could not appropriately capture this phenomenon. In order to disentangle the true tax rate from this disguised zero tax rate the subject who answers zero WTP at the first decision stage is asked to answer the following question: what is the tax ratio that your matched partner would think that you have to send to her? Then, we ask the matched partner "What do you think is the tax rate that your partner should share with you?". If both answers are close enough the additional reward is paid for both players. In the case that both answers show positive kinship tax rate and are almost identical each other we replaces zero kinship tax with this positive value.

4 Data

I conducted the field experiments for 141 workers from two villages. The 73 workers came from M-village and 68 workers came from G-village and all of them participated in lab-in-the-field experiments, which are including 25 and 24 seasonal workers, respectively. The total number of rounds for field experiments are 16 in M-village and 12 in G-village. Total observations are 2,352.

Table 1 shows the individual productivity defined as the planted length per 10 min

more than fifty-three percent of his sample is on the edge of the choice set where WTP to hide income is 70%. Bohm, Lindén, and Sonnegård (1997) find that bids in the BDM are sensitive to the choice of endpoints of the distribution of possible transaction prices.

[16]Note that the dominant strategy for the subject who thinks that the tax payment was duty is to declare zero WTP. This is because that even if she hides her reward by paying some sort of money she is obligated to pay the tax which would be proportional to the initial endowment i.e. 40PHP, 120PHP, or 360PHP. Therefore there is no incentive to hide her income from the others.

by contracts. The workers achieve the highest productivity under IPR which is 22.55 m/10min followed by the workers who are randomly converted from IPR under which the productivity is 19.41 m/10min. The least productivity is recorded in FW that is 14.74 m/10min.

Figure 2 shows the cumulative distribution functions (CDFs) by contract schemes. This figure demonstrates two facts. The first one is that the Assumption 1 made in the conceptual framework holds in the data, which means there exists the threshold in terms of the minimum requirement effort level. Especially, the shape of CDF for FW implies that the distribution of individual productivity in this contract is positively skewed and cut off nearly at the minimum requirement effort level. The second one is that both incentive and self-selection effect are graphically observed. we can verify that the CDF of the IPR contract dominates that of the FW and the converted FW contracts. The two-sample Kolmogorov–Smirnov tests of the equality of distributions reject equality between these three CDFs at the 1% level of statistical significance.

5 Construction of Key Variables

5.1 Structural Estimation for Inequity Aversion

In this section, we introduce a structural econometric model to estimate the parameters for inequity aversion which are specific for each matched pair. The model that we exploit is based on Bellemare et al. (2008) although it is followed by some modifications.

5.1.1 Preferences Varied with Dyadic Relationships

Suppose that subjects have proposers-and-responders-specific preferences with possibly nonlinear asymmetric inequity aversion. The utility of proposer i who is matched with responder k is given by

$$\begin{aligned} u_{ik}(x) = x_{ik} - \alpha_{1ik} \max\{x_{ki} - x_{ik}, 0\} - \alpha_{2ik} \max\{x_{ki} - x_{ik}, 0\}^2 \\ -\beta_{1ik} \max\{x_{ik} - x_{ki}, 0\} - \beta_{2ik} \max\{x_{ik} - x_{ki}, 0\}^2, \end{aligned} \tag{18}$$

where x_{ik} is monetary payoffs for i who is matched with k and vice versa.

The linear inequity aversion of Fehr and Schmidt (1999) is a special case of equation (18) with $\alpha_{2ik} = \beta_{2ik} = 0$.

I use following specifications:

$$\alpha_{1ik} = \exp(z'_{ik}\alpha_1 + \nu^{\alpha}_{ik}), \tag{19}$$

$$\beta_{1ik} = \exp(z'_{ik}\beta_1 + \nu^{\beta}_{ik}), \tag{20}$$

$$\alpha_{2ik} = z'_{ik}\alpha_2, \tag{21}$$

$$\beta_{2ik} = z'_{ik}\beta_2, \tag{22}$$

where z_{ik} is a vector of the differences and the sums of observed characteristics between i and k, and the attributes between them such as social and geographical proximity. Since the preference parameters have directed dyadic structures observed characteristics that are supposed to affect preferences' distribution must be entered in a way that the symmetric condition is satisfied, which requires that the variables (z_i, z_k) should affect the parameters (e.g. α_{ik}) in the same way that the variables (z_k, z_i) affect the opposite dyadic parameters (e.g. α_{ki}). ν^{α}_{ik} and ν^{β}_{ik} reflect unobserved heterogeneity that is varied with not only the proposers but also the responders. We assume that both ν^{α}_{ik} and ν^{β}_{ik} are independent of error terms and of z_{ik} with a bivariate normal distribution with means zero and an arbitrary covariance matrix.

Decisions of Proposers in the Ultimatum Game. Each proposer had eight choices ($j = 1, \ldots, 8$), involving own payoffs $x_{ik}(1), \ldots, x_{ik}(8)$. Subjects are assumed to maximize their expected utility, where proposer i uses the own subjective probability Q_{ikj} that offer j will be accepted by k. Since utility is zero if the offer is rejected, the expected utility of offer j is given by $Q_{ikj}u_{ikj}$, where u_{ikj} denotes person i's utility of payoffs $(x_{ik}(j), 100 - x_{ik}(j))$. The subjective expected utility of making an offer $x_{ik}(j)$ is therefore given by

$$\begin{aligned} Q_{ikj}u_{ikj} = Q_{ikj}[&x_{ik}(j) - \alpha_{1ik}\max\{100 - 2x_{ik}(j), 0\} \\ &-\alpha_{2ik}\max\{100 - 2x_{ik}(j), 0\}^2 \\ &-\beta_{1ik}\max\{2x_{ik}(j) - 100, 0\} \\ &-\beta_{2ik}\max\{2x_{ik}(j) - 100, 0\}^2]. \end{aligned} \tag{23}$$

To allow for suboptimal behavior, we add idiosyncratic error terms ϵ_{ikj} multiplied with a noise-to-signal ratio parameter λ_{ik}. we assume that errors ϵ_{ikj} are independent of each other and of other variables in the model (i.e. $(\nu^{\alpha}_{ik}, \nu^{\beta}_{ik})$, and z_{ik}), and that the difference of any two ϵ_{ikj} across options follows a logistic distribution. We assume that proposer i chooses the option j that maximizes $Q_{ikj}u_{ikj} + \lambda_{ik}\epsilon_{ikj}$.

Decisions of Responders in the Ultimatum Game. Responder i is supposed to decide to accept or reject each offer based on the her utility. The utility of rejecting is zero, and the responder utility u_{ikj} of accepting offer j immediately follows from equation (18):

$$\begin{aligned} u_{ikj} = x_i(j) &- \alpha_{1ik} \max\{100 - 2x_{ik}(j), 0\} \\ &-\alpha_{2ik} \max\{100 - 2x_{ik}(j), 0\}^2 \\ &-\beta_{1ik} \max\{2x_{ik}(j) - 100, 0\} \\ &-\beta_{2ik} \max\{2x_{ik}(j) - 100, 0\}^2. \end{aligned} \tag{24}$$

I assume the responder accepts offer j if $u_{ikj} + \lambda_{ik}\epsilon_{ikj} > 0$. We allow the noise parameter λ_i to vary with observed characteristics by assuming that $\lambda_{ik} = \exp(z'_{ik}\lambda)$.

5.1.2 Beliefs of Proposers

The observed subjective probabilities are assumed to be generated by the following process:

$$P^*_{ikj} = z'_{ik}\delta + \gamma_j + \nu^P_{ik} + \epsilon^P_{ikj}, \tag{25}$$

$$P_{ikj} = \begin{cases} 0, & \text{if } P^*_{ikj} \leq 0, \\ P^*_{ikj}, & \text{if } 0 < P^*_{ikj} < 1 \\ 1, & \text{if } P^*_{ikj} \geq 1. \end{cases} \tag{26}$$

Since true as well as reported probabilities may well be 0 or 1, we allow for censoring at 0 and 1, as in a two-limit tobit model. The choice option effects γ_j are expected to increase with j for amounts bellow the equal split, since proposers probably realize that acceptance probabilities rise if the amount offered to the other player increases toward an equal split.

The correct process generating proposer expectation is assumed to be

$$Q^*_{ikj} = z'_{ik}\delta + \gamma_j + \nu^P_{ik}, \tag{27}$$

$$Q_{ikj} = \begin{cases} 0, & \text{if } Q^*_{ikj} \leq 0, \\ Q^*_{ikj}, & \text{if } 0 < Q^*_{ikj} < 1 \\ 1, & \text{if } Q^*_{ikj} \geq 1. \end{cases} \tag{28}$$

I assume that the triplet $(\nu^\alpha_{ik}, \nu^\beta_{ik}, \nu^P_{ik})$ is distributed as a trivariate normal distribution with arbitrary covariance matrix, independent of observed characteristics and other error terms in the model.

5.1.3 Parameter Estimates

I estimated the model in section 5.1.1 and 5.1.2 by maximum simulated likelihood.[17] Table 2 shows the estimation results of the model. There are four findings that should explicitly be noted. First, the average estimated parameters for individuals are 0.281 for α_i and 0.135 for β_i which are plausibly in line with the theoretical assumption in Fehr and Schmidt (1999). It implies that our estimated model would be suitable. Second, in both parameters α_1 and β_1, several observed characteristics are statistically significant; the difference between and the sum of variables for matched subjects regarding educational attainments, age, and income. For example, the difference of income variable has a negative coefficient in α_1 which is statistically significant at 5% level. This means that a subject will have disutility from her disadvantage when the income level is close with her matched partner. These estimation results imply that the preference for inequity aversion differs among not only the proposers but also her matched responders.

