

# Lecture 2: Trade and inequalities

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# Road map

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
  - Beyond the binary approach to inequalities
  - The consumer side
- 3 Trade and politics: some empirical evidence
- 4 Conclusion

# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
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  - The basic approach
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  - Heterogeneous firms models
  - Beyond the binary approach to inequalities
  - The consumer side
- 3 Trade and politics: some empirical evidence
- 4 Conclusion

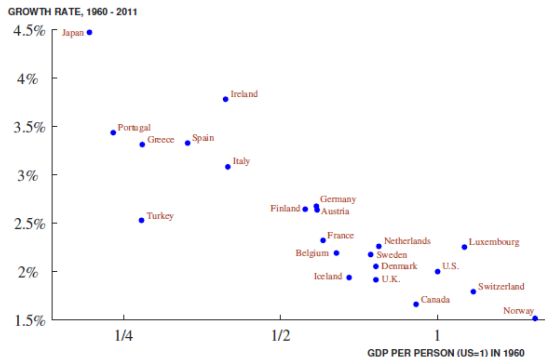
# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
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- 4 Conclusion

## Conditional convergence...

**What is convergence?:** it is the process through which poorer countries catch up with richer ones. For this to happen, they need to experience higher average growth rates. This has been observed for example between OECD countries:

Figure 25: Convergence in the OECD



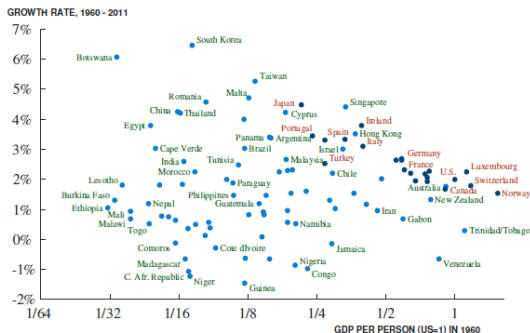
Source: The Penn World Tables 8.0. Countries in the OECD as of 1970 are shown.

→ **Conditional convergence:** within a group of relatively similar countries, higher levels of GDP are on average associated with a lower growth rates.

...but no absolute convergence

**Absolute convergence:** also called *unconditional* convergence, this is the idea that all countries may eventually converge. However, empirically:

Figure 26: The Lack of Convergence Worldwide



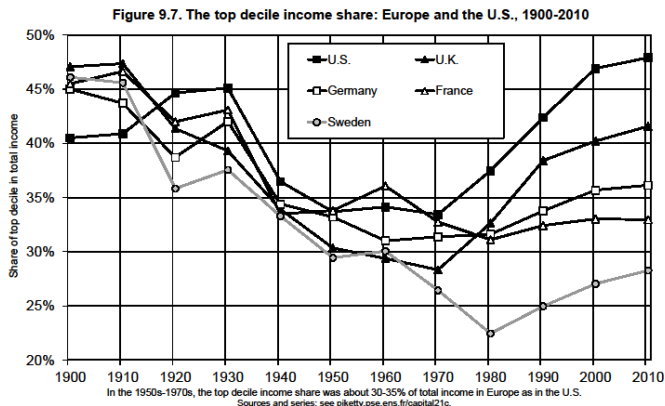
Source: The Penn World Tables 8.0.

→ On average, poorer countries do not experience higher growth rates: they are not catching up, no absolute convergence.

# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
  - Beyond the binary approach to inequalities
  - The consumer side
- 3 Trade and politics: some empirical evidence
- 4 Conclusion

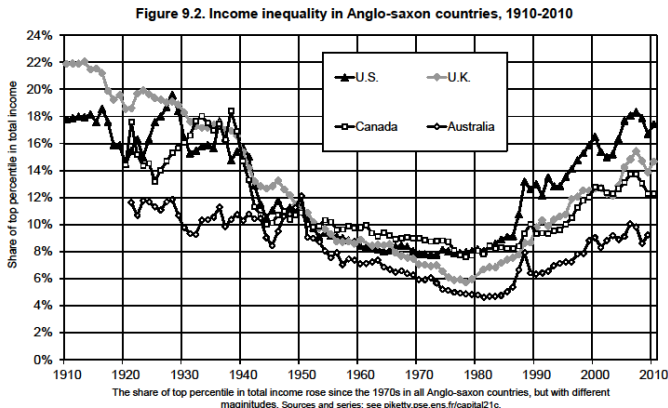
## Trends in inequalities – The top 10% across countries



**The U-shape curve of income inequalities:** inequalities peaked before World War I, and rapidly decreased until the 60's, before increasing again rapidly since the 80's in some countries.

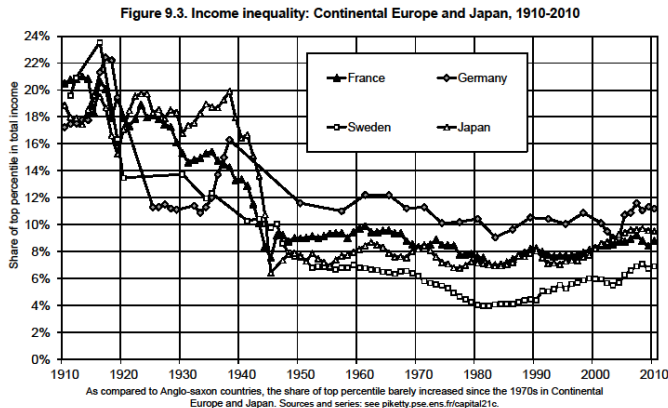


# Trends in inequalities – The top 1% in anglo-saxon countries



→ Clear upward trend from the 80's in anglo-saxon countries, especially in the U.S. and the U.K.

