

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

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1-1 The puzzle in traditional labor contract

□ Transplanting in Central Luzon, Philippines

- Land owner's demand for hired labor is tightly concentrated at a peak season.



A local contractor (*Kabisilya*) leads **community-based labor organization** and takes responsibility to recruit a pool of hired labor

- For agricultural workers and small farmers, income from a transplanting activity is of importance.

1-1 The puzzle in traditional labor contract (cont.)



- Three features:
 - (1) Planting in a straight way
= easy to observe worker's output
 - (2) Team production at a paddy field (5~7 workers)
 - (3) **The fixed wage contract** that remains unchanged for 50 years


- Why have they stuck to **the lowest-powered incentive scheme** rather than performance-based pay?
- How has a kabisilya prevent workers from opportunistic behavior without economic incentives?

1-2 Motivation and Method

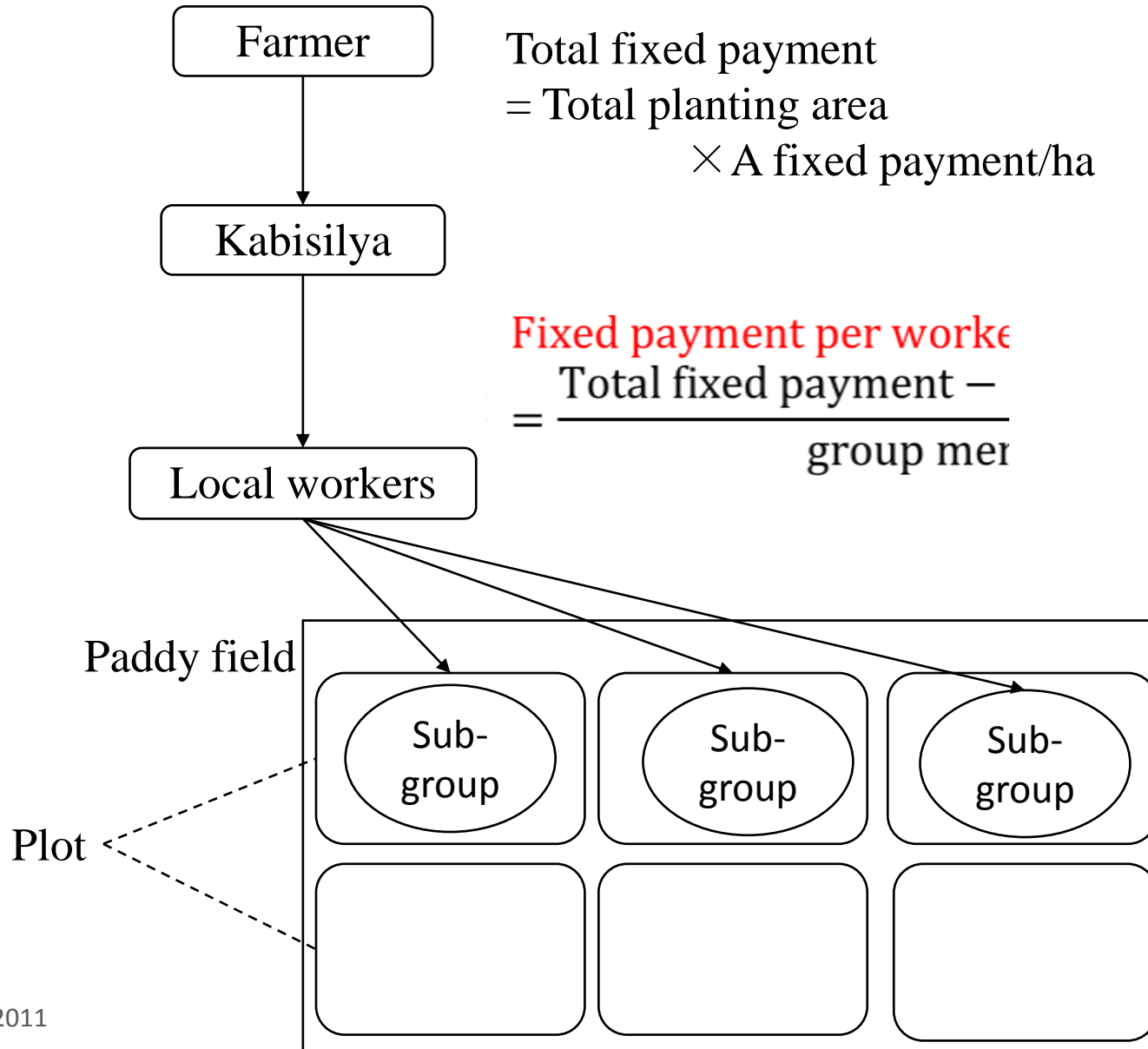
- ❑ Motivation: to solve the puzzle of the fixed wage contract, we focus on **the role of social incentives** in mitigating opportunistic behavior.
- ❑ Two research questions:
 - (1) Whether and how does a worker respond to co-workers' behavior (*peer effects*)?
 - (2) Is there any intrinsic motivation mitigating agency problems in FW?
 - (3) Whether do monetary incentives crowd out intrinsic motivation in FW?
- ❑ Method
 - Field experiments:
 - An exogenous introduction of three economic incentives
 - A randomized team formation
 - Lab experiments to capture social preferences

