Issues in Economic Systems and Institutions: Part II: Social Norms

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Contract Enforcement by Maghribis (Greif 1993)

- Maghribis: a tight-knit community of medieval Jewish merchants.
- Had to employ agents to accompany shipments overseas.
- Agents could cheat: misrepresent prices, embezzle funds.
- Maghribis shared information about misbehaviour of agents—they were not hired by other traders in the network.
- Multilateral punishment strategy: one player punishes on another's behalf.
- Where does the incentive to punish come from?
- What is the economic value of a social network spread across several countries?

A Simple Model

- Infinite periods: $t = 0, 1, 2, ...$
- All players have discount factor $= \delta$.
- M merchants and A agents; $M < A$ (scarcity of merchants).
- If merchant supervises his own ships, payoff $= \kappa$.
- Merchant can hire an agent offering wage W. Payoffs:
  - $(\gamma - W, W)$ if agent acts honestly.
  - $(0, \alpha)$ if agent cheats.
- Agent's reservation wage $= \overline{w}$.
- Exogenous termination probability $= \tau$.

Assumptions

1. Cooperation is efficient:

$$\gamma > \kappa + \overline{w}$$

2. Cheating is tempting but creates deadweight loss:

$$\gamma > \alpha > \overline{w}$$

3. Paying enough to stop cheating outright is too costly:

$$\kappa > \gamma - \alpha$$

Equilibrium

- Merchant strategy: hire only agents who have never cheated (anyone) before at some wage W^*.
- Agent strategy (when record is unblemished): act honestly iff wage is at least W^*.
- Example of **multilateral punishment** strategy (MPS) as opposed to **bilateral punishment** strategy (BPS).
- h_h = probability that an unemployed honest agent is rehired.
- h_c = probability that an unemployed cheater is rehired.
- V_h, V_h^u, V_c^u = lifetime utility of employed honest agent, unemployed honest agent and unemployed cheater.

Efficiency Wage

- Recursive values:

$$V_h = W^* + \delta(1-\tau)V_h + \tau V_h^u$$

$$V_i^u = \delta\left[h_i V_h + (1-h_i)\left(\overline{w} + V_i^u\right)\right]$$

- Can be solved to obtain V_h, V_h^u, V_c^u in terms of primitives.
- Agent's no-cheating (incentive) constraint:

$$V_h \geq \alpha + V_c^u$$

Efficiency Wage

- Partially rewrite:

$$V_h = \frac{W^* + \tau V_h^u}{1 - \delta(1 - \tau)}$$

- Binding incentive constraint defines the lowest wage that will prevent cheating:

$$W^* = [1 - \delta(1 - \tau)](\alpha + V_c^u) - \tau V_h^u$$

- In terms of primitives:

$$W^* = W^*(., h_c, h_h) > \overline{w}$$

Efficiency Wage: Properties

- The agent must be paid a "premium" $W^* - \overline{w}$ to prevent cheating.
- The agent is honest because
  - he fears losing the wage premium $W^* - \overline{w}$.
  - his rehiring prospect dimishes by $(h_h - h_c)$ once he cheats.
- $W^*(., h_c, h_h)$ is decreasing in h_h and increasing in h_c.
- A rogue agent (past cheater) lacks the second reason to be honest. Therefore he needs a higher wage premium.
- Under MPS, merchants will not hire branded cheaters out of **self-interest**, not some desire to offend other members of the community.

Hiring A Cheater is Costly

- Let V_h^c be the lifetime utility of a past cheater who has been hired at wage W_c^* and who chooses to be honest:

$$V_h^c = W_c^* + \delta(1-\tau)V_h^c + \tau V_c^u$$

$$\text{or, } V_h^c = \frac{W_c^* + \tau V_c^u}{1-\delta(1-\tau)}$$

- The incentive constraint is:

$$V_h^c \geq \alpha + V_c^u$$

- Making this bind, we get the efficiency wage for a cheater:

$$W_c^* = W^* = [1-\delta(1-\tau)](\alpha + V_c^u) - \tau V_c^u > W^* \text{ since } V_c^u < V_h^u$$

Social Capital: Value of Information Sharing

- Under MPS

$$h_h = \frac{\tau M}{A - (1-\tau)M}; \quad h_c = 0$$

- Under BPS

$$h_h = h_c = \frac{\tau M}{A - (1-\tau)M}$$

- Therefore, efficiency wage is lower under MPS:

$$W^*_{MPS} < W^*_{BPS}$$

- $\Delta = W^*_{BPS} - W^*_{MPS}$ is the Maghribi's **social capital**.