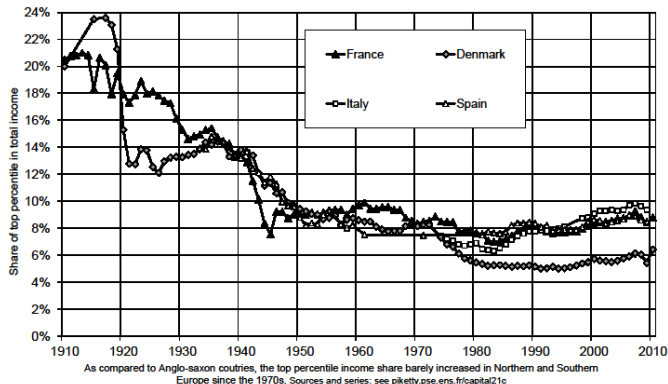
## Trends in inequalities – The top 1% in Europe and Japan



→ Slight increase since the 80's but no clear evidence of U-shaped curve in Europe and Japan.

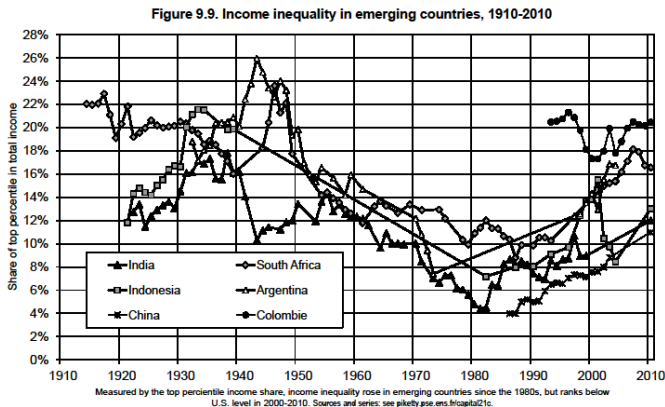
## Trends in inequalities – The top 1% in Europe

Figure 9.4. Income inequality: Northern and Southern Europe, 1910-2010



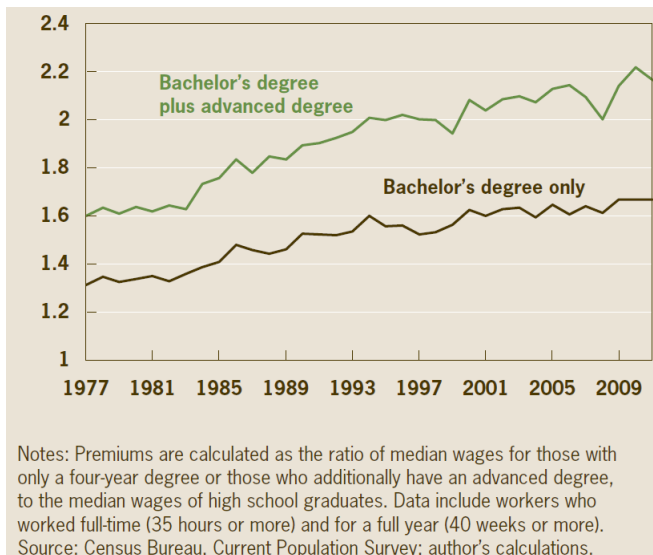
→ No clear evidence of U-shaped curve in these European countries.

## Trends in inequalities – The top 1% in emerging countries



→ We still lack comprehensive data from emerging countries, but the U-shape trend seems to hold in several of them.

## The wage premium



Source: James, *Economic Commentary*, Cleveland Fed, 2012

## What's the role of trade?

The evolution of income inequalities is the result of two forces interacting with each other, that have both witnessed important changes during the XX<sup>th</sup> century:

- **market forces**, that have evolved because of:
  - ▶ industrialization;
  - ▶ skill-biased technical progress;
  - ▶ changes in employers/employees bargaining power in wage-setting, partly because of changes in firms' power on the labor market;
  - ▶ the evolution of the concentration of capital ownership and the share of capital income in total income;
  - ▶ etc.
- **institutions**, that have evolved because of:
  - ▶ changes in the socio-economic distribution of society, e.g. with the rise of a middle class;
  - ▶ globalization and the search for competitiveness against other countries;
  - ▶ changes in political preferences that, for instance, have translated in important changes in top income tax rates;
  - ▶ the weakening of trade unions;
  - ▶ etc.

**Question:** trade and globalization are definitely part of the story. But how exactly, i.e. to what extent and through which mechanisms do trade and trade policies affect income inequalities?

# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
  - Beyond the binary approach to inequalities
  - The consumer side
- 3 Trade and politics: some empirical evidence
- 4 Conclusion

# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
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- 3 Trade and politics: some empirical evidence
- 4 Conclusion



## The Specific Factors (SF) model

This model is a variant of the Ricardian model. Originally discussed by Viner (1892-1970), and later formalized by Samuelson and Jones. Sometimes also called the Ricardo-Viner model.

