Information, the Dual Economy, and Development

Abhijit V. Banerjee - Andrew F. Newman

### Introduction

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- We study an economy consisting of **2 sectors** which are distinguished in 2 ways : *Technological* and *Institutional*.

City	Village
<ul> <li>Modern technology</li> <li>More productive</li> <li>High information</li></ul>	<ul> <li>More traditional</li> <li>Less productive</li> <li>Very little Information</li></ul>
asymmetry: People live	asymmetry: People live
and work in different	and work together.
places and are	Hence, know a lot
essentially anonymous.	about each other.

## Why Information asymmetry matters?

People in this economy sometimes need **Consumption loans**.

Loan transactions are subject to **Default** by the borrower.

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As a result, lenders are reluctant to lend to those who cannot provide a significant amount of **Collateral**. The superior information in the traditional sector allows lenders to monitor borrowers better. Thus, each individual borrower gets as good or **better access to credit** than he would be able to get in the modern sector.

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This sets up a **trade-off** between the *superior access to credit* in the traditional sector and the *higher productivity* in the modern sector.

Thus, each individual borrower gets as good or **better access to credit** than he would be able to get in the modern sector.

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Some of the population will *fail to migrate* to the more productive sector, even long after the opportunity to move becomes available.

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**Possibility of Inefficiency**: In information constrained economies, the market equilibrium may not be surplus maximizing.

Abhijit V. Banerjee – Andrew F. Newman Presented by Sneha Agrawal

- Model, Static Equilibrium results
- Characterize the economies where this kind of *"Inefficiently Slow Modernization"* is likely to emerge
- Dynamics: 2 way interaction between the process of



 Income distribution implications of the process of modernization (Kuznet's inverted-U hypothesis).

- We consider a one period model.
- 2 locations:
  - A **Village** representing the traditional sector.
  - A City representing the modern sector.
- The economy has a single perfectly storable consumption good (numeraire).
- A continuum of agents.

#### Born

#### Endowment: initial wealth of a units.

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Location Choice

City versus Village (No direct cost - freely mobile labour)

# Story II

#### Youth

In his youth, before entering his productive phase, an individual has a chance to consume an *indivisible good*. Eg. Schooling.

- Yields utility s
- Costs *m* units of the good

If wealth is insufficient (a < m), he may attempt to borrow the difference.

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### Adulthood (Production phase)

- Individual earns his income from labour, which he supplies inelastically and repays any loan obligations.
- Difference in Productivity: Individual who can earn w in his village could earn  $\lambda w$ , in the city,  $\lambda > 1$ .

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### Lifetime Utility

VNM preferences: Utility = u + y, where:

• Agent is risk neutral in net income y.

$$y = egin{cases} w & ext{in village} \ \lambda w & ext{in city} \end{cases}$$

• *u* denotes utility from schooling:

$$u = \begin{cases} s & \text{if } m \text{ is consumed} \\ 0 & \text{otherwise} \end{cases}$$

- If no information asymmetry, then everyone could borrow and lend at the market gross interest rate *r*.
- Then: Utility in City =  $\lambda w + s + (a - m)r$ > w + s + (a - m)r = Utility in Village.
- Thus every individual would move to the city.
- The economy would operate efficiently.

### So what changes?

- The consumption loan market is distinguished by the **possibility that a borrower might renege on a debt**.
- While Capital is freely mobile between the two locations and there is *free entry of lenders* in both locations.
- What is not mobile is information and enforcement powers.

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Suppose an agent has wealth a; he borrows m - a. As part of the lending agreement, he promises to keep the lender abreast of his whereabouts.



Punished to have 0 consumption.

## Incentive Compatability

This situation leads lenders to require that *loan contracts satisfy incentive compatibility constraints*:

- Ex Post, that is after income is earned,
- And **Ex Ante**, that is when borrowers could renege on the location agreement.

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#### Ex-Post Incentive Compatability

- Suppose that if the borrower earns y he is to repay P(y).
- Also the income to be earned is known at the time of contracting;
- Borrower gets

$$egin{pmatrix} y-P(y) & ext{if repay} \ \pi y & ext{if flee} \end{cases}$$

- Then ex post IC requires  $y P(y) \ge \pi y \ \forall y$ .
- Competition among lenders will ensure that P(y) = (m a)r;

Hence **Ex post IC** entails  $y - (m - a)r \ge \pi y$  i.e.

$$a \ge a_P \equiv m - \frac{(1-\pi)y}{r}$$

 Since the contract will satisfy this condition, the borrower knows that if he tries to flee before earning his income, he can get :

$$\begin{cases} w - (m - a)r & \text{if remains in Village as agreed} \\ \lambda w - (m - a)r & \text{if remains in City as agreed} \\ \text{at most}(\rho \lambda w) & \text{if flee} \end{cases}$$

#### Ex-ante IC

• Ex ante IC if he agreed to stay in the City:

$$\lambda w - (m - a)r \ge 
ho \lambda w$$
  
 $\Rightarrow a \ge m - rac{(1 - 
ho)\lambda w}{r} \equiv a_A^C$ 

• Ex ante IC if he agreed to stay in the Village:

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ho \lambda)w}{r} \equiv a_A^V \end{aligned}$$

All loans made in equilibrium will satisfy these constraints, and the borrower will never renege.

