ECO 745: Theory of International Economics

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Distributional Effects of Trade

Absent unusual externalities, trade is almost always Pareto optimal

- In practice, losers from trade are not fully compensated for their losses
- Additionally, the gains among winners are not evenly distributed
- What are the distributional effects of trade and globalization?
    - How does trade affect wages and unemployment of different groups of people?

Distributional Effects of Trade

Goldberg and Pavcnik (2007) provide a survey on how trade has affected inequality

- Focus on inequality in middle income and developing countries
- Looks at measures of globalization (trade policy, etc)
    - Interesting feature is prevalence of unilateral trade liberalizations
- Observes how inequality evolved in the countries
    - Generally find that inequality increased following increased globalization

Measures of Globalization

Globalization increased in these countries by several measures

- Tariffs and NTB decreased, Trade flows increased, FDI flow increased

GLOBALIZATION IN SELECTED DEVELOPING COUNTRIES

	Trade Liberalization				Trade Flows (% GDP)				FDI inflows (% GDP)	
	Average Tariff		Average NTB		Exports		Imports			
	Before	After	Before	After	1980	2000	1980	2000	1980	2000
Argentina	45	12	n.a.	declined	5.1	10.8	6.5	11.4	.88	4.09
Brazil	58.8	14.4	n.a.	declined	9.1	10.9	11.3	12.1	.81	5.50
Chile	105	10	n.a.	declined	22.8	31.8	27.0	30.8	.77	5.21
Colombia	50	13	72.2	1.1	16.2	21.9	15.6	20.4	.47	2.92
Hong Kong	n.a.	n.a.	n.a.	n.a.	89.9	150.0	90.8	145.3	n.a.	n.a.
India	117	39	82	17	6.1	14.0	9.7	16.6	.04	.51
Mexico	23.5	11	92	23.2	10.7	31.4	13.0	33.2	.96	2.31

Globalization and Inequality in Mexico

	1970s	1980s	1990s
MEXICO			
Globalization Measures		Unilateral trade liberalization 1985–87 (WTO entry) Devaluation Maquiladoras liberalization (1983) FDI liberalization (1989) Immigration	NAFTA (1994) Peso Crisis Maquiladoras expansion FDI Immigration
Inequality			
Skill premium		Increased	Increased until mid-1990s Stable/declined after mid-1990s Increased between 2000–1990
Wage white collar/ Wage blue collar	Declined 1965–80	Increased	Increased until mid-1990s Stable after mid-1990s
90-10 log wage differential	N.A.	Increased	Increased up to 1996 Stable/decline after mid-1990s
Gini of log wages		Increased	Increased up to mid-1990s Stable/decline after mid-1990s
Income Inequality (Gini)	Declined	Increased	Stable/decline
Other Reforms		Privatization Labor Market Reform Deregulation	Banking Crisis

Goldberg and Pavcnik (2007)

Globalization and Inequality in Colombia

COLOMBIA	1970s	1980s	1990s
Globalization Measures	Partial Trade Reform starting 1979	Gradual trade liberalization starting 1985	Trade liberalization 1990–91 Devaluation
Inequality (urban)			
Skill Premium		Slightly Declined	Increased
90–10 log wage differential		Slightly Declined 1986–90	Increased
Gini of log wages		Stable/ Slight Decline	Increased
Income Inequality (Gini)	Declined	Stable/Increased	Stable
Other Reforms			Labor market reform 1990 Banking reform 1993

Goldberg and Pavcnik (2007)

Globalization and Inequality in Argentina

ARGENTINA	1970s	1980s	1990s
Globalization Measures	Short Trade Reform (1976–82) Appreciation	Unilateral Trade Liberalization (1989–93) Appreciation	Trade liberalization cont. Mercosur 1991
Inequality (urban)			
Skill Premium		Decreased	Increased
Gini of log wages		Increased	Increased
Income Inequality	Increased	Increased	Increased
Other Reforms		Macroeconomic crisis (1988–89) Privatization Deregulation Financial Liberalization in the late 1980s	Deregulation Privatization Financial liberalization in early 1990s Convertibility Plan

Goldberg and Pavcnik (2007)