### Assumptions:

- 2 countries (say Home and Foreign);
- 2 sectors (say manufacturing and agriculture);
- 3 factors of production (say labor, capital, and land);
- labor is perfectly mobile between both sectors;
- capital is immobile: fixed quantity used only for manufacturing;
- land is immobile: fixed quantity used only for agriculture;
- countries differ in their relative factor (capital vs. land) endowment;
- production displays constant returns to scale in each industry;
  - ▶ with twice as much labor and capital (or land), twice as much output is produced.
- production displays diminishing marginal returns in each industry;
  - ▶ for a given quantity of capital, adding an extra unit of labor increases output less and less.
- identical homothetic preferences.

**Question:** how does opening to trade affect the returns of each factor?

## The Specific Factors (SF) model

**Starting point:** let's assume Home is relatively more endowed in capital. Then:

- ① it has a comparative advantage in producing manufacturing goods;
- ② when opening to trade, the price of manufacturing products in Home increases compared to autarky, the price of agricultural products decreases;
- ③ Home therefore exports manufacturing goods, and imports agricultural goods;
- ④ working in the manufacturing sector becomes more profitable. Some workers in Home move from agriculture to manufacturing, up to the point where the marginal productivity of labor (and therefore wages) equalizes across sectors;
- ⑤ because of decreasing marginal returns, more workers in the manufacturing sector means higher returns from capital, while less workers in the agricultural sector means lower returns from land;
- ⑥ since labor is perfectly mobile between the two sectors, wages remain equal between sectors.
- ⑦ capital owners in Home are made better off, land owners in Home are made worse off. Symmetrically, land owners in Foreign are made better off, capital owners in Foreign are made worse off.

## The Specific Factors (SF) model

**Question:** how does this simple model helps understanding the effect of trade on inequalities?

Consider now a model with one type of capital that is mobile, and two types of labor (skilled and unskilled) that are immobile. Skilled workers produce computers and unskilled workers produce agricultural products. If countries open to trade:

- 1 the country that has more skilled workers exports computers and imports agricultural products;
- 2 in this country, capital moves from agriculture to the computer industry;
- 3 the marginal return from labor (i.e. wages) increases in the computer industry, and declines in the agricultural sector;
- 4 skilled workers are made better off, unskilled workers are made worse off;
- 5 assuming skilled workers had initially higher wages than unskilled workers, inequalities have increased!

**Conclusion:** those who are trapped in the comparative-disadvantage sector lose from trade, while those in the comparative-advantage sector win.

## The Heckscher-Ohlin (HO) model

**Limitation of the SF model:** moving from a sector to another takes time, but in the long-run assuming perfect immobility of workers across sectors is not realistic. Depending on the heterogeneity between sectors, the mechanism might be relevant only in the short to medium run.

### Assumptions of the HO model:

- again, 2 countries (say Home and Foreign);
- again, 2 sectors (say manufacturing and agriculture);
- **now, only 2 factors of production (say labor and capital);**
- **now, both factors are perfectly mobile across sectors;**
- both sectors use factors in different proportions;
  - ▶ e.g., manufacturing is more capital intensive ( $K/L$  is higher) than agriculture.
- again, countries differ in their relative factor endowments
- again, production displays constant returns to scale in each industry;
  - ▶ with twice as much labor and capital (or land), twice as much output is produced.
- again, production displays diminishing marginal returns in each industry;
  - ▶ for a given quantity of capital, adding an extra unit of labor increases output less and less.
- again, identical homothetic preferences.

# The Heckscher-Ohlin (HO) model

**Starting point:** let's assume that Home is relatively more endowed in capital.  
Then:

- 1 Home has a comparative advantage in producing the capital intensive good, i.e. manufacturing goods.
- 2 when opening to trade, the price of manufacturing products in Home increases compared to autarky, the price of agricultural products decreases;
- 3 Home therefore exports manufacturing goods, and imports agricultural goods (from Heckscher-Ohlin's theorem).
- 4 part of the labor and the capital employed in the agricultural sector move to the manufacturing (capital-intensive) sector.
- 5 because of decreasing marginal returns, this shift towards the more capital intensive sector increases the real-return of capital, and decreases the real-return of labor (from Stolper-Samuelson's theorem);
- 6 intuitively, since Home produces more of the capital-intensive good but the stock of capital and labor are fixed, capital becomes relatively more scarce, hence higher returns.

# The Heckscher-Ohlin (HO) model – Theorems

**Under the assumptions of the HO model**, we can prove that:

**Heckscher Ohlin Theorem**: a country tends to export the good using intensively the factor of production it is relatively well endowed with, and to import the other good.

**Stolper Samuelson Theorem**: an increase in the price of a good tends to increase more than proportionally the price of the factor used intensively and to decrease the price of the other factor.

## The Heckscher-Ohlin (HO) model – Distributive implications of trade

**Question:** once again, how does this simple model helps understanding the effect of trade on inequalities?

Consider again a model with two goods, computers and agricultural products. Their production requires two inputs: skilled and unskilled labor, both perfectly mobile. Producing computers is relatively more skill-intensive than producing agricultural products. Now assume that Home is relatively more endowed in skilled workers compared to Foreign. If countries open to trade:

- 1 from Heckscher Ohlin's Theorem, Home will export computers and import agricultural products;
- 2 the price of computers in Home will increase, the price of agricultural products will decrease. The opposite will happen in Foreign;
- 3 from Stolper Samuelson's Theorem, the price of skilled labor (i.e. the wage of skilled workers) will increase in Home, and the price of unskilled labor (i.e. the wage of unskilled workers) will decrease. The opposite will happen in Foreign.