1-2 Motivation (cont.)

□ Why do we focus on social incentives?

- Increased attention to the role of social norms and non-monetary incentives in economics (Kandel and Lazear, 1992; List and Rasul, 2010)
 - A few empirical evidence: the existence of co-workers affects a worker's behavior in a piece rate (Bandiera et al., 2010) and a fixed wage (Mas and Moretti, 2009)
 - Self-selection bias in a team composition
 - The underlying motivation of social incentives is largely unknown
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- Anecdotal evidence suggests there exist various social norms in Central Luzon. e.g. *Pakikisama* = inequality aversion (Hayami and Kikuchi, 2000)

2-1 Informal organization for transplanting



2-2 Design of field experiments

□ Incentive schemes of three contracts

- $l_{ij}(= e_{ij} + \varepsilon_{ij})$ is the individual output i in sub-group j . N is the number of total workers in a paddy field. n_j is the number of total workers in a sub-group j . r is a fixed payment per hecter.

FW: $w_{ij}^f = F$, (not associated with l_{ij}^f)

GPR: $w_{ij}^g = F + \alpha \left(\sum_i^n l_{ij}^g / n_j \right)$, where $0 \leq \alpha \left(\sum_i^n l_{ij}^g / n_j \right) \leq F$.

IPR: $w_{ij}^p = F + \alpha \left(l_{ij}^p \right)$, where $0 \leq \alpha \left(l_{ij}^p \right) \leq F$.

- Marginal benefits in each contract

$$\text{FW: } \frac{\partial w_{ij}^f}{\partial e_{ij}} = 0 < \text{GPR: } \frac{\partial w_{ij}^g}{\partial e_{ij}} = \frac{\alpha}{n_j} < \text{IPR: } \frac{\partial w_{ij}^p}{\partial e_{ij}} = \alpha$$

2-2 Design of field experiments (cont.)

□ How to measure individual outputs?

- Productivity is defined as the average length of planted lines in ten minutes
- Three methods:
 - Drawing method by enumerators
 - Video camera
 - Passometer



2-2 Design of field experiments (cont.)