# Threshold Wealth

 Since an agent who agrees to work in any location (I = V, C) needs exactly m to pay for youthful consumption, his initial wealth must satisfy

$$\begin{cases} a \ge max\{a_P, a_A^V\} \equiv a_V & \text{ if in Village} \\ a \ge max\{a_P, a_A^C\} \equiv a_C & \text{ if in City} \end{cases}$$

if he is to borrow at all; if his wealth is below this threshold value, he will be unable to pay for the consumption.

• 
$$a_V = max\{m - \frac{(1-\pi)y}{r}, m - \frac{(1-\rho\lambda)w}{r}\}$$

• 
$$a_C = max\{m - \frac{(1-\pi)y}{r}, m - \frac{(1-\rho)\lambda w}{r}\}$$

• Observe that this threshold value of wealth  $a_l$ , is increasing in the interest rate, decreasing in income, and increasing in the escape probabilities  $\pi$  and  $\rho$ .

We now use this model to distinguish the informational advantage of the village over the city.

#### Assumption for one who is born and remains in the Village

Any attempt to escape either ex ante or ex post would immediately be detected by the local network or village moneylender. Hence,  $\pi = \rho = 0$ .

• Hence, 
$$a_V = max\{m - \frac{y}{r}, m - \frac{w}{r}\}$$
 and  $y = w$  in Village.

$$\Rightarrow a_V(w,r) = m - \frac{w}{r}$$

• As long as  $w \ge mr$ , agent can borrow and go to school.

#### Assumption for one who locates in city either by choice or by birth

Assume  $\pi$  is large enough such that  $\lambda(1-\pi) < 1$ . We also assume  $\rho = \pi$  for loans originating in the city.

• Hence,  $a_C = max\{m - \frac{(1-\pi)y}{r}, m - \frac{(1-\rho)\lambda w}{r}\}$  and  $y = \lambda w$  in City.

$$\Rightarrow a_C(w,r) = m - \frac{(1-\pi)\lambda w}{r} > m - \frac{w}{r} = a_V(w,r) \; \forall w,r.$$

• This market imperfection is the source of the possibility of undermigration:

an individual with  $a_C(w, r) > a > a_V(w, r)$  would indeed gain a higher wage by migrating, but would be giving up the possibility of consuming during youth.

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- Note that it is never socially or individually optimal for someone born in the city to move to the country, because he faces the same value of π but earns a lower income.
- Normalize the population of adults in the world in any period to be 1.
- $R(a) \equiv$  the measure of people born in the Village with wealth < a at the beginning of the period.
- U(a) ≡ the measure of people born in the City with wealth
   a at the beginning of the period.

Given an interest rate r, consider the following cases:

•  $a \ge a_C(w, r)$ : always gets the loan

$$Payoff = \begin{cases} w + s - (m - a)r & \text{if he stays in the village} \\ \lambda w + s - (m - a)r & \text{if he moves to the city} \end{cases}$$

What is better ?

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What is better ? migrate to City.

•  $a < a_V(w, r)$ : does not get loan in either location

$$Payoff = \begin{cases} w + ar & \text{if he stays in the village} \\ \lambda w + ar & \text{if he moves to the city} \end{cases}$$

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$$a_C(w,r) > a \ge a_V(w,r)$$

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$$Payoff = \begin{cases} w + s + (a - m)r & \text{if he stays in the village} \\ \lambda w + ar & \text{if he moves to the city} \end{cases}$$

What is better ? migrate if

$$\lambda w + ar > w + s + (a - m)r$$
  

$$\Rightarrow mr > s - (\lambda - 1)w$$
  

$$\Rightarrow r > \frac{s - (\lambda - 1)w}{m} \equiv \hat{r}(w)$$

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- The really wealthy.
- Those for whom the market interest rate exceeds r̂(w); i.e. those with very low r̂(w).
   r̂(w) if low for very high w. Thus people who get high w (eg. the most skilled) are more likely to migrate.
- The very poor low skilled workers. This requires that their skill levels are low enough to make  $a_V(w, r)$  positive; if not, even agents with zero wealth will be able to borrow for school and will remain in the village.

