Incentives and Social Preferences in a Traditional Labor Contract:
Evidence from Rice Planting Field Experiments in the Philippines

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Abstract

This paper presents evidence on peer effects and the role of social incentives in the traditional labor contracts. By doing so, we aim at addressing the underlying mechanisms of the peer effects and test the hypothesis of motivational crowding-out, utilizing the data from the field and laboratory experiments. We focus on the case of the Central Luzon in the Philippines where informal labor organization has supplied hired labor for rice planting since the 1960s. Team production characterizes its planting process. Interestingly, despite the possibility of infestation of opportunistic behaviors by workers, a fixed wage scheme has been adopted and remained unchanged for fifty years. We exogenously introduced three distinct labor contracts, which are fixed wage (FW), individual piece rate (IPR), and group piece rate (GPR), to 120 workers during the dry planting season in 2011. Our estimation results show the incentive effects – higher productivity level in IPR comparing to other schemes, which implies that moral hazard and free-riding behavior deteriorate performances in FW and GPR. However, we find strong evidence on peer effects that other worker's ability positively affects individual productivity level, which improves group productivity as a whole. In addition to this, our estimation results indicate the individual and peer's social preference impinge on worker's behavior. First, the lower intensity of monetary incentive encourages workers more to cooperate based on altruistic and reciprocal motivation, which eventually mitigate agency problems. Second, the degree of free-riding in GPR is negatively correlated with the group's propensity to social sanction rather than monitoring or pro-social preference although its effect seems to be diminished. Finally, altruistic and reciprocal cooperation in the fixed wage are crowded out by the monetary incentives in IPR and GPR.

Keywords: Social preferences, peer effect, labor contract, field experiment, Philippines

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1. Introduction

This paper shed light on the interplay between economic incentives and social norms in the workplace. To be more precise, we ask how individual performance depend on co-workers' behavior and their social preferences, and how those social incentives can solve agency problems. Moreover, we also examine whether monetary incentives crowd out intrinsic motivation. To this purpose, we combine an individual performance data from field experiments with the data on social preferences constructed from the results of laboratory experiments, which enable us to specify the underlying mechanisms of mitigating agency problems.

Production process we study is an informal rice planting contract in central Luzon, the Philippines. This traditional labor contract has long adopted the fixed wage contract and team-based production process. Interestingly, despite the existence of incentives for shirking behavior, this informal labor contract has remained unchanged for more than fifty years. In field experiments, we exogenously introduce three distinct labor contracts that are fixed wage, individual piece rate, and group piece rate, and a random selection of co-workers in a team exchange. Some recent empirical studies using non-experimental methods in combination with personnel data suggest that social incentives can increase worker's productivity (Mas and Moretti, 2009, Bandiera et al. 2005). While their empirical data are indeed rich and abundant, previous studies face econometric challenges.[2] This paper is the first to provide rigorous empirical evidence about the effect of social preferences and social norms on individual behavior in the workplace using field and laboratory experiments, and its endogenous formation in different compensation schemes.

2. Experimental Design

In the Central Luzon, hired labor for planting is traditionally supplied by a loosely-tied labor group which consists of thirty to a hundred members headed by a boss called *kabisilya*. Since demand for hired labor is very large and concentrated at the same period the local labor market get tight during peak season. Thus coordination between agricultural workers and farmers is needed not to miss appropriate timing of planting to secure good harvesting. The total amount of payment from a farmer is equally divided among planting workers who participate for a certain contracted area. So to all workers the rewards are fixed regardless of their performance. Their primary task is to plant seedling in a way of regular planting.

Our field experiments exogenously alter the intensity of incentives for workers. Begin by defining l_{ij} to be the output level chosen by a worker i in sub-group j. A conventional contract

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[2] First, the observed variation in incentives and team composition might not be orthogonal with other unobservable determinants of performance. Second, observed data in a sole incentive scheme doesn't allow them to test whether a shift of compensation scheme affects a degree of peer effects. Third, social connection or network information such as a dummy variable of friend ship in econometric specification cannot identify what sort of social norms are effective as underlying mechanisms.

or a fixed wage rate for a worker i belonging to sub-group j (w_{ij}^f) is quite simple: $w_{ij}^f = (r \times \bar{l})/N = F$, where N is the number of total workers in planting area, r is a payment per area from a farmer, who has a tenancy right of total planted area, to kabisilya. $\bar{l}\, (= \sum_i^N l_{ij})$ denotes a total length for planting in a contracted area which is a constant value. Under the scheme of individual piece rate, a wage rate (w_{ij}^p) is proportional to individual productivity: $w_{ij}^p = F + \alpha(l_{ij})$, where $0 \leq \alpha(l_{ij}) \leq F$. Under the scheme of group piece rate, a wage rate (w_{ij}^g) is proportional to average productivity of a group rather than individual: $w_{ij}^g = F + \alpha\big(\sum_i^n l_{ij}\,/n_j\big)$, where $0 \leq \alpha\big(\sum_i^n l_{ij}\,/n_j\big) \leq F$ and n_j is the number of workers in a group j.[3] In our experiment treatments, the shift from the conventional fixed wage scheme to the individual piece rate prompts workers to exhibit their responses to the monetary incentive and shirking behavior. On the other hand, the difference of individual outcomes between the group piece rate and the individual piece rate, as well known, corresponds to the degree of free-riding by agents and positive spill over arising from compensation scheme.

