Information, the Dual Economy, and Development

Abhijit V. Banerjee, Andrew F. Newman

April 18, 2017

Introduction

- In this paper, we look at the relation between the relation betwewn the process of **institutional change**, also called modernization, and the process of economic change that seems to go with it.
- We take the view that these processes are not independent, nor is modernization a mere product of economic growth.
- Rather, these are autonomous processes that can, under different circumtances, promote or retard each other.

Introduction

- We study an economy consisting of two sectors that are disguished in two ways: **technological** and **institutional**.
- One sector has more modern technology, and is therefore more productive. But information asymmeteries are large in this sector as people live and work in different places and are essentially annonymous.
- By contrast, the other sector is more traditional, technology is less productive, but people live and work together and know a lot abot each other.

Introduction

- **Why dos the difference in the degree of information asymmetery matter?**
- People in this economy sometimes need consumption loans.
- Loan transactions are subject to default by the borrower.
- 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; as a result, in the traditional sector the access to credit for individual borrowers is as good or better than what it would be in the modern sector.

The trade-off

- Thus this difference in the degree of information asymmetery sets up a trade-off between superior access to credit in the traditional sector and higher productivity in the modern sector.
- It follows that some of the population will fail to move to the modern sector, even after the opportunity to do so becomes available.
- Thus, there is a possibility that the outcome is inefficient, or that modernization is too slow.

The Model

- We consider a one-period model.
- **Village**- representing the traditional sector, and **City**-representing the modern sector.
- The economy has a perfectly storable consumption good.
- A continuum of agents.
- Initial endowment of wealth = a units.
- Location choice has no direct cost - **labour is perfectly mobile**

The model

- In his **youth**, before entering the productive phase, the individual has a chance to consume an *indivsible* good eg. schooling.
- Consumption of this good does **not** affect future incomes.
- Consumption of this good
  - yields utility s
  - costs m units of the good.
- If wealth is insufficient to finance schooling ($a < m$), the agent may attempt to borrow the diffrence ($m - a$).

The model

- In his **adulthood**,the individual earns his income y from labour, which he supplies inelastically, and repays any loan obligations.
- **How do we model that productivity is higher in the city than in the village?**
- An individual who can earn w in the village can earn λw in the city, with $\lambda > 1$.
- vNM utility function: Lifetime Utility $= u + y$

First best case

- No information asymmetery. Everyone can borrow and lend at the market gross interest rate r.
- Utility of the individual if he moves to the city $= \lambda w + s - (m - a)r$, which is greater than $w + s - (m - a)r$, his utility if he stays in the village.
- Thus, everyone moves to the city, and the economy operates efficiently.

Departure from the first best case

- We assume that capital is freely mobile between the two locations and that there is free entry of lenders in the two locations.
- What is not mobile is information and enforcement powers.
- **There is a possibility that a borrower might renege on a debt agreement**.
- 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.
- Now, the borrower may attempt to renege on theloan agreement at two points in time:
  - **Before he has earned his income**
  - **After he has earned his income**

Departure from the first best case

- **Before he has earned his income**
  - Escapes lenders attempts to detect him with probability ρ.
  - With probability $(1-\rho)$ punished maximally by having his consumption set to 0.
- **After earning his income**
  - Success in fleeing with probability π.
  - With probability $(1-\pi)$, caught before disposing his income.Punished by having consumption set to 0.

Incentive Compatibility

- 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.

Ex Post Incenive Compatibility

- Suppose that if the borrower earns y he is to repay $P(y)$ and the income to be earned is known at the time of contracting.
- So the Ex Post Incentive Compatibility constraint is

$$y - P(y) \geq \pi y \tag{1}$$

- Competition among the lenders will ensure that $P(y) = (m - a)r$
- Hence the Ex Post IC is

$$y - (m - a)r \geq \pi y \tag{2}$$

$$\equiv a \geq a_p = m - ((1 - \pi)y)/r \tag{3}$$

- Thus, if $a \geq a_p$, then the borrower has no incentive to renege on the loan agreement **after** he has earned his income.

Ex Ante Incentive Compatibility

- Now, a contract will always satisfy the Ex Post IC, i.e. for an agent can get a loan in a village only if $a \geq m - (1-\pi)w/r$ and an agent will get a loan in the city only if $a \geq m - (1-\pi)\lambda w/r$.
- Now the borrower knows that his payoff if he remains where he agreed is
  - $w - (m-a)r$ in the village
  - $\lambda w - (m-a)r$ in the city
- His payoff is a maximum of $\rho\lambda w$ if he defaults.

- Ex Ante IC if he agreed to remain in the village
  $w - (m - a)r > \rho\lambda w \Rightarrow a \geq a_A^V \equiv m - (1 - \rho\lambda)w/r$.
- Ex Ante IC if he agreed to remain in the city
  $\lambda w - (m - a)r > \rho\lambda w \Rightarrow a \geq a_A^C \equiv m - (1 - \rho)\lambda w/r$.
- All loans made in equilibrium will satisfy these constraints, and the borrower will neer renege.

