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Development economics

Lecture 6: Measuring poverty, inequality, and discrimination

Vojtěch Bartoš

LMU, May 9, 2019

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Poverty

Discrimination and unequal opportunities

Inequality

> "No society can surely be flourishing and happy, of which
> by far the greater part of the numbers are poor and
> miserable." — Adam Smith (1776)

▶ Why we should care about inequality?
  ▶ **Ethical issues:** How to deal with inheritance? Is
    egalitarianism always preferred?
  ▶ **Functional issues:** Inefficiency of uneducated workforce. Riots
    and grievances. Poor sanitary conditions.

▶ What is inequality?
  ▶ Temporary or permanent?
  ▶ Inequality in income or in opportunities?

▶ We'll concentrate on *economic inequality*

Income distribution in a typical developing country

TABLE 5.1	Typical Size Distribution of Personal Income in a Developing Country by Income Shares—Quintiles and Deciles		
Individuals	**Personal Income (money units)**	**Share of Total Income (%)**	
		Quintiles	**Deciles**
1	0.8		
2	1.0		1.8
3	1.4		
4	1.8	5	3.2
5	1.9		
6	2.0		3.9
7	2.4		
8	2.7	9	5.1
9	2.8		
10	3.0		5.8
11	3.4		
12	3.8	13	7.2
13	4.2		
14	4.8		9.0
15	5.9		
16	7.1	22	13.0
17	10.5		
18	12.0		22.5
19	13.5		
20	15.0	51	28.5
Total (national income)	100.0	100	100.0

Source: Todaro and Smith (2012)

Measuring Inequality

- ▶ Many possible ways how to evaluate inequalities. Which is more unequal?
  1. Example 1: (50,50) vs. (10, 90)
  2. Example 2: (25,25,25) vs. (10,10,55)
  3. Example 3: (10,10,55) vs. (5, 20, 50)
  4. Example 4: (5, 20, 50) vs. (200, 32, 50)
- ▶ Q: What counts as income? How to measure it?
- ▶ Let's find some useful criteria for designing a measure of inequality that allow us to do the comparison.

Measuring Inequality: 4 principles

1. **Anonymity principle**

▶ It does not matter who earns how much, only the total income distribution matters:

$$y_1 \leq y_2 \leq \cdots \leq y_n$$

$$I(y_1^{Bob}, y_2^{Anne}, \ldots, y_n^{Cecilia}) = I(y_1^{Anne}, y_2^{Bob}, \ldots, y_n^{Cecilia})$$

2. **Population principle**

▶ If we have $2n$ instead of n people and the population is just "cloned", this should not affect the measure of inequality

$$I(y_1, y_2, \ldots, y_n) = I(y_1, y_2, \ldots, y_n, y_1, y_2, \ldots, y_n)$$

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Measuring Inequality: 4 principles

3. **Relative income principle**

▶ To be able to compare inequality across countries with different levels of wealth, inequality has to be measured in *relative incomes*, rather than in *absolute*.

$$I(y_1, y_2, \ldots, y_n) = I(\gamma y_1, \gamma y_2, \ldots, \gamma y_n) \quad \forall \gamma > 0$$
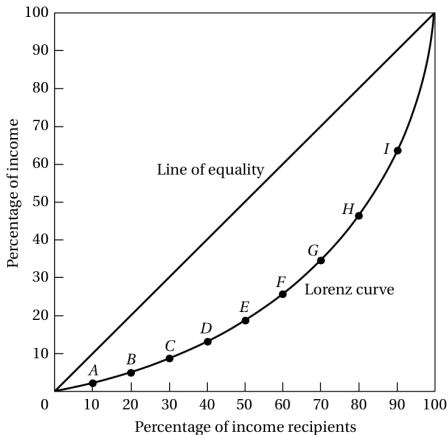
  ▶ We can normalise the data to percentiles

4. **Dalton-Pigou principle**

▶ *"If one income distribution can be constructed from another using a series of regressive transfers then the former distribution has to be more unequal."*

$$I(y_1, y_2, ..., y_n) < I(y_1 - \delta, y_2 + \delta, ..., y_n) \quad \forall \delta > 0$$