Globalization and Inequality in Brazil

BRAZIL	1970s	1980s	1990s
Globalization Measures		Partial unilateral trade liberalization (1988 onwards)	Unilateral trade liberalization (ends 1994) Mercosur 1991 Currency Crisis 1998
Inequality (national)			
Skill Premium	N.A.	Stable/Slight Increase	Increased
Mean log deviation of wage	N.A.	Stable/Increased	Stable
Gini of log wages		Stable	Stable/Small decline
Income Inequality	Stable	Increased	Stable/Small decline
Other Reforms		Labor market reform	

Goldberg and Pavcnik (2007)

Globalization and Inequality in Chile

CHILE	1970s	1980s	1990s
Globalization Measures	Trade Liberalization	Devaluation	
Inequality			
Skill Premium	Increased	Increased	Declined early 1990s Overall increased 1990–2000 (national data)
Wage white collar /Wage blue collar		Increased	
Gini of log wages	Increased	Increased	Decreased relative to late 1980s Stable during the 1990s
Income Inequality (national)	Increased	Increased	Stable/Small increase late 1990s
Other Reforms	Structural Reforms Privatization Deregulation Tex Reform Labor Market Reform	Devaluation Macroeconomic crisis	

Goldberg and Pavcnik (2007)

Globalization and Inequality in India

	1970s	1980s	1990s
INDIA			
Globalization Measures		Limited Removal of Import Licenses Unilateral	Trade Liberalization 1991 FDI liberalization
Inequality (urban)			
Skill Premium		Relatively stable	Increased
90-10 log wage differential		Increased	Increased more rapidly
Income Inequality			Increased
Consumption inequality		Stable/Slight Increase	Increased
Other Reforms		Industrial delicensing	Tax Reform Financial Reform

Goldberg and Pavcnik (2007)

Globalization and Inequality in Hong Kong

Hong Kong	1970s	1980s	1990s
Globalization Measures		Outsourcing to China	Outsourcing to China
Inequality			
Skill Premium (return to education)	Slight decline	Increased	Increased
Wage non-production/Wage production workers	Declined	Increased	Increased

Goldberg and Pavcnik (2007)

Discussion of Empirical Evidence

- Observe that inequality has increased as countries have become more globalized
- Complications in concluding causal link, but evidence is suggestive
  - Globalization, in particular trade reform, is endogenous
  - Several countries underwent major reforms which were not trade related
- Reviews models capable of explaining increases in inequality from increased globalization
  - Stolper-Samuelson effects
  - Skill-complementary and skill-biased technological change
  - Transitional unemployment
  - Increased returns to innovation and human-capital accumulation

Inequality and Unemployment in a Global Economy

Helpman, Itskhoki, and Redding (2010) embed search and matching frictions in CES framework

- Allow for heterogeneity across both workers and firms
- Model will endogenously generate unemployment and variation in wages
    - Trade increases wage inequality and can either raise or reduce unemployment
- Offers an explanation for the wage premium for exporters

Basic Environment

- Two countries: H, F (Denote foreign market using $*$)
- Multiple sectors
- Firms produce differentiated varieties within sectors following Melitz (2003)

Sector Environment

Within each sector:

- Continuum of ex-ante identical workers (become heterogeneous after matching with a firm)
- J varieties, CES preferences over varieties

$$Q = \left[\int_{j \in J} q(j)^{\beta} dj\right]^{\frac{1}{\beta}}, 0 < \beta < 1$$

- Revenue of a firm producing variety j is

$$r(j) = p(j)q(j) = Aq(j)^{\beta}$$

Where A is a demand shifter for the sector

$$A = E^{1-\beta}P^{\beta};\ \ E = \text{expenditures}, P = \text{CES Price index}$$

Firm Entry and Productivity

Free entry. Firms pay a fixed cost f_e to receive a productivity draw, θ, from a Pareto distribution

$$G_\theta(\theta) = 1 - (\theta_{\min}/\theta)^z; \;\; z \geq 1$$

After receiving productivity, firms decide on production strategy:

- Exit without producing
- Produce for domestic market only (pay f_d)
- Both export (pay f_x) and produce for domestic market
    - Iceberg cost $\tau > 1$ for exporting

Search and Matching

Labor market characterized by Diamond-Mortenson-Pissarides search and matching frictions