In a first phase of experiment planting workers are randomly organized into teams for which a single plot is assigned by experimenters. After this first phase, workers are asked to voluntarily organize their planting teams. During this second period, workers express their preferences to be assigned together for the daily contract.

Total planting workers who participate in field experiments are invited to four different types of laboratory experiments: Dictator game, public goods game with disapproval option, ultimatum game, and risk game. Following the interpretation in previous studies, we assume that contribution in public goods game reflects reciprocate expected cooperation, and that the frequency of monitoring and sending disapproval message represent his/her monitoring and social sanction propensity respectively (Carpenter and Seki, 2010). Moreover, we also suppose that sending amount in dictator game reflects altruism, sending amount in ultimatum game reflects fairness motivated by guiltiness, and the minimum acceptance level of responder can be interpreted as inequality aversion based on envious preferences (Camerer and Fehr 2004).[4]

3. The Data

We selected two community-based labor organizations from different villages located in Nueva Ecija Province in the Central Luzon. Our field experiments target 120 workers in those organizations and shift incentive schemes eighteen times during the dry planting season in 2011.

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[3] A compensation scheme is randomly chosen by experimenters. The productivity is defined as the length of planting row per ten minutes. Enumerators who are assigned to each team take charge of measuring worker's individual productivity. The measurement time in each contract is thirty minutes. And the random introduction of incentive schemes and the change of team components are carried out twice in a day.

[4] In public goods game, dictator game, and ultimatum game, the group and pairs of subjects are partially anonymous since they are only informed that partners can be randomly chosen from a pool of workers in a labor organization of same kabisilya. They cannot know who their partners are.

Additional information collected included data on individual characteristics such as their own recognition of treatments and health condition in each experiment, and household characteristics including income sources, relationship with Kabisilya, sex, and age etc.

According to descriptive statistics, workers in individual piece rate could achieve the highest productivity (on average 30.8m/10min) followed by the one in group piece rate (28.6m/10min) and the one in fixed wage (26.4m/10min).

4. Empirical Analysis

We estimate the following specification for the determinants of individual productivity:

$$l_{ijt} = \alpha_i + \beta_j + \lambda F_t + \theta G_t + X_{ijt}\gamma + \mu P_{ijt} + S_{ijt}\delta + \pi R_t + u_{ijt} \quad i = 1,2,\dots,N; t = 0,\dots,18 \quad (1)$$

where l_{ijt} is the productivity of worker i in team j, measured in the meter of planting length per ten minutes, in t times treatment. α_i and β_j are worker and team fixed effects that capture time-invariant determinants of productivity at the worker and team level, respectively. F_t and G_t are dummy variables for fixed wage and group piece rate respectively. X_{ijt} is a vector of household's characteristics, and P_{ijt} is the average of other worker's ability. S_{ijt} is a vector of social preferences measured by laboratory experiments. R_t is a dummy variable on team formation which takes one if a self-selection is adopted in a team formation process.

Table 1 shows that the regresssion results. In collumn (1), we can confirm the incentive effect caused by monetary incentives in individual piece rate. In column (2), however, those coefficients for fixed wage and group piece rate are not statistically significant, which suggests that the monetary incentive effects would be partially explained by the other factors controled in this specification. The average of other worker's ability has significant positive effect on worker's behavior: there exist postive peer effects among workers in this workplace. Column (3) suggest that an increase in the productivity of the most able team member has a larger impact on individual productivity than an equivalent improvement in the ability of the least able member although the estimates are not statistically significant.

The results through column (4) to (6) show the heterogenous effects among different compensation schemes. First, we find strong and robust evidence of the peer effects in all types of contracts even controling other variables of social preferences. Second, only in fixed wage contract, the sending amount in dicatator game and the amount of offer in ultimatum game are positively correlated with individual productivity: Lower intensity of incentives can more create social norm encouraging workers to behave altruistically and reciprocally. It should be emphasized that this pro-social motivation is not statistically significant in other incentive schemes. Thus extrinsic incentives in individual and group piece rate would crowd out intrinsic motivatoin. Third, we also find that propensity to monitor of other team members has a negative coefficient at statistically significant level in column (5). It implies that the situation where other co-workers tend to monitor one's activity makes people recede to exert more effort to earn

money since they are percieved as unfair person.

Fourth, as one can see from column (6), individual performance in goup piece rate appears to be affected by several social preferences. The level of other member's altruism and their propensity to sanction have strong and positive effects to worker's productivity although those effects seems to be diminishing. In terms of social monitoring and propensity to sanction, interestingly, estimation results show that only the latter has significance. Free-riding in group piece rate is mainly inhibited by the fear for resentment from others rather than the response to monitoring by others. Furthermore, workers spitefuly respond to being sactioned if they regard the excessive sanction as the expression of unkind behavior by co-workers, which is also one of examples of motivational crowding-out by extrinsic incentives.

