Understanding the World Economy
Master in Economics and Business

Income and wealth inequalities

Lecture 4

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People care about inequalities --- the Ultimatum Game

Ultimatum Game
- 2 players A & B
- Player A has 10 USD to share.
- A suggests a split of the 10 USD to player B
- If B accepts, split of the 10 USD made accordingly
- If B refuses, 0 USD for both A et B

What should A suggest as a sharing rule?
People care about inequalities --- the Ultimatum Game

Results in a large number experiments in the U.S.

• the modal (most common) split is 50% - 50%

• the average split is about 60% - 40%

• 20% of low offers are rejected.

But difference across countries & societies.
Lecture 4: Income and wealth inequalities

1. Data and measurement

2. Labour market inequalities

3. Policies
Lorenz Curve and Gini coefficient

- Lorenz curve

$x$-axis = entire population from the poorest to the richest (in terms of income or wealth).

$y$-axis = fraction of total income or wealth that a given fraction of the population has.
Lorenz Curve and Gini coefficient
Lorenz Curve and Gini coefficient

• Lorenz curve

The further away is the Lorenz curve from 45° line, the more unequal is the economy.

• This is measured by the Gini coefficient

\[
\text{Gini} = \frac{\text{Area between 45° line and Lorenz curve}}{\text{Area below 45° line}}
\]

Gini = 0 : perfect equality
Gini = 1: the richest has everything
Lorenz Curve and Gini coefficient

\[
\text{Gini} = \frac{A}{A+B}
\]

Source: Fred, based on Census data
Inequality in wealth and earnings --- US, Sweden and Japan

Wealth inequality typically higher than income inequality.
Alternative measures of inequality

• Gini provides a measure of inequality over the whole sample of population but misses potentially important information for some specific groups.

• If focus on the richest: fraction of income received (or wealth held) by the top 10%, or top 1%, or top 0.1% ...

• If focus on the poor: fraction of income received (or wealth held) by the bottom 25%, bottom 50%, ....
Share of total wealth held by the richest 1% (1740-2011)

- **United States**: US independence: 1776
- **Sweden**: French Revolution: 1789-1799
- **United Kingdom**: Bolshevik revolution, World War I and voting rights for all males (except US): 1914-1919
- **France**: World War II: 1939-1945
- **United States**: Golden age of capitalism: 1945-1973

![Graph showing the share of total wealth held by the richest 1% from 1740 to 2011](#)
The share of total income received by the top 1% in U.S. and U.K. (1913-2012)

- End of WWI
- Start of Great Depression
- End of WWII
- End of ‘golden age’ of capitalism:
- Start of global financial crisis: 2008

Income share of the top 1%

- United States
- United Kingdom
Declining share of the top 1% in some European economies and Japan

- End of WWI
- Start of Great Depression
- End of WWII
- End of ‘golden age’ of capitalism
- Start of global financial crisis

Income share of the top 1%

- Denmark
- Japan
- Germany
- Italy
- France
- Sweden
- Netherlands

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‘Piketty moment’ --- Rising inequalities in the 20th century?

• Large decline in inequality across a range of countries from 1914 until the seventies.
  ✓ Capital losses through wars and the Great Depression.
  ✓ Did not recover after because of progressive income taxation.

• Large increase in inequalities at the top in US and UK after 1980.
  ✓ Much less so in Japan or rest of Europe.
  ✓ Associated with wages and business income, less so capital income.

‘Piketty moment’ --- Rising inequalities in the 20th century?

• Large differences in the distribution of wealth across individuals.
• Entrepreneurs, business owners and capitalists
  - Top of income distribution.
  - Have financial assets and capital --- potentially inherited.
  - Wealth and income increase if return to capital \( r \) is high.
• Workers
  - Lower in the income distribution. Bottom when unemployed.
  - Have human wealth and supply labour.
  - Wage income increases if growth rate \( g \) of the economy is high.

Cautious note --- extreme view of differences in capital endowments. Successful workers can accumulate wealth --- wealth is distributed very unevenly though.
The ‘r and g’ logic

• Rising inequalities --- the r and g logic.
  \[ r > g \] implies that wealth grows faster than output and wages.
  As financial wealth unequally distributed among citizens and rich have a higher propensity to save, this leads to increasing inequalities.

