**FIRST MODEL:**

**Galor-Zeira (1993) : The credit market imperfection approach**

### Production of the final good:

$$Y_t = Y^A + Y^M$$

Production of final good = production agricultural + production manufacturing

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Production in the agricultural sector = amount of labour * wage of unskilled worker

Production in the Agricultural sector:

$$Y^A = F^A(L_t) = w^u L_t$$

$L_t$ - the number of unskilled workers producing in the agricultural sector

Production in manufacturing is a function of human and physical capital

*Basically takes wage a constant and given*

Production in the Manufacturing sector:

$$Y^M = F^M(H_t, K_t)$$

$H_t$ - the number of skilled workers producing in the manufacturing sector

$K_t$ - the stock of capital

$F^M$ is a classical CRS production function

$$L_t + H_t = 1$$

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**Individuals:**

Over-lapping generation model

A generation of size 1 is born every period and lives for two periods

Each individual has one parent and one child

*A young person and an adult form a dynasty*

*In every period there's two types of individuals*

In their first life period:

Individuals are endowed with a parental bequest & invest in human and/or physical capital

*The young don't work but receive help from their parents*

*Young make decision in how much to invest in education in t+1*

In their second life period:

Individuals supply labour inelastically, consume and bequeath

*Adults make a decision: to allocate to consumption or transfer to offspring*

**u** = utility of individual i who is young and born in period t

log ***c(t+1)*** = obtains utility from consumption in the future

log ***b(t+1)*** = obtains utility from requesting to next generation

Preferences of individual $i$ born in $t$ are defined by the utility function:

$$u_t^i = (1-\beta)\log c_{t+1}^i + \beta \log b_{t+1}^i$$

where $\beta \in (0,1)$.

Budget constraint

$$c_{t+1} + b_{t+1}^i = I_{t+1}^i$$

→

$$b_{t+1}^i = b(I_{t+1}^i) = \beta I_{t+1}^i$$

Budget constraint: consumption next period + bequest next period

Bequest next period is a **function and a fraction of income**

### The production of human capital

there is an indivisible cost, $h$, invested in $t$ (in the first period of life) to become skilled in $t+1$

To become skilled, there is a fixed cost, h.

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Capital Markets and Prices: *ignore, except*

*We assume that:*

**R = 1 + r** :is a given, constant and exogenous

**Ws = Wu** :wages are constant over time, and low skill wage = high skill wage

### Capital markets and prices

unrestricted international capital flows at the world interest rate $r$.

$\rightarrow k_t = k$ for all $t$ such that:

$$f'(k) + 1 - \delta = 1 + r = R$$

→

$$w_t^s = w^s = f(k) - f'(k)k$$

The unskilled wage is

$$w_t^u = w^u$$

*A model of credit constraints:*

*parent's income is used as collateral*

*markets are not perfect*

*borrowing rate > lending rate*

***theta*R >1*** *= rate you borrow at*

***hR*** *= the return on capital*

***hR*** *= alternative return on investment (lending the money out)*

***Ws - Wu =*** *return on investment by becoming skilled*

***R*** *(interest rate) is small such that it is worth getting education* ***Ws - Wu*** *rather than lending (****hR****)*

Assumption 1: R is sufficiently small such that the gain from investing in eduction is greater than the alternative return on capital

Assumption 2: theta (the borrowing rate) is sufficiently large such that the inequality reverses.

A1: $R$ is sufficiently small such that

$$w^s - w^u > hR$$

the interest rate for borrowers for sake of investment in human capital is

$$\theta R$$

where $\theta > 1$.

A2: $\theta$ is sufficiently large such that:

$$w^s - w^u < h\theta R$$

If you don't have money, don't borrow, because the amount you have to pay back (**h*theta*R**) is higher than the increase in wage:

**h*theta*R > Ws - Wu**

This mechanism generates the **poverty trap**

Borrowing 100% (full loan) not a good idea, but what about 90%, 80%…?