To summarize, we have:

**Proposition 3.1.** An agent born in the village with wealth a and who earns w there migrates to the city when the interest rate is r only if (a)  $a \ge a_C(w, r)$  or (b)  $r \ge \hat{r}(w)$  or (c)  $a < a_V(w, r)$ .

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FIGURE 1 Agents in regions ① and ③ consume in youth; those in ② and ④ to not.

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- For the remainder of this section we assume that everyone earns the same income, i.e. agents only differ in initial wealth.
- Thus we might as well write  $a_C(r)$  and  $a_V(r)$  for  $a_C(w, r)$  and  $a_V(w, r)$  evaluated at this common value of w, and  $\hat{r}$  for  $\hat{r}(w)$ .

#### Who demands loans?

• People with  $a \ge a_C(r)$  definitely demand and ?

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#### Who demands loans?

- People with  $a \ge a_C(r)$  definitely demand and ?
- Those with  $a < a_C(r)$  but who remain in the village.

### Demand for Loans

• If  $r > \hat{r}$ , everyone with wealth less than  $a_C$  migrates to city. So, only too wealthy demand loans.

$$D = m[1 - R(a_C(r)) - U(a_C(r))]$$

• Maximum r that can be charged is s/m. At  $r = s/m > \hat{r}$ , agents are indifferent between taking or not taking a loan. Hence,

$$D \in \left[0, m[1 - R(a_C(s/m) - U(a_C(s/m))]\right]$$

 At r = r̂, people with wealth between a<sub>V</sub> and a<sub>C</sub> are indifferent between migrating or staying. Those who stay back in village demand loans.

$$D \in \left[m[1 - R(a_V(\hat{r})) - U(a_C(\hat{r}))], m[1 - R(a_C(\hat{r})) - U(a_C(\hat{r}))]\right]$$

• As r declines further, all rural people stay and demand loans,

$$D = m[1 - R(a_V(r)) - U(a_C(r))]$$

• Eventually, maximum loan demanded at  $r \leq 1$ , is m.

### SUPPLY

Supply is simply the aggregate wealth  $\bar{a}$  for r > 1. If r < 1, since the good is perfectly storable, S = 0.Hence,

$$S = \begin{cases} \bar{a} & \text{if } r > 1\\ [0, \bar{a}] & \text{if } r = 1\\ 0 & \text{if } r < 1 \end{cases}$$

• What happens in first best?

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- What happens in first best?
- Can the social surplus could be increased relative to its equilibrium level by **forcing agents to choose locations in some way** other than the one which occurs in equilibrium?
- On the face of it, we should expect that any situation where some agents remain in the rural sector is a candidate for inefficiency
- Suppose a small number of people were moved to the urban sector. ⇒ More income would be generated. This reduces the demand for loans however, but if the interest rate is able to fall, the wealth that is no longer being used in the rural sector can flow to the city, clearing the market at a lower interest rate.



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## Understanding Migration

Let us look at the level of migration as a function of equilibrium interest rate.





 If r < r̂, then all those in rural areas with wealth between a<sub>V</sub> and a<sub>C</sub> stay, others migrate. Migration increases upto r = 1.

## Conditions for inefficient equilibrium

- A necessary condition for inefficiency is that the equilibrium  $r \leq \hat{r}$ .
- Since  $1 \le r$ , inefficient undermigration requires that  $1 \le \hat{r} = \frac{s (1 \lambda)w}{m}$

$$\Rightarrow (s-m) \ge (\lambda-1)w.$$

- If the productivity differential between village and city is large (λ is large), then the attraction of the city is enough to swamp the possible lack of school, and everyone migrates.
- By the same token, if the value of the loans is small (*s* is close to *m*), undermigration is unlikely, since poor people have little to lose by leaving their village.

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• From Figure 2, the existence of inefficient undermigration depends in part on the mean level of wealth. But it also depends on the higher moments of the wealth distribution.

**Proposition 3.2.** Suppose condition (3.1) holds and  $R(\cdot)$  and  $U(\cdot)$  are continuous. Then the level of migration is inefficient if and only if (a)  $1 - R(a_V(1)) - U(a_C(1)) > (\bar{a}/m)$ and (b)  $(\bar{a}/m) > [1 - R(a_C(\hat{r})) - U(a_C(\hat{r}))].$ 

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## What the rural institution is doing?

