Lecture 9
Inequality and development

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Natural resources: recap

Hypotheses:

1. The Dutch disease
2. Bad institutions
3. Presidential democracies
4. Corruption
5. Volatility
6. Conflict
7. Unsustainable policies

Natural resources: recap

Savings:

- ▶ Many resource dependent countries have lower genuine saving rates than others
- ▶ Hartwick rule: invest all resource rents $\rightarrow$ zero genuine savings
- ▶ van der Ploeg and Venables (2011):
  - ▶ Optimal savings may be lower for developing countries because they are converging on a development path
  - ▶ Savings should be directed toward accumulating domestic capital and cutting debt

Natural resources: Possible exam questions

- One of the problems from seminar 3
- Explain the endogeneity problem inherent in the relationship between share of natural resource exports and growth.
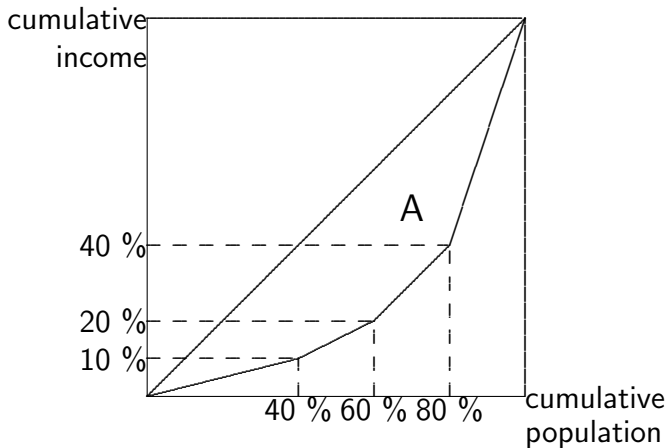
Inequality and Development

- Readings:
  - Ray Chapter 7
  - Galor (2012): Inequality, Human Capital Formation and the Process of Development
- Motivation:
  - Inequality is of both intrinsic and functional significance
- "Inequality reduces the pace of human development and in some cases may even prevent it entirely" (HDR 2013, page 21)

Inequality and Development: Interconnections

- How is inequality related to development?
  - Two way causal relationship
- Economic development $\rightarrow$ inequality
  - Kuznets' inverted U-hypothesis
- Inequality $\rightarrow$ economic development
  - The Classical approach
  - The Political Economy approach
  - The Credit Market Imperfections approach
  - The Unified Theory of Inequality and Growth

Measuring inequality
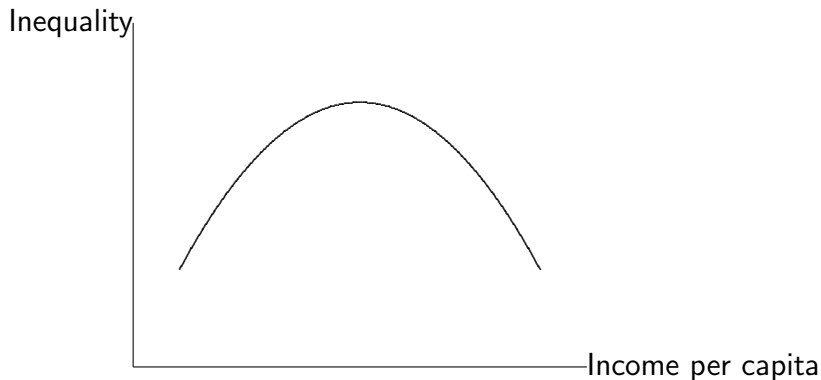
The Lorenz curve and the GINI coefficient

$GINI = 2A$

How does economic development affect inequality?

