PROPERTY RIGHTS AND ECONOMIC DEVELOPMENT

By Timothy Besley , Maitreesh Ghatak

Introduction

Property Rights

- **Property Rights** are a theoretical construct in economics for determining how a resource is used, and who owns that resource.
- Based on ownership :
  - Private
  - State
  - Common
  - Open

- Property rights can be viewed as an **attribute** of an economic good .
  - Together they are referred to as the Bundle of Rights .

Bundle of Rights

Ideally

- Many results in economics are derived under the assumption that Property Rights are perfectly defined .
  - Ex : Making the agent a residual claimant of the output solves the moral hazard problem (assumption : perfectly defined property rights .)
- If there are no *transaction costs*, bargaining will lead to an efficient outcome regardless of the initial allocation of property rights . ~ Coase Th.

Departure from Perfect Property Rights

Right to Use the Good

Expropriation Risk

- Insecure Property Rights imply that individuals may fail to realize the fruits of their investment and efforts

Right to Earn Income from the Good

Insecure Property Rights may lead to costs that individuals have to incur to defend their property which , from economic point of view , is inefficient .

- Appointment of Guard Labor

Departure from Perfect Property Rights

Right to Transfer the Good

Failure to Facilitate Gains from Trade

- Economic Efficiency says that assets should be managed by those who are most productive in doing so .
- Improperly defined Property Rights hinder the mobility of assets

Enforcement

Collateral to Support Modern Economy .

- Improper Property Rights reduce the expected wealth (collateral) of the borrower . This affects the equilibrium .

Relationship -Property Rights and Economic Development

- What are the mechanisms through which property rights affect economic activity
  - Expropriation Risk and Introduction of Guard Labor
  - Mobility of Assets , Effect on Collateral .
- What are the determinants of Property Rights .
  - Study of how property rights are created and evolve overtime
  - Study of institutions that shape the process

Resource Allocation and Property Rights

Role of Property Rights in limiting expropriation

The Basic Model

- Assumptions :
  - Single Producer's Economy
  - effort is between [0,1]
  - expected output is Gamma
  - Farmer's utility function is linear in consumption (c) and leisure (l)
  - Property rights are imperfect – exogenously given probability [0,1] of expropriation τ (coercive authority)

The Basic Model

- Expected consumption

$$c = (1-\tau)A\sqrt{e}.$$

- Maximization Problem

$$(1-\tau)A\sqrt{e} + \bar{e} - e$$

S.t.

$$e \leq \bar{e}.$$

The Basic Model

- FOC for an interior solution

$$\frac{(1-\tau)A}{2\sqrt{e}} = 1.$$

- Optimal Choice of Labor

$$e^* = \left[\frac{(1-\tau)A}{2}\right]^2.$$

The Basic Model

Since we require that $e \leq 1$, we assume throughout that $A \leq 2$. Correspondingly, (expected) gross output is $y(\tau) = ((1-\tau)A^2)/2$, and the producer's net surplus (taking into account the cost of e) is given by $\pi(\tau) = [(1-\tau)A/2]^2 + \bar{e}$. Using this, we have

RESULT

The Basic Model

RESULT

Result 1. *Labor supply, output and profits are strictly decreasing in* τ.

- Expropriation Risk τ acts as a 'Tax' which takes away the incentive to work . So anything which lowers this 'tax' will have a positive impact on the productive effort level

The Basic Model

- If competitive labor market exist , then resource constraints are unlikely to be binding .
  - If e* > endowment , the producer would hire in labor from the market .
  - Effect of the Expropriation Risk τ remains the same – like a tax , it distorts incentives.

Model with Guard Labor

Basic Model

- Only Productive Labor
  - Pro. Lab. Produces output

Guard Labor Model

- Productive & Guard Labor
  - Pro. Lab Produces output + Guard Labor reduces the Risk of expropriation
  - Guard Lab. not required if property rights are perfectly defined.

Model with Guard Labor..

