

Economics Development Note 1

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W1

In class Note

Development Economics

To explain micro-foundations of development

- Modern view: institutions are important for growth
- Classical view: institutions are the same across economies:
 - Perfect (no frictions)
 - No entry barriers
 - Secure property rights

Institutions:

- $y=f(K,L)$; institutions is the f , the way how you combined the capital and labor

Cover both theoretical and empirical work

- Theory: what are potential important causal factors
- Empirics: which of these factors are relevant.

Principal-Agent Theory

Ideal world:

- No public goods,
- No externalities
- No natural monopolies
- No information asymmetries
- A benevolent court system to enforce contracts

Principal-Agent static model in moral hazard (and adverse selection) environment.

Asymmetric information: one party to a transaction knows something that another party does not know.

- Moral Hazard
- Adverse Selection

Principal-Agent Model

Have following features:

- P asks A to perform a task
- A's actions affect the wellbeing of P. These action determine, stochastically, some performance measures
- The interest of P and ones of A may diverge
- A's action is hidden
- Final outcome depends on events (cannot be controlled by P and A)
- (P,A) agree ex ante to reward schedule
- Reward schedule = performance variables

$$e = \{0, 1\} \quad \text{产能}$$

$$\psi(e) \quad \psi(0) = 0$$

$$\psi(1) = \psi$$

$$u = u(e) - \psi(e)$$

$$q = \{\bar{q}, \underline{q}\} \quad \Delta q = \bar{q} - \underline{q} > 0$$

假设, 使用多, $\bar{q} \uparrow$, 即: $\pi_1 > \pi_0$.

某特定结果的概率

$$\bar{q} \begin{cases} P(\bar{q} = \bar{q} | e = 0) = \pi_0 \quad \text{产能为0的结果} \\ P(\bar{q} = \underline{q} | e = 1) = \pi_1 \end{cases}$$

$$\underline{q} \begin{cases} P(\bar{q} = \underline{q} | e = 0) = (1 - \pi_0) \quad \text{产能为0时另一情况(相反)结果} \\ P(\bar{q} = \bar{q} | e = 1) = (1 - \pi_1) \end{cases}$$

$$\text{期望效用: } V_1 = \pi_1 (S(\bar{q}) - F) + (1 - \pi_1) (S(\underline{q}) - \underline{q})$$

Principle更想 \uparrow π_1 情况发生的效用

$$V_0 = \pi_0 (S(\bar{q}) - F) + (1 - \pi_0) (S(\underline{q}) - \underline{q})$$

当 Principle 在关注 Agent 时 $V_0 > V_1$, Principle 更爱 V_0

或 Individual Rationality Constraint

$$\text{P.C.: } \pi_1 u(\bar{q}) + (1 - \pi_1) u(\underline{q}) - q \geq \bar{u}$$

(参与)

任何结果下A的期望回报大于期望付出

Reservation Utility ($\bar{u}=0$)

$$\text{I.C.C.: } \pi_1 u(\bar{q}) + (1 - \pi_1) u(\underline{q}) - q \geq \pi_0 u(\bar{q}) + (1 - \pi_0) u(\underline{q})$$

(激励)

A期望回报在 π_1 下大于 π_0 下时会努力以 π_1 工作其~合约下与 $\max_{\{E, \underline{q}\}} V_1 \rightarrow$ 求出 optimum

Incentive Compatibility Constraint

W2

In Class Note

1) Share Cropping Contract

(因土地分配不均)

例: 地主 (Landlord)

租户 (Tenant) \rightarrow 支付租金 (R)

设立合约

分配比例 α 与努力程度

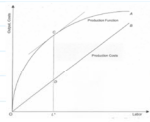
$$R = \alpha \times y(L) + F \quad \text{强制缴纳}$$

$$y'(L) > 0; y''(L) < 0 \quad (\text{基于 Concave 生产函数})$$

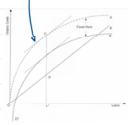
$$\text{固定租金: } \alpha = 0; F > 0$$

$$\text{分享收成: } \alpha \in [0, 1]; F = 0$$

(好的合约基于保险和努力的激励程度)