Third, interestingly, inequity aversion for both one's advantage and disadvantage is likely to be varied with social and geographical connections. For instance, people tend to dislike others' superiority if the others are close enough to them. The parameters α_2 and β_2 are also affected by the social and geographical proximity: the setting of nonlinear preferences which are correlated with the intensity of social interactions are more appropriate in this setting than linear ones.

In the main empirical analysis, we will utilize these proposers-and-responders-specific preferences on inequity aversion regarding both one's advantage and disadvantage as key explanatory variables to quantify the causal impacts of social norms.

5.2 Estimates of Kinship Tax Rate

Table 3 and Figure 3 show the estimated social reputation tax rates and their distributions which are based on the experimental results. There are several findings which are worth noting. First, the average tax rate is 2.38% for the whole observations, 3.67% for the observations conditional on positive tax rate. Furthermore, the tax rate would plausibly fall into the range between 0 to 14.5% without extreme outliers. These percentages seem to be moderate, compared to the other estimates reported in existing literature. This fact implies that our experiment would precisely be able to measure tax rates.[18]

[17]Detailed estimation procedures and the anatomy of the determinants of inequity aversion are provided in the appendix.

[18]In Appendix we can accurately replicate the results presented by Squires (2016) when we use the data coming from his design but targeting on the same sample. This replication and an additional analysis

Second, more than 50 percent of all observations indicate positive social reputation tax rate. Specifically, the percentages for small, medium, and large initial endowment in the case of earned income are 53.2%, 52.8%, and 58.8%, respectively and 60.0%, 59.6%, and 63.5% in the case of windfall income, respectively. In addition, a subject expresses positive tax rates for approximately a half of a pool of participants in a given session. Therefore, it is evident that kinship tax rate is prevalent among subjects so that it would affect their decision-making or behavior in the labor contract that we investigate below. Moreover, obtaining windfall income would more prompt people to engage in the arrangement of income redistribution than earned income.

Third, the average tax rate increases with the size of initial endowment. In all sample, the average tax rates for small, medium, and large endowment are 1.94%, 2.02%, and 2.29%, respectively. Conditional on the positive tax rate, this trend can also be confirmed: 3.42% for small, 3.54% for medium, and 4.05% for large endowment, respectively. To our knowledge, this is the first evidence that kinship tax rates will positively be correlated with the size of initial endowments. This fact indicates that kinship tax might be sensitive to the wealth or relative economic status between the tax payer and the receiver.

Fourth, the average tax rates for windfall income are always higher than ones for earned income regardless of amounts of initial endowment. This implies that whether or not a subject deserves to obtain the reward is a critical determinant of the level of tax rate. Interestingly, when we look at the distribution of kinship tax rate by the initial endowment sizes, the two-sample Kolomogorov-Smirnov tests reject the equality of the cumulative distribution functions (CDFs) between earned and windfall income at the 1% level of statistical significance in the medium endowment while the equality hypothesis of the CDFs between them in the small and large endowment cannot be rejected even at the 10% level. This statistical result strongly suggests that if the stake is relatively small or large enough people are less likely to take account of the deservedness of the reward. In contrast, however, this deservedness are seriously taken into account in the medium endowment which is equal to the level of daily income and tax allowance is introduced for earned income. Based on these results, we will use the kinship tax rate for the earned income in the medium endowment as the key explanatory variable for the main empirical

imply that the preference for ambiguity aversion explains the extremely high tax rate (53.1 percent of the sample are categorized into the group who has 70% tax rate conditional on positive tax rate) in his design. When we counterfactually set the impact of ambiguity aversion on the tax rate at zero for all sample the predicted tax rates from econometric estimation are almost identical within the same individuals regardless of the difference of experimental designs. For more detailed discussion please see the Appendix.

analysis regarding the decision-making in the labor contract.[19]

6 Empirical Analysis

6.1 Self-selection Effect vs. Incentive Effect

6.1.1 Identification

The design of the two-stage field experiments allows for parsing out the self-selection effect from the incentive effect. In order to compare the scales of these two effects and decompose them by observed covariates, we consider the following two equations:

$$y_{ijt} = \alpha^{base} + \beta^{base} IPR_{ijt}^{choice} + \gamma^{base} IPR_{ijt}^{contract} + \epsilon_{ijt}^{base} \tag{29}$$

$$y_{ijt} = \alpha + \beta IPR_{ijt}^{choice} + \gamma IPR_{ijt}^{contract} + Z_i'\phi + W_{ijt}'\eta + \theta_{jt} + \epsilon_{ijt} \tag{30}$$

where y_{ijt} is worker i's productivity which is defined as the length (in a unit of meter) of planted line per 10 minutes in group j at round t. IPR_{ijt}^{choice} is the dummy variable taking one if a worker chose IPR contract in the first stage of the decision-making and zero otherwise. $IPR_{ijt}^{contract}$ is the dummy variable taking one if a worker was actually engaged in rice planting under IPR contract and zero otherwise. Z_i and W_{ijt} are vectors of time-invariant and -variant variables regarding worker's characteristics, respectively. Specifically, the former consists of the parameters captured by lab-in-the-field experiments: inequity aversion which is defined as the individual average of sender-responder-specific preferences, kinship tax that is also calculated individual average of payer-receiver-specific tax rates, and risk preference. Furthermore individual permanent ability and other characteristics surveyed by the questionnaire such as sex, educational attainment, income, and occupation etc. are also included.[20] Time-variant variables are worker's health condition, recognition of the adopted contract, and motivation and reasons to exert effort at a given experimental round. θ_{jt} are group-round fixed effects.

The parameters of interest are β and γ which are capturing self-selection and incentive effects, respectively. More formally, Δ^S denotes the self-selection effect. Then,

$$\begin{aligned} \Delta^S &= E[y|IPR^{choice} = 1, IPR^{contract} = 1] - E[y|IPR^{choice} = 0, IPR^{contract} = 1] \\ &= \alpha^{base} + \beta^{base} + \gamma^{base} - (\alpha^{base} + \gamma^{base}) = \beta^{base}. \end{aligned} \tag{31}$$

[19] Also, robustness checks with different definitions are conducted in the Appendix.

[20] As for individual permanent ability, we adopt the same method with Bandiera et al. (2010). Detailed estimation method and results are available in online appendix.

In the same way, we can derive the incentive effect or Δ^I:

$$\begin{aligned}\Delta^I &= E[y|IPR^{choice}=1, IPR^{contract}=1] - E[y|IPR^{choice}=1, IPR^{contract}=0] \\ &= \alpha^{base} + \beta^{base} + \gamma^{base} - (\alpha^{base} + \beta^{base}) = \gamma^{base}. \end{aligned} \tag{32}$$

In other words, Δ^S measures the mean difference of productivity between the workers who chose IPR and FW conditioned that both of them finally got paid under FW scheme while Δ^I measures the mean difference of productivity between the workers who were engaged in IPR and FW conditioned that both of them chose IPR in the first stage.

Note that the first specification which can be called the base model allows β to be affected by both observable and unobservable covariates which are included in the residual term. This is exactly what the experimental design aims at estimating since not only observable covariates but also unobservable ones would facilitate workers to opt for IPR. Put differently, it is one of the main purposes of the paper to show the productivity gap caused by self-selection by permitting both of covariates to contribute this gap. Therefore $|\Delta^S|/|\Delta^I|$ indicates the relative importance of the *aggregate* self-selection effect on worker's productivity compared to the incentive effect which can precisely be identified because $IPR^{contract}_{ijt}$ is perfectly exogenous conditional on IPR^{choice}_{ijt}.

6.1.2 Decomposition: Where Does Productivity Gap Come From?

By utilizing the second specification that can be labeled as the full model, the self-selection can be decomposed by and can separately be accounted by observable covariates. Although some papers in a field of empirical microeconometrics add covariates to account how much of the change in the coefficient can be attributed to the most recently added set of variables the result of this type of exercise would be problematic since it would be substantially affected by the order in which the covariates are added. In order to avoid this problem we adopt the decomposition method proposed by Gelbach (2014). Consider a regression model $y = X_1\lambda_1^{full} + X_2\lambda_2 + \epsilon$. y is a worker's productivity; $X_1 = [\alpha\ IPR^{choice}\ IPR^{contract}]$; $X_2 = [Z'\ W'\ \theta]$. As usual, OLS algebra implies

$$y = X_1\hat{\lambda}_1^{full} + X_2\hat{\lambda}_2 + \hat{\epsilon}. \tag{33}$$

Now by simple calculation we obtain

$$\hat{\lambda}_1^{base} = \hat{\lambda}_1^{full} + (X_1'X_1)^{-1}X_1'X_2\hat{\lambda}_2, \tag{34}$$

where $\hat{\lambda}_1^{base} \equiv (X_1'X_1)^{-1}X_1'y$. Thus,

$$\begin{aligned}\hat{\delta} &\equiv \hat{\lambda}_1^{base} - \hat{\lambda}_1^{full} \\ &= (X_1'X_1)^{-1}X_1'X_2\hat{\lambda}_2. \end{aligned} \tag{35}$$

This identity provides the method to conditionally decompose the difference in the base and the full regression coefficients. Since $\hat{\lambda}_1^{base} - \hat{\lambda}_1^{full}$ identically equals the sample omitted variables bias formula, any decomposition can be considered as a decomposition of $\hat{\lambda}_1^{base} - \hat{\lambda}_1^{full}$. Moreover, the above equation can be rewritten as follows:

$$\begin{aligned}\hat{\delta} &= \sum_{k=1}^{k_2} \hat{\Gamma}_k \hat{\lambda}_{2k} \\ &= \sum_{k=1}^{k_2} \hat{\delta}_k, \text{ where } \hat{\delta}_k \equiv \hat{\Gamma}_k \hat{\lambda}_{2k}, \end{aligned} \tag{36}$$

where $\hat{\Gamma}_k \equiv (X_1'X_1)^{-1}X_1'X_{2k}$. X_{2k} and $\hat{\lambda}_{2k}$ are the column of observations on the kth covariate in X_2 and the estimated coefficient on X_{2k} in the full specification of interest, respectively.[21] Intuitively, this method decomposes the sample omitted variable bias into two parts: the mean difference of covariates between treatment and control groups, and the direct impacts of covariates on the outcome (here a worker's productivity).