- Assumptions (**Guard Labor Model**) :
  - e1 (productive labor) [0,1]
  - e2 (guard labor) [0,1]
  - The prob. of expropriation -

    $\tau(1-\gamma\sqrt{e_2})$, where $\tau \in [0, 1]$ and $\gamma \in [0, 1]$.

    Expropriation is lower if e2 is higher ,

    Gamma is the effectiveness of Guard Labor.

Model with Guard Labor..

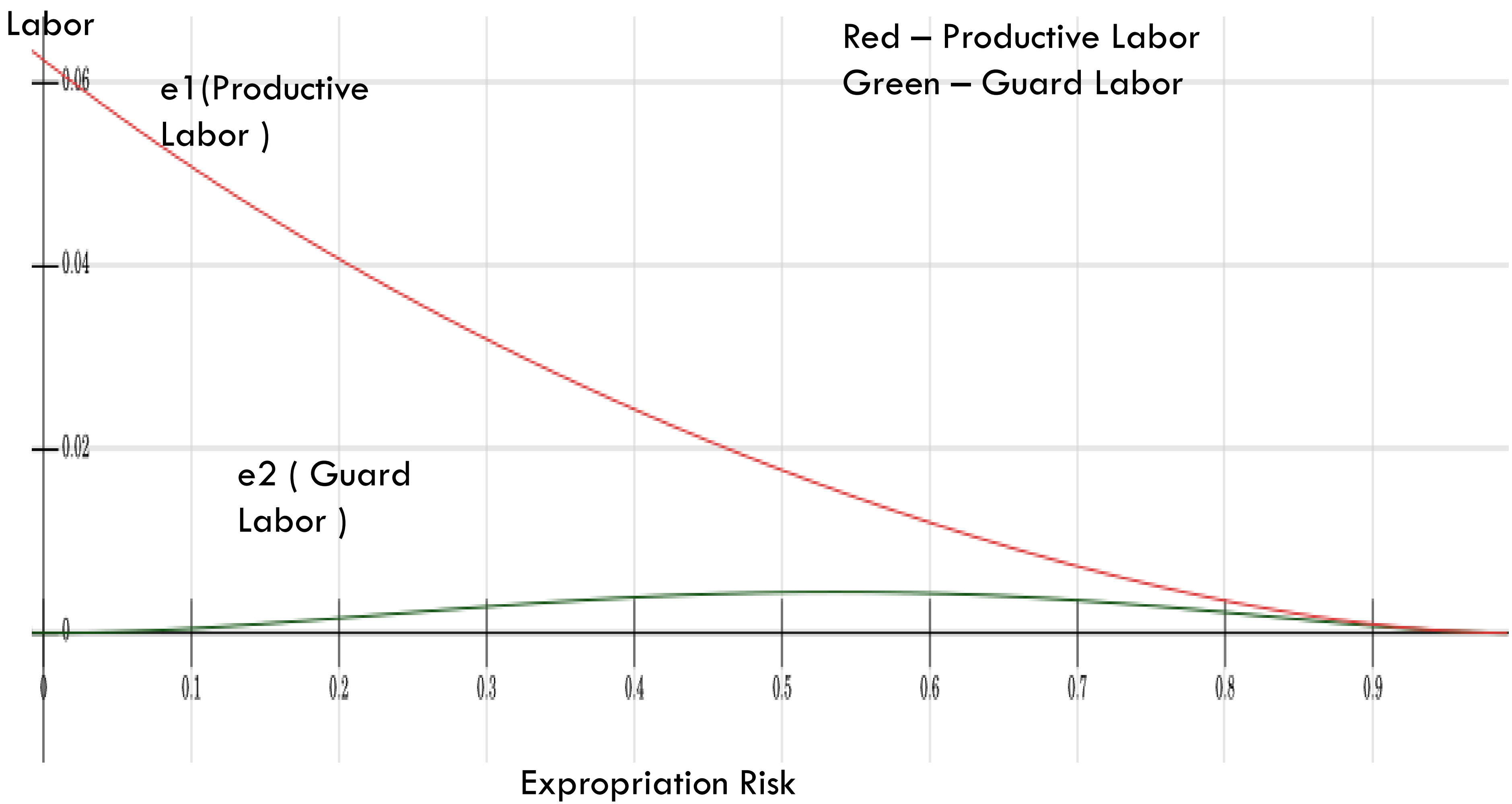
- Maximization Problem :

$$\max_{e_1, e_2} \left(1 - \tau\left(1 - \gamma\sqrt{e_2}\right)\right) A\sqrt{e_1} + \bar{e} - e_1 - e_2.$$