  ▶ Both *regressive* and *progressive* transfers possible

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Lorenz curve

Source: Todaro and Smith (2012)
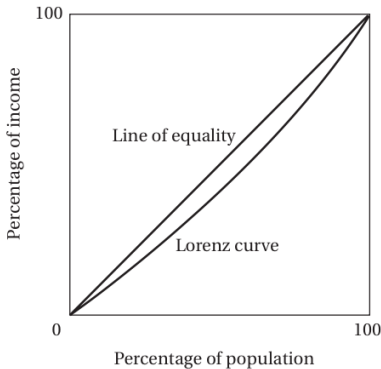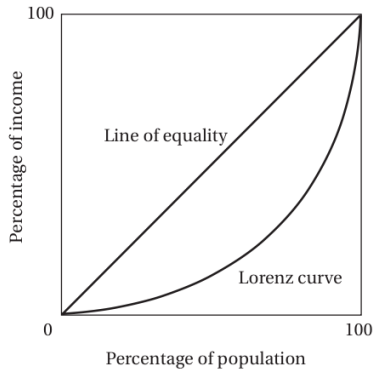
- ▶ Q: How to read the graph?
- ▶ Q: How does a Lorenz curve look like if $y_i = y$ $\forall i$?
- ▶ Q: How to create a more unequal distribution from this one (recall Dalton-Pigou)?
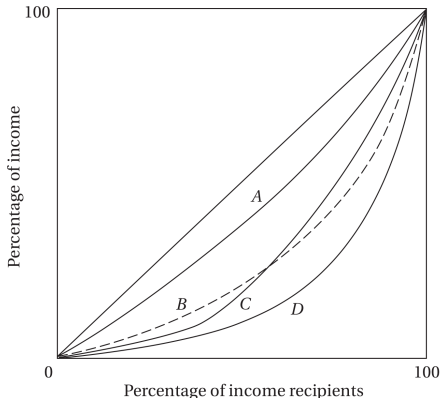
Lorenz curve

(a) A relatively equal distribution

(b) A relatively unequal distribution

Source: Todaro and Smith (2012)

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Lorenz curve

Source: Todaro and Smith (2012)

- ▶ Q: But what if two curves cross (B & C)?
- ▶ We need some unified value that allows ranking.

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Measuring Inequality: towards Gini index

- ▶ **Philosophy:** Should inequality among the poorest count more than among middle class?
    - ▶ We disregard these issues and treat all inequality equally. If time allows $\rightarrow$ Hufe, Kanbur, and Peichl (2019) on measuring "unfair inequality"
- ▶ Notation:
    - ▶ n ... total population
    - ▶ n_j ... number of people in income group j ($\sum_{j=1}^{m} n_j = n$)
    - ▶ $\mu = \frac{1}{n} \sum_{j=1}^{m} n_j y_j$ ... average income

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Measuring Inequality: towards Gini index

▶ **Mean absolute deviation:**

$$MAD = \frac{1}{\mu n} \sum_{j=1}^{m} n_j |y_j - \mu|$$

▶ Problems? *All* regressive Dalton-Pigou transfers must result in increased inequality.
  ▶ Here income transfers across individuals above/below mean do not change MAD.
    ▶ Take any two incomes $y_i > y_j$, both above mean. Transfer from y_i to y_j. As long as both stay above mean, no effect on MAD.