Implication: There is a threshold level at which it is worth borrowing the rest (0 < x < 100)

### Investment decisions and income

if $b_t^i \geq h$

$$I_{t+1}^i = w^s + (b_t^i - h)R$$

if $b_t^i < h$

$$I_{t+1}^i = \max\{w^s - (h - b_t^i)\theta R, w^u + b_t^i R\}$$

So we need to find which of the two (above) is higher, giving you a threshold where an individual will invest in human capital if and only if **b > b^**

where **b^ = (Wu - Ws + h*theta*R) / [R*(theta - 1)]**

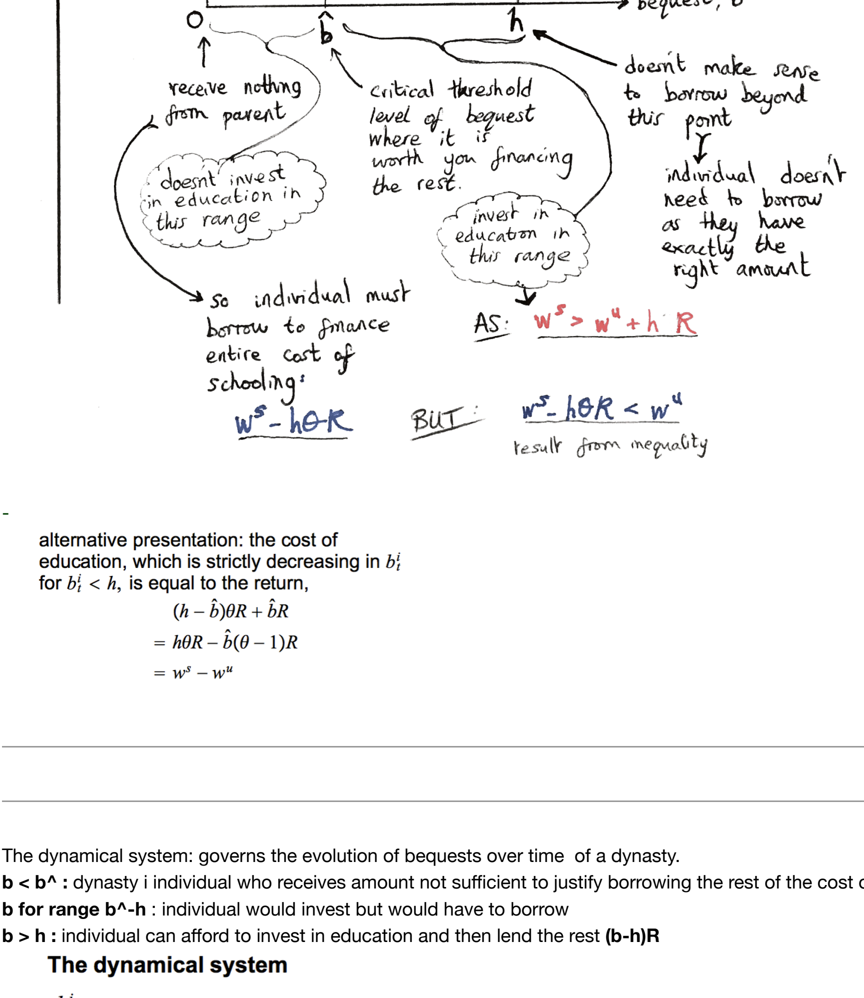
where, as follows from A1 and A2 there exists

$$\hat{b} = \frac{w^u - w^s + h\theta R}{R(\theta - 1)} \in (0, h)$$

such that

$$w^s - (h - \hat{b})\theta R = w^u + \hat{b}R$$

and individuals choose to invest in human capital if and only if $b_t^i \geq \hat{b}$.

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alternative presentation: the cost of education, which is strictly decreasing in $b_t^i$ for $b_t^i < h$, is equal to the return,

$$(h - \hat{b})\theta R + \hat{b}R$$
$$= h\theta R - \hat{b}(\theta - 1)R$$
$$= w^s - w^u$$

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The dynamical system: governs the evolution of bequests over time of a dynasty.