- Since in the initial equilibrium there are people who choose to remain in the traditional sector, they are getting loans that they would not get in the modern sector. In other words, the rural credit institution does facilitate borrowing
- On the other hand if they were moved to the modern sector the wealth they were using would not lay fallow: somebody would end up using it in the more productive modern sector. The interest rate would fall to make this possible.
- Hence, rural credit institution creates inefficiency by allowing the interest rate to be set too high relative to its second-best level.

- If the economy is wealthy in the sense that ā ≥ m, migration is always efficient (condition (a) is violated in this case).
- Poor economies will tend to have efficient migration as well.
- It is the middling economies, where the villagers have something to lose but wealth is not yet so plentiful as to render the urban agency problems nugatory, that are the best candidates for inefficient undermigration.
- Observe that the falling interest rate which results from a policy of **forced migration will hurt net lenders** (which may include very poor agents as well as the very wealthy); the beneficiaries would tend to be those at the middling wealth levels.

# Some Rudimentary Dynamics (Aim)

• We have identified undermigration as a possibility in the short run.

Is it still possible when the distribution of wealth (which affects both demand and the supply side of the loan market) is endogenous?

#### Is there an undermigration trap?

• Re-xamine the relationship between



Does the "sectoral shifting" account of modernization provide robust foundation for the famous Kuznets inverted U?

- What is Kuznet's Inverted U hypothesis? Kuznets (1955) concluded on the basis of a study of the process of modernization in a number of then-developed countries that the initial impact of modernization was to increase inequality but that over time, inequality would decrease as the economy approached full modernization.
- We consider these issues by starting with a purely rural economy and examining the level of migration and the distribution of labour earnings over time after the urban sector is opened.

## The Dynamic version of the Story

- We restore the assumption that there is a multitude of skill levels *w*. We shall make alternative assumptions about whether these are known at the time migration decisions are made.
- The economy lasts an infinite number of periods and the population is stationary.

#### Beginning of the period

In every period an individual receives his initial wealth in the form of a **Bequest from his parent**.

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#### Prior to Date1

Decides on Location, borrowing and youthful consumption.

#### Date 1 and 2

- Adult consumption and earnings occur twice, at dates 1 and 2 within the period.
- Uncertainty (if any) about skill level is resolved at date 1.
- The wage earned at date 2 is the same as that earned at date 1.
- The agent's date 1 consumption occurs after repaying any loans. (We shall make assumptions to guarantee that repayments can be made out of a single date's earnings).

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The utility is of the form  $u + c_1 + c_2^{1-\beta}b^{\beta}$ , where u is the indicator of youthful consumption,  $c_i$  is adult consumption at date i, and b is the bequest.

### Dynamic Model

- If the agent earns y at each date, his indirect utility is  $(1+\delta)y + ar + u(1-\frac{mr}{s})$ , where  $\delta \equiv \beta^{\beta}1 \beta^{1-\beta} < 1$
- Finally, assume that agents who are caught after reneging on loans are subject only to having their date- 1 income confiscated; date-2 income is inappropriable.
- Equilibrium allocation: the one we shall focus on exclusively has each agent consuming date-1 earnings net of loan repayments at date 1, and splitting date-2 earnings between date-2 consumption and the bequest; in particular, no one is actually borrowing or lending between dates.
- This is the unique symmetric equilibrium and the only one that would be compatible with even a slight imperfection in the consumption loan market.

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- Under these assumptions, the  $b = \beta y$ , which is identical to the offspring's initial wealth, provided that y is large enough to cover any loan repayments.
- All this is ensure that we get to exactly the same one-period behaviour that we saw in the previous sections.
- Finally, for what follows we need to distinguish between two alternative assumptions about when an agent's skill becomes known (to himself and the public alike).
  - Case1: This information is not learned until date 1
  - Case2: It is known at birth.

- Suppose first that **agents learn their skill level at date 1** after choosing a location.
- Let the distribution of skills (corresponding to village labour earnings) be F(w), which is supported on a nondegenerate interval [w, w) with density f(w), mean w, and variance σ<sup>2</sup>.
- The distribution of earnings among those in the city is then  $F(w/\lambda)$ .

- To ensure repayment of loans, we need to assume that w ≥ s since s ≥ mr i.e. the maximum possible value of repayment would not exceed s.
  - $\Rightarrow a_V(\cdot) = m \frac{\bar{w}}{r} \le m \frac{\bar{w}}{s/m} \le m \frac{\frac{w}{s}}{s/m} \le m \frac{s}{s/m} = 0$  $\Rightarrow \text{ The fraction of villagers born with wealth less than } a_V(r) = 0 \text{ i.e. villagers can always insure.}$
- We are only interested in the case in which average wealth *ā* < *m*, since in the other case modernization is instantaneous. Thus we assume that β is smal enough that *ā* = β*w* < *m*.
- We shall use **Coefficient of Variation** as an inequality measure .