Endogenous Partnerships (Ghosh-Ray 1996)

- In standard repeated games, players are in **exogenous** long term partnerships.
- **Bilateral punishment** strategies can sustain cooperation.
- In **random matching** games, players play with exogenously changing partners.
- If there are **information flows** within the community (e.g., Maghribi traders), **multilateral punishment** strategies can sustain cooperation.
- In many environments:
  - players endogenously seek new partners or stick with old ones.
  - players only know about personal interactions—information flows are absent.
- Examples: informal credit, small business partnerships, romantic relationships, friendships.

A Simple Model

- The stage game is a prisoners' dilemma:

	Cooperate (C)	Defect (D)
Cooperate (C)	$3, 3$	$0, 4$
Defect (D)	$4, 0$	$1, 1$

- Players are initially randomly matched. Thereafter, they can continue playing each other or unilaterally break up and seek a new partner (exogenous break-up prob $= 0$).
- Two types (private information):
  - myopic or short run players (discount factor 0).
  - non-myopic or long run players (discount factor δ).
- In the pool of unmatched players, a fraction π are non-myopic (new players are born every period).

A Cooperative Equilibrium

- Myopic players have a dominant strategy: always play D.
- Assume non-myopic players
  - start by playing C against strangers
  - continue the partnership and keep playing C as long as the other does
  - seek a new partner if the other plays D
- Let V_S and V_F denote expected lifetime payoff in the "stranger phase" and "friendship phase".

$$\begin{aligned} V_F &= 3 \\ V_S &= \pi V_F + (1-\pi)\delta V_S \Rightarrow V_S = \frac{3\pi}{1-\delta(1-\pi)} \end{aligned}$$

Incentives

- Playing C is optimal in the friendship phase if:

$$3 \geq 4(1-\delta) + \delta V_S$$

- Using the value of V_S:

$$\delta \geq \frac{1}{4(1-\pi)}$$

- Playing C is optimal in the stranger phase if:

$$V_S \geq (1-\delta)(4\pi + 1 - \pi) + \delta V_S$$

- Using the value of V_S:

$$\delta \geq \frac{1}{(1-\pi)(1+3\pi)}$$

Condition for Existence

- Since $4 > 1 + 3\pi$, the second constraint is tighter. A cooperative equilibrium exists iff:

$$\delta \geq \frac{1}{(1-\pi)(1+3\pi)}$$

- For a given fraction of patient agents (π), higher patience (δ) helps cooperation.
- For a given degree of patience (δ), cooperation is possible if π is neither too high nor too low: $\pi_1 \leq \pi \leq \pi_2$ where

$$\pi_1 = \frac{1}{3}\left[1 - \sqrt{\frac{4\delta - 3}{\delta}}\right]$$

$$\pi_2 = \frac{1}{3}\left[1 + \sqrt{\frac{4\delta - 3}{\delta}}\right]$$

Intuition

- When "good guys" are scarce (π is low), players do not want to initiate cooperation with strangers because it is too risky.
- When "good guys" are abundant (π is high), players are tempted to cheat because termination is not costly enough.
- The existence of cheaters helps patient players cooperate!
- The model has two kinds of incomplete information:
  - lack of information about new partner's past behaviour
  - lack of information about new partner's trustworthiness (discount factor)
- The second kind of ignorance helps mitigate the first.

Population Mixed Strategy

- Cooperators and cheats may arise endogenously.
- Payoff to cooperators:

$$V_S = \frac{3\pi}{1-\delta(1-\pi)}$$

- Payoff to cheats:

$$V_c = 4\pi + (1-\pi).1 = 3\pi + 1$$

- These payoffs are equal at π_1 and π_2. The latter is the stable eequilibrium.