Ex Ante Incentive Compatibility

- 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
  - $a \geq max a_p, a_A^l$
  - $a \geq max a_p, a_A^v \equiv a_V$ in the village
  - $a \geq max a_p, a_A^c \equiv a_C$ in the city
- $a_v = \max\{m - (1-\pi)y/r, m - (1-\rho\lambda)w/r\}$
- $a_C = \max\{m - (1-\pi)y/r, m - (1-\rho)\lambda w/r\}$.
- Observe that this threshold value of wealth a_I , is increasing in the interest rate, decreasing in income, and increasing in the escape probabilities π and ρ.

Incentive Compatibility

- We now use the model to distinguish the informational advantage of the city over the village.
- 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, i.e. $\lambda{=}\pi{=}0$
- Thus the threshold level of wealth is $m - w/r \equiv a_v(w, r)$.
- $a_v = \max\{m - y/r, m - w/r\}$ and $y = w$ in village.
- So $a_v = m/r$.Thus, if for an agent, $w \geq mr$, then she can borrow and go to school.

Incentive Compatibility

- **For an agent who locates to the city, either by choice or by birth**, we assume that π is large enough so that $(1-\pi)\lambda < 1$.
- We also assume that $\pi = \rho$ for loans originating in the city.
- Hence $a_c(w,r) = \max\{m - \frac{(1-\pi)\lambda}{r}, m - \frac{(1-\rho)\lambda w}{r}\}$, $y = \lambda w$ in the city.
- Thus, $a_c(w,r) = m - \frac{(1-\pi)\lambda w}{r}$, $a_v(w,r) = m - \frac{w}{r}$
- 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.

Static Equilibrium

- Normalize the population of adults in the world in any period to be 1.
- Let $R(a)$ be the measure of people born in the Village with wealth less than at the beginning of the period.
- Let $U(a)$ the measure of people born in the City with wealth less than at the beginning of the period.

Static Equilibrium

- **Consider the choice problem faced by a person born in the rural sector**
- **Case 1** : Give the interest rate r, the agent has wealth $a \geq a_c(w, r)$
  - Payoff $= w + s - (m - a)r$ if he stays in the village
  - Payoff $= \lambda w + s - (m - a)r$
- So, it will be optimal for the agent to migrate to the city.

Static Equilibrium

- **Case 2**: $a < a_V(w, r)$
  - Payoff $= w + ar$ if he stays in the village
  - Payoff $= \lambda w + ar$ if he migrates to the city
- So it is optimal for him to migrate to the city
- **Case 3**: $a_v(w, r) \leq a < a_C(w, r)$
  - Payoff $= w + s - (m - a)r$ if he stays in the village and is able to take a loan
  - Payoff $= \lambda w + ar$ if he moves to the city
  - So, it is optimal for this agent to migrate if $\lambda w + ar \geq w + s - (m - a)r \Rightarrow r > s/m - (\lambda - 1)w/m$

Static Equilibrium

- This tells us that migration will be carried out by the really wealthy, i.e. those with $a \geq a_c(w, r)$ as well as by those for whom the gross market interest rate r exceeds $r(\tilde{w})$.
- Now, $r(\tilde{w}) = s/m - (\lambda - 1)w/m$ is a decreasing function of w and w is (presumably) higher or those with a higher skill level. So, for any given value of r, it is more likely that r will exceed $r(\tilde{w})$ for a more skilled individual than for a less skilled one.
- Thus more skilled individuals are more likely to migrate.
- Very poor low skilled people may also migrate. $a_v(w, r) = m - w/r$ so if w(skill) is low enough, then $a_v(w, r) = m - w/r$ will be positive. On the other hand, if skill is high enough so that $w \geq mr$ then a_v becomes negative and everyone can then borrow and stay in the village.