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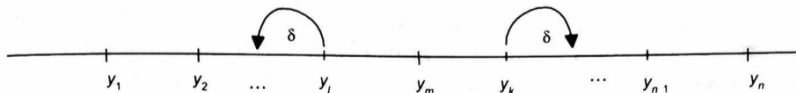○○○○○○○○○○○○○○○

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Measuring Inequality: Gini index
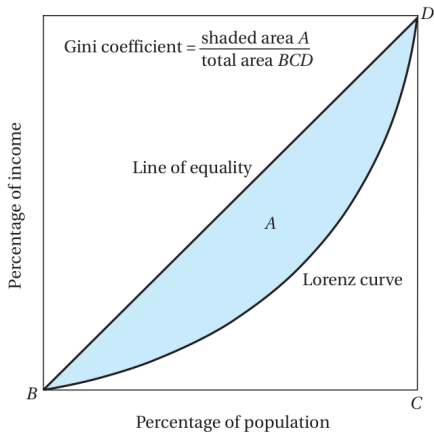
- **Gini coefficient** (Corrado Gini, 1912):

$$Gini = \frac{1}{2n^2\mu} \sum_{i=1}^{m} \sum_{j=1}^{m} n_i n_j |y_i - y_j|$$

- Satisfies all principles for inequality index:
  1. Anonymity: obvious
  2. Population: dividing by n^2
  3. Relative income: dividing by μ
  4. Dalton-Pigou: yes, see below

Lorenz curve vs. Gini index

Source: Todaro and Smith (2012)

▶ Gini coefficient:

$$Gini = \frac{1}{2n^2\mu} \sum_{i=1}^{m} \sum_{j=1}^{m} n_i n_j |y_i - y_j|$$

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Discrimination and unequal opportunities

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Poverty

- ▶ While income inequality can be bad in itself (both in rich &
  poor countries alike), we mainly care about people who are
  most desperate and vulnerable
- ▶ There is still about 700 million people living at less than 1.9$
  (2011 PPP) a day (World Bank 2013)
    - ▶ Q: What is the *1.9$ PPP a day* measure? What does it
      represent? (World Development Report, 1990)

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Poverty: Conceptual issues

1. Income or consumption?
   - Income represents capacity to consume, not consumption itself.
   - Income used more often (also better data availability, even though more prone to measurement error; recall: What is income?).

2. Absolute or relative poverty?
   - What is adequate level of nutrition, housing, education, clothing, assets (e.g. fridge), car ownership (EU vs. USA) in a given country? What are the basic needs for functioning in such society.
   - Distinction important: otherwise mixed up with *inequality*
   - Absolute used (although always with certain amount of relativity).

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Poverty: Conceptual issues

3. Temporary or chronic poverty?
   - Agricultural societies often go through seasonal income cycles. Poverty fluctuates throughout the year.
   - Case: Afghanistan: 20% food poverty after harvest, 45% food poverty before harvest (NRVA, 2008)
   - Very different policies when tackling either type.

4. Household or individual poverty?
   - Potentially unequal access to resources across household members.
   - Discrimination of females, elderly, minority groups (later in this lecture)

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Poverty: Conceptual issues

5. How to set a **poverty line**?
   - Critical threshold
   - Q: How is it determined?
   - Often comes from a detailed household survey, which determines a typical consumption basket for a poor.
   - Often also calorie based.

- **Note:** With all the conceptional issues, the poverty line and all poverty measures need to be taken as approximations and tools for first-glance
  - Refer to WDR (1990): also uses multiple measures; Recall Banerjee and Duflo (2007) in Lecture 1.

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Poverty measures

- ▶ Notation:
    - ▶ y_p ... poverty line
    - ▶ y_i ... income of individual i
    - ▶ n ... population
    - ▶ $\mu = \frac{1}{n} \sum_{i=1}^{n} y_i$

- ▶ **Head count**: number of individuals for whom $y_i < y_p$: HC
    - ▶ Issues: population principle?

- ▶ **Head count ratio**: $HCR = \frac{HC}{n}$
    - ▶ Q: Imagine a policy aimed at reduction of poverty where some poor have incomes of 1\$ and some of 10\$ and the poverty rate is 12\$. Who would you help first if you want to minimize HCR?

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Poverty measures

▶ **Poverty gap ratio**:

$$PGR = \frac{\sum_{i=1}^{HC}(y_p - y_i)}{n\mu}$$

  ▶ How much money would we need to get everyone above y_p relative to total income available in the country.
  ▶ But: what about very unequal countries with some very rich individuals?