Gradualism

- Suppose the cooperation level can be scaled up or down to $x \in [0, 1]$. Payoff matrix:

	Cooperate (C)	Defect (D)
Cooperate (C)	$3x, 3x$	$0, 4x$
Defect (D)	$4x, 0$	x, x

- In the F phase, players will obviously choose $x = 1$.
- Allowing for partial cooperation in the S phase:

$$V_S = \frac{3\pi\left[(1-\delta)x + \delta\right]}{1 - \delta(1-\pi)}$$

Gradualism

- Choose the highest x that satisfies the S-phase incentive constraint:

$$V_S \geq (1-\delta)[4\pi x + (1-\pi)x] + \delta V_S$$

- This gives us

$$x = \frac{3\delta\pi}{3\delta\pi^2 - 2\delta\pi + 1 - \delta}$$

- We have equilibrium cooperation for a broader set of parameters.
- Two disciplinary forces at woork:
  - scarcity of trustworthy agents
  - gradual trust building

Production

- Indivisible project requires investment of L.
- Output is either Q (prob $p(e)$) or 0 (prob $1 - p(e)$), where e = effort spent on project.
- Cost of effort = e, and $p'(e) > 0$, $p''(e) < 0$.
- Effort is unobservable to anyone other than the farmer/entrepreneur.
- All agents are risk neutral.

Self-Financed Farmer/Entrepreneur

- The farmer solves

$$\max_e p(e)Q - e - L$$

- This gives the first-best effort level e^* defined by the FOC:

$$p'(e^*) = \frac{1}{Q}$$

- This is what an agent would choose if he invested his own money and internalized all costs and benefits. It maximizes social surplus.

Debt-Financed Farmer/Entrepreneur

- The farmer has no funds of his own. He must borrow to finance the project.
- A profit maximizing lender has money to lend (opportunity cost of funds $= 0$).
- Effort cannot be monitored (moral hazard; involuntary default).
- Let $i =$ interest rate on the loan (endogenous), and $w =$ collateral put up by the borrower. Total debt $R = (1 + i)L$.
- Limited liability: farmer cannot repay if there is crop failure (but collateral is seized).

Pareto Frontier

- Moneylender's profit:

$$\pi = p(e)R + [1 - p(e)]\, w - L \tag{1}$$

- Borrower's utility:

$$v = p(e)(Q - R) + [1 - p(e)]\,(-w) - e$$

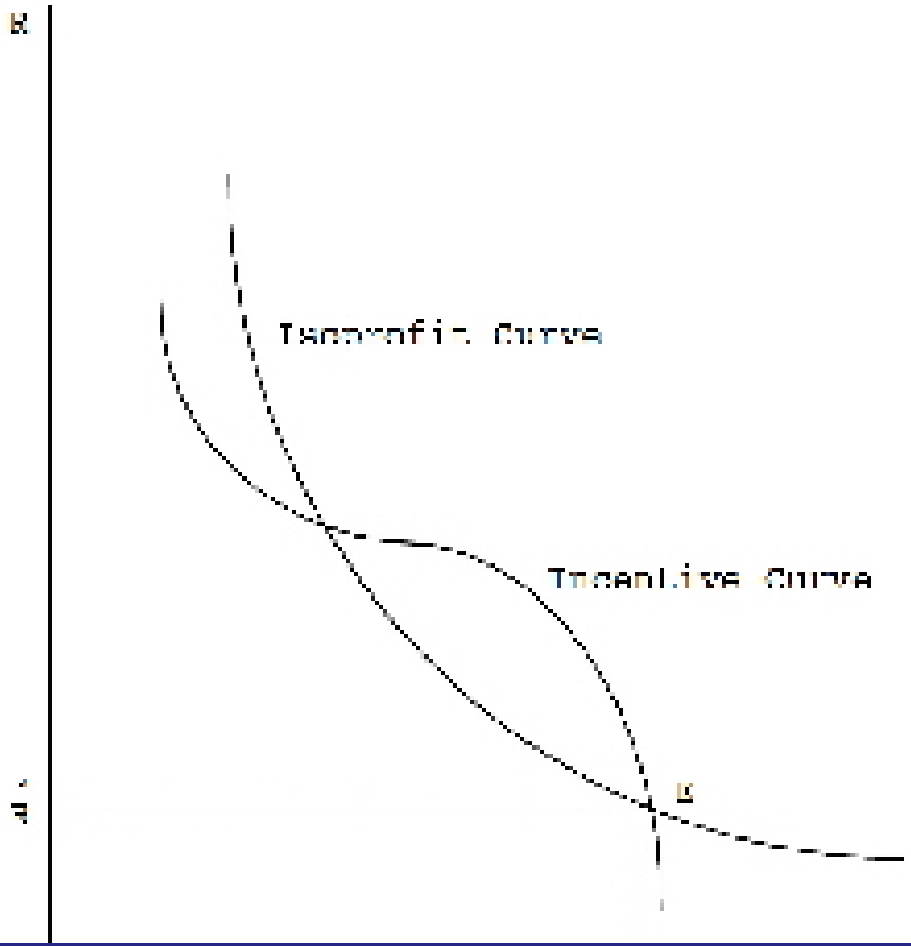
- We look at the Pareto frontier in (v, π) space generated by varying the interest rate i.
- Effort response function $\widehat{e}(R; w)$ is defined by