Figure 1

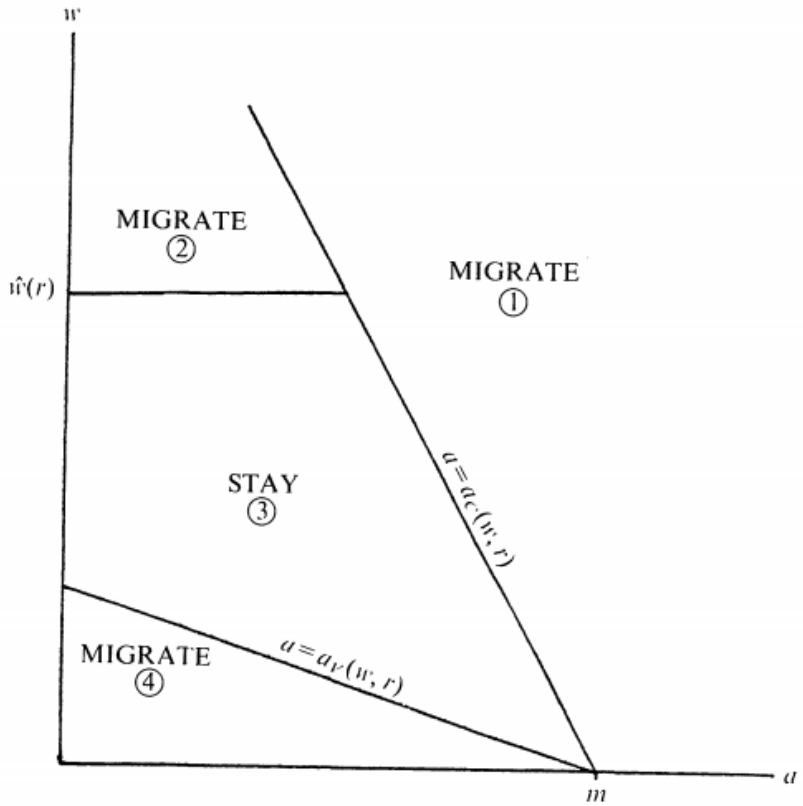


FIGURE 1
Agents in regions ① and ③ consume in youth; those in ② and ④ to not.

Static Equilibrium

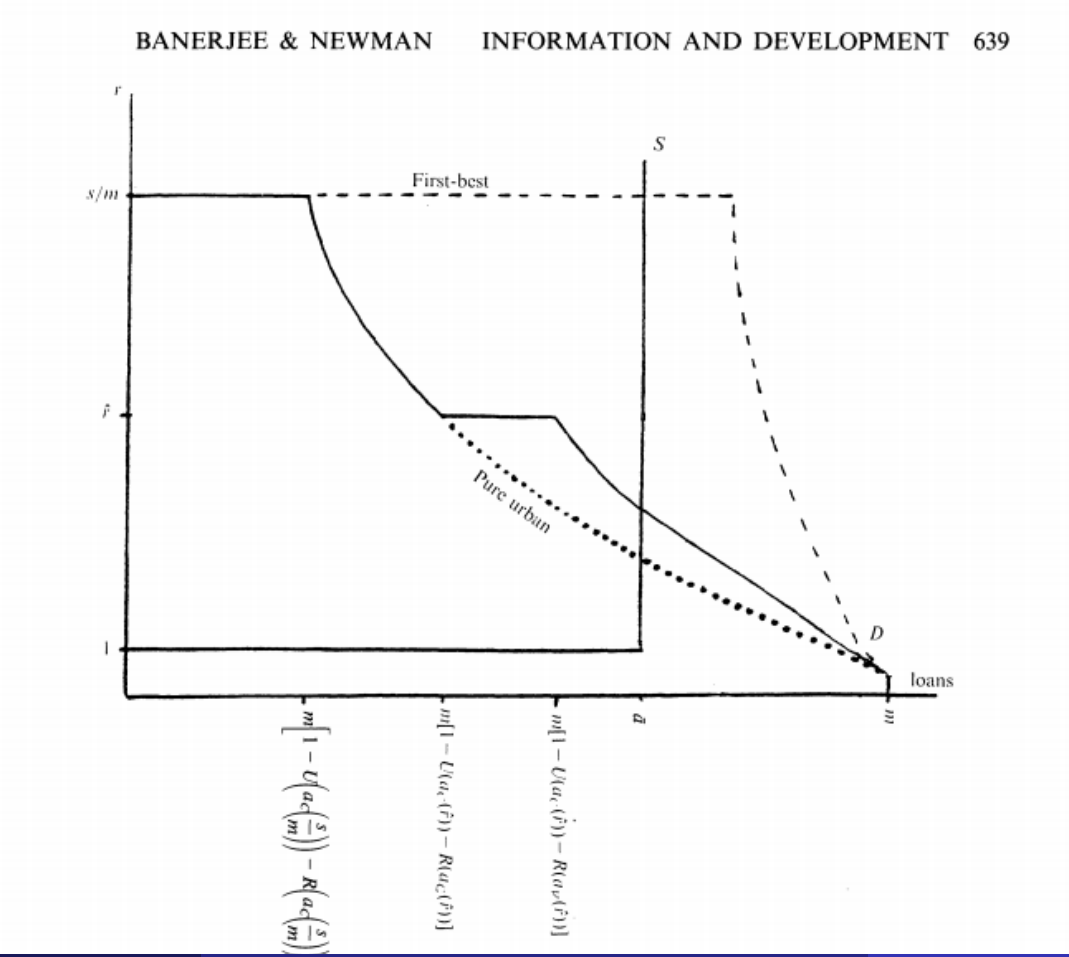
- The above discussion can be summarized in the following proposition: *An agent born in the village with wealth a and who earns w there migrates to the city when the interest rate is r only if (a)* $a \geq a_c(w, r)$ *or (b)* $r \geq r(\tilde{w})$ *or (c)* $a < a_v(w, r)$
- For the remainder of the section, we assume that everyone earns the same income(w) and agents only differ in initial wealth.