### Structure of Population and Wealth Distribution

- Suppose that in period t
  - $R_t \equiv$  the population of the rural sector at the beginning of the period (i.e. before the location decisions).
  - Then  $1 R_t \equiv$  the urban population.
- This will serve as the state variable.
- Since an agent whose income realization is w and who remains in the village in period t − 1 bequeaths βw to his child, the fraction of the rural population at the beginning of period t with wealth less than x = Prob(βw < x) = F(x/β).</li>
- Thus the rural wealth distribution is just  $R_t F(x/\beta)$ , while the urban distribution is  $(1 R_t)F(x/\beta\lambda)$ .

- The distribution of wages in the economy in period t is then given by  $R_{t+1}F(w) + (1 R_{t+1})F(w/\lambda)$ .
- By our notational convention,  $R_{t+1}$  is the rural population after people choose their locations and so represents the relevant population for computing the distribution of incomes.
- Inequality =  $\frac{\text{Sttd.Deviation}}{\text{Mean}} = \frac{\sqrt{R^2\sigma^2 + (1-R)^2\lambda^2\sigma^2}}{R\bar{w} + (1-R)\lambda\bar{w}}$

• If 
$$R = 0$$
, Inequality  $= \frac{\lambda \sigma}{\lambda \bar{w}} = \frac{\sigma}{\bar{w}}$ 

- If R = 1, Inequality  $= \frac{\sigma}{\bar{w}}$ .
- It can be shown that it is increasing at 0, decreasing at 1, and has a (unique) maximum at  $R = \frac{\lambda}{\lambda+1}$ .

As R decreases, mean income =  $R\bar{w} + (1-R)\lambda\bar{w}$  increases i.e. the economy developes.

We show that:

- *R<sub>t</sub>* decreases monotonically. How?
  - We saw from Migration diagram that R<sub>t</sub> − R<sub>t+1</sub> ≥ 0 i.e migration ≥ 0 for all equilibrium r.
     ⇒ R<sub>t</sub> follows a monotonically decreasing path over time.
- The economy fully modernizes (i.e.  $R_t \rightarrow 0$ ). How?
  - From Figure 3, a lower bound for the level of migration =  $R(\infty) - R(a_C(\hat{r})) = R_t(1 - F(a_C(\hat{r})/\beta)).$
  - Thus, if w
     ¬ (a<sub>C</sub>(r)/β) ⇒ F(a<sub>C</sub>(r)/β) < 1, there is a uniform positive lower bound on the fraction of the rural population that will migrate each period.</p>

     ⇒ R<sub>t</sub> → 0.

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- Economy modernizes in more than one period i.e. its not instantaneous.
  - If  $r < \hat{r}$ , not everyone migrates except when  $m[1 R(a_C(\hat{r}))] = \beta \bar{w}$ .
  - This implies there should be some excess supply to service some rural people with wealth less than *a<sub>C</sub>*.
  - Hence, if  $1 F(\frac{a_C(\hat{r})}{\beta}) < \frac{\beta \bar{w}}{m}$ , migration is in multiple phases.

**Proposition 4.1.** If  $\bar{w} > a_C(\hat{r})/\beta$ , w > s, and  $(\beta \bar{w}/m) > 1 - F(a_C(\hat{r})/\beta)$ , then as  $t \to \infty$ ,  $R_t \to 0$  (the economy fully modernizes) and the path of inequality and income follows an inverted-U curve.

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- Although the economy fully modernizes, it does so too slowly : even if full modernization takes only finite time, any discounted sum of single-period social surpluses would be increased if modernization were to occur immediately as the modern sector opens.
- Modernization operates at 2 levels:
  - Individual effect

Some fraction of the rural agents are always successful enough to pass on a large bequest to their children. Thus, children can afford school even in modern sector. This depends on primitive assumptions about the distribution of earnings.

### Kuznet's Inverted U II

• Trickle Down effect: More at aggregate level.

As more people move to the city, they earn more so that **aggregate** wealth increases

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Meanwhile, **demand for loans typically does not increase**. This leads to a **decrease in the interest rate**, which relaxes the borrowing constraints for everyone.

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More generally, the **agency costs of borrowing in the city are reduced** at the lowered interest rate (in this case reflected by the fall in  $a_C(r)$ ), which in turn make the modern sector attractive to more people.

- What if the conditions of Proposition 4.1 are not satisfied? Is it possible that a long-run version of undermigration can occur, i.e. that the economy could settle into a steady state in which some people inefficiently remain in the rural sector?
- If the economy were to get stuck in an **undermigration trap**, both the individual and trickle-down effects would have to be mitigated.