$$p'(\widehat{e}) = \frac{1}{Q + w - R} \tag{2}$$

Mapping the Pareto Frontier

- Fix π. Then choose $R = (1 + i)L$ to maximize v subject to the incentive constraint.
- Mathematically, (1) and (2) give us the solution

Mapping the Pareto Frontier



Results

Theorem

As long as the loan is not fully collaterized ($w < R$), effort choice by a debt financed farmer/entrepreneur is less than first best ($\widehat{e} < e^*$).

- **Debt overhang:** An indebted agent does not capture the full marginal social returns from his effort.
- Limited liability plays a role: the borrower faces upside risk but offloads downside risk to the lender.
- The higher is the debt burden (R) and smaller is the collateral (w), the more severe is the moral hazard.
- Collateral serves two purposes:
  - secures the loan (direct)
  - incentivizes the borrower (indirect)

The Quality of Usury: Deadweight Loss of Greed

Theorem

(Pareto efficient) Equilibria in which lenders obtain higher profits involve higher debt and interest rates, but lower levels of effort. Therefore these equilibria produce lower social surplus.

- The only way to increase lender profits is to increase the interest rate.
- This has a disincentive effect on effort and reduces social surplus.
- When $\pi = 0$, e is still less than e^*: agency is part of the problem.
- When π is maximized, inefficiency further increases.
- Government/NGO intervention in credit markets, creating cheaper access to credit, has an **efficiency** rationale in addition to a **redistributive** purpose.

Credit Rationing

- Equilibrium in a market with profit maximizing lenders happens where the isoprofit curve is tangent to the incentive curve.
- This puts an upper bound on i and R: private lenders will not increase the interest beyond a point even if there is excess demand for credit.
- Theories of endogenous price rigidity: Stiglitz-Weiss, Shapiro Stiglitz.
- Markets may not clear even without price controls. Implications for labour markets.

The Quality of Mercy: Debt Forgiveness

- If R is too high for historical reasons (unanticipated shocks like a pandemic or global recession), reducing the debt burden to some extent may be a win-win for lenders and borrowers.
- How large the "haircut" should be is a matter of bargaining.
- Applies also to sovereign debt, corporate debt, consumer loans, etc.
- Some long term considerations to keep in mind:
  - if there are multiple creditors, haggling may ensue as to how the haircuts should be distributed
  - moral hazard of bailouts: borrowers may increase risky behaviour anticipating debt forgiveness
  - shadow of corruption: politicians/bureaucrats/loan officers have an incentive to collude with borrowers and reduce debt beyond what is needed for generating incentives

The Quality of Markets: Wealth Begets Wealth

Theorem

An increase in the size of the collateral, w, leads to a fall in the equilibrium interest rate and debt, R, and an increase in the effort level, e. The Pareto frontier shifts outward.

- At every choice of R, the borrower has an incentive to work harder, thus increasing social surplus.
- With profit maximizing lenders, wealthier borrowers will get cheaper credit and earn more income.
- In a model with variable loan size, they can also get more credit and be rationed less.
- The market is severe on the poor, easier on the rich.
- There are other channels through which markets can magnify inequality, e.g., nutritional efficiency wage (Dasgupta and Ray (1986)).

Grameen Bank: Beginnings

- Founded by Muhammad Yunus in 1976.
- Jobra village in Chittagong, Bangladesh.
- Initial capital of $27 oout of Yunus's own pocket.
- First set of borrowers: 42 families.
- Attracted Ford foundation and other donors.