Demand of Loans

- People who demand loans are those for whom $a \geq a_c(r)$ and those for who $a < a_c(w, r)$ but who stay in the village.
- If $r < \tilde{r}$, then everyone in the village migrates to the city. The demand for loans is then $m[1 - R(a_c(r)) - U(a_c(r))]$.
- If $r = s/m$ which is $> \tilde{r}$, then even those with $a \geq a_c(r)$ are indifferent between taking and not taking a loan. So the demand for loans is in the range $[0, m[1 - R(a_c(r)) - U(a_c(r))]]$.
- At $r = \tilde{r}$ people with wealth between a_v and a_c are indifferent. So, the demand for loans is in the range $[m[1 - R(a_v(\tilde{r})) - U(a_c(\tilde{r})], m[1 - R(a_c(\tilde{r})) - U(a_c(\tilde{r}))]]$.
- As r declines further, all rural people stay and demand loans so demand is $m[1 - R(a_v(r)) - U(a_c(r))]$.
- Eventually, the demand for loans reaches its maximum value of m.

Supply of Loans

- **Supply**=
  - $\bar{a}$ if $r > 1$
  - $[0, \bar{a}]$ if $r = 1$
  - 0 if $r < 1$



- 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.
- To see this, note that labour is being used inefficiently in the rural sector. If 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.

- A necessary condition for inefficiency(some people remain in village) is that $\tilde{r} \geq r$, the equilibrium interest rate.
- Since the good is perfectly storable, the minimum value of r can be 1. So, for the outcome to be inefficient, it must be the case that $\tilde{r} \geq 1$, i.e. $(s - m) \geq (\lambda - 1)w$.
- The idea is that when $(\lambda - 1)w > (s - m)$, it means that the productivity differential between(and hence the income differential) between the city and the village is large enough for it the benefit of the higher income in the city to overshadow the loss of not being able to borrow to go to school.
- When this is not the case, then, some people might choose to remain in the village.