6.1.3 Main Results for Prediction 1 and 3

Here we empirically tests whether or not Prediction 1 and 3 which are derived by the conceptual framework hold. Prediction 1 is for the existence of incentive effect and Prediction 3 is for the contribution of each covariate in the decomposition of self-selection effect.

Table 4 presents the estimation results of the base and full specifications. The column of the base specification shows that the self-selection effect or the mean productivity gap between the workers who chose IPR in the first stage but were converted into FW and who chose FW in the first stage is 4.67 meter per 10 min and statistically significant, which is equal to 31.7% of the average productivity in FW. On the other hand, the coefficient of a dummy variable or $FW_{ijt}^{contract}$ is -3.11 and statistically significant, which implies that the monetary incentive increases a worker's productivity by 16.2%. The difference between these coefficients is statistically significant ($p < 0.01$) and $|\Delta^S|/|\Delta^I| = 1.502$. Therefore, although the extrinsic incentive significantly affects worker's behavior through both effects

[21] Note that the sample omitted variables bias formula is linear in its k_2 components.

in our setting the self-selection effect is more prominent than the incentive one. Compared to Lazear (2000)'s estimation, the scales of both effects seem to be relatively low but the ratio of self-selection effect to incentive effect is reasonably same with his result.[22]

In terms of the decomposition of the self-selection effect, the last column shows the contribution of each covariate to the productivity gap stemming from the self-selection, conditional on all of covariates simultaneously. There are four findings that should be emphasized. First, interestingly, the social preferences play the most significant role in explaining the productivity gap. Among them, the most influential composition that explains this effect is guilt aversion if a worker's ability is less than the threshold. This factors composes 47.8% of the explanation part of the productivity gap. This estimation result tells us that if the average level of this preference is same between two contracts and all other relationship held constant, the difference in productivity would be 1.41 meter per 10 min smaller. Though the detailed results are not shown in Table 4 $\hat{\Gamma}_{guilt}$ and $\hat{\lambda}_{2,guilt}$ are both positive in this case. Then these estimated parameters imply that the worker with more guilt averse is more likely to select herself into IPR since she is less abled than the others such that earnings in IPR are relatively low and guilt aversion is *positively* correlated with productivity under FW, which in turn increases the productivity gap. The decomposition result for guilt aversion if a worker's ability exceeds the threshold shows that the opposite mechanism is true: the more guilt averse the worker is the less likely she is to choose IPR and the more effort she puts then this mechanism contribute to the negative self-selection effect.

The decomposition of self-selection effect also shows negative contribution of social reputation tax. The parameters for social reputation tax or $\hat{\Gamma}_{tax}$ and $\hat{\lambda}_{2,tax}$ are negative and positive, respectively. So the mechanism through which social reputation tax impacts on self-selection process is that the worker who is obliged by higher tax rate less prefer IPR and the higher tax rate facilitates a worker to put more effort in FW to reduce her earnings, which indicates that the gap would be diminished by this covariate.

The preference of enviousness does not explain the decomposition of self-selection effect at all since enviousness is not correlated with productivity under FW at which a worker always chooses the minimum requirement effort level, which is consistent with Prediction 3.

Second, risk preference doesn't play an important role to explain the decomposition because the estimate is marginal and not statistically significant. According to the detailed

[22]Lazear (2000) found that the total productivity gain by switching from FW to IPR is 44% of which a sorting of workforce would be explaining approximately 22%.

decomposition, $\hat{\Gamma}_{risk}$ is marginally positive but $\hat{\lambda}_{2,risk}$ is almost zero: risk preference is not directly affecting the outcome while the worker with more risk averse is less likely to opt for IPR.

Third, the estimation result for gender shows that it explains the decomposition by 6.4%. As previous studies demonstrate, a female worker seems not to prefer competitive environments and variable payment schemes such as IPR compared to a male worker and she tends to be less productive.[23] This can also be applied into our setting. This finding is interesting since it might offer the explanation for gender wage gap in the workplace. If a female worker keeps a distance from IPR she may result in a lower average wage than a male worker.

Finally, as in Lazear (2000) that theoretically and empirically proves, individual permanent ability is obviously a major important factor behind the self-selection effect, which explains 22.7% of the difference between coefficients in the base and full model: if the individual permanent ability is identical among all of workers conditional on all other covariates in the model the performance gap will become larger by 0.67 meter per 10 min.

6.1.4 De-motivated by Random Conversion?

One might be concerned that our experimental design which forcefully converts a worker who choose IPR to FW might disappoint a converted worker. This *de-motivation effect* can create biases in above estimations for self-selection effects. Note that the de-motivation effect decreases the self-selection effect and thus our estimated effect can be considered as the lower bound. Table 5 documents the estimation results to check whether the de-motivation effect is problematic in our context. The first column replicates the last equation's result. In the second column, we include individual fixed effects which absorb the effects of all time-invariant variables on individual characteristics. This attempt slightly increases the coefficient for the self-selection effect by 0.1067, which implies that unobserved time-invariant factors doesn't play a major part in explaining the degree of this effect. Next, we compare those who are forcefully converted into FW for the first time to those who are converted several times. The de-motivation hypothesis expects that the former feel more disappointed since the latter gets used to the random conversion. Hence, the interaction term between the dummy for first conversion and the self-selection effect should have the smaller magnitude of the coefficient. According to the estimation result,

[23] Niederle and Vesterlund (2007) show that women shy away from competition. Dohmen and Falk (2011) demonstrate that women are prone to avoid variable payment schemes such as IPR and tournament.

we find no evidence on the existence of the de-motivation effect.

6.2 Who Opts for Individual Piece Rate?

In this section, we present the evidences to answer what sort of factors shape the self-selection process and how important social norms are in this process.

6.2.1 Econometric Specification

In order to rigorously identify the impacts of covariates on a worker's choice, there should be exogenous variations in terms of them. The random assignment of co-workers in forming a team combined with the design of the lab-in-the-field experiments to estimate the parameters varied with the matched partners allows me to precisely quantify the impacts of social norms on an individual choice. Consider a following regression model:

$$\begin{aligned} IPR_{ijt}^{choice} = \kappa + \phi \textstyle\sum_{k \in n_j, k \neq i} Reputation_{ijt}^{k} + \mu \textstyle\sum_{k \in n_j, k \neq i} Envy_{ijt}^{k} \\ + \gamma \textstyle\sum_{k \in n_j, k \neq i} Guilt_{ijt}^{k} + \tau \bar{\hat{a}}_{-ijt} + X_{ijt}^{\prime} \nu + \psi RepInteract_{ijt} \\ + \omega PastHistory_{ijt} + \rho_i + \eta_{jt} + \xi_{ijt}, \end{aligned} \tag{37}$$

where $Reputation_{ijt}^{k}$ is a social reputation tax or kinship tax that worker i is obligated to pay co-worker k. n_j is a total number of workers in group j. Therefore, $\sum_{k \in n_j, k \neq i} Reputation_{ijt}^{k}$ denotes the aggregate tax that worker i is supposed to pay for all other group members.[24] $Envy_{ijt}^{k}$ and $Guilt_{ijt}^{k}$ are worker i's preferences for one's (dis)advantage toward co-worker k that are structurally estimated in section 5.1. $\bar{\hat{a}}_{-ijt}$ is the mean of permanent ability of other teammates who belong to the same group with i. Note that all these four variables are orthogonal to the residual term conditional on individual fixed effects. X is a vector of time-variant worker's covariates. $RepInteract_{ijt}$ is the proportion of those who live in the same village in a given group. Our experimental design takes advantage of the coexistence of local and seasonally migrant workers in the same workplace by randomly mixing them into same teams, which makes $RepInteract_{ijt}$ exogenous.[25] $PastHistory_{ijt}$

[24] In this main specification, we use the social reputation tax that is imposed on subject's earned income and in which the stake size is medium. See section 2.3.2 for more detail.

