INEQUALITY AND ECONOMIC GROWTH: THE PERSPECTIVE OF THE NEW GROWTH THEORIES

Philippe Aghion, Eve Caroli, and Cecilia Garcia-Peñalosa
Effect of inequality on growth

Good?  
Bad?
Empirical studies

- Cross-country regression of GDP growth on income inequality \( \Rightarrow \) negative correlation

- Case study: Philippines and South Korea
  - 1960 similar macroeconomic indicators
  - Philippines were more unequal than South Korea
  - 1990 South Korea’s output level 5x increases, Philippines output level barely doubled
  - Contrary argument to standard theory
Kuznets hypothesis

- Inverted U-shaped relation between income inequality and GNP per capita
- Evolution of the distribution of income over the transition from a rural and industrial economy
- Data example:
  U.S.: the share of total wealth owned by the 10% richest household,
  1770: 50%, 1870: 75%, 1970: 50%
New theories

- Since 1980 sharp increase in wage inequality

- Growth closely associated with:
  - Trade liberalization
  - Technical change
  - Emergence of new organizational forms
  - two parts of the survey inequality on wealth and then inequality on income
Wealth inequality growth enhancing

- Saving channel (marginal propensity to save of the rich is higher)

- Investment indivisibilities

- Incentive consideration
Ramsey-Coss-Koopmans growth model

- Assumption: agents are identical, perfect capital markets
- Rate of growth of individual consumption:

\[ g = \frac{r - \rho}{\sigma} \]

- \( \rho \) intertemporal discount rate
- \( \sigma \) intertemporal elasticity of substitution
- \( r \) after tax interest rate
Ramsey-Coss-Koopmans growth model

- Smaller $r$ - due to greater taxation $\rightarrow$ lowering incentives to save $\rightarrow$ growth rate decreases
- Trade off between productive efficiency and social justice
- Redistribution, 2 effects:
  - Direct: reduce differences in income and wealth, hence lowers the rate of growth
  - Indirect: redistribution financed through income tax diminishes the incentive to accumulate wealth

possible explanation by Allesina & Rodrik, and Persson & Tabellini
Negative effect on growth

Assumptions: wealth and human capital endowments differ across individuals, capital markets are imperfect

Inequality has a direct negative effect:
- reduces investment opportunities
- worsens borrower incentives
- generates macroeconomic volatility
The Opportunity enhancing effect of redistribution

- Assumptions: diminishing returns to capital, capital market imperfections

- Redistributing wealth form the rich (low marginal productivity of investments (MPI)) to the poor (high MPI), but who can not invest more than their endowments would enhance growth.

→ redistribution creates investment opportunities
The Opportunity enhancing effect of redistribution

- Endogenous growth model
  \[ y_{i,t} = A_t k_{it}^{\alpha} \quad 0 < \alpha < 1 \]

- \( A_t \) level of human capital or technical knowledge
  - Level of technology is endogenous
  - Learning by doing and knowledge spillover

Knowledge spillover implies that the learning done by one individuals affects the level of technology of all other agents.
Learning by doing and knowledge spillover

\[ A_t = \int y_{i,t-1} \, di = y_{t-1} \]

- Accumulation of knowledge results from the past aggregate production activities
- Growth depends on individual investments
- Rate of growth \( g_t = \ln(y_t/y_{t-1}) \)

\[ g_t = \ln((\int A_t k_{i,t} \, di)/(A_t)) = \ln \int k_{i,t} \, di \]
Assumption: Perfect capital market

- All individuals invest the same amount of capital no matter what their initial wealth is.
  \[ k_{it} = k_t^* \]
- Opportunity cost of investing is the interest rate \( r \)
- Individuals invest in capital until \( MPC = r \)
- \( w \) (wealth) > \( MPC \) \( \Rightarrow \) lenders
- \( w < MPC \) \( \Rightarrow \) borrowers

Aggregate output and growth are not affected by the distribution of wealth.
Highly imperfect capital markets

- Borrowing is not possible if \( k_{it} < w_{it} \)
- Individual investments are a constant fraction of their wealth \( y_{it} = (sw_{it})^\alpha \) and growth rate is \( g_t = \alpha \ln s + \ln \int (w_{it})^\alpha \) \( \alpha \) \( di \)
- Diminishing returns of \( ki \) \( \Rightarrow f(ki) \) is concave \( \Rightarrow \) greater inequality between individual investments for a given aggregate capital stock will reduce aggregate output \( \Rightarrow \) lower growth
Redistribution policies

- Redistribution of endowments
  \[ w_{it}' = w_{it} + \beta (w_T - w_{it}) \]  with 0 < \beta < 1  
  \[ \beta \rightarrow \text{tax rate} \]