▶ **Income gap ratio**: $IGR = \frac{\sum_{i=1}^{HC}(y_p - y_i)}{y_p HC}$
  ▶ Or normalised income shortfall

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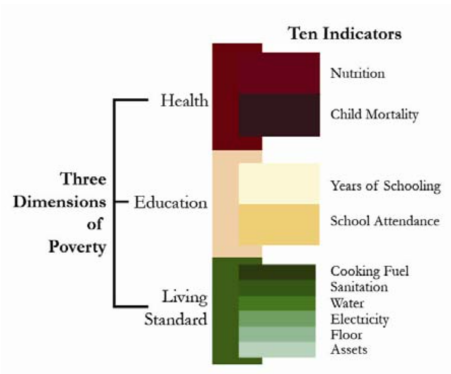000000●00000000

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Poverty measures

- Often we care also about *inequality* among the poor:
- **Foster-Greer-Thorbecke index**:

$$FGTI = \frac{1}{n} \sum_{i=1}^{HC} \left(\frac{y_p - y_i}{y_p} \right)^{\alpha}$$

  - $\alpha = 0 \ldots$ Headcount ratio
  - $\alpha = 1 \ldots$ "Poverty gap index"
  - $\alpha > 1 \ldots$ More weight assigned to those way below y_p

- FGT with $\alpha = 2$ is a part of the Mexican poverty alleviation program Oportunidades/Progresa (chap. 5, art. 34). It uses this index to allocate funds for education, health, and welfare programs for the poor. Why?

Poverty measures

- **Multidimensional poverty index**: UNDP (2010)
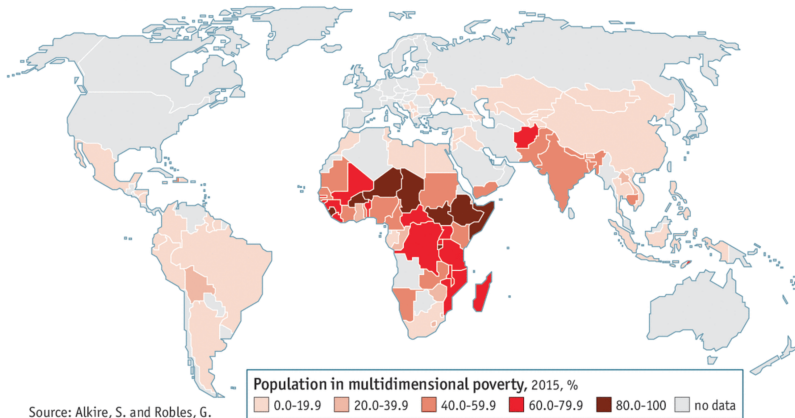

Source: Alkire and Santos (2010)

Source: The Economist (2010)

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Multidimensional poverty index

- ▶ Q: Why good measure? Why bad measure?
- ▶ Can be tailored for local conditions: Mexico is using its own to assess its antipoverty programs, France is introducing one too.
- ▶ MPI measured using headcount ratio (HR_M) or an adjusted HR ($HR_M A$), where A stands for the average intensity of deprivation based on the actual number of indicators below multidimensional poverty among the poor.
  - ▶ Poor are those who score 3 out of 10 points on the indicator scale.
- ▶ 1.6 billion people living in "acute" poverty using MPI (1.4 billion using $1.25) - data from 2005 as in UN Rethinking poverty 2010 report
  - ▶ Niger only country with MPI above 0.6 (0.50 using $1.25)
  - ▶ Georgia at 0.003 (0.11 using $1.25)
  - ▶ Guatemala at 0.127 (0.11 using $1.25)
  - ▶ Kenya at 0.302: but inequalities across ethnic groups: 29% among Embu, 96% among Turkana and Masai

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Multidimensional poverty index

Source: The Economist (2015)

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Absolute versus relative poverty

- ▶ Alleviating chronic poverty is an obligation in most moral
  philosophies and in all major religions. But why should we
  care about relative poverty?
- ▶ Inequality and growth:
  - ▶ Q: Theoretical reasoning for lower growth with higher
    inequality?
    - ▶ Lack of collateral, i.e. inefficient allocation of credit
    - ▶ Capital flight if luxury goods not produced locally
    - ▶ Rent seeking more prevalent (inefficient allocation of state
      resources)
  - ▶ Q: Theoretical reasoning for decreasing inequality with higher
    growth?
   - ▶ Sollow model convergence and Lucas' paradox.