• Since the late seventies, high r and low g --- at least until financial crisis.
  Falling growth rate after Golden Age (productivity slowdown).
  Booming housing and stock markets.

### The growth rate of top global wealth, 1987-2013

<table>
<thead>
<tr>
<th></th>
<th>1987-2013</th>
<th>1990-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average real growth rate per year (after deduction of inflation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The top 1/(100 million) highest wealth holders</td>
<td>6.8%</td>
<td>4.1%</td>
</tr>
<tr>
<td>(about 30 adults out of 3 billions in 1980s, and 45 adults out of 4.5 billions in 2010s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The top 1/(20 million) highest wealth holders</td>
<td>6.4%</td>
<td>3.8%</td>
</tr>
<tr>
<td>(about 150 adults out of 3 billions in 1980s, and 225 adults out of 4.5 billions in 2010s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average world wealth per adult</td>
<td>2.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Average world income per adult</td>
<td>1.4%</td>
<td>1.5%</td>
</tr>
<tr>
<td>World adult population</td>
<td>1.9%</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

Between 1987 and 2013, the highest global wealth fractiles have grown at 6%-7% per year, vs. 2.1% for average world wealth and 1.4% for average world income. All the growth rates are net of inflation (2.3% per year between 1987 and 2013). Sources: see piketty.pse.ens.fr/capital21c.
Between 1987 and 2013, the number of $ billionaires rose according to Forbes from 140 to 1400, and their total wealth rose from 300 to 5 400 billion dollars. Sources and series: see piketty.pse.ens.fr/capital21c.
Lecture 4: Income and wealth inequalities

1. Data and measurement

2. Labour market inequalities

3. Policies
Labour market inequalities

Thousands of 2011 dollars

- Advanced degree
- College degree
- Some college
- High school degree
- Less than high school


Source: Jones --- U.S. Census
Labour market inequalities

U.S. unemployment rate by educational attainment

Labour market inequalities

Lifetime earnings for men and women in the US

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Expected lifetime earnings ($m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than secondary school</td>
<td>Male: 1.0, Female: 0.8</td>
</tr>
<tr>
<td>Secondary school</td>
<td>Male: 1.5, Female: 1.3</td>
</tr>
<tr>
<td>Some post-secondary/no degree</td>
<td>Male: 2.0, Female: 1.7</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>Male: 2.5, Female: 2.1</td>
</tr>
<tr>
<td>Master's degree</td>
<td>Male: 3.0, Female: 2.5</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>Male: 3.5, Female: 3.0</td>
</tr>
<tr>
<td>Professional (law, medicine, etc)</td>
<td>Male: 4.0, Female: 3.5</td>
</tr>
</tbody>
</table>
Labour market inequalities

Lifetime earnings by ethnicity in the United States

Source: Carnevale et al., Georgetown University, 2011
Technological change and inequalities

• Classical view --- Technological change increases the standards of living of workers and capitalists.

• Alternative view --- Technological change might hurt workers and particularly the poorest ones = low skilled workers.
  ✓ Old age debate.
  ✓ Became particularly acute with the computer and digital revolution.

• Technological change = driver of income inequalities?
Technology --- the end of labour?
The skill premium and the supply of skills in the United States

Fraction of hours worked by college-educated workers
(left scale)

Wage premium
$\frac{w_S}{w_U}$ (right scale)

Source: C. Jones
A simple model of the labour market

The demand of skilled workers relative to unskilled \( \left( \frac{L_S}{L_U} \right)^d \)

\[
\left( \frac{L_S}{L_U} \right)^d = \left( \frac{A_S}{A_U} \right)^\theta \left( \frac{w_S}{w_U} \right)^{-\theta}
\]

with \( \frac{w_S}{w_U} = \) relative wage of skilled = wage premium,

\( \frac{A_S}{A_U} = \) demand shifter (think technology) and \( \theta > 0 \)

Equilibrium wage premium:

\[
\frac{w_S}{w_U} = \left( \frac{A_S}{A_U} \right) \left( \frac{L_S}{L_U} \right)^{-1/\theta}
\]

with \( \frac{L_S}{L_U} = \) supply of skilled workers relative to unskilled
Rise of the Skill Premium in the United States

\[
\frac{w_S}{w_U} = \frac{\text{wage of skilled}}{\text{wage of unskilled}}
\]

Unskilled = High school and below
Skilled = college educated

Relative Demand 1960

Relative Supply 1960
Rise of the Skill Premium in the United States

\[
\frac{w_S}{w_U} = \frac{\text{wage of skilled}}{\text{wage of unskilled}}
\]

Unskilled = High school and below
Skilled = college educated

Relative Demand 2000
Relative Supply 2000

2.0
1.5
1.0
20%
45%

\[\frac{L_S}{L_U}\]
The demand and supply for skills

• The supply of college graduates has increased — an increase in supply should cause wages to fall. Did not happen. Why?