Migration as a function of the equilibrium interest rate

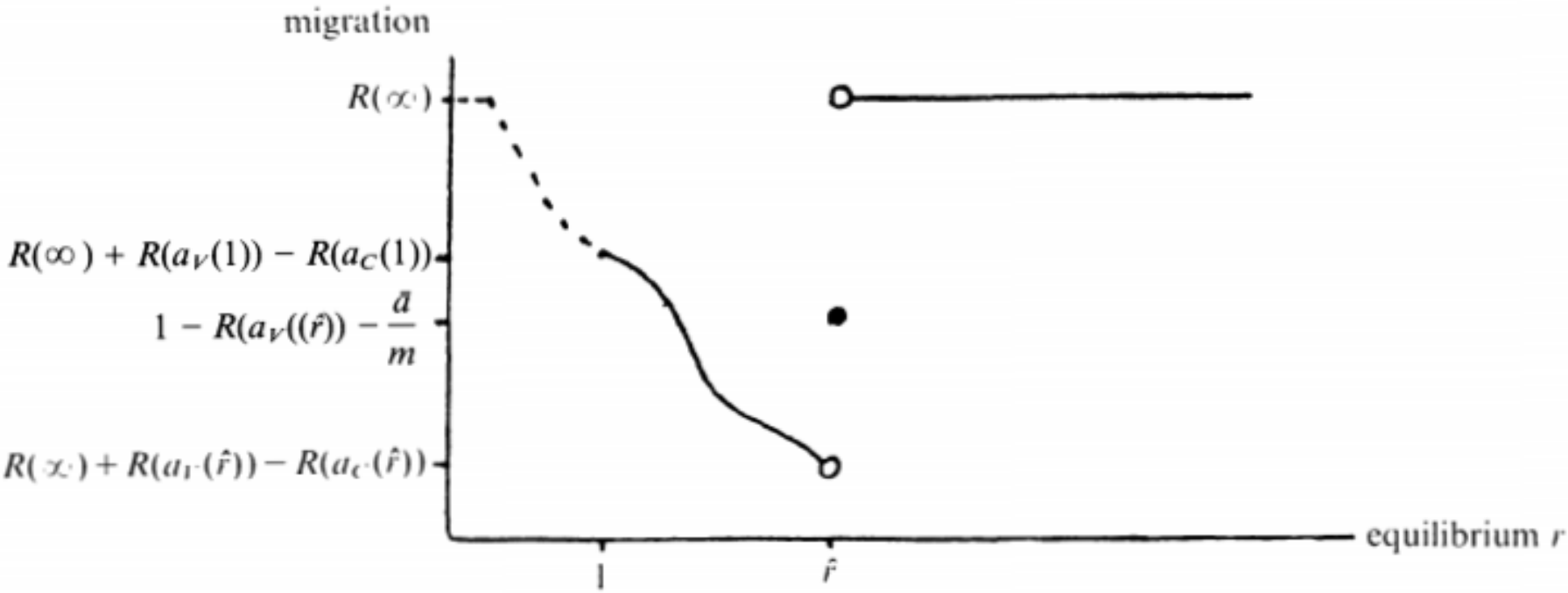


FIGURE 3

Necessary and Sufficient condition for inefficient migration

- Proposition: *Suppose* $(s-m) \geq (\lambda-1)w$ *holds and* $R(.)$ *and* $U(.)$ *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)$1 - R(a_C(\tilde{r}) - U(a_C(\tilde{r}) < (\bar{a}/m)$

What is the Rural Institution 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.

Conclusion

- If the economy is wealthy in the sense that $\bar{a} \geq m$, 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

- We have seen that in the short run, i.e. when we consider a one period model, then undermigration is a possibility.
- The question is, is undermigration still a possibility when the distributon of wealth, which affects both the demand and the supply of loans, is endogenous.
- The setting that we now consider is comparable to the one in which the traditional questions about the relationship between modernization and income distribution were originally asked.
- We look at the income distribution aspects of the process of modernization: how migration dynamics can lead to a variety of patterns of evolution of inequality.

Some Rudimentary Dynamics

- **Does the "sectoral-shifting" account of modernization provide a robust foundation for Kuznets famous 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.
- This prediction for the pattern of evolution of inequality is known as Kuznet's Inverted-U Hypothesis.

Some Rudimentary Dynamics

- We consider a purely rural economy and examine the level of migration and distribution of labour earnings over time after the urban sector is opened.
- We restore the assumption that there is a multitude of skill levels w. We shall make alternative assumptions about whether the skill level of an individual is known to himself or not at the time he takes the migration decision.
- The economy lasts and infinite number of periods and the population is stationary (does not grow with time).
- In every period the individual receives his initial wealth a as a bequest from his parents.
- Adult consumption occurs twice, at dates 1 and 2 within the period.

Some Rudimentary Dynamics

- The lifetime utility of the agent takes the form $u + c_1 + c_2^{1-\beta} b^{\beta}$ where
  - u represents youthful consumption.
  - c˙i is adult consumption att date i.
  - b is the bequest that the agent leaves fot his children.
- **Location choice, borrowing at youthful consumption are decided before date 1.**
- At date 1, uncertainty, if any about the skill level is resolved,
- Income earned at date 1 is same as the income earned at date 2.
- 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.

Some Rudimentary Dynamics

- If the agent earns y at each date, then his indirect utility is $(1-\delta)y + ar + u(1 - mr/s)$ where $\delta \equiv \beta^{\beta}(1-\beta)^{1-\beta}$.
- 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.This in turn means that the threshold levels of wealth a_V and a_C are the same as those derived in the previous section.
- With these preferences, the marginal utility of a dollar at date 1 exceeds that at date 2. This introduces the possible need for a second consumption loan market (distinct from borrowing to go to school) where agents borrow against date 2 earnings in order to consume at the first date.
- We however, focus exclusively on the equilibrium allocation where each agent is 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.

Some Rudimentary Dynamics

- Under these assumptions, the bequest, which is equal to the offspring's initial wealth a, is equal to βy, provided that the income of the parent in period 1 (y) was enough to repay the loan obligations.
- All this will 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 agents skill becomes known (to himself and the public alike).
- In one case, the skill level of an individual is known at birth. In another case, it is not known till period 1.
- We will see that this small change in timing assumptions can have a dramatic effect on the pattern of evolution of inequality.

Full Modernization and Kuznets curve

- Suppose the agents learn their skill levels **after choosing the location (at date 1)**.
- Let the distribution of skills (where skill level corresponds to the labour earnings in the village) be $F(w)$ which is supported on a non-degenerate interval $[\underline{\underline{w}}, \overline{\overline{w}}]$.
- The density function is $f(w)$, mean is $\bar{w}$, variance σ^2.
- The distribution of earnings among those in the city is then $F(\lambda w)$.