- FOC (non-binding)

$$e_1 = \left(\frac{2(1-\tau)A}{4-(\tau\gamma A)^2}\right)^2 \text{ and } \quad e_2 = \left(\frac{\gamma\tau(1-\tau)A^2}{4-(\tau\gamma A)^2}\right)^2.$$

Plot (e1 , e2)



Labor
Red – Productive Labor
Green – Guard Labor
e1(Productive Labor)
e2 (Guard Labor)
0.06
0.04
0.02
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Expropriation Risk

- Observations (1) :
  - e1 , e2 are *complementary*
    - *e1 is increasing in Gamma , introduction of Guard Labor increases Productive Labor*
  - Direct and Indirect effect of the Expropriation Risk τ on e1 . Direct dominates indirect .

Result 2. *If the insecure asset is involved in the production process, then in the case where the source constraint is not binding: (i) improved property rights (lower τ) increases productive labor;) there exists $\bar{\tau} \leq 1$ such that guard labor is increasing in τ so long as $\tau \leq \bar{\tau}$ and decreasing herwise; and (iii) economic efficiency is increasing in improved property rights (lower τ).*

- Observations (2) :
  - Increase in the Expropriation Risk τ raises the expected marginal return from e2 -- effect 1
  - Complementarity says a decrease in e1 will put downward pressure on e2 -- effect 2
  - For small τ effect 1 dominates , for large τ effect 2 dominates

Result 2. *If the insecure asset is involved in the production process, then in the case where the source constraint is not binding: (i) improved property rights (lower τ) increases productive labor;) there exists $\bar{\tau} \leq 1$ such that guard labor is increasing in τ so long as $\tau \leq \bar{\tau}$ and decreasing herwise; and (iii) economic efficiency is increasing in improved property rights (lower τ).*

Binding Resource Constraint

- If : sum of labors (e1 + e2) is greater than the endowment i.e.

$$(1-\tau)^2 A^2 (4+\tau^2\gamma^2 A^2)/(4-\tau^2\gamma^2 A^2)^2 > \bar{e})$$

- FOC (Binding)

$$(1-\tau+\tau\gamma\sqrt{e_2})A\frac{1}{2\sqrt{e_1}} = 1+\lambda,$$

$$\tau\gamma\frac{1}{2\sqrt{e_2}}A\sqrt{e_1} = 1+\lambda,$$

- Solving the previous two equations (and using the binding resource constraint) we get :

$$2\tau\gamma e_2 + (1-\tau)\sqrt{e_2} - \tau\gamma\bar{e} = 0.$$

- Solving and picking the larger root (smaller is –ve) :

$$e_1 = \bar{e} - \left[\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right) + \sqrt{\left\{\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right)\right\}^2 + \frac{\bar{e}}{2}}\right]^2,$$

$$e_2 = \left(\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right) + \sqrt{\left\{\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right)\right\}^2 + \frac{\bar{e}}{2}}\right)^2.$$

- Observations :
  - e1 is always decreasing
  - e2 is always increasing
  - Productive and guard labor are *substitutes*

** Guard Labor is driving away resources from productive labor*

Non-Productive asset is subjected to expropriation risk

- h – residential property

$$\max_{e_1,e_2}\left(1-\tau\left(1-\gamma\sqrt{e_2}\right)\right)\overline{h}+\tau\left(1-\gamma\sqrt{e_2}\right)\underline{h}+A\sqrt{e_1}+\overline{e}-e_1-e_2.$$

Result 3. *If the insecure asset is not involved in the production process, then in the case where the resource constraint is not binding, the productive and guard labor supply decisions are independent and accordingly, e_1 is unaffected by τ.*

- Arjun’s Presentation Begins.