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Inequality and growth
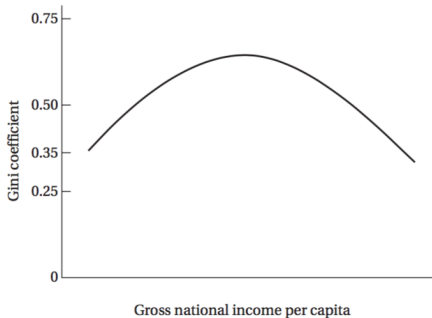
Source: Todaro and Smith (2012)

- ▶ **Kuznets curve**:
- ▶ Structural change in a country:
    - ▶ Assume two sectors: rural and urban, both with relatively low inequality (homogenous)
    - ▶ Initially everyone employed in agriculture
    - ▶ Shift (migration) from rural to urban setting temporarily increases inequality [video here]
    - ▶ When last migrant moves to the city, inequality low again
- ▶ Q: What this model says?
- ▶ Evidence?

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Inequality and growth
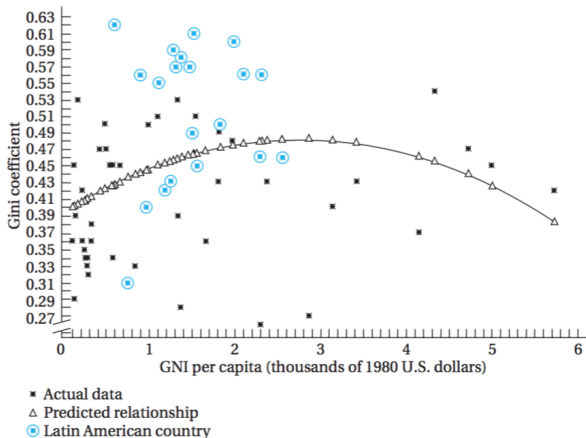
Source: Gary S. Fields, *Distribution and Development: A New Look at the Developing World* (Cambridge, Mass.: MIT Press, 2001), ch. 3, p. 46. © 2001 Massachusetts Institute of Technology, by permission of The MIT Press.

Source: Todaro and Smith (2012)

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Inequality and growth
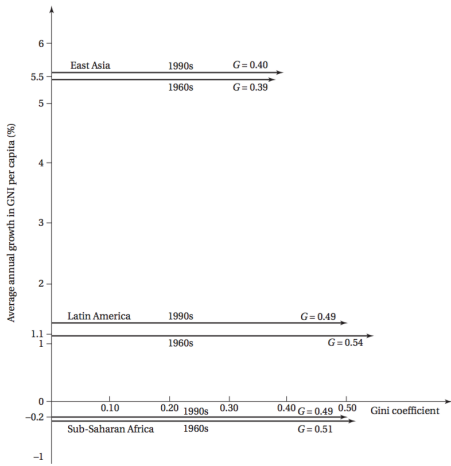
Sources: World Bank, *World Development Indicators, 1998* (Washington, D.C.: World Bank, 1998), tab. 1.4; *Economist*, October 19, 1996, p. 82.