**Conclusion:** when a rich country relatively better endowed with skilled workers opens to trade with a poorer country, skilled workers in the rich country are made better off, unskilled workers worse off: inequalities increase in the rich country. In the poorer country, unskilled workers are made better off and skilled workers worse off: inequalities decrease.

## Limitations – Testing the predictions of the HO model

Many papers have discussed the observed impact of trade on wages (e.g. Feenstra, 2000) and its consistency with the HO theory. Overall, they conclude that:

- the expected increase of wage inequalities in **rich countries** is **consistent** with empirical observations;
- the expected decrease of wage inequalities in **poor countries** is **not consistent** with empirical observations.

Davis & Mishra, 2007: “It is time to declare Stolper-Samuelson dead. [...] Stolper-Samuelson, qua theorem, is not wrong, of course. But if we use it, as we so often have, as if it provides a reliable answer to this question of real human significance, then it is worse than wrong—it is dangerous.”

Remark: the theory is useful to get insights on a problem, but the assumptions should not be accepted uncritically. The HO theory stresses one (relevant) mechanism in a simplified world. In a complex world, other mechanisms will play and interact, and the conclusions (and empirical predictions) from one specific model should not be taken for granted.



# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
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**In the previous models:** firms produce everything domestically and may export part of their production of final goods. Ex: the computer firm in Home fully produces computers in Home and export part of its production in Foreign.

**In this model:** firms use intermediate inputs in their production, and may out-source (i.e. import from other firms) the production of some of these inputs. Ex: the computer firm in Home may import components from Foreign to produce computers in Home, and export part of its production in Foreign.

### **Assumptions:**

- one final good (say, computers) is produced by a competitive industry;
- skilled and unskilled workers are hired to perform a continuum of tasks (i.e. to produce a continuum of inputs);
- inputs are produced from labor (both skilled and unskilled) and capital;
- tasks  $z \in [0; 1]$  can be ranked according to their skill-intensity;
- the two countries have different relative supplies of skilled and unskilled workers;

**Starting point:** let's assume that Home is relatively more endowed in skilled workers. Then:

- ① skilled workers being relatively more abundant in Home, their relative wage is lower than in Foreign (their skill-premium is lower);
- ② Home has a comparative advantage in producing tasks (i.e. inputs) that are more skilled-intensive (since in relative terms, skilled labor is cheaper);
- ③ thus, the most skill-intensive inputs are produced in Home, the least skill-intensive are produced in Foreign.
  - ▶ there exists a threshold  $z^*$  such that all inputs  $z > z^*$  are produced in Home, and all other in Foreign;

**What if countries open to trade?** In Feenstra & Hanson (1996), there is a flow of capital from the rich (here, Home) to the poor (here, Foreign) country. Then:

- ① the marginal productivity of labor in Foreign (Home) increases (decreases). Producing in Foreign becomes more profitable than before;
- ② the threshold activity moves to  $z'^* > z^*$ , i.e. the less skill-intensive tasks in Home (those from  $z^*$  to  $z'^*$ ) are now done in Foreign;
- ③ in both countries the set of tasks becomes relatively more skill-intensive;

**Conclusion:** in both countries, the skill-premium (and inequalities) increases.

# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - **Heterogeneous firms models**
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  - The consumer side
- 3 Trade and politics: some empirical evidence
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# The standard heterogeneous firms model – Melitz (2003)

## Starting point:

- within sectors, there is a lot of heterogeneity among firms in terms of:
  - ▶ size;
  - ▶ productivity;
  - ▶ profits;
  - ▶ access to the global market;
- these features are all correlated: exporters and non-exporters are different in all these dimensions.

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**Question:** does trade generate reallocation across firms, i.e. does opening to trade affect the distribution of firms along these dimensions?

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**Melitz (2003):** seminal paper on firms heterogeneity, one of the most influential trade papers. Can be used to investigate many questions, including the impact of trade on wage inequalities.

# The standard heterogeneous firms model – Melitz (2003)

## Assumptions (on demand):

- a representative agent derives utility from the consumption of a continuum of goods indexed by  $\omega$ . Preferences are CES, with  $\sigma$  the elasticity of substitution between any two goods:

$$U = \left[ \int_{\omega \in \Omega} q(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}}$$

- the representative consumer seeks to maximize this utility subject to its budget constraint, which corresponds to the total revenue from production:

$$R = \int_{\omega \in \Omega} p(\omega)q(\omega)d\omega$$

- from Dixit & Stiglitz (1977), aggregate consumption is  $Q = U$  and the aggregate price index is:

$$P = \left[ \int_{\omega \in \Omega} p(\omega)^{1-\sigma} d\omega \right]^{\frac{1}{1-\sigma}}$$



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$$P = \left[ \int_{\omega \in \Omega} p(\omega)^{1-\sigma} d\omega \right]^{\frac{1}{1-\sigma}}$$