Full Modernization and Kuznets curve

- To guarantee that the individuals can always repay their loan obligations out of date 1 earnings alone, we assume that $\underline{\underline{w}} \geq s$. This is because $\underline{\underline{w}}$ is the minimum income that an individual can have an s is teh maximum value that the loan repayments (mr) can take.
- This in turn implies that $a_V(r)$ is always leaa than or equal to zero (as we assume it cannot take negative values).
  $a_V(.) \leq m - \bar{w}/r \leq m - \bar{w}/(s/m) \leq m - \overline{\overline{w}}/(s/m) \leq m - s/(s/m)$
- This in turn implies that the fraction of villagers born with wealth less than $a_V(r)$ is always zero.
- We are only interested in the case in which average wealth $\bar{a} < m$, since in the other case modernization is instantaneous. Thus we assume that β is small enough that $\bar{a} = \beta\bar{w} < m$.
- We shall use Coefficient of Variation as an inequality measure .

Full Modernization and Kuznets curve

- Suppose that in period t, the population of the rural sector at the beginning of the period (before the location decision has been made), is R_t and that in the urban sector is $R_t - 1$.
- This is 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 $x = P(\beta w < x) = F(x/\beta)$.
- Thus the rural wealth distribution is just $R_t F(x/\beta)$, while the urban distribution is $(1 - R_t)F(x/\lambda\beta)$.

Full Modernization and Kuznets curve

- 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.
- $Inequality = Coefficient of Variation = \sqrt{\frac{[R+(1-R)\lambda^2](\sigma^2+\bar{w}^2}{[R+(1-R)\lambda]^2\bar{w}^2}} - 1$
- If R=0, Inequality $= \sigma/\bar{w}$
- If R=1, Inequality $= \sigma/\bar{w}$
- It has a unique maximum at $R = \lambda/(\lambda + 1)$.

Full Modernization and Kuznets curve

- The mean income $R\bar{w} + (1 - R)\bar{w}$ is decreasing in R.
- R_t**, or the fraction of the population in the village, decreases monotonically**.
  - the level of migration $(R_t - R_{t+1})$ is always non negative as no one ever migrates from the city to the village. So, R_t decreases monotonically.
- The economy fully modernizes, i.e. $R_t \to 0$ over time.
  - A lower bound for the level of migration is given by $R(\infty) - R(a_C(\tilde{r})) = R_t(1 - F(a_C(\tilde{r})/\beta))$.
  - Thus if $\overline{\overline{w}} > a_C(\tilde{r})$, it means that $(1 - F(a_C(\tilde{r}))$ is positive and there is a uniform positive lower bound on the fraction of the rural population that will migrate each period.
  - It follows that R_t converges to zero.

Full Modernization and Kuznets curve

- The economy does not modernize instantly.
- If $r < \tilde{r}$, not everyone migrates, except the singular case when $m[1 - R(a_C(\tilde{r}))] = \beta\bar{w}$.
- This implies there should be some excess supply to service some rural people with wealth less than a_C.
- $\beta w > m[1 - F(a_C(r_C)/\beta)]$ means that at $r = \tilde{r}$ supply of loans exceeds demand so the market will clear at a lower interest rate.Thus there will be people in the village who will not find it optimal to move as soon as the urban sector is opened. Thus migration will occur in multiple phases.
- Proposition: *If* $\overline{\overline{w}} > a_C(\tilde{r})$ *and* $\beta w > m[1 - F(a_C(r_C)/\beta)]$ *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*

Full Modernization and Kuznets curve

- 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.
- The assumption that we made to ensure that there is full mofernization was that $\overline{\overline{w}} > a_C(\tilde{r})/\beta$ i.e. when we begin, there is a fraction of agents rich enough (wealth in excess of $a_C(\tilde{r})$ so that the bequest that they leave their children is enough that the children migrate to the modern sector and get schooling there.
- This is the **individual effect**
- There is also the **trickledown effect** associated with modernization.

Full Modernization and Kuznets curve

- Trickle down effect operates at a more aggregate level.
- As more people move to the city, they earn more so that aggregate wealth increases.
- Meanwhile, demand for loans typically does not increase. This leads to a decrease in the interest rate, which relaxes the borrowing constraints for everyone.
- More generally, the agency costs of borrowing in the city are reduced at the lowered interest rate (reflected by the fall in $a_C(r)$), which in turn make the modern sector attractive to more people.

Undermigration in the long run

- We saw that if the conditions in the proposition are satisfied then the economy always fully modernizes. but what if the sufficient conditions for undermigration fail to hold?
- If the economy were to get stuck in an undermigration trap, both the individual and trickle-down effects would have to be mitigated.
- We first begin with assuming that $\overline{\overline{w}} \leq a_C(\tilde{r})/\beta$ so $F(a_C(\tilde{r})/\beta = 1$. This is essentially weakening the individual effect.
- We will continue to assume that $\beta\bar{w} < m$ another necessary condition for undermigration.