• The demand for college-educated workers has increased by an amount large enough to offset supply.
Why has the demand for skills increased?

• **Skill-biased technological change**
  
  New technologies are more effective at improving productivity of college-educated workers.
  
  Would raise the wages of educated workers.

• **Trade Globalisation**
  
  Opening of world trade makes skilled workers scarcer in advanced countries (Hecksher-Ohlin Theory) --- increasing their relative wage.
  
  More relevant since the late nineties with large developing countries, abundant in unskilled labor, being major trade partners (e.g. China).
Skill-biased technological change and job polarisation

- High skilled workers benefit the most from technological improvements since the eighties
  = skill-biased technological change.
- But essentially, middle of the distribution of skills (=middle-class) are hurt the most.
- Very low level of skills are less affected.
- Why?

Reference: Autor and Dorn (2013)
The computer revolution and the demand for skills

- Machines and computers able to execute routines that follow procedural rules = **routine tasks**
  - Examples --- calculations, filing, information processing and transmission, repetitive tasks...
  - Jobs --- accountant, file clerk, bookkeeper, machine operator...
- But struggle with many high-skilled tasks than cannot be easily programmed = **abstract tasks**
  - Examples --- creativity, problem solving or decision making, skilled social interactions...
  - Also need high skilled workers to set-up machines/computers.
  - Jobs --- researcher, engineer, manager, lawyer...
The computer revolution and the demand for skills

• Can also struggle with some low skilled tasks that cannot be easily programmed = **manual tasks**
  
  ✔ Examples --- visual and spatial recognition, verbal communication and social interaction...
  
  ✔ Jobs --- hairdresser, waiter, childcare, social workers...

Skills content of jobs according to these three categories:

Routine tasks = typically low to medium level of skills required

Abstract tasks = high level of skills required

Manual tasks = typically lower level of skills required
Routine tasks = middle of the skill distribution (= middle-class)

Source: Autor and Dorn (2013)
Polarisation of employment in the United States

Smoothed changes in employment by skill percentile, 1980–2005

Source: Autor and Dorn (2013)
Polarisation of wages in the United States

Smoothed changes in real hourly wages by skill percentile, 1980–2005

Skill percentile (ranked by 1980 occupational mean wage)

Level of skills

Source: Autor and Dorn (2013)
The future of Job Polarisation

Declining jobs = routine tasks

- Data Entry Keyers
- Word Processors and Typists
- Ticket Agents and Travel Clerks
- Communications Equipment Operators
- Information and Record Clerks
- Sewing Machine Operators
- Machine Tool Operators
- Molding Machine Operators
- Electrical and Electronics Assemblers
- Forming Machine Operators
- Textile Machine Operators

Employment will grow in = health & social services

- Registered Nurses
- Home Health Aides
- Nursing Assistants
- Medical Secretaries
- Licensed Practical Nurses
- Therapists
- Medical Assistants
- Health Support Technicians
- Counselors
- Physicians and Surgeons
- Social Workers

...and non-routine abstract et manual tasks

- Postsecondary Teachers
- Software Developers and Programmers
- Computer and Information Analysts
- Management Analysts
- Marketing and Market Research Specialists
- Construction and Mining Supervisors
- Computer Support Specialists
- Personal Care Aides
- Fast Food Workers
- Construction Laborers
- Carpenters
- Childcare Workers
- Restaurant Cooks
- Electricians
- Personal Appearance Workers
Trade globalisation --- The China Shock

• U.S. cities that make products that face a lot of import competition from China faced the largest employment losses.

• Rising imports from China may explain up to 1/4 of the decline in U.S. manufacturing employment between 1990 and 2007.