- Firm pays search cost bn to match with n workers (b will be endogeneous)
- Workers are ex ante identical
- After being matched to a firm receive a match specific ability draw
- Individual workers receive their match specific ability, a, from a Pareto distribution

$$G_a(a) = 1 - (a_{\min}/a)^k; \;\; k > 1$$

- Firms do not directly observe worker ability
- Firms pay *screening cost* equal to ca_c^{δ} to identify workers with ability below a_c

Firm Production

Output depends on productivity, θ, measure of workers hired, h, and average ability of workers, $\bar{a}$

$$y = \theta h^{\gamma} \bar{a}$$

- $0 < \gamma < 1$ so decreasing returns to scale

Suppose firm pays matching cost to match with n workers and chooses a screening cutoff a_c

- Number of hires will be equal to

$$h = n(a_{\min}/a_c)^k$$

- Average ability of hired workers equal to

$$\bar{a} = \frac{k}{k-1} a_C$$

Firm Production

- Plug h and $\bar{a}$ into firm technology

$$y = \theta h^{\gamma} \bar{a} = \theta \left(n (a_{\min}/a_c)^k \right)^{\gamma} \left(\frac{k}{k-1} a_C \right) = \kappa_y \theta n^{\gamma} a_c^{1-k\gamma}$$

Where $\kappa_y \equiv \left(\frac{k}{k-1}\right) a_{\min}^{\gamma k}$ and require $0 < \gamma k < 1$ so firms will screen workers

- If exporter, need to allocate output, $y(\theta)$, across domestic, $y_d(\theta)$, and foreign markets, $y_x(\theta)$
- Equate marginal revenues across markets

$$\left[\frac{y_x(\theta)}{y_d(\theta)} \right]^{1-\beta} = \tau^{-\beta} (A^*/A)$$

- Total revenue given by

$$r(\theta) \equiv r_d(\theta) + r_x(\theta) =$$

Firm Production

- Total revenue given by

$$r(\theta) \equiv r_d(\theta) + r_x(\theta) = A y_d(\theta)^{\beta} + \overbrace{A^{*}[y_x(\theta)/\tau]^{\beta}}^{\text{only if export otherwise } =0} = \Upsilon(\theta)^{1-\beta} A y(\theta)^{\beta}$$

where $\Upsilon(\theta)$ captures a firm's market access

$$\Upsilon(\theta) \equiv 1 + I_x(\theta)\tau^{\frac{-\beta}{1-\beta}} \left(\frac{A^{*}}{A}\right)^{\frac{1}{1-\beta}} ; \quad I_x(\theta) = \begin{cases} 1, & \text{if export} \\ 0, & \text{otherwise} \end{cases}$$

Bargaining and Profit Maximization

- Suppose bargaining occurs between workers and firm.

$$\text{Firm Nash Bargaining Share} = \frac{1}{1+\beta\gamma}; \quad \text{Worker Share} = \frac{\beta\gamma}{1+\beta\gamma}$$

- Taking into account bargaining outcome, firm maximizes profits

$$\pi(\theta) \equiv \max_{n,a_c,I_x} \overbrace{\frac{1}{1+\beta\gamma}}^{\text{revenue share}} \overbrace{[\Upsilon(\theta)]^{1-\beta} A\left(\kappa_Y \theta n^{\gamma} a_c^{1-\gamma k}\right)^{\beta}}^{\text{revenue (depends on } I_x)} - \overbrace{bn}^{\text{matching cost}} - \overbrace{\frac{c}{\delta} a_c^{\delta}}^{\text{screening cost}} - \overbrace{f_d}^{\text{domestic fixed cost}} - \overbrace{I_x f_x}^{\text{export fixed cost}}$$

- Yields zero profit conditions for producing domestically, θ_d, and exporting, θ_x

$$\theta_x > \theta_d > 0$$

First Order Conditions for Matching and Screening

FOC from profit maximization yields FOC for workers matched and screening threshold

$$\left(\frac{\beta\gamma}{1+\beta\gamma}\right) r(\theta) = bn(\theta)$$

$$\frac{\beta(1-\gamma k)}{1+\beta\gamma} r(\theta) = ca_c(\theta)^{\delta}$$

- Larger firms will match with more workers and choose a higher ability cutoff for hires
  - If $\delta > k$ then larger firms will also hire more workers