- and consumers have the following demand function for variety  $\omega$ :

$$q(\omega) = \left( \frac{p(\omega)}{P} \right)^{-\sigma} \frac{R}{P}$$

# The standard heterogeneous firms model – Melitz (2003)

## Assumptions (on supply):

- labor  $l$  is the only input to production;
- labor wage  $w$  can be normalized to 1;
- production displays constant marginal cost  $1/\varphi$  where  $\varphi$  is the efficiency of the firm;
- production displays increasing returns to scale (IRS) because of a fixed cost  $f$  common to all firms. The cost from producing  $q$  units for a firm with efficiency  $\varphi$  is (after the normalization of  $w$ ):

$$l(q, \varphi) = f + \frac{q}{\varphi}$$

- because of IRS, only one firm produces each variety  $\omega$ ;
- thus, the profit of the firm producing  $\omega$  writes:

$$\pi(\omega) = q(\omega)p(\omega) - f - \frac{q(\omega)}{\varphi}$$

- firms seek to maximize this profit function, taking the demand function  $q(\omega)$  as given.

# The standard heterogeneous firms model – Melitz (2003)

## Assumptions (on timing and entry/exit decisions):

- there is a large (unbounded) pool of potential entrepreneurs;
- to enter the market, they must make a (sunk) investment  $f_e$ ;

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- to enter the market, they must make a (sunk) investment  $f_e$ ;
- after making this investment, they learn their productivity parameter  $\varphi$ , which is drawn from a distribution  $g(\varphi)$  with positive support over  $(0; +\infty)$ ;
- after entry, firms may decide to stay (if  $\pi(\varphi) \geq 0$ ) or instantaneously exit (if  $\pi(\varphi) < 0$ ) without producing;

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- after entry, firms may decide to stay (if  $\pi(\varphi) \geq 0$ ) or instantaneously exit (if  $\pi(\varphi) < 0$ ) without producing;
- firms which decide to stay face a probability  $\delta$  of extinction (from an exogenous bad shock) in each period;
- the free entry condition is such that the expected value from entering (denoted  $V_e$ ) is null:

$$V_e = P_{in}\bar{V} - f_e$$

where  $P_{in}$  is the probability of successful entry (i.e. the probability of drawing  $\varphi$  such that  $\pi(\varphi) > 0$ ), and  $\bar{V}$  is the present value of profits conditional on successful entry (we assume no time discounting):

$$\bar{V} = \sum_{t=0}^{\infty} (1 - \delta)^t \bar{\pi} = \frac{\bar{\pi}}{\delta}$$

## The standard heterogeneous firms model – Melitz (2003)

### Optimal prices, quantities, and profits:

- taking the demand function, we can rewrite:

$$p(\omega) = q(\omega)^{-\frac{1}{\sigma}} P^{\frac{\sigma-1}{\sigma}} R^{\frac{1}{\sigma}}$$

- hence the firm's objective becomes:

$$\max_{q(\omega)} \pi(q(\omega)) = q(\omega)^{\frac{\sigma-1}{\sigma}} P^{\frac{\sigma-1}{\sigma}} R^{\frac{1}{\sigma}} - f - \frac{q(\omega)}{\varphi}$$

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- and taking the first order condition one gets:

$$\pi'(q(\omega)) = \frac{\sigma-1}{\sigma} q(\omega)^{-\frac{1}{\sigma}} P^{\frac{\sigma-1}{\sigma}} R^{\frac{1}{\sigma}} - \frac{1}{\varphi} = \frac{\sigma-1}{\sigma} p(\omega) - \frac{1}{\varphi} = 0$$

- from which one gets the optimal prices, quantities, and profits:

- ▶  $p(\omega) = \frac{\sigma}{\varphi(\sigma-1)}$
- ▶  $q(\omega) = R P^{\sigma-1} \left( \frac{\varphi(\sigma-1)}{\sigma} \right)^{\sigma}$
- ▶  $\pi(\omega) = \frac{R}{\sigma} \left( \frac{P \varphi(\sigma-1)}{\sigma} \right)^{\sigma-1} - f$

# The standard heterogeneous firms model – Melitz (2003)

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- ▶  $\pi(\omega) = \frac{R}{\sigma} \left( \frac{P \varphi(\sigma-1)}{\sigma} \right)^{\sigma-1} - f$

**First conclusion:** firms will stay in the market if and only if  $\varphi \geq \varphi_a^*$  where  $\varphi_a^*$  is the threshold value such that  $\pi(\varphi_a^*) = 0$  (in autarky): the less efficient firms (with  $\varphi < \varphi_a^*$ ) exit the market to avoid negative profits due to fixed costs.



# The standard heterogeneous firms model – Melitz (2003)

## Assumptions (on trade):

- when countries open to trade, firms can sell their products  $\omega$  abroad;
- accessing the foreign market implies a fixed cost  $f_X$ ;
- selling products abroad is more costly: firms incur an “iceberg” cost  $\tau$  per unit sold;
- The cost from selling  $q$  units abroad is:

$$l_X(q_X, \varphi) = f_X + \frac{\tau q_X}{\varphi}$$

- technical assumption:  $\tau(\frac{f_X}{f})^{\frac{1}{\sigma-1}} > 1$ , i.e. it is more costly to sell abroad than domestically.