Undermigration in the long run

- We are interested in deriving a recursion function for the state variable R_t. Denoting the current interest rate by r_t, the rural population evolves according to:

$$R_{t+1} = G(R_t) = \begin{cases} R_t F(a_C(r_t)/\beta) & r_t < \hat{r}, \\ (\beta\bar{w}/m)[R_t + (1-R_t)\lambda] - (1-R_t)(1-F(a_C(r_t)/\lambda\beta)), & r_t = \hat{r}, \\ 0, & r_t > \hat{r}. \end{cases} \quad (4.1$$

Undermigration in the long run

- To completely characterize the dynamics, we know that r itself changes with R_t through the loan market equilibrium.
- The supply of loans in each period is $\beta \bar{w}[R_t + (1 - R_t)\lambda]$
- r is increasing in R when $r_t < r$.

$$\begin{cases} m[1-(1-R_t)F(a_C(r_t)/\lambda\beta)] & r_t < \hat{r} \\ [m(1-R_t)\{1-F(a_C(r_t)/\lambda\beta)\}, m\{1-(1-R_t)F(a_C(r_t)/\lambda\beta)\}] & r_t = \hat{r}, \\ m(1-R_t)[1-F(a_C(r_t)/\lambda\beta)], & r_t > \hat{r}. \end{cases}$$

e expressions, one can verify that r is increasing in R when $r_t < \hat{r}$.

Undermigration in the long run

- For all $R \in [0,1]$ $G(r) \leq R$ since no one migrates from the city to the village. As $G(R) \geq$, it follows that $G(0) = 0$. So full modernisation is a steady state. This is the case when $r > \tilde{r}$.
- We now need to establish the existence of the fixed points of G(.) other than zero.
- At any such a fixed point, the associated interest rate r^* must satisfy $r \leq r^*$ and $F(a_C(r^*)) = 1$.
- Suppose there is a fixed point $\bar{R}$ associated with interest rate $\tilde{r}$. As this is a fixed point, there is no migration. So supply must be equal to the highest demand generated by $\tilde{r}$.

$$\beta \bar{w}[\bar{R} + (1 - \bar{R})\lambda] = m[1 - (1 - \bar{R})F(a_C(\hat{r})/\lambda\beta)]$$

Undermigration in the long run

- Now choose R^* less then R. The corresponding interest rate r_* must also be then less than $\tilde{r}$. As long as $F(a_C(r^*)) = 1$, R^* is also a fixed point of G.
- So there will be an interval $[\underline{R}, \overline{R}]$, possibly degenerate, of fixed points.
- Now we need to guarantee a non zero solution to the above equation to see that G has fixed points bounded away from 0.
- Solving the equation, we have

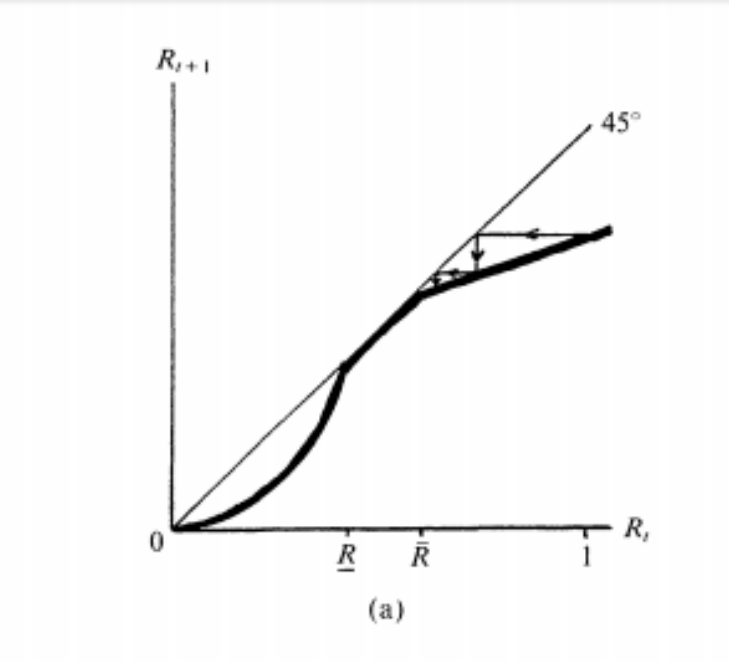
$$\bar{R} = \frac{\lambda\beta\bar{w}/m + F(a_C(\hat{r})/\lambda\beta) - 1}{(\lambda - 1)\beta\bar{w}/m + F(a_C(\hat{r})/\lambda\beta)};$$

Undermigration in the long run

- Since $\bar{R} > 0$, at least some of these levels are positive: full modernization does not occur.
- We therefore refer to the interval $[\underline{R}, \overline{R}]$ 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.