5. Conclusion

This paper presents evidence on the interplay between social norms and economic incentives in the traditional labor contracts. Main conclusion from our econometric analysis is that social norms such as altruistic cooperation or inequality aversion and peer effects can mitigate agency problems in the workplace. However, even focusing on the same social norm, we find that its impact crucially relies on the economic incentives that are in place.

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Table. 1 Estimation Results

	(1)	(2)	(3)	(4)FW	(5)IPR	(6)GPR
Dummy for fixed wage	-5.065***	-0.375	-0.284			
	(0.7410)	(0.4480)	(0.4470)			
Dummy for Group piece rate	-2.401***	-0.178	-0.202			
	(0.8320)	(0.4980)	(0.5160)			
Average ability of other team members		0.895***	0.599***	0.881***	0.722***	0.777***
		(0.0342)	(0.2250)	(0.0428)	(0.1340)	(0.0865)
Maximum ability of other team members			0.225			
			(0.1380)			
Minimum ability of other team members			0.0677			
			(0.1060)			
Mean of team members' social preferences						
Sending amount in dictator game		-0.0317	-0.0291	-0.0599	0.00635	0.450*
		(0.0298)	(0.0295)	(0.1070)	(0.2740)	(0.2520)
Contribution in public goods game		0.00449	0.00277	-0.13	0.127	-0.355
		(0.0238)	(0.0235)	(0.1200)	(0.3020)	(0.2910)
Propensity to monitor other team members		0.181	0.156	-0.511	-5.975*	-0.767
		(0.3780)	(0.3810)	(1.4530)	(3.2740)	(2.7870)
Propensity to sanction other team members		-0.402	-0.434	-0.221	-3.174	5.415*
		(0.5440)	(0.5440)	(1.2340)	(3.7230)	(2.9950)
Difference between sending amounts in dictator game and ultimatum game		-0.0248	-0.0218	-0.0496	-0.135	0.125
		(0.0264)	(0.0265)	(0.0656)	(0.0945)	(0.1190)
Minimum acceptance level as responder in ultimatum game		0.138	0.168	0.0251	0.452	0.794**
		(0.1530)	(0.1530)	(0.2260)	(0.3230)	(0.3870)
Mean of team members' social preferences (square)						
Sending amount in dictator game				-0.0006	-0.0015	-0.00723*
				(0.0016)	(0.0045)	(0.0040)
Contribution in public goods game				0.00207	-0.00173	0.00442
				(0.0015)	(0.0040)	(0.0040)
Propensity to monitor other team members				0.0865	-2.22	0.573
				(0.5420)	(1.3790)	(0.9360)
Propensity to sanction other team members				0.371	0.977	-3.340*
				(0.8620)	(2.3730)	(1.9350)
Difference between sending amounts in dictator game and ultimatum game				0.00155	-0.000896	0.000198
				(0.0021)	(0.0046)	(0.0046)
Family of Kabisilya (yes =1, no=0)		-0.498	-0.458	-2.811**	-5.156*	-3.099
		(0.7130)	(0.7090)	(1.1850)	(2.9870)	(2.7600)
The ration of co-workers who go to same charch				1.255**	1.439	-0.305
				(0.5940)	(1.2290)	(0.9840)
Mean of individual social preferences						
Sending amount in dictator game		0.0351**	0.0337**	0.1278*	0.0113	0.00152
		(0.0136)	(0.0135)	(0.0108)	(0.0321)	(0.0395)
Difference between sending amounts in dictator game and ultimatum game		0.0541***	0.0528***	0.1324*	0.00803	0.0313
		(0.0167)	(0.0168)	(0.0162)	(0.0370)	(0.0394)
Minimum acceptance level as responder in ultimatum game		-0.169**	-0.155**	-0.0902	0.124	-0.248
		(0.0752)	(0.0742)	(0.1030)	(0.1720)	(0.1560)
Contribution in public goods game		-0.00143	-0.00163	0.00623	-0.0385	-0.0401
		(0.0124)	(0.0125)	(0.0147)	(0.0298)	(0.0347)
Propensity to monitor other team members		-0.412**	-0.418**	-0.842***	-0.883*	-0.0371
		(0.1810)	(0.1800)	(0.2330)	(0.4490)	(0.3810)
Propensity to sanction other team members		-0.0623	-0.0606	0.302	-0.336	0.181
		(0.2670)	(0.2660)	(0.3600)	(0.7120)	(0.6400)
Household Characteristics				YES		
Team fixed effects				YES		
Time dummy				YES		
N	612	568	568	248	169	151
r2	0.239	0.801	0.798	0.873	0.65	0.883
F	9.915	63.800	62.330	47.73	7.523	8.503

Notes: Dependent variable is individual productivity defined as the meters of planting length per ten minutes. Standard errors are reposrted in parenthese. *** denotes significance at 1%, ** at 5% and * at 10%.