[25] Seasonal workers who come from different provinces are organized and managed by one of the workers in the their own pool and they usually migrate to and stay in the villages for a short period. Generally, a organization of seasonal workers change the village where they stay for engaging in a rice planting task every seasons and they never come back to the same village where they have stayed once. This is because that they pick up the next season's village based on the referral by the last village's organizer. Additionally, they are not supposed to work together with local workers.

is the weighted probability that a worker can correctly obtain the information of the state for other teammates, which is defined as the number of rounds a worker has shared with a partner weighted by the time distance from the present: sharing one round in the 10 rounds ago should be less important than sharing one round in the last round. The random assignment of teammates in every rounds produces exogenous variations in this covariate. ρ_i and η_{jt} are individual fixed effects and group-round fixed effects, respectively.

The parameters of interest are ϕ, μ, and γ, which identify the causal effects of social norms on the worker's contract choice. In addition, τ captures the impact of relative superiority of individual ability to other teammates on the contract choice. Those variables are all aggregated into each team level excluding worker i herself. This is a natural way to construct key variables in our setting: fist, all workers are randomly assigned into several teams consisting of four to seven members and this random assignment is executed in every experimental rounds: second, the experimenters allocate paddy fields to each team: third, after being assigned to a team and a paddy field, all workers are asked to decide which contracts they prefer, FW or IPR: fourth, the workers who belong to the same team are supposed to engage in a rice planting task together during all working time: and finally, it is strictly prohibited by the experimenters to work with the persons who belong to different teams and to plant rice seedlings in the paddy field that they are not assigned. These features in the setting mean that they can not observe the behavior of those who belong to different teams and vice versa. Moreover, the information on a worker's contract choice, outcome, and payment based on whichever FW or IPR is confidential to other teams but is shared and common knowledge within a her own team so that her decision on a contract choice and productivity can not be affected by and can not affect other teams' ones. Therefore, social norms that a worker feels toward her teammates rather than toward an entire society will be relevant and effective in a decision-making stage of our field experiments.

6.2.2 Basic Results for Proposition 2

Table 6 denotes the estimation results based on the above equation. According to column 1, the increase of one standard deviation in guilt aversion decreases the probability to choose IPR by 12.6%. So the more guilt averse the worker is the less likely she is to opt for IPR. Also, the increase of 10% in social reputation tax decreases the probability by 21.8%. Social pressure to redistribute income might be a major obstacle to choose the more remunerative option. Note that, however, column 3 shows that if the worker's wealth level is relatively lower than other teammates the negative impact of social reputation on a contract choice is diminished. So a tax allowance for the poor is likely to be available in the study area. Contrary to these negative effects, the increase of one standard deviation in enviousness augments the probability for IPR by 15.1%. The envy emotion motivates workers to reduce the wag gap between her and teammates by letting her opt for IPR. Social preferences affect prominently the worker's behavior in a contract choice in either a positive or a negative way .

In terms of individual permanent ability, column 1 also shows that the impact of the relative superiority of one's ability to other teammates on a contract choice is close to zero and not statistically significant. According to column 2, however, the interaction term between average of others' ability level and worker i's risk preference has the negative and statistically significant coefficient, which implies that if a worker is less risk averse and more abled than teammates she seems to self-select herself into IPR. Then sorting by an individual ability might vary with the heterogeneity of risk preference.

6.3 Under Which Conditions Do Moral Sentiments Work?

In this subsection, we test the hypotheses that are proposed in the section for theoretical foundation, which answers what triggers social norms to be effective and under which conditions those norms work.

6.3.1 Econometric Specification

There are two econometric models for identifying the mechanisms to explain why specific social norms come into play in the workplace. First, we estimate the equation (37) by splitting a sample into 20 sets of sub-samples. To be more precise, after sorting all of observations by the variable $RepInteract_{ijt}$ we split the observations into 20 sub-samples in which each includes the same number of observations such that the first set includes from 0 to 5th percentile, the second set includes 5 to 10th percentile, and the final set includes 95 to 100th percentile. By doing this we demonstrate *non-linear* heterogeneous effects of social norms on a contract choice, which is varied with the possibility of repeated interaction. Second, same logic and process are applied in terms of non-linear heterogeneous effects varied with the availability of past history information.

6.3.2 Estimation Results for Proposition 4, 5, and 6

Figure 4, Figure 5, and Figure 6 show that the estimated coefficients obtained from the above econometric model for guilt aversion, enviousness, and social reputation tax, respectively. Interestingly, all of figures demonstrate that there exist thresholds around 70th percentile at which the coefficients start to become statistically significant. Guilt aversion and social reputation tax (enviousness) affect negatively (positively) a contract choice above the threshold. However, these social norms explain nothing below the threshold. Put differently, social norms come into the play in the workplace only if the workers ensure that the matching with current partners would infinitely be repeated. The workers might recognize that the game is infinite if the possibility of repeated interaction is above 75% which is corresponding to the experimental settings of Bó (2005) and Bó and Fréchette (2011). From these results we conclude that proposition 4 holds in our setting.

The story is quite different when it comes to the non-linear heterogeneous effects by the observability of current partners' past history. Figure 7, Figure 8, and Figure 9 show the results of the second econometric model described in above subsection. There are two findings. First, in all of estimation results, the coefficients in the first sample (from 0 to 5th percentile) are statistically significant: negative for guilt aversion and social reputation tax and positive for enviousness. Note that the actual values of $PastHistory_{ijt}$ for the 0 to 5th percentile are almost zero. Then these facts allow me conclude that proposition 5 holds or the community might be able to sustain the social norms even without the information sharing with respect to the current partners' history.

Second, the coefficients are always statistically significant even for other sub-samples and there might not be any threshold unlike the estimation results of the repeated interaction. So we could say that proposition 6 holds as well.

In sum, the community enforcement mechanism supports to sustain social norms only if the repeated interaction is ensured. Additionally, the information of the partners' state such as reputation is likely to be transmitted through both a whole community network and localized social connections, which makes the community enforcement works.

7 Discussion and Conclusion

The interplay between economic incentives and social norms is the critical issue in economics. This paper develops new field experiments to identify the causal impacts of social norms on worker's self-selection behavior into the different intensity of incentive contracts. In the three-stage field experiment which is carried out in the traditional agrarian labor contract in the Philippines, we randomly organize teams in which workers are required to work together. Next, we offer two options of contracts for workers, i.e. FW and IPR and they can choose one of them. Thereafter, randomly picked up subjects who choose

IPR are converted into FW. Econometric results indicate that the self-selection effect dominates and explains major parts of the productivity gap between FW and IPR. In addition, social norms significantly alter the decision-making by workers. Guilt aversion and kinship taxation discourage workers to choose the remunerative option or IPR while enviousness facilitates them to opt for it. Finally, even without frequent and fixed interactions within communities, community enforcement mechanisms which are founded by infinite repeated interaction and availability of informal reputation system trigger and help for social norms to emerge among workers. Although the field experiment targets a specific pool of subjects and villages in a certain timing, external validity in this paper might relatively be assured compered to other existing studies due to relying on a larger sample size or observations, focusing on the real labor contract, and analyzing relevant and prevalent social preferences.

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8 Appendix A: Detailed Explanation of Theoretical Predictions

Incentive Effect. To derive Prediction 1 in terms of the incentive effect we compare the optimal effort level between FW and IPR for two cases: First, if $\Delta_i^{\alpha,FW} > 0$ and $\Delta_i^{\alpha,IPR} > 0$, the incentive effect is quantified by the following equation:

$$\begin{aligned} \Delta_i^{\alpha} &= e_i^{*IPR}\big|_{\Delta_i^{\alpha,IPR}>0} - e_i^{*FW}\big|_{\Delta_i^{\alpha,FW}>0} \\ &= \max\left\{\frac{\phi'}{\theta_i} - e_0, 0\right\}. \end{aligned} \tag{38}$$

Second, if $\Delta_i^{\beta,FW} > 0$ and $\Delta_i^{\beta,IPR} > 0$, to derive the incentive effect we can compare two first-order-conditions:

$$1 - \tau_i = \frac{\partial h(\cdot)}{\partial\left(\Delta_i^{\beta,FW}\right)}\left(e_i^{*FW}\right) > \frac{\partial m(\cdot)}{\partial\left(\Delta_i^{\beta,IPR}\right)}\left(e_i^{*IPR}\right). \tag{39}$$

Since $\dfrac{\partial h(\cdot)}{\partial\left(\Delta_i^{\beta,FW}\right)} > \dfrac{\partial m(\cdot)}{\partial\left(\Delta_i^{\beta,IPR}\right)}$ if and only if $\Delta_i^{\beta,FW} < \Delta_i^{\beta,IPR}$. The incentive effect is as follows:

$$\Delta_i^{\beta} = e_i^{*IPR}\big|_{\Delta_i^{\beta,IPR}>0} - e_i^{*FW}\big|_{\Delta_i^{\beta,FW}>0} > 0,\ \text{if } \theta_i < \bar{\theta}_i \equiv \frac{a^2}{2F}. \tag{40}$$

This positive incentive effect is also easily derived from the fact that the equilibrium effort level in FW takes at most $\sqrt{2F/\theta_i}$ to keep the earnings positive. So, the condition $a^2/2F > \theta_i$ can be obtained from $e_i^{*IPR}\big|_{\Delta_i^{\beta,IPR}>0} = a/\theta_i > \sqrt{2F/\theta_i} = e_i^{*FW}\big|_{\Delta_i^{\beta,FW}>0}$. This condition also satisfies $\Delta_i^{\beta,FW} < \Delta_i^{\beta,IPR}$.