Grameen Bank: 2011

- 8.35 million borrowers, 95% women.
- 2,565 branches covering 81,379 villages.
- Total disbursement: $11.35 billion.
- $10.11 billion repaid, $968.31 million outstanding.
- Monthly loan dibursement $123.38 million, loan recovery rate: 96.67%.
- 56% of capital from deposits, no donor funds since 1998.

Grameen Lending Strategy

- Clientele mostly women (97%).
- **Group loans** and **joint liability**: given to groups of five. Group members will not get further loans if any member of the group defaults.
- Grameen II: moved away from group loans.
- Payment in regular **weekly installments**, starting almost immediately.
- Compulsory **weekly meetings** of the team to discuss problems and prospects.

Peer Monitoring: Stiglitz (1993)

- Output is Q (prob p) or 0 (prob $1-p$). Cost function: $c(p) = \frac{1}{2}\gamma p^2$.
- Let loan size $= 1$, and interest charged $= R$.
- Lender's opportunity cost of funds $= \rho$.
- First best effort choice:

$$p^* = \arg\max_p pQ - \frac{1}{2}\gamma p^2 = \frac{Q}{\gamma}$$

- Effort under IL loan contract:

$$\widehat{p} = \arg\max_p p(Q-R) - \frac{1}{2}\gamma p^2 = \frac{Q-R}{\gamma} < p^*$$

Joint Liability without Social Capital

- Group of two with JL. Assume $Q > 2R$.
- If partner chooses p', best response is

$$\begin{aligned} & \arg\max_p p(Q-R) - p(1-p')R - \frac{1}{2}\gamma p^2 \\ = \quad & \frac{Q-2R}{\gamma} + \frac{R}{\gamma}p' \end{aligned} \tag{3}$$

- Effort choice has positive externalities.
- Zero-profit condition:

$$pR + p(1-p)R = p(2-p)R = \rho \tag{4}$$

Joint Liability without Social Capital

- Suppose group members are not socially connected and cannot monitor each other's effort.
- Noncooperative effort choice in Nash equilibrium (put $p = p'$):

$$p(R) = \frac{\gamma - 2R}{\gamma - R} \tag{5}$$

- Solve for R and r using (4) and (5):

$$\widetilde{p} = \frac{Q - R}{\gamma} = \widehat{p}$$

- For a given interest rate, effort choice is lower because JL imposes double taxation.
- However, since group members cross subsidize each others' default, lender can afford to lower interest rate.
- These two effects wash out.

Joint Liability with Social Capital

- Suppose group members can monitor each others' p due to social proximity.
- They cooperatively choose a common p to maximize their payoff. This internalizes the externality.

$$\begin{aligned} \overline{p}(R) &= \arg\max_p p(Q-R) - p(1-p)R - \frac{1}{2}\gamma p^2 \\ &= \frac{Q-2R}{\gamma-2R} \end{aligned} \tag{6}$$

- Comparing (5) and (6): $\overline{p}(R) > p(R)$.
- JL mitigates moral hazard more than IL. The benefits can be passed on to borrowers through lower interest rates.
- Ability of members to monitor each other is key.

Peer Selection (Ghatak (1999))

- Suppose there are two types of borrowers: safe and risky.
- Output is Q_i (prob p_i) or 0 (prob $1 - p_i$) where $i = s, r$, with.
- Suppose $Q_s < Q_r$, and $p_s Q_s > p_r Q_r$.
- If $R > Q_s$, it will drive out the safe borrowers from the market.
- Adverse selection may both contract the market and have distributional consequences (safe borrowers forced to cross-subsidize risky borrowers).
- JL gives a way out through peer selection.

Assortative Matching

- Borrowers can observe each others' p due to social proximity. Lender cannot.
- JL requires voluntary partnerships of two.
- Expected payoff of i partnered with j:

$$EU_{ij} = p_i p_j (Q - R) + p_i (1 - p_j)(Q - 2R)$$

$$EU_{is} - EU_{ir} = p_i (p_s - p_r) R$$

- All borrowers prefer a safe partner to a risky partner, but safe borrowers have more to gain from a safer partner than risky borrowers.
- Risky borrowers cannot bid away safe partners.
- Screening: safe borrowers opt for JL, risky borrowers opt for IL.