Source: Todaro and Smith (2012)

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Inequality and growth
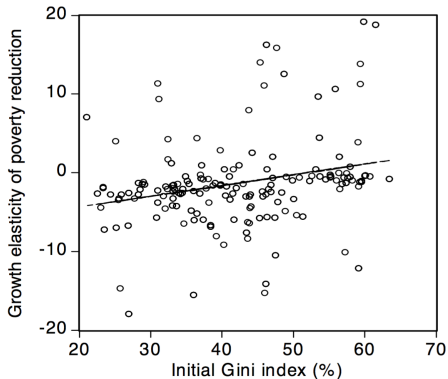
- ▶ Relationship between initial inequality and the growth elasticity of poverty reduction
- ▶ Higher inequality countries tend to have lower (absolute) elasticities

Source: Ravallion (2007): Inequality is Bad for the Poor

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Gender gaps

- ▶ Women often the largest share of the poor (especially single-headed households)
  - ▶ Reasons?

Ratio of women to men of working age in the poorest households in sub-Saharan Africa, selected countries, 2004-2009


Source: UNDP (2012)

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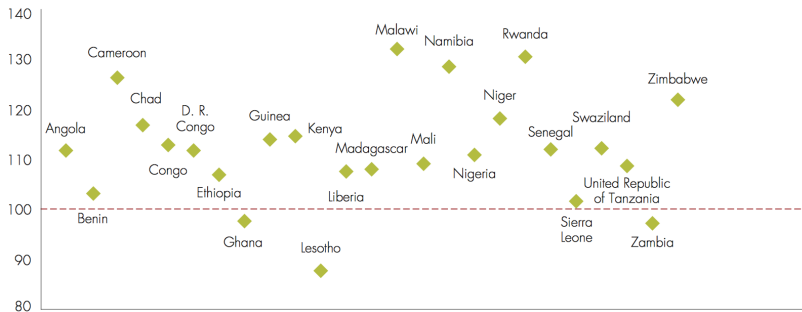
Missing women (Sen, 1992, 2003)

- ▶ Amartya Sen: "there are 100 million missing women around the world, (44 million in China, 37 million in India)"
- ▶ Biological ratio established around 1.05 boys:girls ratio (Europe, US)
- ▶ Reasons?
  - ▶ Higher female mortality, higher infant mortality among girls (1992).
  - ▶ Neglected health and nutrition during childhood (1992)
  - ▶ Selective abortion of female foetuses (2003)
  - ▶ Statistics:
    - ▶ China: 86 girls to 100 boys (similar in South Korea, northern India)
    - ▶ Kerala, India: exception with 1:04 ratio – good education (90% literacy), women participate in productive activities

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"Lifeboat" model

- Two household members with same "production function"
- Splitting resources unequally produces higher future output
- Discuss Miguel (2005): Witch killing

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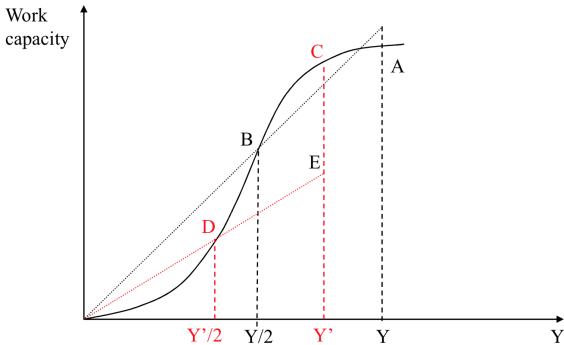
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Banerjee et al. (2009): Labor market discrimination in Delhi

- 3160 fictitious resumes in response to 371 job openings in Delhi, India
- Randomly allocated caste-resembling surnames (and Muslim names too)
- Responses collected by researchers - measure of discrimination. Why?
- Q: What is a "caste"?

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Banerjee et al. (2009): Labor market discrimination in Delhi

Table 3
Regression results, software jobs. Dependent variable: Callback Dummy.