Autor, Dorn, and Hanson (AER, 2013)
The China Shock

Figure 1. Import penetration ratio for US imports from China (left scale), and share of US working-age population employed in manufacturing (right scale).
The China Shock

<table>
<thead>
<tr>
<th>Table 3—Imports from China and Change of Manufacturing Employment in CZs, 1990–2007: 2SLS Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable:</strong> 10 × annual change in manufacturing emp/working-age pop (in % pts)</td>
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<table>
<thead>
<tr>
<th>I. 1990–2007 stacked first differences</th>
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<tbody>
<tr>
<td>(1)</td>
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<tr>
<td>----------------------------------------</td>
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<tr>
<td>(Δ imports from China to US)/worker</td>
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<tr>
<td></td>
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<tr>
<td>Percentage of employment in manufacturing&lt;sub&gt;−1&lt;/sub&gt;</td>
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<tr>
<td></td>
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<tr>
<td>Percentage of college-educated population&lt;sub&gt;−1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Percentage of foreign-born population&lt;sub&gt;−1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Percentage of employment among women&lt;sub&gt;−1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Percentage of employment in routine occupations&lt;sub&gt;−1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Average offshorability index of occupations&lt;sub&gt;−1&lt;/sub&gt;</td>
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<td>Census division dummies</td>
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<table>
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<tr>
<th>II. 2SLS first stage estimates</th>
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<tr>
<td>(Δ imports from China to OTH)/worker</td>
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<td></td>
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<tr>
<td>R&lt;sup&gt;2&lt;/sup&gt;</td>
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*Notes:* N = 1,444 (722 commuting zones × 2 time periods). All regressions include a constant and a dummy for the 2000–2007 period. First stage estimates in panel II also include the control variables that are indicated in the corresponding columns of panel I. Routine occupations are defined such that they account for 1/3 of US employment in 1980. The offshorability index variable is standardized to mean of 0 and standard deviation of 10 in 1980. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national population.
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Governments (might) dislike inequalities

• Preference view --- one dollar in the hands of the poorest is worth more than in the hand of the richest. Even more so if large difference in income between the two = preference for redistribution.

• Efficiency view --- inequalities are the outcome of effort. Efforts need to be rewarded = low taxes and low redistribution.

• Governments trade off these two conflicting objectives.
The economic costs of inequalities

Potential social and economic costs of inequalities.

• Many inequalities within a society are not the outcome of work effort and are inherited.

• Unequal societies might reward rentiers instead of effort and innovation.

• Negative externalities
  - Lack of cooperation within the society.
  - Social unrest.
  - Crime and rent-seeking.
Inherited inequality

• Rich because of rich parents? Poor because of poor parents?
• Inequalities can be extremely persistent and transmitted from one generation to the next if *intergenerational mobility* is low.
• Various channels
  - Inherited wealth.
  - Inherited human capital...
• Dependent on institutions and policies in a country.
Income inequality and the intergenerational transmission of earnings

Source: Corak (2012)
Policies

- Taxes and transfers to reduce disparities in disposable income = redistributive policies.
- Reducing individual differences in endowments such as wealth (e.g. inheritance tax, wealth taxation)
- Adopting policies to increase the value of endowments held by poorer people and increase their determinants of success in the labour market (education, policies addressing discrimination...)
- Insuring citizens against the economic losses associated with bad luck, such as job loss or ill health.
The effect of redistributive policies on inequality

Progressive taxation and/or transfers lowers the Gini coefficient.

Income Gini before taxes > Income Gini after taxes and transfers
Inequality in wealth, earnings and disposable income: US, Sweden and Japan

Stronger redistributive policies in Sweden.
Income inequality in market and disposable income across the world

Gini coefficients (various years, 1992-2013)

Disposible Gini

Market Gini
Effective tax rate (% of gross income)

Income and Taxes in France

Percentile of individual income

Source: Landais, Piketty and Saez (2011)
Summary

• The level of inequality is typically measured by Gini coefficients or sometimes by the share of income/wealth in the hands of the top percentiles.
• Inequality declined within most countries during most of the 20th century, a trend that has reversed in many of them since the 1980s.
• Inequality tends to be on the rise when the rate of return on capital exceeds the growth rate of the economy.
• In the recent decades, technological change and to some extent trade globalisation have fostered wage inequality in rich countries as they have favored skilled workers. Jobs with routine tasks have been specifically hurt by technological change.
• While inequalities may provide incentives to exert more effort, they also incur economic and social costs. Government policies, in particular through redistribution, can help mitigating those costs if well targeted.