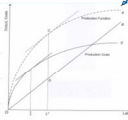
当 $F > 0$, 劳动产能 ↓



若 $R = \alpha \times y(L)$

决定了生产函数斜率

即: 产量 ↑, $R \uparrow \rightarrow$ 激励



(改变 Incentive, 改变人们 Behavior)

例: 劳动力产能 $Y = 2\sqrt{L}$, 劳动力成本 $c(L) = \frac{1}{2}L^2$

(设努力无法衡量)

$\max_L 2\sqrt{L} - \frac{1}{2}L^2 - F$ ← 固定租金

努力的成本

$$\frac{\partial \Pi}{\partial L} = L^{-1/2} - L = 0$$

$$\frac{1}{\sqrt{L}} = L$$

$$\therefore L^* = 1$$

$$Y^* = 2\sqrt{1} = 2$$

设 $S = \frac{1}{2}$ (劳动者从产出所得)

$$\max_L \frac{1}{2}(2\sqrt{L}) - \frac{1}{2}L^2$$

$$\frac{\partial \Pi}{\partial L} = \frac{1}{2} \cdot 2 \cdot \frac{1}{2}L^{-1/2} - L = 0$$

$$\frac{1}{2\sqrt{L}} = L$$

$$L^* = \left(\frac{1}{2}\right)^{2/3} \approx 0.63$$

$$Y = 2\sqrt{0.63} = 1.58$$

2) LL 及风险厌恶

$$y = l + \varepsilon \leftarrow \text{random shock}$$

劳动力产出

$$U(c) = E(c) - \frac{R_L}{2} \text{Var}(c)$$

期望成本

$$(i = \frac{L}{T})$$

租户产能的成本: $c(L) = \frac{1}{2}L^2$

$$c_T = sY - F$$

$$E(c_T) = E(sY - F)$$

$$= sE(y) - F$$

$$= s \cdot l - F$$

$$\text{Var}(c_T) = \text{Var}(sY - F) = s^2 \sigma^2$$

($F > 0$; 固定租金)

租户效用:

$$U^T(l, s, F) = E(c_T) - \frac{R_L}{2} \text{Var}(c_T) = s \cdot l - F - \frac{R_L}{2} s^2 \sigma^2 - \frac{1}{2} l^2$$

$$C_L = (1-s)y + F$$

$$E(c_L) = E[(1-s)y + F] = (1-s)E(y) + F = (1-s)l + F$$

$$\text{Var}(c_L) = \text{Var}[(1-s)y + F] = (1-s)^2 \sigma^2$$

$$U^*(l, s, F) = (1-s)l + F - \frac{R_L}{2} (1-s)^2 \sigma^2$$

$$\max_{s, l} S = U^* + U^T$$

$$= l - \frac{R_L}{2} \sigma^2 - \frac{R_L}{2} (1-s)^2 \sigma^2 - \frac{1}{2} l^2$$

$$\frac{\partial S}{\partial l} = 1 - l = 0 \rightarrow l^* = 1$$

$$\frac{\partial S}{\partial s} = -sR_L\sigma^2 + R_L(1-s)\sigma^2 = 0 \rightarrow s^* = \frac{R_L}{R_L + R_T}$$

W3

In-class Note

Incomplete Information (无法衡量努力)

$y = l + \varepsilon$
 effort \rightarrow 无法 contracted
 s and F : 雇员选择 \hat{l} 的等级
 故: $\partial F / \partial l = F - \frac{R_T}{2} s^2 \sigma^2 - \frac{1}{2} l^2$
 $\frac{\partial F}{\partial l} = s - \frac{2l}{2}$
 First Order Approach $\begin{cases} s = \hat{l} \\ \hat{l} = s \end{cases}$
 I.C.C. \rightarrow

同 $\max U^L$ 独立效用
 $ICC \geq 0 \rightarrow \lambda_1, U^T$ 雇员效用
 $PC \geq 0 \rightarrow \lambda_2, U^T$