	I	II	III
Scheduled Caste	0.0087	0.0089	0.01213
[SE]	(0.0108)	(0.0107)	(0.0107)
t-ratio	0.81	0.83	1.2
OBC	−0.0045	−0.0047	−0.0049
[SE]	(0.0121)	(0.0121)	(0.01237)
t-ratio	−0.37	−0.39	−0.38
Scheduled Tribe	0.0026	0.0025	0.0032
[SE]	(0.0112)	(0.0112)	(0.01108)
t-ratio	0.23	0.23	0.3
Muslim	0.0064	0.0063	0.0099
[SE]	(0.0112)	(0.0112)	(0.01158)
t-ratio	0.57	0.57	0.91
High quality CV	–	**0.0255**[***]	**0.0265**[***]
[SE]	–	(0.0072)	(0.0087)
t-ratio	–	3.50	2.95
Female dummy	Yes	Yes	Yes
Address type dummy	Yes	Yes	Yes
No. of observations	2083	2083	2083

Notes. Sample: All resumes sent in response to Software ads, excluding caste-neutral category. RHS variables of interest are dummies for different categories of non-upper-caste surnames and the resume-quality dummy. Columns I and II report the results of OLS regressions with job fixed effects. Column III reports results from a (marginal) probit regression clustered at the job level. All regressions have dummies for gender and address type. Omitted category is upper-caste, all coefficients measure difference in callbacks with this category.

[***] Significance at the 1% level.

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Banerjee et al. (2009): Labor market discrimination in Delhi

Table 4
Regressions with job fixed effects, call-center jobs. Dependent variable: Callback Dummy.

|	I	II
Scheduled Caste	**−0.513**[*]	**−0.513**[*]
[SE]	(0.0299)	(0.0313)
t-ratio	−1.71	−1.70
OBC	**−0.0575**[*]	**−0.0559**[*]
[SE]	(0.0313)	(0.0316)
t-ratio	−1.83	−1.77
Scheduled Tribe	−0.0588	−0.0619
[SE]	(0.0416)	(0.0418)
t-ratio	−1.41	−1.48
Muslim	−0.0074	−0.0059
[SE]	(0.0423)	(0.0423)
t-ratio	−0.17	−0.14
Resume dummies	No	Yes
Female dummy	Yes	Yes
Address type dummy	Yes	Yes
No. of observations	761	761
No. of jobs	106	106

Notes. Sample: Resumes sent in response to Call-Center ads, excluding 'Neutral' names. RHS variables of interest are dummies for different categories of non-upper-caste surnames. Column II adds dummies for the resume template used. All regressions are OLS with job fixed effects and have dummies for gender and address type. Omitted category is upper-caste, all coefficients measure difference in callbacks with this category.
   [*] Significance at the 10% level.

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Fershtman and Gneezy (2001): Taste or stereotypes-based

- ▶ Research questions:
    1. Is there discrimination based on ethnic affiliation?
    2. Is there a group bias, or is there a systematic discrimination against one group?
    3. Is this discrimination taste-based (Becker, 1957), or is it stereotype-based (Arrow, 1973)?
    4. Are the ethnic stereotypes accurate?

- ▶ Method: Using economic experiments (Trust game and Dictator game)

- ▶ Subjects: 966 Israeli undergraduates

- ▶ Ashkenazic Jews (European and American immigrants and their Israeli-born offspring) and Eastern Jews (Asian and African immigrants and their Israeli-born offspring)

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Discrimination
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Fershtman and Gneezy (2001): Taste or stereotypes-based
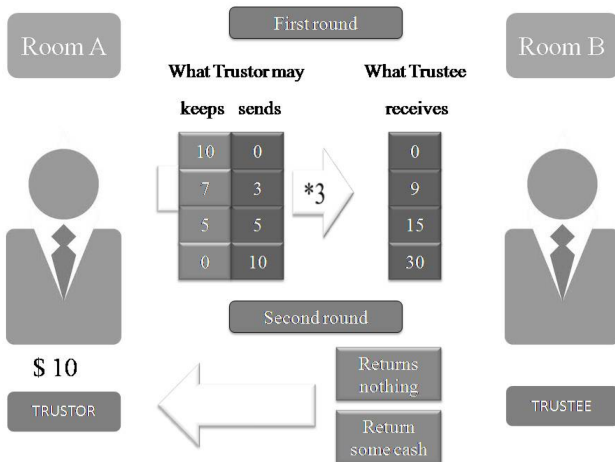
Trust game originally by Berg, Dickhaut, and McCabe (1995)