Property Rights

- Right to use the good.
- Right to earn income from the good.
- Right to transfer the good.
- Right to enforcement of property rights.

Property rights and asset trade

Role of property rights

- Facilitates exchange of assets
- Allows producers/consumers to exploit gains from trade
- Improves resource allocation efficiency

Gains from trade refers to net benefits to agents from allowing an increase in voluntary trading with each other.

For efficiency , assets should be controlled by those most productive with it.

PROPERTY RIGHTS AND TRADE IN ASSETS

Basic Model

- Probability of success- $\sqrt{e}$
- Output in case of success is A and in case of failure is 0.
- Fraction of landed agents- δ
- Fraction of landless agents- (1-δ)

- Productivity shock- θ

  $\theta \in \{\underline{\theta}, \overline{\theta}\}$

  $0 \leq \underline{\theta} \leq \overline{\theta} \leq 1$

$\theta s \ assumed \ i.i.d \ over \ time \ and \ across \ individuals$

- Probability of low productivity- p

- Utility function is given by-

  U= c + l

- Given $\theta \ output \ is \ \theta A\sqrt{e}$

- Producers objective is to maximise w.r.t e his utility level

i.efor given θ,

$max_e \theta A\sqrt{e}$ +$\overline{e}$ -e

- Optimal values of effort e and profit π

e^*=$[\theta A/2]^2$

$\pi^* = [\frac{\theta A}{2}]^2 + \overline{e}$

We normalize $\overline{e} = 0$.

- Utility from alternate activity such as working for a wage - $\overline{u}$

$$\overline{u} \geq o$$

We assume

$\pi^*(\underline{\theta})>\overline{u}$

i.e , any landowner prefers to operate land rather than taking the outside oppurtunity.

- $(1\text{-p})(1\text{-}\delta) > p\delta$

i.e , more high productivity landless than low productivity ,landed.

Therefore land is scare, rents accrue to land owners.

- Perfect rental markets,hence-

$r^* = \pi^*(\overline{\theta}) - \overline{u}$

- Assume all land is fully utilized and has high productivity

VALUE FUNCTION

- Value functions V and W.
- V- when land is rented out in current period
- W- when in the current period the landowner cultivates the land himself.

Thus,

$$V = \pi^*(\overline{\theta}) + \beta(1\text{-}\tau)[(1-p)W + pV]$$

$$W = \pi(\overline{\theta}) + \beta[(1-p)W + pV]$$

Solving we get

$$W = \frac{\pi^*(\overline{\theta}) + \beta pV}{1 - \beta(1-p)}$$

- Plugging W into V we get

$$V = \frac{1-\beta\tau(1-p)}{1-(1-\tau p)\beta} . \pi^*(\overline{\theta})$$

- V is decreasing in τ.

- V',W' denote lifetime expected payoff from autarky when,respectively he has a low and high productivity shock in the current period.

- $V' = \pi^*(\underline{\theta}) + \beta\{pV' + (1\text{-}p)W'\}$

- $W' = \pi^*(\overline{\theta}) + \beta\{pV' + (1\text{-}p)W'\}$

- Solving we get

$$V' = \frac{\pi^*(\underline{\theta})\big(1-\beta(1-p)\big)+\beta(1-p)\pi^*(\overline{\theta})}{1-\beta}$$

- And we have already got

$$V = \frac{1-\beta\tau(1-p)}{1-(1-\tau p)\beta}\pi^*(\overline{\theta})$$

- Result 4: If $\beta > \frac{1}{2-p}$, then there is a $\hat{\tau} \in (0,1)$, such that for $\tau \geq \hat{\tau}$ there is no trade in assets and land is cultivated by low productivity farmers.