Undermigration in the long run

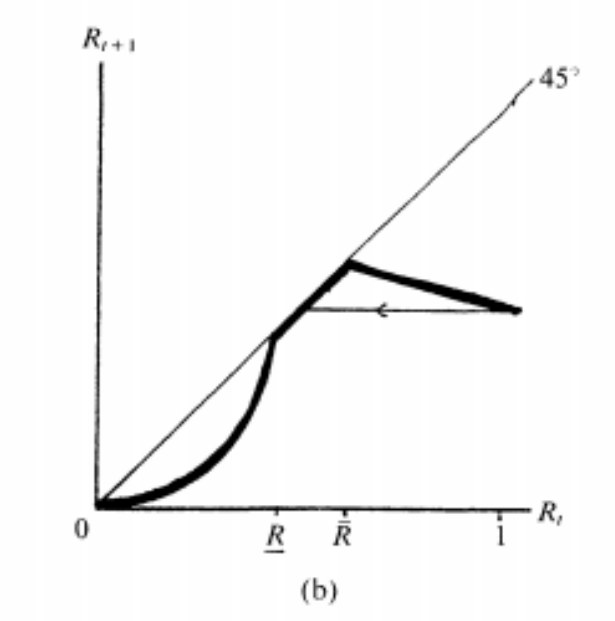
- When $R \geq \bar{R}$, $r = \tilde{r}$.



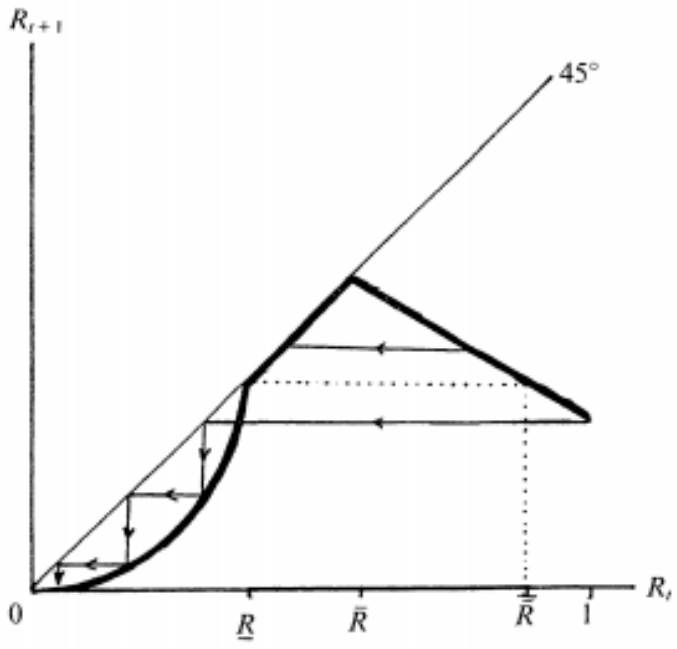
- If the slope of G is positive, then we see that an economy starting at R=1 will converge to $\bar{R}$. Income inequality will increase over time, decreasing slightly towards the end.

Undermigration in the long run

- when the slope of G is negative, undermigration is a possibility.



Undermigration in the long run



(c)

Undermigration in the long run

- 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.

Other Dynamics with self selection

- The evolution of inequality may not always generate Kuznets Inverted U. 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.
- Thus migration follows the same pattern that we studied in the one period model. The relatively high skilled and the relatively low skilled migrate and the relatively medium skilled stay back.
- It is possible that the low skilled individuals who migrate to the city start earning close to what the medium skilled are earning back in the village

Other Dynamics with self selection

- Then, initially, when we have a situation such that the low skilled are in the city and the medium skilled are back in the village, and the proportion of high skilled agents is low, then the inequality has fallen relative to the initial situation.
- But subsequently, as the rural sector empties out, inequality increases again. The result is an upright U, rather than Kuznetss inverted U.
- 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.

Discussion

- 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 as a possibility

- Till now, overmigration, a major problem in many countries, has not been considered.
- Overmigration exists if $\bar{a} < m$, 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.
- 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.
- Under such circumstances, with the dissolution of the local information networks, the individuals cannot get a loan there either. So, they migrate to the city for higher income, thus creating an artificial fall in demand of loans.

Alternate assumptions about capital flows

- Let us 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.
- 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

- 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, r_V and r_C one for each location.(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.

Alternate assumptions about capital flows

- 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.

Alternate assumptions about capital flows

- 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.
- Thus, in a static economy, if capital is not mobile, then forced migration might not be able to acheive a pareto improvement. But it might still be able to do so in a dynamic economy.
- This is because the people who are forced to migrate to the city will not be able to borrow there bit they will generate more wealth. This wealth will be used to give out more laons in the city and hence these people who were previously unable to get a loan, might be able tp get one in subsequent periods and might be made better off.

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.
- 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 and that a policy is introduced which has the effect of lowering it, say to 0.

Implications for Rural lending Institutions

- Imagine at the same time that there is no change in aggregate wealth.
- The initial impact is that a_V falls.So 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_C.
- This means that the "top" of the middle class expands as well.
- The net effect is a decrease in migration and a slowdown in the rate of modernization.

Implications for Rural lending Institutions

- 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.