$\max_s S = U^T + U^L = s - \frac{R_T}{2} s^2 \sigma^2 - \frac{R_L}{2} (1-s)^2 \sigma^2 - \frac{1}{2} s^2$
 Share Capping Constraint
 $\frac{\partial S}{\partial s} = 1 - R_T s \sigma^2 + R_L (1-s) \sigma^2 - s = 0$
 $-R_T s \sigma^2 + R_L \sigma^2 - R_L s \sigma^2 - s = 0$
 $s [R_T \sigma^2 + R_L \sigma^2 + 1] = 1 + R_L \sigma^2 \rightarrow$ Variance of Output

$$\hat{s} = \frac{1 + R_L \sigma^2}{1 + R_L \sigma^2 + R_T \sigma^2} \quad (R_T > 0)$$

$$s^* = \frac{R_L}{R_L + R_T}$$

2) Insurance

Reduce risk via consumption smoothing

1. Credit (但不简单)
2. Self-insurance (用一人的个人财富)

为何需要?

D. Ray 给出的:

1. 难以观测的结果 (人在骗人, 往哪里推荐)
2. 难以观测的过程
3. 难以强制的合约

无保险有高风险能时:

$$p u(H) + (1-p) u(L) - C$$

低效时:

$$q u(H) + (1-q) u(L)$$

若每一独立成员提供高风险能:

$$ICC: p u(H) + (1-p) u(L) - C > q u(H) + (1-q) u(L)$$

若每位都是风险厌恶:

$$u(pH + (1-p)L) > p u(H) + (1-p) u(L)$$

高效率得 $(1-p)(H-L)$ into Common Pool; 低效者得 $p(H-L)$, 每位得 $pH + (1-p)L$
 概率高/低

2) Enforcement Contract

例: Perfect Insurance: 每位成员风险厌恶有 $pH + (1-p)L \rightarrow$ 取名为 M
 N 为周期数

在给定年份中有高产出, 从“无保险状态” (信任) 所得为 $u(H) - u(M)$

$$损失: N [u(M) - [p u(H) + (1-p) u(L)]]$$

加入 S , Social Sanction

故 Enforcement Constraint:

$$N [u(M) - [p u(H) + (1-p) u(L)]] + S > u(H) - u(M)$$

N 大下: Perfect Insurance 的效用 \rightarrow 产出的期望效用 \rightarrow 社会制裁 \rightarrow 无保险所得
 社会制裁越强, 越遵守 Enforcement Constraint
 重复越多

Insurance 的主要问题是因: moral hazard + adverse selection

2) Grameen Bank

因 asymmetric information, 需 collateral 解决

引发问题:

1. 穷人无资产
2. 有资产无 formal titles

银行无法对穷人进行金融或非金融制裁, 其周围的人可以低成本进行非金融制裁

Grameen Bank:

1. 小额贷款 (只讲项目)
2. 无需抵押
3. 组织同时五人监督组
4. 贷款个项目, 组对彼此负责连带责任

W₆

1) 设计实验

设: 读本书在成绩的影响

$$Y_i = \text{Observed test score}$$

$$Y_i^T = \text{Average test score, 若学校: 读书}$$

$$Y_i^C = \text{Average test score, 若学校: 无书}$$

有无书的 Causal effect:

$$Y_i^T - Y_i^C$$

- 两种产品: X 与 Z (无产出, 自然资源)
- farmer 可用 $e \in [0, 1]$ 产出 X , 有概率产出 A 与 $1-e$ 产出 0
- 期望产出 $A\bar{e}$
- Farmer 决定最佳 e 等级, 无其它策略选择
- Farmer 线性效用: $u(c, l) = c + l$ (消费与空闲)

(续 W_5)

1. δ (未来收入的重要程度)
 - ($\delta = 0$, 只考虑当下收入, 高概率没收入)
 - ($\delta = 1$, 未来收入且可信)
2. Z , deviate 后收入
 - (Z 若 \uparrow , $\frac{Z}{Z+X(1-\delta)} \approx 1$, 则 $\delta \approx 1$)
 - ($\uparrow Z$, 越难 Commit)