PROOF

- Putting τ=0, we see

  V > V'

- Putting $\tau = 1$ we see that if

$$\frac{\pi^*(\underline{\theta})}{\pi^*(\overline{\theta})} > (1 - \frac{\beta}{1-\beta+\beta p}) \qquad \text{(Necessary condn)}$$

V'>V

- Sufficient condition is $\beta > 1/(2-p)$
- If V '> V for τ=1, by continuity and the fact that V is monotonically decreasing in τ ,Result 4 follows.

CONCLUSIONS

- Thus insecure property rights lead to no trade.
- Per-capita output loss is

$\delta p(\pi^*(\overline{\theta}) - \pi^*(\underline{\theta}))$

- Thus fall in τ *constitutes pareto improvement*
- People who rent out better off, those who rent in are indiffirent.

IMPLICATIONS

- In the case $\pi^*(\underline{\theta}) = 0$ the autarky option is equivalent to keeping land idle
- Often in LDCs land kept idle due to insecure property rights.
- Thus improving security of property rights can therefore reduce asset utilizaton.

PROPERTY RIGHTS AND COLLATERALIZABILITY OF ASSETS

- Facilitates use of assets to mitigate agency cost.
- Property Rights improve borrower's ability to pledge their assets as collateral.
- Thus relaxes credit constraints.

What the poor lack is easy access to the property mechanisms that could legally fix the economic potential of their assets so that they could be used to produce, secure, or guarantee greater value in the expanded market.

-De Soto (2001)

- *'Dead capital'*

BASIC MODEL

$\overline{e}$

MAXIMIZATION PROBLEM

MAXIMIZATION PROBLEM contd.

- Expected surplus and Optimal effort level is
  $\frac{1}{4}A^2(1+\Delta x)^{2} - \rho x$

- For concreteness sake

$$\frac{1}{4}[A(1+\Delta)]^2 - \rho > \frac{1}{4}A^2$$

And
$$\frac{A(1+\Delta)}{2} < 1$$

DEVIATIONS

- Effort is unobservable.
- There is Limited liability.
- Value of illiquid asset is w.
- This can be pledged as collateral.
- When Output is high, he can pay up to $A(1+\Delta)+w$
- When output is low, he can pay w.
- Problem is absence of secure title rather than absence of wealth.

- Effective Collateral value is $(1-\tau)w$.
- r is the interest payment on successful project.
- c is level of collateral.
- Expected payoff of producer with contract (r,c) is $\sqrt{e}\{A(1+\Delta)-r\}-(1-\sqrt{e})\mathrm{c}-\mathrm{e}$
- While that of a lender is $\sqrt{e}r+(1-\sqrt{e})c-\rho$
- Outside option is $\frac{1}{4}A^2$.

MAXIMIZATION PROBLEM

THE END

- Rest Arnab will do…….. ☺

PROPERTY RIGHTS AND ECONOMIC DEVELOPMENT

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RECAPITULATION

Result 1: Labour supply, output and profits are strictly increasing in τ.

Result 2: If the insecure asset is involved in the production process, then in the case where the resource constraint is not binding:

(I) Improved property rights (lower τ) increases productive labour:

(II) There exists $\bar{\tau} \leq 1$ such that guard labour is increasing in τ so long as $\tau \leq \bar{\tau}$ and decreasing otherwise; and

(III) Economic efficiency is increasing in improved property rights (lower τ)

Result 3: If the insecure asset is not involved in the production process, then in the case where the resource constraint is not binding, the productive and guard labour supply decisions are independent and accordingly, e_1 is unaffected by τ.

Result 4: If, $\beta > 1/(2-p)$, then there is a $\hat{\tau} \in (0,1)$ such that for $\tau \geq \hat{\tau}$ there is no trade in assets and land is cultivated by low-productivity farmers.

PROPERTY RIGHTS AND COLLATERALIZABILITY OF ASSETS

- Property rights facilitate trade in assets by achieving efficient reallocation of resources.
- When agency costs (transaction costs) are there effective property rights can mitigate these costs.
- In credit market agency (enforcement) costs hamper efficient loans by lenders. Property rights improve collateralizability of pledged assets, relaxing credit constraints.
- De Soto argues that lack of property rights mechanisms renders it difficult for poorer agents to realize the true economic potential of their assets in credit markets.
- Bauer (1954) in his study of West African trade suggested that both in Nigeria and in the Gold Coast family the tribal rural rights are unsatisfactory for loans.