Worker's Selection Process The difference of utility is as follows if $\Delta_i^{\alpha,IPR}, \Delta_i^{\alpha,FW} > 0$:

$$\begin{aligned} U_i^{IPR}(e_i^{*IPR}) - U_i^{FW}(e_i^{*FW}) &= (1-\tau_i)\left(\phi_i\left(e_i^{*IPR}\right) - \frac{\theta_i\left(e_i^{*IPR}\right)^2}{2}\right) - l\left(\Delta_i^{\alpha,IPR};\alpha_{1i},\alpha_{2i}\right) \\ &- (1-\tau_i)\left(F - \frac{\theta_i\left(e_i^{*FW}\right)^2}{2}\right) + g\left(\Delta_i^{\alpha,FW};\alpha_{1i},\alpha_{2i}\right) \end{aligned} \tag{41}$$

And if $\Delta_i^{\beta,IPR}, \Delta_i^{\beta,FW} > 0$

$$\begin{aligned} U_i^{IPR}(e_i^{*IPR}) - U_i^{FW}(e_i^{*FW}) &= (1-\tau_i)\left(\phi_i\left(e_i^{*IPR}\right) - \frac{\theta_i\left(e_i^{*IPR}\right)^2}{2}\right) - m\left(\Delta_i^{\beta,IPR};\beta_{1i},\beta_{2i}\right) \\ &- (1-\tau_i)\left(F - \frac{\theta_i\left(e_i^{*FW}\right)^2}{2}\right) + h\left(\Delta_i^{\beta,FW};\beta_{1i},\beta_{2i}\right) \end{aligned} \tag{42}$$

First, the impact of marginal increase in enviousness on the difference in utility between IPR and FW is as follows:

$$\frac{\partial \Delta_i^U}{\partial \alpha_{1i}}\bigg|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0} = -\frac{\partial l}{\partial \alpha_{1i}} + \frac{\partial g}{\partial \alpha_{1i}} = -\Delta_i^{\alpha,IPR} + \Delta_i^{\alpha,FW} \tag{43}$$

The condition to keep this equation always positive is $\Delta_i^{\alpha,IPR} < \Delta_i^{\alpha,FW}$. The simple calculation shows:

$$\begin{aligned} &\Delta_i^{\alpha,IPR} < \Delta_i^{\alpha,FW} \\ \iff &e_o^2\theta_i^2 - 2F\theta_i + a^2 > 0 \end{aligned} \tag{44}$$

Due to the assumption $F < ae_0$ this inequality always holds. So, $\dfrac{\partial \Delta_i^U}{\partial \alpha_{1i}}\bigg|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0} > 0$.

Next, the impact of marginal increase in guilt aversion on the utility difference is as follows:

$$\frac{\partial \Delta_i^U}{\partial \beta_{1i}}\bigg|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} = (1-\tau_i)\theta_i e_i^{*FW}\frac{\partial e_i^{*FW}}{\partial \beta_{1i}} - \frac{\partial m}{\partial \beta_{1i}} + \frac{\partial h}{\partial \beta_{1i}}, \tag{45}$$

where

$$e_i^{*FW} = \left\{ \left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}} - F + G \right) \frac{2}{\theta_i} \right\}^{1/2},$$

$$\frac{\partial e_i^{*FW}}{\partial \beta_{1i}} = \frac{1}{2} \left\{ \left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}} - F + G \right) \frac{2}{\theta_i} \right\}^{-1/2}. \tag{46}$$

Therefore,

$$\begin{aligned} \left.\frac{\partial \Delta_i^U}{\partial \beta_{1i}}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} &= \frac{1-\tau_i}{\beta_{2i}} - \frac{1}{2}\frac{a^2}{\theta_i} + F - \left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}} - F + G \right) \\ &= \frac{2(1-\tau_i)-\beta_{1i}}{2\beta_{2i}} - \frac{1}{2}\frac{a^2}{\theta_i} + 2F - G \\ &< 0 \text{ if } \theta_i < \bar{\theta}_i \equiv \frac{a^2}{2}\frac{1}{\frac{2(1-\tau_i)-\beta_{1i}}{2\beta_{2i}} + 2F - G}. \end{aligned} \tag{47}$$

Interestingly, a worker is more likely to prefer FW to IPR when she feels more guilty by having higher earnings than the teammate only if a worker's ability exceeds the given threshold.

The impact of marginal increase in individual permanent ability if $\Delta_i^{\alpha,IPR}, \Delta_i^{\alpha,FW} > 0$ is as follows:

$$\begin{aligned} \left.\frac{\partial \Delta_i^U}{\partial \theta_i}\right|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0} &= (1-\tau_i+\alpha_{1i}-\alpha_{2i}) \left(\frac{e_0^2}{2} - \frac{a^2}{2\theta_i^2} \right) \\ \iff & \frac{1}{2}(1-\tau_i+\alpha_{1i}-\alpha_{2i}) \left(e_0 + \frac{a}{\theta_i} \right) \left(e_0 - \frac{a}{\theta_i} \right) \\ &< 0, \text{ if } \theta_i < \bar{\theta}_i \equiv \frac{a}{\sqrt{2F}}, \end{aligned} \tag{48}$$

and if $\Delta_i^{\beta,IPR}, \Delta_i^{\beta,FW} > 0$,

$$\left.\frac{\partial \Delta_i^U}{\partial \theta_i}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} = (1-\tau_i-\beta_{1i}+\beta_{2i}) \left\{ -\frac{1}{\theta_i} \left(\frac{1-\tau_i-\beta_{1i}}{-2\beta_{2i}} - F + G \right) - \frac{1}{2}a^2\theta_i^{-2} \right\}. \tag{49}$$

Note that the first order condition for $\left. e_i^{*FW} \right|_{\Delta_i^{\beta,FW}>0}$ is

$$\begin{aligned} 1-\tau_i &= \frac{\partial h(\cdot)}{\partial \left(\Delta_i^{\beta,FW} \right)} \\ \iff 1-\tau_i &= \beta_{1i} - 2\beta_{2i}\Delta_i^{\beta,FW}. \end{aligned} \tag{50}$$

This is not contradict with $1-\tau_i-\beta_{1i}+\beta_{2i} < 0$. Therefore, $\left.\frac{\partial \Delta_i^U}{\partial \theta_i}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} > 0$.

The impact of marginal increase in kinship tax if $\Delta_i^{\alpha,IPR}, \Delta_i^{\alpha,FW} > 0$ is as follows:

$$\left.\frac{\partial \Delta_i^U}{\partial \tau_i}\right|_{\Delta_i^{\alpha,IPR},\Delta_i^{\alpha,FW}>0} = -\left(\frac{a^2}{2\theta_i}\right) + \left(F - \frac{\theta_i e_0^2}{2}\right). \tag{51}$$

The simple calculation shows that

$$\begin{aligned} & -\left(\frac{a^2}{2\theta_i}\right) + \left(F - \frac{\theta_i e_0^2}{2}\right) \\ \Longleftrightarrow\quad & -e_o^2\theta_i^2 + 2F\theta_i - a^2 < 0. \end{aligned} \tag{52}$$

This inequality always holds with the assumption $F < ae_0$. In the case that $\Delta_i^{\beta,IPR}, \Delta_i^{\beta,FW} > 0$,

$$\begin{aligned} \left.\frac{\partial \Delta_i^U}{\partial \tau_i}\right|_{\Delta_i^{\beta,IPR},\Delta_i^{\beta,FW}>0} &= -\left(\frac{a^2}{2\theta_i}\right) + \left(F - \frac{\theta_i \left(e_i^{*FW}\right)^2}{2}\right) \\ &- \left(\tau_i + \beta_{1i} - \beta_{2i}\right)\frac{1}{2\beta_{2i}}. \end{aligned} \tag{53}$$

Since $F - \frac{\theta_i e_0^2}{2} \geq F - \frac{\theta_i \left(e_i^{*FW}\right)^2}{2}$ and $\tau_i + \beta_{1i} - \beta_{2i} > 0$ the above equation is always negative.