Inequality
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Poverty
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Discrimination
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Fershtman and Gneezy (2001): Taste or stereotypes-based

Dictator game originally by Kahneman, Knetsch, and Thaler (1986)

Inequality
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Poverty
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Discrimination
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Fershtman and Gneezy (2001): Taste or stereotypes-based

▶ Trust lower towards Eastern Jews...
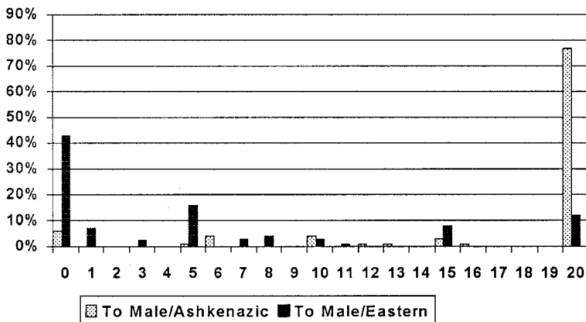
FIGURE II
Transfer from Male to Male/Ashkenazic and Male/Eastern in the Trust Game

Source: Fershtman and Gneezy (2001)

Inequality
000000000000

Poverty
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Discrimination
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Fershtman and Gneezy (2001): Taste or stereotypes-based
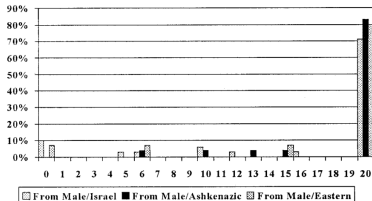

FIGURE IIIa
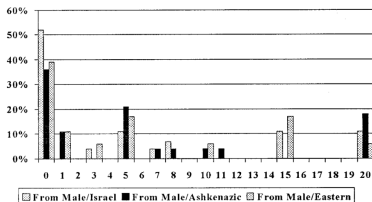Transfer to Male/Ashkenazic by Males According to Origin in the Trust Game

FIGURE IIIb
Transfer to Male/Eastern by Males According to Origin in the Trust Game

Source: Fershtman and Gneezy (2001)

- ► ... by Ashkenazic and Eastern Jews alike...
- ► Similar stereotyping even by the members of a group discriminated against common (e.g., Hoff and Pandey, 2006: caste stereotyping in exam scores - just making caste salient lowers lower-caste test scores)

Inequality
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Poverty
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Discrimination
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Fershtman and Gneezy (2001): Taste or stereotypes-based

▶ ... but not driven by correct expectations (stereotypes)...

TABLE II
AVERAGE AMOUNT RETURNED BY MALES ACCORDING TO ETHNIC BACKGROUND AND
THE AMOUNT THEY RECEIVED FROM PLAYER A

Amount given by Player A	5	10	15	20
Average returned by Ashkenazic male	1.8	13	17.2	24.3
Average returned by Eastern male	2.8	14.2	16.7	23.1

Source: Fershtman and Gneezy (2001)

Inequality
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Poverty
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Discrimination
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Fershtman and Gneezy (2001): Taste or stereotypes-based

▶ And not driven by taste-based discrimination either...
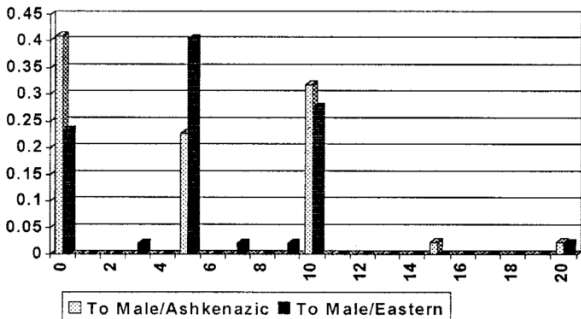

FIGURE IV
Transfer by Males to Males According to Origin in the Dictator Game

Source: Fershtman and Gneezy (2001)