A BRIEF OVERVIEW

- We are trying to argue that where imperfect property rights lowers the effective value of pledgeable assets as collateral and aggravates the problem of moral hazard an increase in property rights will lead to a more efficient system.
- We first construct the model and look at the benchmark case where there is no moral hazard or imperfect property rights.
- In this case the producer has access to capital at the going rate and the maximization of social surplus boils down to the producers' problem.
- Then we proceed to the case where both imperfect property rights and moral hazard problem exists.
- We find out the standard optimal solution to the debt contract.
- Depending on whether the participation constraint we construct intervals for the effective value of pledged assets for which optimal contract and effort levels are affected by property rights mechanisms.
- Then we move on to the general equilibrium framework where in a two sector model we find out which borrowers approach which lenders.

THE MODEL

- The effort level put in by the borrower (producer) $e \in (0,1)$ is his private information.
- The effort endowment is normalized to $\bar{e} = 0$.
- $\sqrt{e}$ is the probability of obtaining output level A and $1 - \sqrt{e}$ is the probability of obtaining output 0.
- Besides effort now there is a second factor of production capital $x = \{0,1\}$.
- When $x = 1$, the output is $A(1 + \Delta)$ with probability $\sqrt{e}$ and 0 with probability $1 - \sqrt{e}$.
- The cost per unit of capital is ρ.
- There is a lender who has access to the capital at the rate ρ.
- The lender faces the moral hazard problem in the credit market due to unobservability of e.

THE BENCHMARK CASE

- Under a frictionless system with perfect property rights the producers' decision problem is as follows:

$$Maximize_{e\in(0,1);x\in\{0,1\}}\ A(1+\Delta x)\sqrt{e}-e-\rho x$$

- Optimal first best effort choice given the maximal problem is $e=\{\frac{A(1+\Delta x)}{2}\}^2$.
- Capital x and effort level e are complements.
- Expected surplus at the optimal level is given as follows:

$$S=\frac{1}{4}A^2(1+\Delta x)^2-\rho x$$

- Now when $x=1$ we make the following assumptions:

I. $S=\frac{1}{4}A^2(1+\Delta x)^2-\rho x>\frac{1}{4}A^2$: This implies that the surplus is strictly greater when capital is employed besides labour. When only labour is employed the surplus is $\frac{1}{4}A^2$. So it is also like an outside option for the agent.

II. $\frac{A(1+\Delta)}{2}<1$: This ensures that the effort level e will have an interior solution.

PROBLEM WITH IMPERFECT PROPERTY RIGHTS

- Now we introduce the problem of moral hazard as well as limited liability for the producer (borrower).
- The borrower possess an illiquid asset w. So in the event of high output the agent can pay $A(1 + \Delta) + w$ and in the event of low output the agent has to pay w.
- If w was large enough then the first best level of effort could have been achieved with the moral hazard problem fully alleviated.
- But imperfect property rights could aberrate the moral hazard problem, by reducing the actual value of the illiquid asset to $w(1 - \tau)$, where τ is the various costs associated with registering assets as collateral particularly in LDC's and here it is the coefficient of imperfect property rights.
- The parameter τ could be interpreted stochastically such that the probability of foreclosure of the asset w by the lender in the event that the loan is defaulted by the borrower is $1 - \tau$.

THE INTERESTING CASE

- Now given the structure of the moral hazard problem with imperfect property rights there could be three possible cases:
  I. The value of illiquid assets is so large that even with imperfect property rights the wealth $w(1-\tau)$ is large enough to alleviate the moral hazard problem.
  II. The value of w is so low that even without imperfect property rights moral hazard problem is persisting and imposes inefficiencies. In such a case the imperfect property rights merely aggravate the existing inefficiencies.
  III. The third situation arises where w is large enough to alleviate the moral hazard problem but due to imperfect property rights the effective value of the pledged wealth as collateral becomes $w(1-\tau)$which is lower than the wealth required to do away with the moral hazard problem. So imperfect property rights brings in inefficiency.
- Since the first two cases deal with situations where there are other constraints besides imperfect property rights we stick to the third case only where inefficiency is introduced solely due to imperfect property rights.