Table 1: Individual productivity by contracts

Contract	Obs	Productivity (meter/10min)	Std.
FW	744	14.74	4.48
IPR	807	22.55	4.93
FW converted from IPR	801	19.41	3.74

Notes: This table shows the level of individual productivity by contracts. Contracts have three categories. The fist one is fixed wage or FW. The second one is individual piece rate or IPR. The third one is FW converted from IPR

Table 2: Parameter estimates of the structural model for inequity aversion

	α_1	β_1	α_2	β_2	λ	P	Offer	γ	Other Parameters	
Constant	-0.478 **	-0.684 **	0.512 **	-0.637 **	-0.771		0	-0.151 *	$V(\varepsilon_{ii}^{P})$	-0.510 **
	(-0.226)	(-0.293)	(0.26)	(-0.278)	(-1.528)			(-0.084)		(-0.265)
Difference in							15	0.716 **	$V(u_{ik}^{\alpha})$	-0.543 **
Sex	-0.662	-0.357	0.961	-0.493	-0.349	0.888		(0.312)		(-0.259)
	(-1.416)	(-0.764)	(2.055)	(-1.054)	(-0.747)	(1.901)	30	0.807 ***	$V(u_{ik}^{\beta})$	0.015 **
Education	-0.179	0.076	-0.989	-0.048	0.944	0.261		(0.264)		(0.008)
	(-0.23)	(0.098)	(-1.271)	(-0.062)	(1.213)	(0.335)	45	0.627 ***	$V(u_{ik}^{P})$	0.823 **
Age	0.261	0.417	0.593	0.801	0.777	0.486		(0.204)		(0.395)
	(0.432)	(0.688)	(0.979)	(1.323)	(1.284)	(0.802)	55	-0.396 **	$\rho_{\alpha\beta}$	-0.155 *
Income	-0.676 **	0.748 *	0.296 *	-0.991 *	-0.965	-0.106		(-0.167)		(-0.084)
	(-0.339)	(0.395)	(0.16)	(-0.522)	(-0.999)	(-0.11)	70	-0.711 **	$\rho_{\alpha P}$	0.710 *
Sum of								(-0.365)		(0.379)
Sex	-0.762	0.304	0.969	0.025	0.137	0.333	85	-0.768 **	$\rho_{P\beta}$	-0.373
	(-0.916)	(0.365)	(1.164)	(0.03)	(0.165)	(0.4)		(-0.358)		(-0.926)
Education	-0.799 *	0.272	0.612	-0.370	-0.565	0.415	100	-0.785 ***		
	(-0.428)	(0.326)	(0.735)	(-0.445)	(-0.679)	(0.499)		(-0.255)		
Age	-0.639 *	-0.096 *	-0.033	-0.531	0.087	-0.134				
	(-0.354)	(-0.051)	(-0.588)	(-0.445)	(0.073)	(-0.112)				
Income	-0.709 *	-0.992 *	-0.571 *	0.454 **	-0.770	0.204				
	(-0.377)	(-0.523)	(-0.31)	(0.229)	(-0.653)	(0.173)				
Both recognized kinship	-0.073	-0.556 *	0.540	0.154 *	-0.249	0.251 *				
	(-0.089)	(-0.297)	(0.657)	-0.229	(-0.303)	-0.173				
Both recognized friendship	0.957 *	0.848	0.950 *	0.456	0.157	-0.603 *				
	(0.516)	(1.865)	(0.502)	(1.003)	(0.345)	(-0.33)				
Geographical distances	-0.963 **	-0.641 *	0.620 *	0.076 **	-0.842	0.460 **				
	(-0.471)	(-0.346)	(0.336)	(0.039)	(-0.971)	(0.196)				

Notes: Standard errors are given in parentheses. *, **, and *** indicate significant at the 10%, 5%, and 1% levels, respectively.

Table 3: Descriptive statistics of social reputation tax rate

Size of		All sample					Kinship tax rate >0				
endowments	Income source	Obs.	Mean	Std	Min	Max	Obs.	Mean	Std	Min	Max
Small	Earned	7212	1.58	2.34	0.00	10.92	3833	2.97	2.48	0.03	10.92
(40PHP)	Windfall	7212	2.30	3.29	0.00	14.50	4299	3.86	3.48	0.03	14.50
Medium	Earned	7212	1.50	2.23	0.00	10.49	3808	2.83	2.37	0.01	10.49
(120PHP)	Windfall	7212	2.53	3.30	0.00	13.47	4296	4.25	3.32	0.01	13.47
Large	Earned	7212	1.99	2.88	0.00	13.25	4238	3.74	3.01	0.01	13.27
(360PHP)	Windfall	7212	2.60	3.35	0.00	14.45	4578	4.36	3.33	0.01	14.45

Notes: This is the distribution of social reputation tax rate by size of endowment and income sources. The columns for "All sample" include all observations while the columns for "social reputation tax>0" include only observations for which tax rate is more than zero. A unit of figure is percentage.

Table 4: Self-selection effect vs. incentive effect and its decomposition

Dep Var: Individual Productivity (meter per 10 min)	Specification		Gelbach (2014)
	Base	Full	decomposition
Self-selection effect	4.6712***	1.7167	2.9545**
(Dummy for taking one if a subject chose IPR)	(0.8464)	(1.3531)	(1.0803)
Incentive effect	3.1104***	3.1104***	
(Dummy for taking one if a subject worked under FW)	(0.6012)	(0.6012)	
			Explained
Covariates:			composition
Guilty aversion * **1[**the ability > the threshold]	No	Yes	-1.3048***
			(0.0382)
Guilty aversion * **1[**the ability < the threshold]	No	Yes	1.4114***
			(0.0928)
Enviousness	No	Yes	0.0242
			(0.1734)
Social reputation tax (kinship tax)	No	Yes	-0.5304***
			(0.2182)
Risk preference	No	Yes	0.0069
			(0.0005)
Sex (female == 1)	No	Yes	0.1895*
			(0.0942)
Individual permanent ability	No	Yes	0.6715***
			(0.2438)
Other individual controls	No	Yes	0.2578**
			(0.1285)
Group and Round FE	No	Yes	2.2284***
			(0.5258)
Obs.	2352	2352	

Notes: Standard errors are given in parentheses. *, **, and *** indicate significant at the 10%, 5%, and 1% levels, respectively.

Table 5: De-motivation effects by random conversion

Dep Var: Individual Productivity	(1)	(2)	(3)	(4)	(5)	(6)
Self-selection effect	1.7167	1.8234	1.9184	1.8441	1.8938	1.8126
(Dummy for taking one if a subject chose IPR)	(1.3531)	(1.1302)	(1.2293)	(1.2920)	(1.2922)	(1.3284)
Incentive effect	3.1104***	3.1104***	3.1104***	3.1104***	3.1104***	3.1104***
(Dummy for taking one if a subject worked under FW)	(0.6012)	(0.6012)	(0.6012)	(0.6012)	(0.6012)	(0.6012)
First conversion dummy * self-slection effect			1.7284			
			(1.4928)			
Conversion rate = 0.3 * self-selection effect				1.8421		
				(1.3398)		
1{others are not converted} * self-selection effect					1.8392	
					(1.3485)	
1{Incentive effect>average} * self-selection effect						1.7928
						(1.3837)
Other individual control variables	Yes	No	No	No	No	No
Individual FE	No	Yes	Yes	Yes	Yes	Yes
Group and Round FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2352	2352	2352	2977	2352	2352

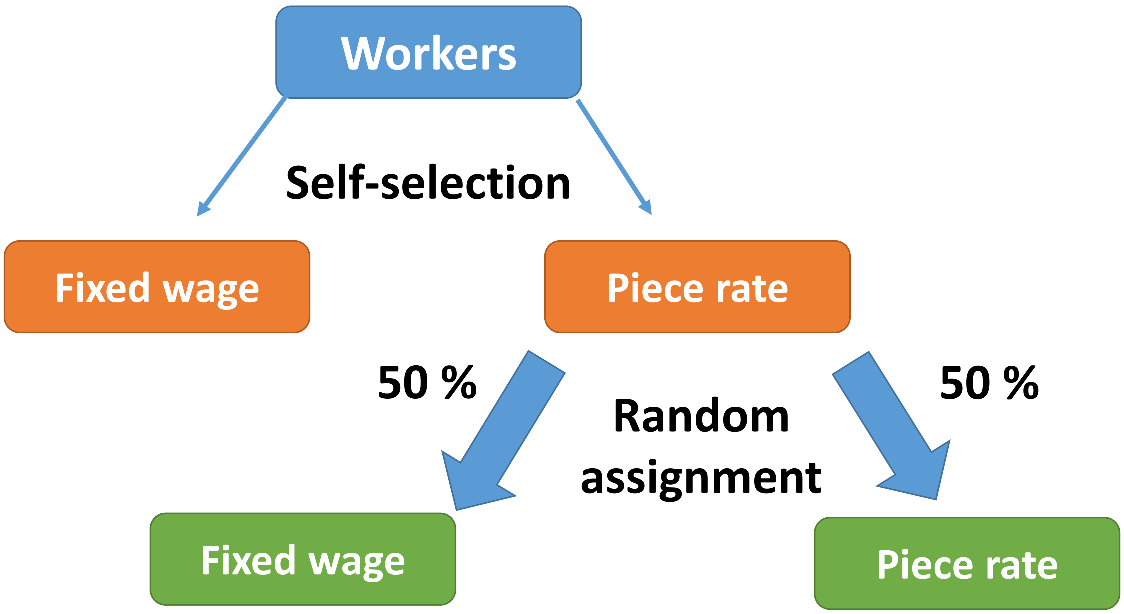
Notes: Standard errors are given in parentheses. *, **, and *** indicate significant at the 10%, 5%, and 1% levels, respectively.