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## Optimal prices, quantities, and profits:

- following the same reasoning as before, the optimal prices, quantities, and profits from exports are:
  - ▶  $p(\omega) = \frac{\tau \sigma}{\varphi(\sigma-1)}$
  - ▶  $q(\omega) = RP^{\sigma-1} \left( \frac{\varphi(\sigma-1)}{\tau \sigma} \right)^\sigma$
  - ▶  $\pi(\omega) = \frac{R}{\sigma} \left( \frac{P \varphi(\sigma-1)}{\tau \sigma} \right)^{\sigma-1} - f_X$

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- following the same reasoning as before, the optimal prices, quantities, and profits from exports are:
  - ▶  $p(\omega) = \frac{\tau \sigma}{\varphi(\sigma-1)}$
  - ▶  $q(\omega) = RP^{\sigma-1} \left( \frac{\varphi(\sigma-1)}{\tau \sigma} \right)^\sigma$
  - ▶  $\pi(\omega) = \frac{R}{\sigma} \left( \frac{P \varphi(\sigma-1)}{\tau \sigma} \right)^{\sigma-1} - f_X$

**Second conclusion:** firms export *iff*  $\varphi \geq \varphi_X^*$ , and from the technical assumption,  $\varphi_X^* > \varphi^*$ . Only efficient firms produce, only very efficient firms export.

# The standard heterogeneous firms model – Melitz (2003)

## Discussion:

- in addition to the previous results, other conclusions can be drawn from the Melitz model (on aggregate variables, on the equilibrium number of entrant firms, on average productivity, etc.);
- when opening to trade, expected profits of successful firms (those staying on the market) increase, so more entrepreneurs want to enter the market, but only the most productive can stay: the least productive exit and average productivity increases;

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- competition with other firms affects profits through real-wages (with higher average productivity,  $P$  goes down, so  $q(\omega)$  goes down);
- it can be shown that  $\varphi_X^* > \varphi^* > \varphi_a^*$ : when opening to trade, the least productive firms (with  $\varphi \in [\varphi_a^*; \varphi^*]$ ) become insufficiently productive and have to exit the market;
- the more productive a firm is, the larger it is, the more profitable it is (i.e. the more it produces), and the more it exports.
- a reduction in trade costs benefits the most productive firms that are exporting, and hurts the least productive that will make less profits and may be forced to exit the market;

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**Question:** Melitz models heterogeneity in firms size, profits, and access to the international market. How does it relate to workers' heterogeneity?

**Questions:** the empirical literature shows evidence of wage inequalities between workers with similar skills (e.g. Katz & Autor, 1999). How to explain this observation? Does trade exacerbates or reduces this source of inequalities?

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**Previous literature:** assumes perfectly competitive labor markets: workers can freely move from a firm to another up to the point where wages equalize across firms. Identical workers in different firms are always paid identical wages.

**This paper:** introduces imperfectly competitive labor markets into the Melitz model:

- workers are paid more in more productive firms;
- because of job market frictions, their wages do not equalize;
- as in Melitz, opening to trade leads to more dispersion in firms' productivity, thus more dispersion in wages.

→ See tutorial for the resolution of the model.

## Search for quality workers – Helpman et al, 2010

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- as in Melitz (2003), firms are heterogeneous in productivity;
- workers and firms can match more or less efficiently. Workers are more productive in certain firms than in others;
- firms can test workers to assess the quality of the match. This screening is costly;
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- firms can test workers to assess the quality of the match. This screening is costly;
- the screening technology is common to all firms. As labor has higher returns in more productive firms, these firms have an incentive to screen more intensively;
- as a result, more productive (and therefore larger) firms screen more and on average obtain better matches;
- when a high-quality match is realized, workers can bargain for a higher wage: the opportunity cost to abandon this match being higher, firms are willing to pay higher wages;
- workers apply indifferently to any firm: high productivity firms pay higher wages but perform more screening, hence a higher probability of getting rejected and receiving zero wage (static model, one unique period).

### Effect of opening to trade:

- as in the standard Melitz model, trade generates a selection of firms and a reallocation of the labor force;
- the most productive (and therefore larger) firms expand through their exports, the least productive firms shrink or exit. The former have now even more incentives to screen actively, the latter have less incentives to do so;
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- the difference in average match quality between high and low productivity firms increases, and so do wages: wage inequalities unambiguously increase;
- opening to trade has an ambiguous effect on employment:
  - ▶ on the one hand, if it increases expected wages, it may increase labor-market tightness (individuals have more incentives to actively seek a job) and increase employment;
  - ▶ on the other hand, firms being more productive at equilibrium, the screening intensifies and the share of realized matches decreases, reducing employment.
- conditional on trade openness, an increase in the fraction of exporting firms has an ambiguous effect on wage inequalities: it increases when the fraction of exporting firms is sufficiently small, and decreases when it is sufficiently large.

→ The effect on wages is driven by the heterogeneity in match quality.

# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
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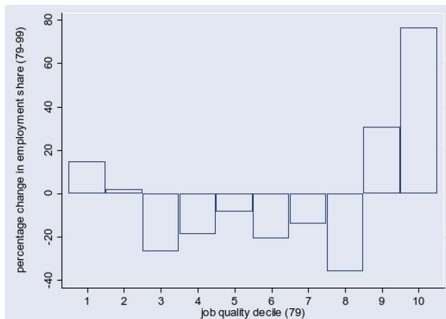
## Continuum of skills – Blanchard & Willmann, 2016

**Previous literature:** opening to trade may affect wages through the skill-premium: if high (low) skills are relatively more used in the comparative-advantage sector, then high (low) skilled workers gain from trade and inequalities increase (decrease).