□ Randomized team formation

- Team members are exchanged in each treatment
- First phase: total planting workers are randomly organized into teams → Random-selection
- Second phase: workers can express their preferences as to whom they want to plant together in each treatment.
→ Self-selection

2-3 Design and interpretation of lab experiments

- ❑ Public goods game with monitoring and disapproval option:
 - Contribution = *reciprocal cooperation* (Camerer and Fehr, 2002)
 - Frequency of monitoring and sending messages = *propensity for social monitoring and social sanction* (Carpenter and Seki, 2010)
 - ❑ Dictator game (Forsythe et al., 1994): Sending amount of money = *altruism*
 - ❑ Ultimatum game (Fehr and Schmidt, 1999)
 - Strategy methods: a subject is supposed to play both a proposer and a responder
 - The minimum acceptance level in UG = inequality aversion based on *envious reciprocity*
 - The sending amount in UG = Inequality aversion based on *guiltiness*
 - ❑ Risk game (Schechter, 2009): Investment = *risk preference*
- *In PGG, DG, and UG, subjects played with a partially anonymous partner(s).

3 The Data

□ Sample and survey area

- Target and Date:
 - Two labor organization from different villages (G village and M village) in a dry season, 2011
 - 120 workers (58 from G village, 62 from M village)
- Number of times to introduce each contract in survey areas

	Random Selection			Self-selection			Total
	FW	GPR	IPR	FW	GPR	IPR	
contract							-
G village	3	2	2	3	2	3	15
M village	3	2	2	2	2	2	13

4-1 Econometric framework

- Estimation model for the determinant of individual productivity

$$l_{ijt} = \alpha_i + \beta_j + \lambda FW_t + \theta GPR_t + X_{ijt}\gamma + \mu P_{ijt} + S_{ijt}\delta \\ + \pi SELF_t + u_{ijt} \\ i = 1, 2, \dots, N; t = 0, \dots, 18$$

where l_{ijt} is the productivity of worker i in team j ; α_i and β_j are worker and team fixed effects; FW_t and GPR_t are dummy variables for FW and GPR; X_{ijt} is a vector of household's characteristics; P_{ijt} is the average of other worker's ability; S_{ijt} is a vector of social preferences; $SELF_t$ is a dummy variable for self-selection in a team formation process.

4-3 Baseline results

- Negative coefficients for FW and GPR (1)

= Opportunistic behavior in FW and GPR

- Coefficients in (2) – (4) are statistically insignificant and point estimations decrease.

= there are some effects of social preferences and peers' behavior

- Positive peer effects

- Response to social incentives

- Max ability of peers (p-value=0.104) > Min ability of peers

Table. 4 Estimation Results

	(1)	(2)	(3)	(4)
Dummy for fixed wage	-5.065*** (0.7410)	-0.375 (0.4480)	-0.284 (0.4470)	-0.365 (0.4570)
Dummy for Group piece rate	-2.401*** (0.8320)	-0.178 (0.4980)	-0.202 (0.5160)	-0.167 (0.5210)
Average ability of other team members		0.895*** (0.0342)	0.599*** (0.2250)	0.910*** (0.1600)
Maximum ability of other team members			0.225 (0.1380)	
Minimum ability of other team members			0.0677 (0.1060)	
Square of average ability of other team members				-0.000246 (0.0029)
Mean of individual social preferences				
Sending amount in DG		0.0351** (0.0136)	0.0337** (0.0135)	0.0351*** (0.0136)
Difference between sending amounts in UG and DG		0.0541*** (0.0167)	0.0528*** (0.0168)	0.0539*** (0.0161)
Minimum acceptance level as responder in UG		-0.169** (0.0752)	-0.155** (0.0742)	-0.168** (0.0745)
Contribution in PGG		-0.00143 (0.0124)	-0.00163 (0.0125)	-0.00158 (0.0123)
Propensity to monitor other team members		-0.412** (0.1810)	-0.418** (0.1800)	-0.414** (0.1830)
Propensity to sanction other team members		-0.0623 (0.2670)	-0.0606 (0.2660)	-0.0608 (0.2720)
Social preferences of other members	NO	YES	YES	YES
Household Characteristics	YES	YES	YES	YES
Team fixed effects	YES	YES	YES	YES
Time dummy	YES	YES	YES	YES
N	612	568	568	568
r ²	0.239	0.801	0.798	0.801
F	9.915	63.800	62.330	79.55

Notes: Standard errors are reported in parentheses. *** denotes significance at 1%, ** at 5% and * at 10%.