Table 6: The determinants of self-selection process

Dep Var: Choosing Individual Piece Rate = 1	(1)	(2)	(3)	(4)
Guilt aversion	-1.4356***	-1.4351***	-1.4372***	-1.4839***
	(0.1054)	(0.1023)	(0.1837)	(0.1384)
Enviousness	1.5664**	1.5632**	1.9021**	1.9831**
	(0.7285)	(0.7285)	(0.8282)	(0.8384)
Social reputation tax (earned income and medium endowment)	-2.1754**	-2.1744**	-2.8372**	-2.80332**
	(1.0726)	(1.0722)	(1.4193)	(1.4492)
Average of others' ability level	0.0356	0.0351	0.0372	0.0839
	(2.1054)	(2.1054)	(1.1054)	(2.3384)
Average of others' ability level * risk preference		-1.3207**		-1.4936**
		(0.6059)		(0.6821)
Social reputation tax * averege of others' wealth level			1.0383*	1.0874*
			(0.4933)	(0.5293)
Other time-variant worker's controls	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Group and Round FE	Yes	Yes	Yes	Yes
Obs.	2352	2352	2352	2352

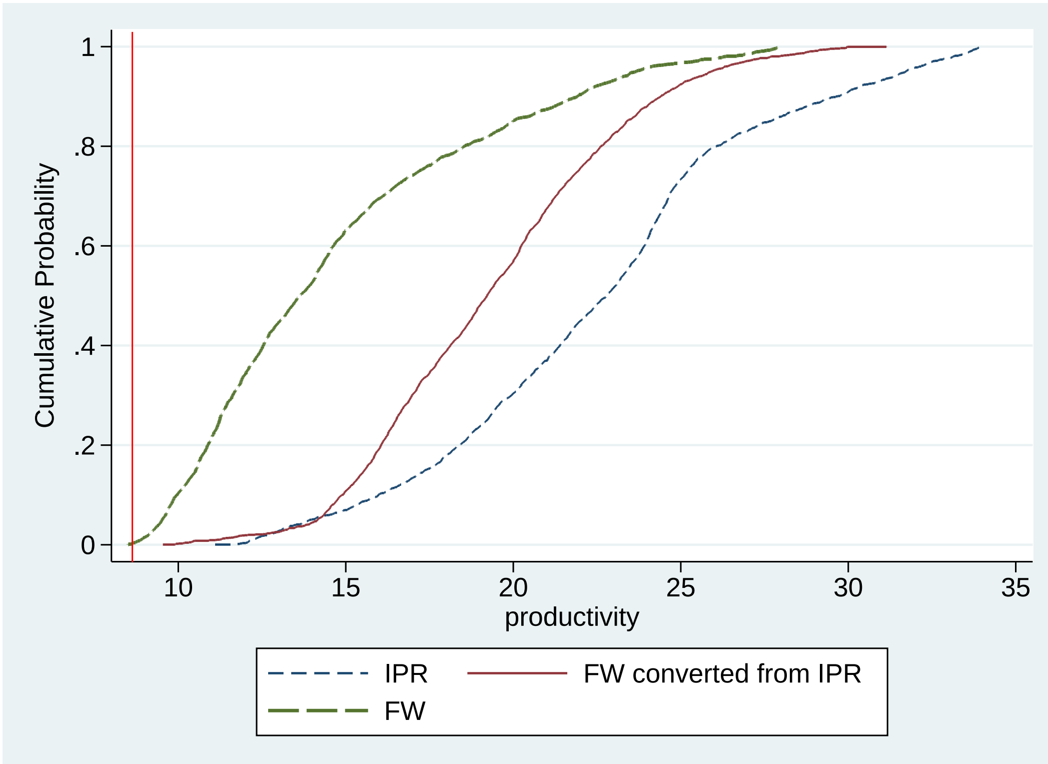
Notes: Standard errors are given in parentheses. *, **, and *** indicate significant at the 10%, 5%, and 1% levels, respectively.

Figure 1: The structure of the two-stage field experiment



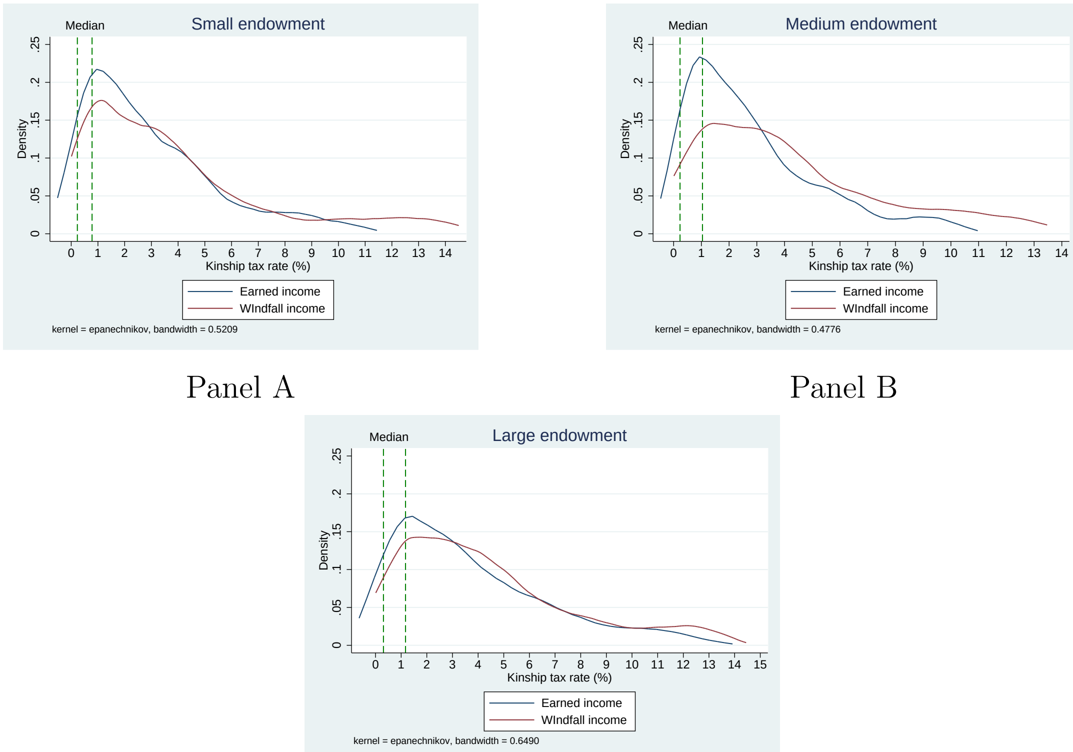
Note: This figure shows the structure of two-stage field experiment. In the first stage, the workers are proposed two contracts or FW and IPR. They are asked to self-select themselves into either contract. The second stage forcefully and randomly converts some of the workers who choose IPR into FW with 50% probability.

Figure 2: The distribution of individual productivity



Note: This figure shows that the distribution of individual productivity by contracts.The curves are the cumulative distribution functions. The vertical red line denotes the minimum requirement effort level calculated from the conceptual framework and the field experimental setting.

Figure 3: The distribution of social reputation tax rate



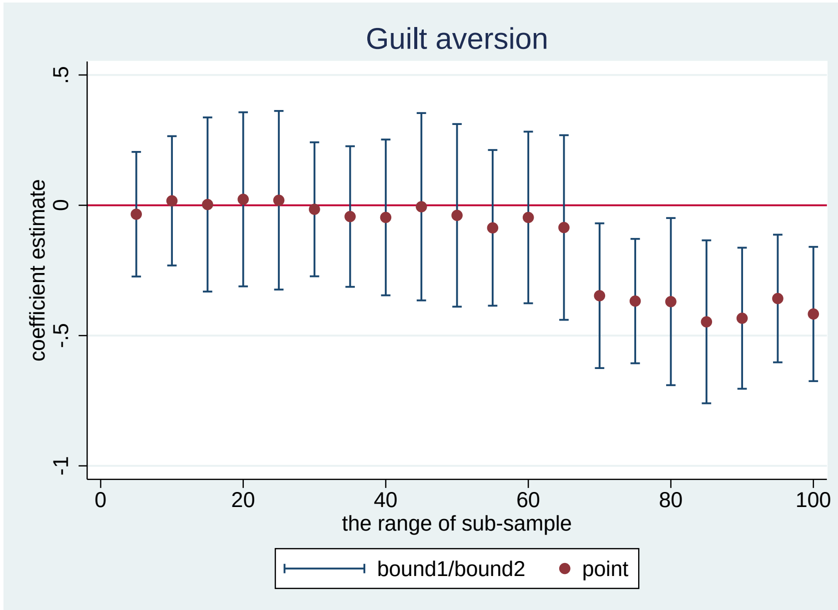
Panel A

Panel B

Panel C

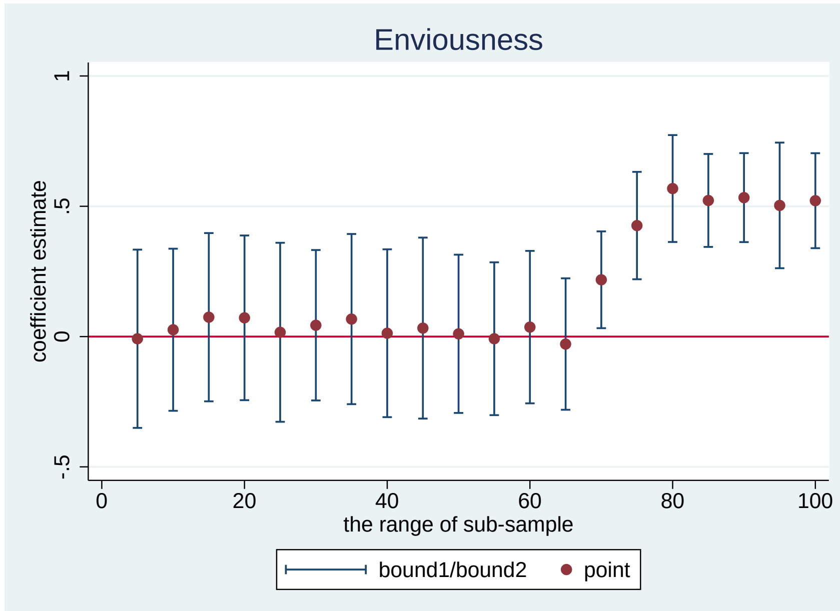
Note: Panel A, B, and C show the distribution of social reputation tax rate for small, medium, and large endowment, respectively. vertical lines colored by green denote median for each distribution.