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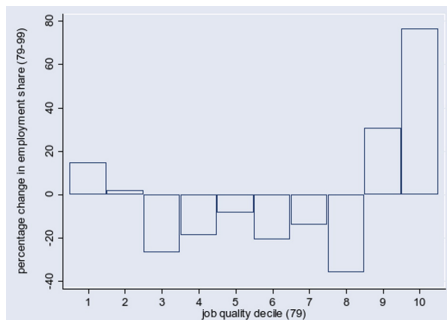
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**Figure:** Non-monotonic changes in employment (Goos and Manning, 2007).

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**Figure:** Non-monotonic changes in employment (Goos and Manning, 2007).

**This paper:** develops a model with endogenous and continuous educational attainment to obtain a more nuanced understanding of the effect of trade liberalization on wages inequalities (and polarization). Shows that the distributional consequences of trade are generally non-monotonic.

### Assumptions:

- there is a continuum of agents who differ by their inherent ability  $a$  distributed continuously over  $[0; 1]$  with density  $f(a)$ ;
- every agent is endowed with 1 unit of labor supplied inelastically;
- agents consume a single final good  $Y$  produced with CRS technology, from a continuum of intermediate tasks  $j \in [0; 1]$ , where  $j$  is an index of the task's skill-intensity;

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- to perform a task  $j$  agents need to acquire skills through education, at the cost  $c(j, a)$ ; the cost function is increasing and convex in  $j$ , decreasing in  $a$ , and the cross-derivative is negative: the marginal cost of learning more complex tasks (higher  $j$ ) is lower for agents with higher inherent ability;
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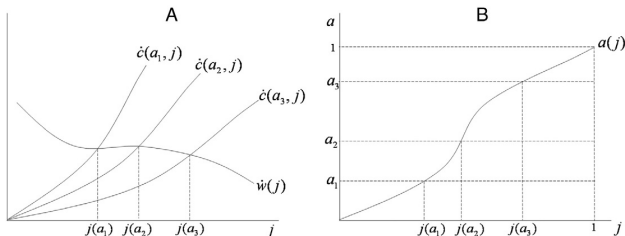
### Educational choice:

- Taking the wage schedule as given, the agent FOC gives:

$$\frac{\partial c(a, j)}{\partial j} = \frac{\partial w(j)}{\partial j}$$

i.e. agents accumulate education up to the point where the marginal returns ( $w_j$ ) are equal to the marginal cost ( $c_j$ )

**Equilibrium:** with some additional assumptions, the paper shows that at equilibrium, agents with higher inherent ability  $a$  sort into higher skill sectors  $j$ , and earn higher wages  $w(j)$ :



**Figure:** Optimal sorting (Blanchard and Willmann, 2016)

*Note: dots above variables denote derivatives w.r.t.  $j$ . It is assumed that  $a_1 < a_2 < a_3$ .*

Given the cost function  $c(a, j)$ , optimal sorting depends on the shape of the wage schedule  $w(j)$ , but not its level. If wages' dispersion exogenously decreases (lower  $\dot{w}(j)$ ), equilibrium skill acquisition goes down. If  $\dot{w}(j)$  increases for high  $j$ s and decreases for low  $j$ s, there is skill polarization.

## Continuum of skills – Blanchard & Willmann, 2016

**When opening to trade:** many potential effects. The authors consider a specific example to illustrate potential non-monotonic effects of trade liberalization on educational attainment:

- they assume two countries opening to trade;
- the two countries only differ by their education system;
- the cost of education in Home is:

$$c(j, a) = \frac{1-a}{a} \frac{2j^2}{5}$$

- the cost of education in Foreign is:

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- the costs functions are quite similar except for high values of  $j$  for which education is much more costly in Foreign;
- as a result, high ability agents in Foreign are at a disadvantage in high-skill sectors compared to Home: they turn to the middle-skill sectors;
- thus, trade liberalization decreases the price of medium-levels intermediate goods in Home and induce polarization: low-ability workers choose lower education than under autarky, high-ability workers choose higher education;
- the consequence is a “hollowing-out” (emergence) of the middle class in Home (Foreign).



# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
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**This paper:** takes a different perspective: standards of living are not only a matter of income, but also of prices. If different individuals consume different baskets of goods, and if trade affects goods prices heterogeneously, then the impact of trade through prices is heterogeneous as well.

**Example:** poorer households typically spend a higher share of their income in food. If food prices increase, they are relatively more penalized.

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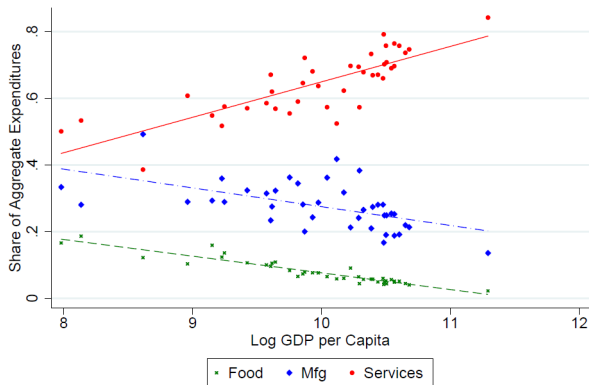
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**Example:** poorer households typically spend a higher share of their income in food. If food prices increase, they are relatively more penalized.