#### Undermigration trap

- To weaken the *Individual effect*, let's do away with the first assumption i.e. <sup>¯</sup><sub>w</sub> > <sup>a<sub>C</sub>(<sup>̂</sup>)</sup><sub>β</sub>.
   So, let <sup>¯</sup><sub>w</sub> ≤ <sup>a<sub>C</sub>(<sup>̂</sup>)</sup><sub>β</sub> ⇒ F(<sup>a<sub>C</sub>(<sup>̂</sup>)</sup><sub>β</sub>) = 1
- We continue to assume that  $\bar{a} = \beta \bar{w} > m$ , also necessary for undermigration.
- Recursion function for the state variable  $R_t$ Denoting the current interest rate by  $r_t$ , the rural population evolves according to:

$$\int_{\mathcal{A}} \frac{R_t F(a_C(r_t)/\beta)}{\left(\frac{\partial w}{\partial w}\right)^{n}} \int_{\mathcal{A}} \frac{1}{(1-R_t)^{n}} \frac{1}$$

$$R_{t+1} = G(R_t) \begin{cases} (\beta \bar{w}/m) [R_t + (1 - R_t)\lambda] - (1 - R_t)(1 - F(a_C(r_t)/\lambda\beta)) & \text{if } r = \hat{r} \\ 0 & \text{if } r > \hat{r} \end{cases}$$

• To completely characterize the dynamics, we know that *r* itself changes with *R<sub>t</sub>* through the **loan market equilibrium**.

• Supply of loans 
$$= \beta \bar{w} [R_t + (1 - R_t) \lambda]$$

$$\int m[1 - (1 - R_t)F(a_C(r_t)/\lambda\beta)] \qquad \text{if } r < \hat{r}$$

$$Demand = \begin{cases} [m(1-R_t)[1-F(a_c(r_t)/\lambda\beta)], m[1-(1-R_t)F(a_c(r_t)/\lambda\beta)]] & \text{if } r = \hat{r} \\ m(1-R_t)[1-F(a_c(r_t)/\lambda\beta)] & \text{if } r > \hat{r} \end{cases}$$

Note that *r* is inreasing in *R* when  $r < \hat{r}$ .

Now observe that for all R ∈ [0, 1], G(R) ≤ R, since migration never goes from city to village. Since G(R) ≥ 0 by definition, we conclude that G(0) = 0. This is the case when r > r̂.

# Fixed Point or G(.)

- We now need to establish the existence of the fixed points of  $G(\cdot)$  other than zero.
- At any such a fixed point, the associated interest rate  $r^*$  must satisfy  $r^* \leq \hat{r}$  and  $F(a_C(r^*)/\beta) = 1$ .
- Suppose there is a fixed point (call it R
   ) associated with the interest rate r
- As this is a stationary point, there can be no migration when  $R = \bar{R}$ . Therefore, supply must be equated to the highest level of demand generated by  $\hat{r}$ .  $\Rightarrow \beta \bar{w} [\bar{R} + (1 - \bar{R})\lambda] = m[1 - (1 - \bar{R})F(a_C(\hat{r})/\lambda\beta)]$

## Fixed Point or G(.)

• Now, choose  $R^* < \overline{R}$ . The corresponding  $r^* < \hat{r}$ . Why?

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## Fixed Point or G(.)

- Now, choose R\* < R. The corresponding r\* < r̂. Why? Because Supply increases and demand decreases.
- So long as F(a<sub>C</sub>(r<sup>\*</sup>)/β) = 1, R<sup>\*</sup> is also a fixed point of G(·). Indeed, there will be an interval (possibly degenerate) of fixed points [<u>R</u>, <u>R</u>], where the interest rate <u>r</u> associated with <u>R</u> satisfies a<sub>C</sub>(<u>r</u>) = β<sup>¯</sup>w.
- Thus we need only establish the existence of a nonzero R to guarantee that G(·) has stationary points bounded away from zero.

$$\Rightarrow \bar{R} = \frac{\lambda \beta \bar{w}/m + F(a_{\mathcal{C}}(\hat{r})/\lambda \beta) - 1}{(\lambda - 1)\beta \bar{w}/m + F((a_{\mathcal{C}}(\hat{r}))/\lambda \beta)} > 0$$
$$\Rightarrow \lambda \beta \bar{w}/m + F(a_{\mathcal{C}}(\hat{r})/\lambda \beta) - 1 > 0$$

**Proposition 4.2.** Suppose that  $\lambda\beta\bar{w}/m + F(a_C(\hat{r})/\lambda\beta) - 1 > 0$ . Then there exists an interval  $[R, \bar{R}]$  of rural population levels which remain constant over time once the economy arrives there.