Figure 4: The coefficients of guilt aversion by the possibility of repeated interaction



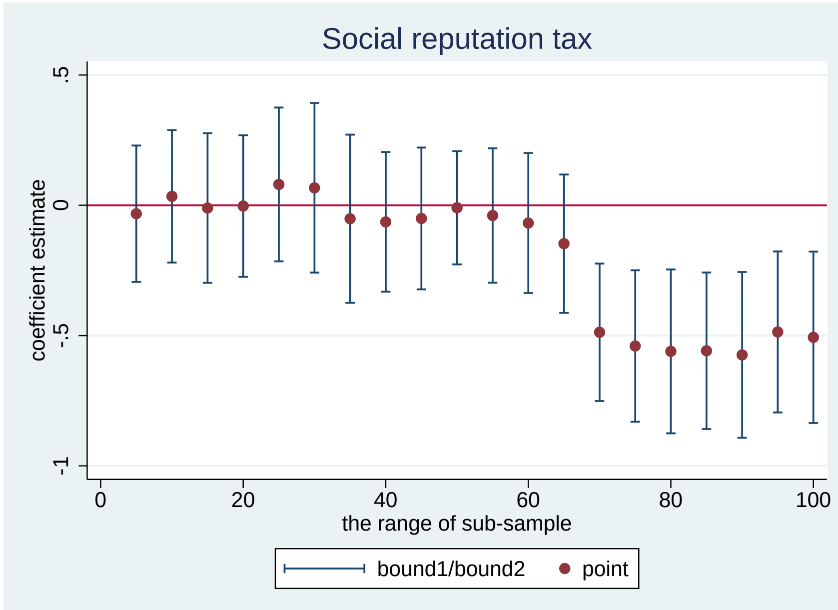
Note: This figure shows the estimated coefficients for guilt aversion by sub-samples. After sorting the observations by the value of the possibility of repeated interaction we split a whole observation into 20 sub-samples (0-5%, 5-10%, ..., 95-100% of a whole observation) in which the same number of observations is included. The range of coefficients denotes the confidential intervals and point estimates are also plotted.

Figure 5: The coefficients of enviousness by the possibility of repeated interaction



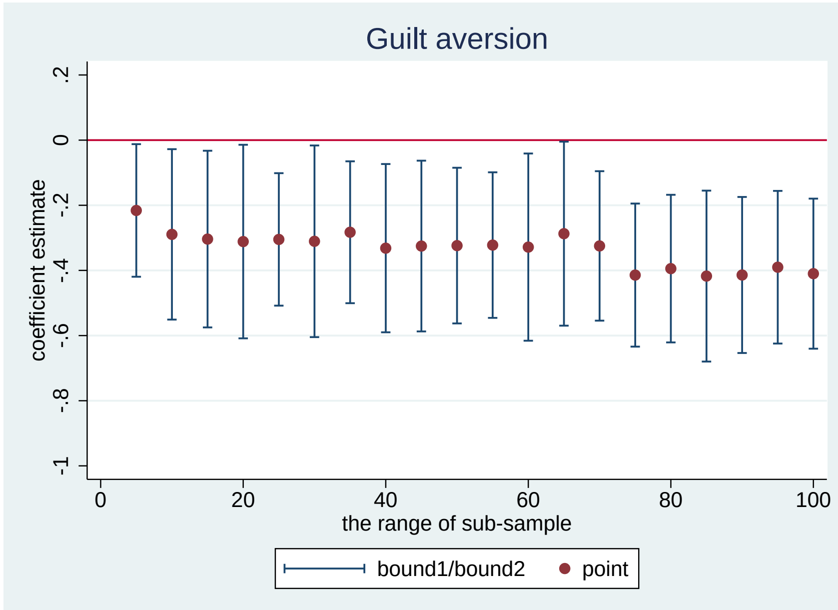
Note: This figure shows the estimated coefficients for enviousness by sub-samples. After sorting the observations by the value of the possibility of repeated interaction we split a whole observation into 20 sub-samples (0-5%, 5-10%, ..., 95-100% of a whole observation) in which the same number of observations is included. The range of coefficients denotes the confidential intervals and point estimates are also plotted.

Figure 6: The coefficients of social reputation tax by the possibility of repeated interaction



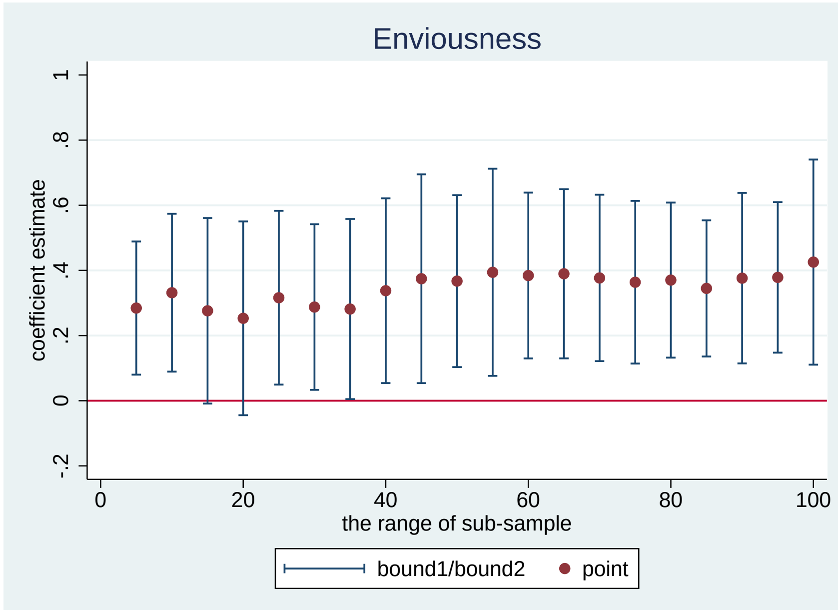
Note: This figure shows the estimated coefficients for social reputation tax by sub-samples. After sorting the observations by the value of the possibility of repeated interaction we split a whole observation into 20 sub-samples (0-5%, 5-10%, ..., 95-100% of a whole observation) in which the same number of observations is included. The range of coefficients denotes the confidential intervals and point estimates are also plotted.

Figure 7: The coefficients of guilt aversion by the availability of past history of partners



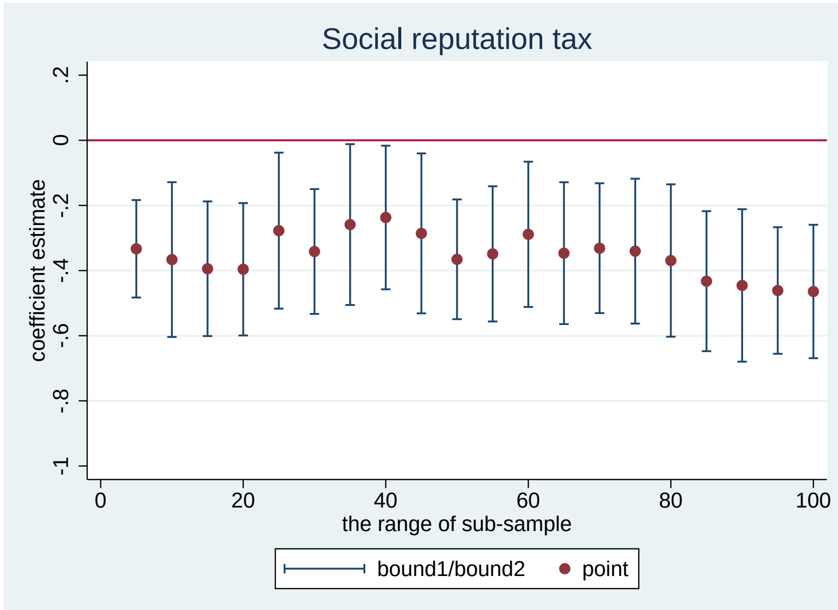
Note: This figure shows the estimated coefficients for guilt aversion by sub-samples. After sorting the observations by the value of the availability of past history of partners we split a whole observation into 20 sub-samples (0-5%, 5-10%, ..., 95-100% of a whole observation) in which the same number of observations is included. The range of coefficients denotes the confidential intervals and point estimates are also plotted.

Figure 8: The coefficients of enviousness by the availability of past history of partners



Note: This figure shows the estimated coefficients for enviousness by sub-samples. After sorting the observations by the value of the availability of past history of partners we split a whole observation into 20 sub-samples (0-5%, 5-10%, ..., 95-100% of a whole observation) in which the same number of observations is included. The range of coefficients denotes the confidential intervals and point estimates are also plotted.

Figure 9: The coefficients of social reputation tax by the availability of past history of partners



Note: This figure shows the estimated coefficients for social reputation tax by sub-samples. After sorting the observations by the value of the availability of past history of partners we split a whole observation into 20 sub-samples (0-5%, 5-10%, ..., 95-100% of a whole observation) in which the same number of observations is included. The range of coefficients denotes the confidential intervals and point estimates are also plotted.