**Question:** does this effect increase or reduce inequalities? → **This is an empirical question.** The authors use data on aggregate expenditures and parameters estimated from a non-homothetic gravity equation to obtain sector-specific Engel curves.

# The consumer side – Fajgelbaum and Khandelwal, 2016

Figure 2: Engel Curves, by Broad Sector Groups

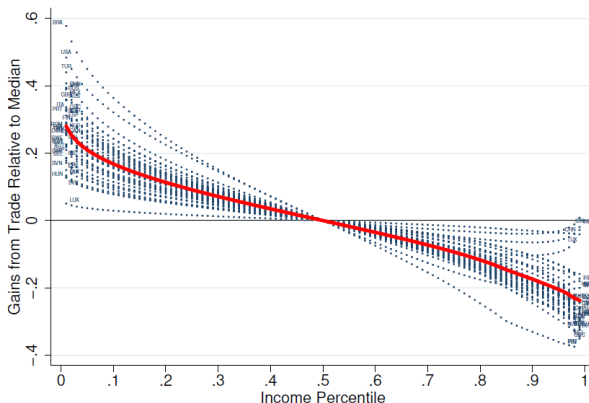


→ Consumption share of food and manufacturing (Mfg) decreasing with income. For services, it is increasing.

**Remark:** trade has a larger negative effect on the price of food and manufacturing than on the price of services.

# The consumer side – Fajgelbaum and Khandelwal, 2016

Figure 5: Distribution of Unequal Gains: Baseline Case



The deviations are relative to the median individual. The red line is the average across countries.

**Conclusion:** on average, poorer households are made better off by trade through the consumption side.

# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
  - Beyond the binary approach to inequalities
  - The consumer side
- 3 Trade and politics: some empirical evidence
- 4 Conclusion

**Autor et al (2013):** they study the impact of the rise of Chinese import competition on local labor markets in the US between 1990 and 2007. They show that “rising imports cause higher unemployment, lower labor force participation, and reduced wages in local labor markets that house import competing manufacturing industries”. These effects are heterogeneous and depend on the initial patterns of industry specialization.



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**Question:** did the exposure of local labor markets to international competition affect political behavior?

## Importing political polarization – Autor et al (2020)

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- experienced an increase of market shares for the conservative *FOX News Channel*;
- became ideologically more polarized in campaign contributions;
- became relatively more likely to elect a Republican to Congress;
- became more likely to elect a GOP conservative in areas with majority white (non-Hispanic) population, and more likely to elect a liberal Democrat in other areas (at the expense of moderate Democrats);
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**Conclusion:** the areas exposed to import competition experienced both political polarization and a rightward shift in ideology.

## The return to protectionism – Fajgelbaum et al (2020)

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**Fajgelbaum et al (2020):** they study the “trade war” initiated in 2018 by the U.S.: a sudden and unprecedented increase in trade tariffs to protect several sectors of the economy, to which trading partners retaliated by increasing their own tariffs.

The authors study the aggregate effect on the U.S. economy and identify the sectors and regions most impacted, depending on their electoral characteristics.

**Findings:** among other results, the authors find:

- a large impact of import and retaliatory tariffs on imports and exports;
- a complete pass-through of tariffs to duty-inclusive prices;
- a resulting losses to U.S. consumers and firms that buy imports of \$51 billion, or 0.27% of GDP;
- after accounting for tariffs revenue and gains to domestic producers, an aggregate real income loss of \$7.2 billion, or 0.04% of GDP;
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**First conclusion:** Although small, the net effect of this trade war is negative. In addition, important distributive effects from U.S. consumers to domestic producers. Then, what could be the rationale for increasing tariffs?

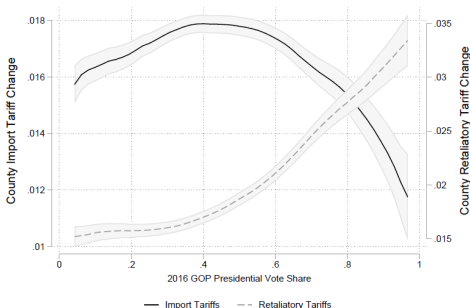


## The return to protectionism – Fajgelbaum et al (2020)

**Second set of results:** among other results, the authors find:

- U.S. import protection was biased toward sectors that are disproportionately located in regions where voters are likely to be pivotal in elections (as proxied by vote shares in the 2016 Presidential elections);
- this finding is consistent with tariffs being set to favor voters who will likely be critical in elections;
- taking into account retaliation by trade partners, the most impacted sector is agriculture which tends to be more concentrated in Republican-leaning counties.

Figure VII: Tariff Changes vs. 2016 Republican Vote Share



# Table of Contents

- 1 Stylized facts on economic inequalities
  - Inequalities between countries
  - Inequalities within countries
- 2 Trade and inequalities: the economist's toolbox
  - The basic approach
  - Alternative models based on comparative advantage
  - Heterogeneous firms models
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## Conclusion

Trade liberalization generates changes in market forces that deeply affect the economy, with possibly important impacts on inequalities through various channels:

- changes in the composition of sectors within a country depending on its comparative advantages;
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→ Whenever we consider the impact of a new trade policy, we should carefully think about all these mechanisms and assess what would happen if the policy is implemented, vs. if it is not. Important to think about this (possibly non-neutral) counterfactual situation!