4-3 Baseline results (cont.)

- Peer effects:
FW > GPR > IPR
→ Reducing
opportunistic behavior

Table 5 Estimation results for heterogeneous effects by contracts

	(1)FW	(2)IPR	(3)GPR
Average ability of other team members	0.881*** (0.0428)	0.722*** (0.1340)	0.777*** (0.0865)
Mean of team members' social preferences			
Sending amount in DG	-0.0599 (0.1070)	0.00635 (0.2740)	0.450* (0.2520)
Contribution in PGG	-0.13 (0.1200)	0.127 (0.3020)	-0.355 (0.2910)
Propensity to monitor other team members	-0.511 (1.4530)	-5.975* (3.2740)	-0.767 (2.7870)
Propensity to sanction other team members	-0.221 (1.2340)	-3.174 (3.7230)	5.415* (2.9950)
Difference between sending amounts in UG and DG	-0.0496 (0.0656)	-0.135 (0.0945)	0.125 (0.1190)
Minimum acceptance level as responder in UG	0.0251 (0.2260)	0.452 (0.3230)	0.794** (0.3870)
Mean of team members' social preferences (square)			
Sending amount in DG	-0.0006 (0.0016)	-0.0015 (0.0045)	-0.00723* (0.0040)
Contribution in PGG	0.00207 (0.0015)	-0.00173 (0.0040)	0.00442 (0.0040)
Propensity to monitor other team members	0.0865 (0.5420)	-2.22 (1.3790)	0.573 (0.9360)
Propensity to sanction other team members	0.371 (0.8620)	0.977 (2.3730)	-3.340* (1.9350)
Difference between sending amounts in UG and DG	0.00155 (0.0021)	-0.000896 (0.0046)	0.000198 (0.0046)

4-3 Baseline results (cont.)

FW in (1)

- Sending amount in DG (+)
- Altruistic motivation and inequality aversion mitigates shirking behavior (reducing by 48% evaluated in average altruistic level)

Crowding out effects

- Altruistic behavior (+) in FW
- Not significant in IPR
- Joint significant test for δ
- FW: F-value = 3.88***
- IPR: F-value=1.52
- GPR: F-value=1.32

Table 5 (cont.)

	(1)FW	(2)IPR	(3)GPR	
Panel B				
Family of Kabisilya (yes =1, no=0)	-2.811** (1.1850)	-5.156* (2.9870)	-3.099 (2.7600)	
The ration of co-workers who go to same charch	1.255** (0.5940)	1.439 (1.2290)	-0.305 (0.9840)	
Mean of individual social preferences				
Sending amount in DG	0.1278* (0.0108)	0.0113 (0.0321)	0.00152 (0.0395)	
Difference between sending amounts in UG and DG	0.1324* (0.0162)	0.00803 (0.0370)	0.0313 (0.0394)	
Minimum acceptance level as responder in UG	-0.0902 (0.1030)	0.124 (0.1720)	-0.248 (0.1560)	
Contribution in PGG	0.00623 (0.0147)	-0.0385 (0.0298)	-0.0401 (0.0347)	
Propensity to monitor other team members	-0.842*** (0.2330)	-0.883* (0.4490)	-0.0371 (0.3810)	
Propensity to sanction other team members	0.302 (0.3600)	-0.336 (0.7120)	0.181 (0.6400)	
Household Characteristics	YES	YES	YES	
Team fixed effects	YES	YES	YES	
Time dummy	YES	YES	YES	
	N	248	169	151
	r2	0.873	0.65	0.883
	F	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 in parentheses. *** denotes significance at 1%, ** at 5% and * at 10%.