Kuznets' curve

Kuznets' inverted U-hypothesis (1955): as the economy grows inequality first increases and then decreases

Kuznets' curve: Mechanisms

Uneven and compensatory changes (Ray):

- Growth is uneven: one sector takes off creating inequality (Uneven changes)
- Later, income spreads through the economy (Compensatory changes)
  - More people are employed in the growing sector
  - More people acquire the skills currently in demand
  - Demand for other goods and services increases

Testing the inverted U-hypothesis

- Kuznets (1955,1963):
    - used the ratio of the income share of the richest 20 % to the poorest 60 %
    - compared a small set of developing countries to a small set of developed countries
- Paukert (1973):
    - used the GINI
    - cross-section of 56 countries
    - finds the same inverted U pattern

Testing the inverted U-hypothesis

Problem

- Countries may not have the same inequality-income relationship
- The Latin effect: Most high-inequality middle-income countries are Latin American
  - There might be other structural reasons for high inequality in Latin America

Solution

- Inclusion of country-specific intercept dummies
  - requires data for several points of time
 - Deininger and Squire (1996) find that the inverted U vanishes

How does inequality affect economic development?

The Classical approach

Inequality is beneficial for growth:

- Marginal savings rate increases with wealth
- Inequality channels resources towards individuals whose marg. propensity to save is higher
  - higher aggregate savings
  - more capital accumulation
  - economic growth

The Classical approach
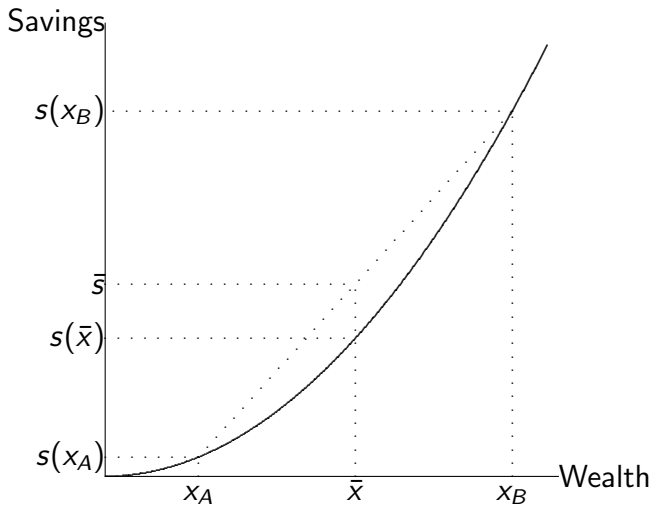
The Classical approach

"The underdeveloped countries must consciously accept a philosophy of growth and shelve for the distant future all ideas of equitable distribution and welfare state. It should be recognized that these are luxuries which only developed countries can afford."

-Mahbub ul Haq (1966)

The Political Economy approach

Inequality is harmful for growth:

- Alesina and Rodrik (1994) and Persson and Tabellini (1994): Fiscal policy explanation
    - Only feasible redistribution policy is taxing increments to wealth
    - Taxes imposed on the margin are distortionary and slows growth
    - Tax level chosen by the median voter
    - In an unequal society the median voter is poorer than the mean $\rightarrow$ chooses redistribution, which slows growth

The Political Economy approach

- Alternative mechanism, same result (Saint-Paul and Verdier 1996):
  - Redistribution policies are efficient
  - The median voter is not the decisive voter: the rich have more political power
  - In an unequal society the decisive voter tends to be richer than the mean $\rightarrow$ preventing efficient redistribution policies

The Political Economy approach: Evidence

- Endogeneity problem
  - Use initial inequalities in wealth
- Alesina and Rodrik (1994) and Persson and Tabellini (1994): Negative relationship between inequality and growth
  - Poor evidence for the particular mechanism
- Perotti (1996): Inequality associated with <u>lower</u> taxes which is associated with lower growth

The Credit Market Imperfections approach

- In the presence of credit market imperfections inequality may lead to under-investment in growth-enhancing activities
- Banerjee and Newman (1993): investment in entrepreneurial activities
- Galor and Zeira (1988, 1993): investment in human capital

The Credit Market Imperfections approach

Evidence:

- Perotti (1996):
    - Inequality associated with lower levels of human capital formation
    - Lower levels of human capital formation associated with lower growth
- Deininger and Squire (1998):
    - Initial inequality has a significant adverse effect on education and growth
    - Hurts primarily the poor

The Galor Zeira Model

Production

- ▶ Output is produced in two sectors:
  $Y_t = Y_t^s + Y_t^u$

- ▶ Skilled labor sector: neoclassical technology

$$Y_t^s = F(K_t, L_t^s) \equiv L_t^s f(k_t); \qquad k_t \equiv K_t/L_t^s$$

- ▶ Unskilled labor sector: linear technology

$$Y_t^u = aL_t^u$$

Factor prices

- ▶ Perfect competition
  - ▶ wage:

$$w_t^u = a$$
$$w_t^s = f(k_t) - f'(k_t)k_t \equiv w^s(k_t)$$

  - ▶ interest rate: $r_t = f'(k_t)$

- ▶ Producers can borrow and individuals can lend at constant world interest rate $r_t = r$

- ▶ This determines the capital intensity and the skilled wage

$$k_t = f'^{-1}(r) \equiv k$$
$$w_t^s = w^s(k) \equiv w^s$$
$$w_t^u = a \equiv w^u$$

Individuals

Overlapping generations: each individual

- has one parent and one child
- leaves a bequest to the child
- lives in two periods:
- in the first period
  - consumption is integral in parent's consumption
  - may choose to work as unskilled and save, or invest in acquiring skill
- second period:

$$u_t = \alpha log c_{t+1} + (1 - \alpha) log b_{t+1}$$
$$c_{t+1} + b_{t+1} \leq \omega_{t+1}$$

- maximizing wealth ω_{t+1} gives max utility

Occupational choice

- Investment in human capital characterized by:
    - imperfect capital markets: $r < i$ (interest rate paid by individual borrowers)
    - fixed cost
$$h = \theta w^s + (1 - \theta) w^u$$

- Wealth of an unskilled worker:

$$\omega_{t+1}^u = (1 + r)w^u + (1 + r)b_t + w^u \equiv \omega^u(b_t)$$

- Wealth of a skilled worker:

$$\omega_{t+1}^s = \begin{cases} w^s - (h - b_t)(1 + i) & \text{if} \quad b_t < h \\ w^s + (b_t - h)(1 + r) & \text{if} \quad b_t \geq h \end{cases}$$

Occupational choice

- Acquire education if
  $\omega_{t+1}^s = \omega^s(b_t) > \omega_{t+1}^u = \omega^u(b_t)$
- Assumptions: Education is
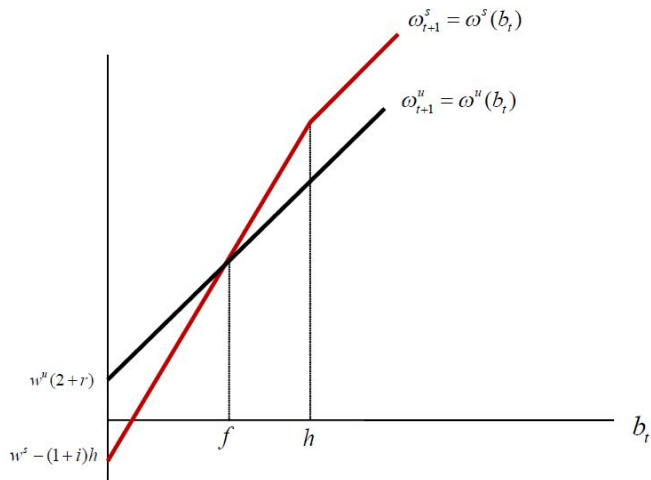 - profitable for those who can finance the entire cost:

  $$w^s + (b_t - h)(1 + r) > (2 + r)w^u + (1 + r)b_t$$
  $$\Leftrightarrow w^s - h(1 + r) > (2 + r)w^u$$