**b < b^ :** dynasty i individual who receives amount not sufficient to justify borrowing the rest of the cost of education

**b for range b^-h** : individual would invest but would have to borrow

**b > h :** individual can afford to invest in education and then lend the rest **(b-h)R**

### The dynamical system

$$b_{t+1}^i = \left\{ \begin{array}{ll} \beta[w^u + b_t^i R] & for \;\; b_t^i < \hat{b} \\ \beta[w^s - (h - b_t^i)\theta R] & for \;\; b_t^i \in [\hat{b}, h) \\ \beta[w^s + (b_t^i - h)R] & for \;\; b_t^i \geq h \end{array} \right\} \equiv \phi(b_t^i)$$

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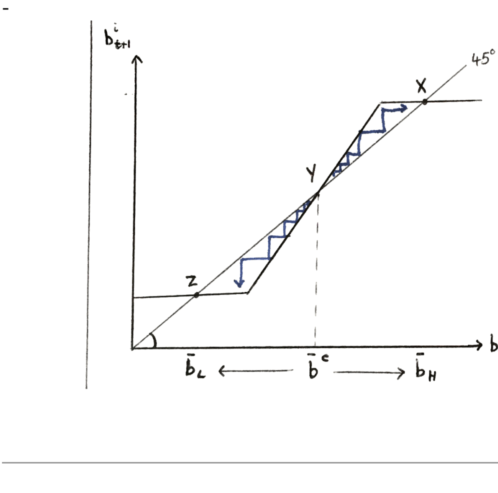


- Every additional pound received from parent means next generation gets β(R), as (1-β) is consumed.
- Every extra pound you receive from parents, that's one less pound borrowed:
  - give fraction β of wealth
- 45° is identity line: if ϕ > 45° wealth within the dynasty accumates over time
  - $b_0^i$ gives $b_1^i$ next period, then $b_2^i$ etc. to converge to steady state Z.
- So we have 3 steady states:
  - X, Y, Z

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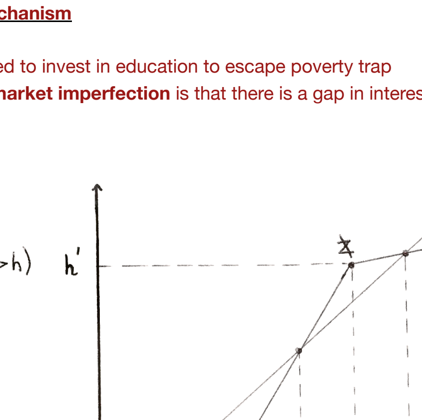


- Y is an unstable steady-state where we diverge
- It is an unstable steady-state
  - ↳ $b_t^i < \bar{b}_c$ we converge to Z
  - ↳ $b_t^i > \bar{b}_c$ we converge to X
- Low income steady state is locally stable but is a steady state
  - ↳ need a positive shock to break out of $\bar{b}_L$ convergence

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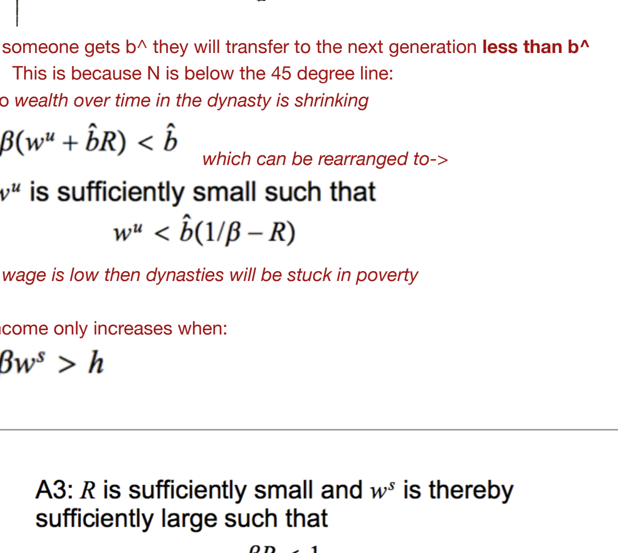
**The mechanism**