2. Empirical evidence

Institution: the rules of games that shape social interaction

Reversal of Fortune

(探究 1500 与现今的世界收入分配)

结论: 前殖民地 1500 有较高城镇化的有较低 I/K 如今 (1995)
非殖民地 1500 有较高城镇化的有较高 I/K 如今 (1995)

Colonial Origins and Comparative Development

(探究欧洲殖民政策与 Institution 关系, Institution 对如今影响)

Changing Institution is costly

- 1) Setting up is costly
- 2) Incentives of vested interest
- 3) Complementary investment

Unbundling Institution

结论: Property rights institution 与 I/K 有强相关性
Contracting institution 只对 stock market 的发展有影响

W_1

W_2 Microfinance

- 1) 因 Transaction Cost, 信用市场不完善 (尤其在发展中国家, 信息不对称)
2. 故需 Collateral 确保信用

Microfinance: 研究穷人用 Social Capital 并抵押物贷款

Roots of Microfinance: e.g. Grameen Bank

- Group lending mechanism
- Peer monitoring

Grameen Bank

特征:

$$\max_{\tau} \left\{ [\tau + \lambda(1-\tau)] \frac{(1-\tau)A^2}{2} - \lambda \left(\frac{(1-\tau)A}{2} \right)^2 \right\}$$

$$\frac{\partial}{\partial \tau} = \frac{(1-\tau)^2 A^2}{2} + \frac{\lambda(1-\tau)^2 A^2}{2} - \lambda \left(\frac{(1-\tau)A}{2} \right)^2$$

$$\frac{A^2}{2} [(1-2\tau) + \lambda(1-\tau)] + \lambda(1-\tau) = 0$$

$$\tau = \frac{\lambda-1}{\lambda-2}$$

General Labor

$$\max (1-\tau)(1-$$

$$\text{FOC: } \frac{\partial}{\partial e_1} = c A^{\frac{1}{2}} e_1^{-\frac{1}{2}} - 1 = 0$$

$$e_1^{-\frac{1}{2}} = \frac{2}{cA}$$

$$e_1 = \left(\frac{cA}{2} \right)^2$$

$$\frac{\partial}{\partial e_2} = A\bar{e}_1 - \tau_r A\bar{e}_1 + \tau_r A\bar{e}_1 \bar{e}_2 + \bar{e} - e_1 - e_2$$

$$\tau_r A e_1^{-\frac{1}{2}} \cdot \frac{1}{2} e_2^{-\frac{1}{2}} - 1 = 0$$

$$e_2^{-\frac{1}{2}} = \frac{2}{\tau_r A e_1^{-\frac{1}{2}}}$$

$$e_2 = \left[\frac{\tau_r A e_1^{-\frac{1}{2}}}{2} \right]^2$$

Solve for e_2

$$e_2 = \left[\frac{\tau_r A \frac{cA}{2}}{2} \right]^2 - \left[\frac{\tau_r A^2 [1-\tau(1-\tau\bar{e}_1)]}{2} \right]^2$$

$$\therefore e_1 = \left(\frac{2(1-\tau)A}{4-(\tau_r A)^2} \right)^2 : e_2 = \left(\frac{\tau_r (1-\tau)A}{4-(\tau_r A)^2} \right)^2$$

1. Peer monitoring

Grameen Bank

特征:

- 为 self-employment project 提供小额贷款
- 无抵押, 高息 (低于放债人)
- 贷款者自己参与进 self-employment project
- 款项给予个人项目, 但群体共用信用

Social Capital

- 社群成员间彼此知晓
- 其邻居可实施 non-financial sanctions

Group Lending Mechanism

- 允许穷人彼此作为保证人
- Important Incentives to repay promptly (一人不还, 群体受罚)

Group Liability and Client Selection

(可以降低 screening 和 enforcement Cost)

- Gyle Continues (持续长期)
- Group lending 可缓解 Adverse Selection

· Frequent repayments: 每周, 以群体名义还

· Progressive Lending: 最初小额, 持续可大 (eg 小孩上学)