  - not profitable for those who have to borrow the whole amount

  $$w^s - (1 + i)h < w^u(2 + r)$$

  For later purposes, assume $w^s - (1 + i)h < 0$

Occupational choice

Short-run effects: skill composition

▶ Income distribution translates directly into the distribution of bequests

▶ Distr. of bequests affects occupational choice in the short run

$$I_{t+1}^u = \int_0^f D_t(b_t) db_t$$

$$I_{t+1}^s = \int_f^\infty D_t(b_t) db_t$$

▶ Occupational choice today determines
  ▶ GNP today
  ▶ the income distribution in next period

Dynamics

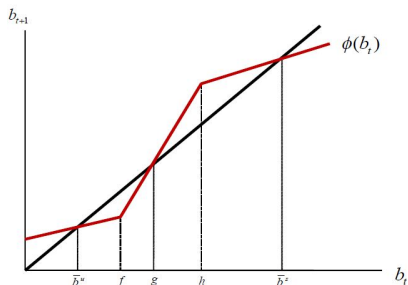The evolution of bequests is determined by the sequence $\{b_t\}_{t=0}^{\infty}$ such that

$$b_{t+1}^s =$$
$$\phi(b_t) \equiv \begin{cases} (1-\alpha)[w^u(2+r) + (1+r)b_t] & \text{if} \quad 0 \leq b_t \leq f \\ (1-\alpha)[w^s - (h-b_t)(1+i)] & \text{if} \quad f \leq b_t \leq h \\ (1-\alpha)[w^s + (b_t-h)(1+r)] & \text{if} \quad h \leq b_t \end{cases}$$

$\phi(b_t)$ is piecewise linear:

$$\phi'(b_t) = \begin{cases} (1-\alpha)(1+r) & \text{if} \quad 0 \leq b_t \leq f \\ (1-\alpha)(1+i) & \text{if} \quad f \leq b_t \leq h \\ (1-\alpha)(1+r) & \text{if} \quad h \leq b_t \end{cases}$$

Dynamics

Assume: $(1-\alpha)(1+r) < 1$ and $(1-\alpha)(1+i) > 1 +$ additional restrictions in footnote 23 $\Rightarrow$ Multiple locally stable ss-equilibria: $\bar{b}^u$ and $\bar{b}^s$

g is locally unstable:

$$\lim_{t\to\infty} b_t = \left\{ \begin{array}{lll} \bar{b}^u & \text{if} & b_t < g \\ \bar{b}^s & \text{if} & b_t > g \end{array} \right.$$

Long-run effects: skill composition

- Distr. of bequests today determines the long-run skill composition

$$\lim_{t \to \infty} l_{t+1}^u = \int_0^g D_t(b_t) db_t \equiv \bar{l}^u$$

$$\lim_{t \to \infty} l_{t+1}^s = \int_g^\infty D_t(b_t) db_t \equiv \bar{l}^s$$

- Over time, society will be segmented into a group of rich and a group of poor.

Skill composition and GNI

▶ GNI will consist of wage and capital income of both the young and the old:

$$\bar{Y} = \big(\overbrace{w^u}^{l_1^u} + \overbrace{w^u + (\bar{b}^u + w^u)r}^{l_2^u} \big) \overbrace{(1 - \bar{l}^s)}^{\bar{l}^u}$$

$$+ \big(\overbrace{w^s + r(\bar{b}^s - h)}^{l_2^s} \big) \bar{l}^s$$

$$= w^u(2 + r) + r\bar{b}^u$$

$$+ [(w^s - rh) - w^u(2 + r) + r(\bar{b}^s - \bar{b}^u)]\bar{l}^s$$

$$\frac{\partial \bar{Y}}{\partial \bar{l}^s} = (w^s - rh) - w^u(2 + r) + r(\bar{b}^s - \bar{b}^u) > 0$$