- Since R
   > 0, at least some of these levels are positive: full modernization does not occur.
- We therefore refer to the interval [<u>R</u>, <u>R</u>] as the "undermigration trap".
- We go back to our original question and ask whether long-run undermigration is possible starting from a pure rural economy?

## How might the economy reach the under migration trap?

- When  $R \ge \bar{R}$ ,  $r = \hat{r}$ .( Proved in footnote: Easy) Hence, G(R) is linear and can have either slope depending on the sign of  $(\beta \bar{w})/m(1-\lambda) + 1 - F(a_C(\hat{r})/\lambda\beta)$ .
- Case1: Slope is positive.



## Negative Slope

- Case2: Possibility of Undermigration Trap.
- Only way a pure rural economy would fall into the undermigration trap is if  $G(1) = \beta \bar{w}/m \ge \underline{R}$ .



• When this condition is satisfied, the economy jumps to the undermigration trap as soon as the urban sector opens.

## Negative Slope

- Case3: Escaping the Undermigration Trap.
- If this condition fails, the economy jumps past the undermigration trap when the urban sector opens and then eventually fully modernizes



• In these cases, trickle-down remains strong enough to eventually modernize the economy.

Abhijit V. Banerjee – Andrew F. Newman Presented by Sneha Agrawal

## Remarks

- We have been asking whether long run undermigration is possible assuming that the economy starts out purely rural. This is a useful thought experiment, but is not necessarily the only relevant case.
- Many instances of modernization and development, especially in modern times, correspond to opening an already large urban sector to the rural sector.
- Thus initial conditions with R < 1 are also of interest.
- In Figure c, if the economy begins with the size of the rural sector in the interval  $[\overline{R}, \overline{\overline{R}}]$ , it falls into the trap. We therefore have a dynamic analogue to the conditions leading to undermigration in the static case discussed in the previous section.
- Opening a moderate-sized city to the village may not effect further development of the economy, at least if one relies on the laissez-faire migration mechanism.

Kuznets Inverted U may not always materialize.

- It is possible under plausible specifications to generate rather different patterns for the evolution of inequality. In particular, the way individuals *select* for migration will be crucial.
- Suppose that agents learn the level of their earnings at birth, before they make their location decision. Assume this information is public.
- Then each period, migration follows the pattern described by Proposition 3.1 and Figure 1.
- In particular, note that low-skill agents migrate while medium-skill agents remain in the rural sector. Imagine that the lowskilled in the city actually end up earning close to what the medium-skilled are earning back in the village.

- Then, assuming the fraction of very high-skill agents is small, the possibility arises that opening the urban sector could actually decrease the level of inequality.
- Subsequently, as the rural sector empties out, inequality increases again. The result is an "upright" U, rather than Kuznets's inverted U.

## Conclusion

- The implications of the dynamic examples in this section may be summarized by saying that the characteristics of those who choose to migrate may have important implications for the evolution of inequality in developing countries.
- Moreover, as the examples show, the dynamics of inequality can depend delicately on the parameters of the distribution of these characteristics: seemingly irrelevant changes of the timing of location decisions can have a dramatic impact on the evolution of the aggregate variables.
- We conclude that there is no broad theoretical reason even if we adhere to a sectoral shifting story of development-to believe in the universality of the inverted U.

#### Discussion: Some points to think!

- The model in this paper, while suggestive in several respects, leaves out much to be a useful predictive model of the process of modernization.
- Some of these omitted factors such as **congestion effects in the modern sector** and the fact that one does not get completely cut off from the traditional sector when one first starts working in the modern sector, go against our results.
- Others, like the fact that the ability of the traditional sector to provide better loans or insurance may depend on **how many people are left in the traditional sector**, may reinforce our results.
- A truly predictive model of the process of modernization must build in all of these effects.
# **Overmigration?**

- Overmigration exists if ā < m, but the loan market fails to clear, i.e. even at an interest rate of unity there is more wealth than is demanded for youthful consumption.
- Now, this will not be possible under laissez-faire
  - If r = 1, anyone who moved to the city who does not have a loan there would be better off staying in his village.
  - The wealth would flow to him there, and the condition that  $(s m) \ge (\lambda 1)w$  implies he would be better off.
- But, it is possible that catastrophes such as the Bengal famine in the 1940's would have the effect of forcing sudden movement to the city with concomitant dissolution of the rural information networks.