- Average endowment
  \[ w_T \]
  - \[ w_T < w_{it} \] pay a tax; \[ w_T > w_{it} \] receive a net subsidy

- If \( \beta \) increases the investments across individuals become more equal \( \rightarrow \) redistribution have a positive effect on output and growth

- \( \beta = 1 \) the highest possible growth rate as:
  \[ g = \alpha \ln s + \ln \int (w_{it} + \beta (1 - w_{it})^{\alpha} \, di \]
  \( \Rightarrow \) redistribution is growth enhancing \( \rightarrow \) decreasing returns to individual investments
The positive incentive effect of redistribution: Questioning the traditional argument

- Capital market imperfection due to traditional incentive problems, like moral hazard, ....

- **Moral hazard** → limited liability
  - e.g. individual \((i)\) with \(w=0\), borrows \(c\) to invest in a risky project
  - Probability of success depends on the **costly effort** exerted by \(i\)
  - Project succeeds: \(i\) keeps output-\(c\)
  - Project fails: \(i\) incurs no loss, as \(i\) has disbursed no funds
  - Optimal amount of effort \(i\) chooses to exert will be less than the amount the lender would like to
  - Effort is increasing with wealth of \(i\)
Modell based on Aghion & Bolton (just conclusion presented)

- $w_i < k_{it}$ borrower, risk of default increases with size of loan
- $w_i > k_{it}$ lender supply best level of effort $e^*$

Assumptions:

a. Individual efforts are not observable
b. Borrower`s repayment to her lenders cannot exceed her second period output

⇒ If a. or b. violated all individual supply best level of effort $e^*$
Lump sum tax raised on individuals with $w_i > k_{it}$

- if $t_i < w_i - k_{it}$, then tax distributing among borrower
- Not effect the effort $e^*$ supplied by the wealthy, whose after-tax endowment remain strictly above $\phi A$
- Increase the effort supplied by any subsidized borrower
- Tax subsidy positive incentive effect on output & growth as effort increases or remain constant
Macroeconomic Volatility

- Correlation between high inequality & macroeconomic volatility

- 2 production technologies:
  - Traditional technology
  - High yield technology

- Assumptions:
  - Inequality of access to investments: only a fraction of saver can invest in high-yield project
  - Credit market imperfections: Because of incentive compatibility considerations and investor with wealth $w$ can borrow only $vw$, where $v<\infty$

- All individuals save a constant fraction of their wealth, $s$
Macroeconomic Volatility

- investor≠saver

- **During Booms:**
  - Investors: net wealth & borrowing capacity increases → accumulate debts → demand for investable funds ↑
  - Interest rate high during boom
    Due high i → debt repayment obligation increases → squeezing the borrowing capacity of investors in high yield technology
  - Saving keep increasing → fraction of s become idle → s invested in trational technology
  - **Downturn in economy** → i fall → increase borrowing capacity → eventually reenter to a boom
Role of government in a volatile economy

- Reduce borrowing constraints
- Reducing the degree of inequality of access to investment
  - Increase fraction of savers, who invest in high-yield technology
  - Structural reforms (investing in infrastructure or human capital)
  - Reducing bureaucratic obstacles
Does growth increase earnings inequality?  

**Motivation**

- **Determinants:**
  - Social forces
  - Political forces
  - Economic forces

- Distribution of labor earnings

- Increase in earnings inequality:
  - Increase in educational wage differentials
  - Increase in age-related wage differentials
  - Increase in within-group wage differentials
Does growth increase earnings inequality?

**Motivation**

- Jan Tinbergen: "Race between the forces increasing supply of skills and those increasing demand for skills required by firms"

- Acceleration of the rate of growth of the relative demand of skills
  - Rapid growth of imports
  - Rapid diffusion of computers
  - Organizational change
International Trade

- Specialization of countries in export
  - Developing countries: unskilled labour
  - Developed countries: skilled labour
- Globalization boom causes predictable inequality trends
Relationship between the ratio of the skilled to unskilled wage \((w)\) and relative labor supply or fraction of the labor force that has skills \((s)\)
International Trade

- Reallocation of labor between low-skill and high-skill industries
- Eli Berman, John Bound and Zvi Griliches test by decomposing the variations of the share of white-collar workers in employment
International Trade

An Empirical Test

- Share of white-collar workers in total manufacturing employment:
  \[ E_i = \frac{X_i}{N_i} \]

- Share of industry i's employment in total employment:
  \[ S_i = \frac{N_i}{N} \]

- Aggregate change in share of white-collar workers:
  \[ \Delta E = \sum_{i=1}^{I} \Delta S_i E_i + \sum_{i=1}^{I} \Delta E_i S_i, \]