Long-run effects on GNI

- Income per capita is higher the larger the fraction of skilled workers
- The fraction of skilled workers is higher the lower the threshold level of bequests, g
- This threshold level is lower (and thus GNI is higher)
  - the lower the cost of education
  - the lower the interest rate for borrowers
  - the higher the wage of skilled workers
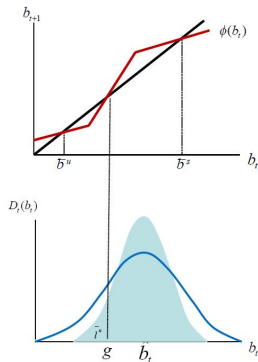 - the higher the propensity to bequeath

Income distribution and economic growth

Does inequality hurt economic growth in the Galor-Zeira model?

Income distribution and economic growth

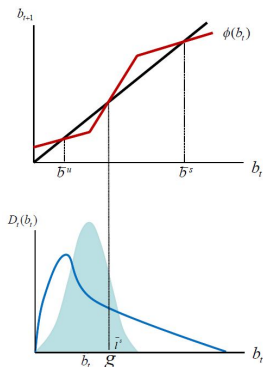Does inequality hurt economic growth in the Galor-Zeira model?

1) For a non-poor economy an increase in inequality may result in a lower long-run GNI

Income distribution and economic growth

Does inequality hurt economic growth in the Galor-Zeira model?

2) For a poor economy an increase in inequality may enhance growth and result in a higher long-run GNI

The unified theory of inequality and growth

Galor and Moav (2004):

- Reconciliation of
  - the Classical approach (inequality channels resources towards people with a high marg. propensity to save, increasing capital accumulation $\rightarrow$ growth)
  - the Credit Market Imperfections approach (in non-poor economies equality alleviates adverse effects of credit constraints on human capital formation $\rightarrow$ growth)
- Captures the changing role of inequality in the process of development

The unified theory of inequality and growth

- The effect of inequality on growth depends on the relative return to physical and human capital
- When the relative return to physical capital is high inequality is beneficial for growth
  - Inequality channels resources to towards people with a high marg. propensity to save
- When the relative return to human capital is high inequality is harmful for growth
  - Equality alleviates adverse effects of credit constraints on human capital formation
  - Diminishing returns to human capital $\rightarrow$ investments should be spread among individuals

The unified theory of inequality and growth

- Early industrialization: physical capital prime engine for growth
- Later: human capital prime engine for growth
- The impact of inequality on growth went from positive to negative

The unified theory of inequality and growth: Model

- Capital accumulation determined from domestic savings (endogenous r)
- Savings rate increasing in wealth
- No borrowing
- Investments in human capital divisible, and subject to decreasing returns
- Physical and human capital are complements
- Homogeneous group of rich and poor

The unified theory of inequality and growth: Model

- Capital-labor ratio starts out below $\tilde{k}$: no investments in human capital
  - All bequests are invested in physical capital
  - Only the rich leave bequests $\rightarrow$ inequality growth-enhancing
- As physical capital accumulates k exceeds $\tilde{k}$
  - The rate of return to human capital increases
  - The rich starts investing in education in addition to physical capital

The unified theory of inequality and growth: Model

- Physical accumulates further $k > \hat{k}$: Wages increase suffiently to make poor people able to acquire some education
  - Marginal return from education higher for the poor $\rightarrow$ inequality has a negative effect on human capital accumulation
- As differences in marginal saving rates narrow the positive effect of inequality dissapears
- As wages increase further, credit-constraints are no longer binding
  - Inequality no effect on growth

The Unified Theory: Evidence

- Becker et al. (2011):
  - Investigates empirically the role of education in the process of industrialization in Prussia
  - Finds that education played an important role
  - The role of education has been intensified in later stages of industrialization

Relevance for developing countries

- International capital inflows diminishes the positive role of inequality
- Adoption of new technology has increased the return to human capital
- Given credit constraints, equality has a positive effect on growth

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