4-4 Heterogeneous effects

- Underlying mechanisms of peer effects
 - Interaction term: Other members' ability \times social preferences
 - All coefficients are not significant in FW, GPR, and IPR
 - = Peer effects exhibit instinctive herding behavior
- Altruistic behavior for whom?
 - Interaction term:
 - (1) Sending amount in DG \times relatives of kabisilya
 - (2) Sending amount in DG \times church members
 - Both are positive and significant in FW (coefficients: (1) > (2))

5 Conclusion

- The highest productivity in IPR (Lazear, 2000)
= the Lower productivity in FW and GPR is evidence of **sharking behavior**
- How are those agency problems mitigated?
 - **Peer effects**: co-worker's ability → (+) productivity
= instinct herding behavior or contagious enthusiasm
 - **Altruism** and **inequality aversion** toward a manager and peers → (+) only in FW (crowded out in IPR and GPR)
 - **Social sanction** and **altruistic cooperation** by peers → (+) in GPR (but diminishing)
- Optimality of a conventional FW contract
 - The largest peer effects
 - Crowding out of intrinsic motivation
→ explaining economic rationality of FW

Appendix: a measure of ability

- Estimation model for worker fixed effect

$$l_{ijt} = a + W_i\delta + T_j\gamma + \lambda FW_t + \theta GPR_t + X_{ijt}\gamma + M_{C_i}\rho + \pi SELF_t + \epsilon_{ijt}$$

where W_i and T_j are vectors of worker and team dummies respectively. M_{C_i} is a vector of all possible interactions from the set $\{C_{i1}, \dots, C_{ik}\}$. C_{il} is a dummy variable which is equal to one if worker l is on duty in the same group j at time t , otherwise zero.

- Use this estimated ability as P_{ijt} , instead of contemporaneous productivity, controlling the reflection problem (Manski, 1993)

Appendix: Robustness check

□ Other possible hypotheses to explain the puzzle of FW

(1) Imprecise measurement of workers' effort level

(2) Favoritism in subjective evaluation by kabisilya

Table. 7 Estimation results for the test of optimal intensity of incentives

	Fixed wage			Individual piece rate		
	(1)	(2)	(3)	(4)	(5)	(6)
Individual Productivity	0.0410*	0.0976*	0.0771	0.123***	0.128***	0.103***
	(0.0211)	(0.0495)	(0.0481)	(0.0286)	(0.0343)	(0.0359)
Relationships with Kabisilya						
Family			0.607			2.067***
			(0.4930)			(0.6700)
Relatives			-1.983**			0.436
			(0.8000)			(1.1000)
Friend			0.521			1.503**
			(0.4990)			(0.7470)
Neighbor			0.0196			1.464**
			(0.6130)			(0.6770)
Household Characteristics	NO	YES	YES	NO	YES	YES
Team fixed effects	NO	YES	YES	NO	YES	YES
Time dummy	NO	YES	YES	NO	YES	YES
N	291	247	247	210	169	169
r ²	0.0138	0.421	0.459	0.0916	0.554	0.596
F	3.763	10.05	13.71	18.42	10.09	12.44

Notes: Dependent variable is the subjective evaluation by kabisilya scaled from one to ten. Heteroskedasticity-robust standard errors are reported below each coefficient. *** denotes significance at 1%, ** at 5% and * at 10%.

Appendix: Robustness check (cont.)

□ Other possible hypotheses to explain the puzzle of FW

(3) Contract renewal probability determined by individual performance

Table. 8 Estimation results for the test of intertemporal incentives

	(1)	(2)
Individual Productivity	0.0773** (0.039)	
Kabisilya's evaluation		0.187** (0.084)
Household Characteristics	YES	YES
Team fixed effects	YES	YES
Time and contract dummy	YES	YES
N	567	568
r ²	0.461	0.46
F	10.58	9.064

Notes: Dependent variable is the total working year in current kabisilya. Heteroskedasticity-robust standard errors are reported below each coefficient. *** denotes significance at 1%, ** at 5% and * at 10%.