- Within-industry component: 70%
International Trade

Trade in Intermediate Goods

- Traded goods primarily final goods
- Lower price of intermediate goods:
  - Increasing demand of complementary production
  - Decreasing demand for substitutes
- Falk and Koebl test input demand functions for
  - Materials
  - Skilled labor
  - Capital
  - High-skilled labor
  - Unskilled labor
Cross-price elasticities of demand:
- $\epsilon > 0$: substitutes
- $\epsilon < 0$: complements

Estimated degree of substitutability between material inputs and unskilled labor: 0.14–0.34

Trudy Owens and Wood: primary product import tends to increase with income level
Disembodied Technical Change

Basic idea:
- higher (faster) technical change leads to more inequality

Technical change:
- Raises demand for skilled worker -> higher wage premium
- In the long run education supply adjusts -> reducing wage premium
General Purpose Technology

Technical Change

GPT:

- New invention, which is considered as a general breakthrough or game changer.
- Effects the entire economic system
- Raises aggregate output and productivity in the long run
  - fluctuations while the economy adjust to the GPT.
- Examples: Steam engine, computer.
- Paul David(1990): diffusion to entire economy is not linear
Effect of GPT on skills

- Galor Tsiddon (1997): two kinds of skills, inherited and individual skills.
- GPT eliminates inherited skills -> people with higher ability to accumulate human capital move to the technological advanced sector -> earnings inequality raise, but high mobility.
- In the long term run effect of inherited skills start to dominate -> mobility is diminishing and inequality declines.
Firms learn from other firms, they use procedures of successful firms as template on which they can start to implement the GPT.

At the beginning of a GPT, no one knows how to implement it, firms must make successful implementations without guidance from other firms.

If enough firms are using the new technology, even more firms will experiment with it -> high demand for skilled labor.

The model will be discussed in detail on the blackboard.
Skill Biased Technical Change

Theory:

- Skills increase over time
- Main counter argument:
  - There have been no increase in productivity growth since the 1980’s

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*Source: Wolff (1996), Table 1.*

*Note: The data is for the whole economy, rather than just manufacturing.*
Counter Arguments

No good measure for factor productivity is used in most of the empirical researches. (will be discussed in detail on the blackboard)

Better measures are:
- R&D expenditure
- Computer use

These two measures support the skill biased technical change hypothesis. Berman, Bound and Griliches (1994) showed that both have a positive and significant impact on the share of nonmanual workers.
Embodied Technical Change and within Group Inequality

- 60% of increase in inequality of total wages are within groups with the same education level and working years.

**Model by Gianluca Violante (1996)**

- Workers are ex-ante identical.
- They can remain at the same job and improve their skills through learning by doing, or they can move to a job with a higher technological level, which is more productive.
- Changing the job means a partial loss in skills.
- Over time worker become heterogeneous, variance in productivity increases and wages become more unequal.
Embodied Technical Change and within Group Inequality

- Aghion, Howitt and Violante model will be discussed on Blackboard.
Organizational Change

- Productivity gap between individuals with different skill levels increases

- Trends:
  - Flatter organization and decentralization
  - Collective work
  - Replacement of vertical by horizontal channels, less hierarchy, reduction of specialization
  - Growing segregation of workers, higher homogeneity of firms
Organizational Change

- Reasons for correlation of organizational and technological change:
  - Management of information
  - Spread of new technologies
  - Increase of skill homogeneity within firms

- 2 effects of technical progress on inequality:
  - Direct one
  - Indirect one via induced changes in organizational structures
Organizational Change

- Organizational change itself skill-biased
- Timothy Bresnahan, Brynjolfsson and Hitt: Decentralization positive effect on human capital investment
- Caroli and John Van Reen: technical and organizational change reduce share of unskilled manuals
  - Multiskilled agents
  - Skill segregation
Organizational Change

Strong arguments point to reverse relationship:
- Decision rights delegated: Number of team leaders
- Nature of tasks being transferred
- Decentralization
- Segregation leads to more homogenous skill structures
Effect of organic firms on inequality depends on whether multi-skilling requirements and decision rights delegation induced by flattening of organization.

Types of flexibility:
- External flexibility: firing unskilled, hiring skilled
- Internal flexibility: promote workers
Discussion

- Growth and economic development do not necessarily entail reduction in inequality
- Discussed factors wide earnings distribution
- Technological change most important factor
  - Associated with trade liberalization
  - Associated with organizational change
Summary

- Effect of inequality on growth
  - Capital market imperfection
  - Human capital accumulation
- Effect of growth on earnings inequality
  - Trade liberalization
  - Technical change
  - Organizational change

→ Sustained redistribution
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