OPTIMAL DEBT CONTRACT

- We define the debt contract as (r, c) where r is the interested payment made by the borrower to the lender in the event of success and c is the value of the pledged collateral paid by the borrower in the event of failure.
- The lenders' problem is then to maximize it's expected payoff subject to the incentive constraint and limited liability constraint of the producer.

$$Maximize_r \; r\sqrt{e} + c\left(1-\sqrt{e}\right) - \rho$$

$$s.t. \quad \arg\, max_e \; \{A(1+\Delta) - r\}\sqrt{e} - c\left(1-\sqrt{e}\right) - e$$

$$w(1-\tau) \geq c$$

- So by backward induction we first maximize the expected utility of the borrower (producer) to find out the optimal effort level that satisfies the incentive constraint.
- From the first order condition the optimal level of effort turns out to be

$$e = \left[\frac{A(1+\Delta)-(r-c)}{2}\right]^2.$$

- Clearly effort is decreasing in r and increasing in c.

THE LENDERS' PROBLEM

- Now when both incentive and limited liability constraints are binding we have;

$$e = \left[\frac{A(1+\Delta)-(r-c)}{2}\right]^2 \text{ and } c = w(1-\tau).$$

- Now plugging these values of e and c in the lenders' profit function we modify the lenders' problem as follows:

$$Maximize_r \ \frac{A(1+\Delta)-\{r-w(1-\tau)\}}{2}\{r-w(1-\tau)\}+w(1-\tau)-\rho$$

- Solving this maximization problem we get : $r = \frac{A(1+\Delta)}{2} + w(1-\tau).$
- The corresponding effort level is $e = \left[\frac{A(1+\Delta)}{4}\right]^2.$
- The effort level does not depend on property rights coefficient τ. It is only r, the payment made by the producer with success that is increasing with decrease in τ.
- Given these values of effort level e and payment r which satisfies both the incentive and limited liability constraints and also maximizes the lenders' profit we can find out the expected utility and the expected profits of the borrower and the lender respectively.

NON BINDING PARTICIPATION CONSTRAINT

- Now the borrowers' expected utility is given as :

$$u \equiv \{\frac{A(1+\Delta)}{4}\}^2 - w(1-\tau) \quad [\text{which is of the form } (e-c)]$$

- On the other hand the expected profits of the lender is:

$$\Pi \equiv \frac{1}{2}\{\frac{A(1+\Delta)}{2}\}^2 + w(1-\tau) - \rho$$

- Now for trade to take place we require $u \geq \frac{A^2}{4}$ (recall that the outside option of the producer was $\frac{A^2}{4}$).
- So putting $\{\frac{A(1+\Delta)}{4}\}^2 - w(1-\tau) \geq \frac{A^2}{4}$ we get:

$$w(1-\tau) \leq \frac{A^2}{4}[\frac{(1+\Delta)^2}{4} - 1] \equiv \underline{w}$$

- So clearly when the participation constraint is not binding the effective value of pledged asset $w(1-\tau)$ is less than some threshold $\underline{w}$.
- Then the effort level is unchanged with change in τ, however r is increasing with a decrease in τ.

BINDING PARTICIPATION CONSTRAINT

- Now when the participation constraint is binding we need to find out the optimal levels of e and r, that not only satisfy the incentive and limited liability constraints and maximizes the lenders' profit but also satisfies the binding participation constraint.
- Recall that the form of the expected utility function of the borrower when e and r satisfies the incentive and limited liability constraint and also maximizes the lenders' profit is of the form $(e - c)$.
- So using $e = [\frac{A(1+\Delta)-(r-c)}{2}]^2$ and $c = w(1-\tau)$ we have;

$$\{\frac{A(1+\Delta) - (r - w(1-\tau))}{2}\}^2 - w(1-\tau) = \frac{A^2}{4}$$

- From the above equation we get ;

$$r = A(1+\Delta) - 2\sqrt{\frac{A^2}{4} + w(1-\tau)} + w(1-\tau)$$

- The corresponding effort level is given as $e = \frac{A^2}{4} + w(1-\tau)$.
- Clearly both e and r are now functions of τ.