- Suppose that the condition (ā/m) > 1 − R(a<sub>C</sub>(1)) − U(a<sub>C</sub>(1)) mentioned in the proof of Proposition 3.2 holds.
- Then we would have a situation in which everyone (say) was in the city, but a fair amount of them (more than is necessary given the amount of wealth in the economy) were unable to borrow so that much of the economy's wealth would be "idle", i.e. consumed rather than used for school.
- Thus, while forced migration might have desirable consequences if there are not too many villagers who are poor (have wealth less than  $a_C(1)$ ), the opposite may be true if there are too many of them; an optimum would then involve keeping some of those people in the rural sector.

### Alternate assumptions about capital flows

- Say we drop the assumption that wealth is free to flow between the village and the city.
- Then the principal effect is that the argument for static inefficiency no longer applies. Why?
  - While forcing everyone into the modern sector would continue to result in increased output, the capital would no longer follow them to the city.
  - Thus, under laissez-faire, the rate of modernization, although "inefficiently slow", could not be considered to be inefficient in the sense we have been considering: only if capital were somehow forced into the modern sector along with the individuals could a surplus gain be achieved.

### Alternate assumptions about capital flows I

- To see this explicitly, take the extreme case in which the capital is stuck in each location at whatever amounts are there initially.
- In equilibrium there will be two interest rates, one for each location. Call them  $r_V$  and  $r_C$  (we cannot say which is higher, in general).
- All villagers with wealth below  $a_V(r_V)$  and above  $a_C(r_C)$  will migrate.
- Forcing those who remain to move to the city will not affect the urban interest rate (since demand falls in the village, the interest rate would fall there, but this does not help anyone because everyone who had been there before was getting a loan anyways).And, City interest rate does not fall now!

## Alternate assumptions about capital flows II

- Hence, the new arrivals do not have an effective demand because their wealth still lies below  $a_C(r_C)$ . The new arrivals must be worse off (since they had chosen not to move in the equilibrium and their options in the city are no different), so total surplus must decline.
- This situation parallels the one in which life in the village has some consumption value that is unavailable in the city (scenery, for instance). In this standard hedonic pricing setting, agents locate in one sector or the other depending on their tastes for scenery; the resulting allocation is efficient. Thus, it is the ability of wealth to flow between the sectors that generates the static inefficiency in our model.

#### • Statics versus Dynamics

• But there is a difference between the case of wealth and that of scenery.

### Alternate assumptions about capital flows III

- The next period's capital can effectively be brought to the city, while next period's scenery cannot. Once everyone is forced into the urban sector, they will generate more wealth for the ensuing period than they would have under laissez faire.
- Since capital market clearing within the urban sector entails that all of this wealth be used for loans, surplus will be higher in the second period than it would be without forced migration.
- Therefore, when wealth cannot flow across the two sectors, the static economy is efficient, but the dynamic economy may remain inefficient

# Implications for rural lending institutions

• At first blush, our results might suggest that policies designed to encourage the availability of credit in the traditional sector may be misguided. But that may not be true: Why?

# Implications for rural lending institutions

- At first blush, our results might suggest that policies designed to encourage the availability of credit in the traditional sector may be misguided. But that may not be true: Why?
- Policies designed to ease access to credit in the rural sector should be implemented bearing in mind what the social opportunity cost of capital is, and more particularly in conjunction with policies designed to elicit greater availability of capital, e.g. saving subsidies or foreign aid.
- Suppose the village begins with a (small) positive value of π and that a policy is introduced which has the effect of lowering it, say to 0. (Improvement in availability of credit)

- Imagine at the same time that there is no change in aggregate wealth (nothing is done either to elicit more saving within the economy or to obtain capital from abroad).
  - The initial impact is that a<sub>V</sub> falls ⇒ fewer people will migrate to the city: the "bottom" of the middle class remaining in the village expands.
  - Since this typically results in a greater demand for loans, *r* will rise, which raises *a*<sub>*C*</sub>;
  - This means that the "top" of the middle class expands as well (of course, the rising interest rate causes  $a_V$  to rise again, but it is easy to show that it cannot rise above its old level).
  - The **net effect is a decrease in migration** and a slowdown in the rate of modernization.
- Notice this argument depends crucially on the interest-rate increasing effect of the rural lending programme.

## This can be mitigated in several ways.

- In practice, programmes such as Grameen bank tend to rely on foreign aid and other sources of *funding that come from outside the economy* and which therefore are unlikely to affect the capital market within the country very much.
- If the capital were not funnelled to poor women, it probably would not go to more productive uses in Bangladesh. Hence, **right targetting** is also very important.
- More generally, policies which encourage savings will be most effective when it can be ensured that the capital thus generated will actually reach potential borrowers.
- Programmes designed to channel credit to targeted groups must be accompanied by programmes designed to raise this credit from low cost sources.