*The need to invest in education to escape poverty trap

**Credit market imperfection** is that there is a gap in interest rates between borrowers and lenders (risk premium)




- $\hat{b}$ = min. level of help needed from parents
- h = precisely amount needed for investment
- X = above 45° line so more than h is transfered to the next generation
- N = needs to be below 45° to sustain poverty trap

If someone gets b^ they will transfer to the next generation **less than b^**

This is because N is below the 45 degree line:

*So wealth over time in the dynasty is shrinking*

$\beta(w^u + \hat{b}R) < \hat{b}$ *which can be rearranged to->*

$w^u$ is sufficiently small such that

$$w^u < \hat{b}(1/\beta - R)$$

*If wage is low then dynasties will be stuck in poverty*

Income only increases when:

$$\beta w^s > h$$

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A3: $R$ is sufficiently small and $w^s$ is thereby sufficiently large such that

$$\beta R < 1$$
$$\beta w^s > h$$

A4: $w^u$ is sufficiently small such that

$$w^u < \hat{b}(1/\beta - R)$$

implying that

$$\beta(w^u + \hat{b}R) < \hat{b}$$

Note that:

(1) this assumption can be expressed as an assumption on the parameters:

$$w^u < (1 - \beta R)(hR\theta - w^s)/[\beta R\theta - 1]$$

(2) A4 implies that

$$\beta R < 1$$

Assumptions A1 - A4 assure that the dynamical system is characterized by 2 stable steady states:

$$b^L = \frac{\beta w^u}{1 - \beta R}$$

i.e., $b^L = \beta(b^L R + w^u)$

$$b^H = \frac{\beta(w^s - hR)}{1 - \beta R}$$

i.e., $b^H = \beta((b^H - h)R + w^s)$

and a threshold unstable steady state

$$b^T = \frac{\beta(w^s - h\theta R)}{1 - \beta\theta R}$$

i.e., $b^T = \beta((b^T - h)\theta R + w^s)$

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Main result: A model that generates a poverty trap/ multiple steady states.

Wealth distribution determines long term outcomes

The economy is the average of its dynasties

We need credit market imperfection (**Galor-Zeira, 1993**)

Otherwise, if borrowing rate was same as lending rate, everyone would borrow to finance education and **phi line** would be flat.

Our production function is **binary:**

There is indivisibility of investments - there is a binary h threshold

e.g, you have to graduate:

criticise assumption: education is divisible - you can take 1 or 2 year courses.

<u>Removing this indivisibility assumption (threshold h) will kill result</u>

Individuals are trapped in poverty because they cannot justify paying (borrowing) a lot.

*In standard production function: you get a little education to gain some return & eventually escape the poverty trap by increasing level of education of future generations*

Utility function is homothetic: a constant fraction Beta of income is passed onto the next generation.

Criticism of this model is that there are **no random elements:**

It assumes poor can never become rich and the wealthy can never fall into poverty

0 probability of a positive or negative shock (e.g, winning the lottery)

Adding randomness would kill the result, as probabilities would determine the long-run results.

Moav (2002):

changing (adds constant pi bar) so individuals need a threshold wealth to start.



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Tel-Aviv Paper (2012)

Why do poor people do things that don't help them escape poverty traps?

Idea is that there is a trade-off between conspicuous human capital and income

Research in economic development: people converge back to the bad equilibrium of borrowing even when they pay lump-sum.

Explanations given for not investing in a child's education:

Making a show

Prestige motive

Indian wedding, SA funeral, Indian helicopter, Tajikistan law, visible consumption, blacks compensating through conspicuous consumption (bling culture).

Not necessary to understand TECHNICAL DETAILS, just the STORY