EFFECTIVE RANGE OF PLEDGEABLE WEALTH

- When the effective wealth $w(1-\tau)$ is insufficient to obtain the first best level of effort then we have;

$$\sqrt{\frac{A^2}{4} + w(1-\tau)} \leq \frac{A(1+\Delta)}{2}$$

$$or, \qquad w(1-\tau) \leq \frac{A^2}{4}\left[(1+\Delta)^2 - 1\right] \equiv \overline{w}$$

- So when $w(1-\tau) > \overline{w}$ we have a first best outcome. Then the illiquid assets w is large enough along with a low value of τ that ensures the first best level.
- The economy is constrained by property rights when $w > \overline{w} > w(1-\tau)$.
- When $\overline{w} > w$ then imperfect property rights aggravate existing inefficiencies.
- When $w \geq \overline{w} > w(1-\tau)$ then imperfect property rights create new inefficiencies.
- So in the range $[\underline{w}, \overline{w}]$ a decrease in τ increases e and decreases r.

A CATEGORICAL SUMMARY

- When $w(1-\tau) < \underline{w}$ then;
  I. e is independent of τ and hence is not affected by a change in property rights.
  II. The effort level is less than the first best level and hence inefficient.
  III. r is increasing with a decrease in τ because the increase in the value of pledgeable wealth allows the lender to transfer more to the borrower thus redistributing wealth.
- When $w(1-\tau) \in [\underline{w}, \overline{w}]$ then;
  I. r is decreasing and e is increasing with a decrease in τ.
  II. The effort level is still less than the first best level and hence inefficient.
- When $w(1-\tau) > \overline{w}$ then;
  I. The first best level of effort is achieved.
  II. e and r both does not depend on τ.
  III. The payment $r = c$ and a decrease in τ merely increases the effective value of pledged wealth.

Result 5 :

For $(1-\tau) \in [\underline{w}, \overline{w}]$ *, the interest payment,* r *, is lower and producer effort is greater after a marginal increase in the security of collateral which increases the level of pledgeable wealth ,* $w(1-\tau)$*.*

For $(1-\tau) < \underline{w}$ *, or* $w(1-\tau) > \overline{w}$ *, marginal improvements in the security of collateral do not affect resource allocation (i.e. , loan size and effort) in the credit market.*

However, in the former case, it has a redistributive effect with lenders gaining relative to borrowers.

THE GENERAL EQUILIBRIUM FRAMEWORK

- Supposing now there is a two sector model with a formal and an informal sector.
- The transactions technology and accessibility of funds are denoted by $1-\tau_F$ and ρ_F respectively in the formal market.
- The informal sector is a network of lenders where these parameters are denoted as $1-\tau_N$ and ρ_N respectively.
- The underlying assumption is that $\tau_F > \tau_N$ and $\rho_F < \rho_N$.
- The producer has the option of approaching both the sectors and his expected utility will be represented as follows:

$$U(\tau_i, \rho_i) = \left[\frac{A(1+\Delta)+\sqrt{[A(1+\Delta)]^2+8[w(1-\tau_i)-\rho_i]}}{4}\right]^2 - w(1-\tau_i)$$

- Now assuming $u_i > \frac{A^2}{4}$ if $U(\tau_F, \rho_F) > U(\tau_N, \rho_N)$ then the formal sector dominates otherwise not.
- So with improvement in property rights in an informal network could lead to a more efficient formal sector where the effort level of the producer increase.

CONCLUDING REMARKS

In a system where there is imperfection in property rights the informal sector tends to dominate and a perfection of property rights alleviates the moral hazard problem at least to a certain extent so as to make the system more efficient and hence getting the institutional framework closer to a formal setup.