Wages

Workers receive their Nash bargained share of revenue

$$\text{Worker Share} = \frac{\beta\gamma}{1+\beta\gamma}$$

Assume this share is paid out through wages. Then firm wages equal to

$$w(\theta) = \frac{\beta\gamma}{1+\beta\gamma}\frac{r(\theta)}{h(\theta)} = b\frac{n(\theta)}{h(\theta)} = b\left[\frac{a_c(\theta)}{a_{\min}}\right]^k$$

Which implies that larger firms pay higher wages and have workers of higher average ability

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Which implies that larger firms pay higher wages and have workers of higher average ability

- Note that the expected wage conditional on being sampled is the same across firms

$$\frac{w(\theta)h(\theta)}{n(\theta)} = b$$

Therefore workers have no incentive to direct their search

Search Cost

- Search cost, b, modeled as

$$b = \alpha_0 x^{\alpha_1};\ \ \alpha_0 > 1, \alpha_1 > 0$$

Where x is the *market tightness* or probability of a worker being sampled

$$x = \frac{N}{L} = \frac{\text{number of workers sampled in a sector}}{\text{workers searching for employment in sector}}$$

- Outside option for worker is ω

- Workers are indifferent between searching inside a sector or not if

$$\omega = xb$$

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$$\omega = xb$$

- Yields search cost and market tightness endogenously (assume $\alpha_0 > \omega$)

$$b = \alpha_0^{\frac{1}{1+\alpha_1}} \omega^{\frac{\alpha_1}{1+\alpha_1}};\quad x = (\omega/\alpha_0)^{\frac{1}{1+\alpha_1}}$$

Equilibrium

Can derive expressions for cutoffs, wages, revenues, unemployment in closed form

Key relationships

- Wages increasing in productivity of firm
- Exporter premium in wages when open to trade
- International trade increases sectoral wage inequality

Wages and Productivity

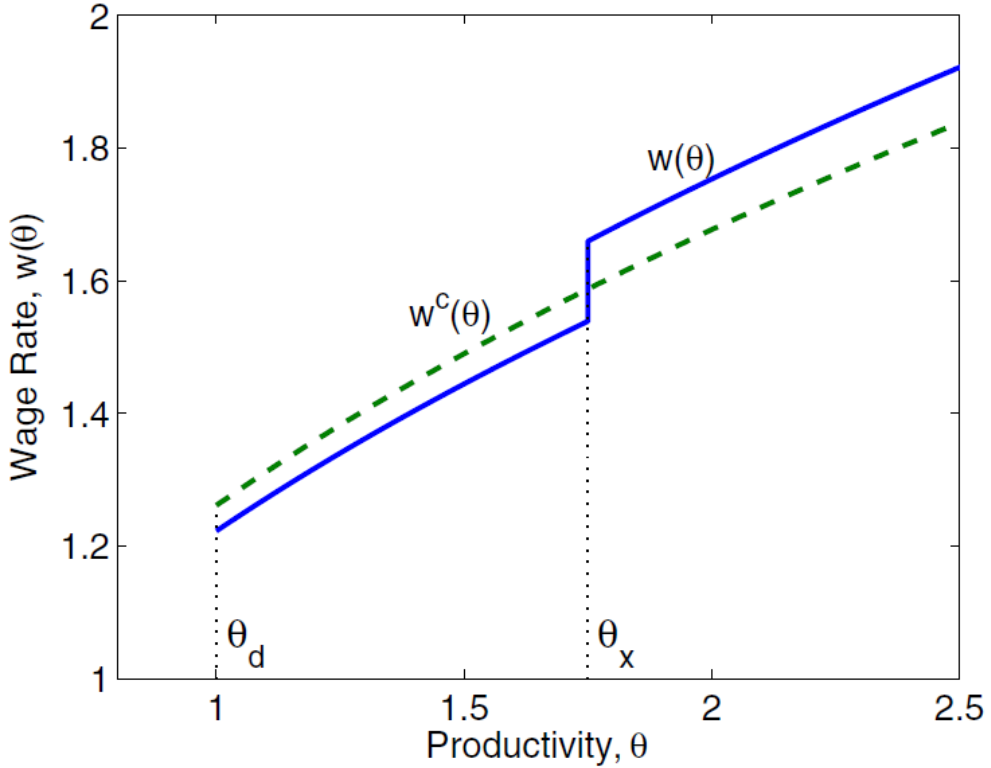

FIGURE 1.—Wages as a function of firm productivity.

Helpman, Itskhoki, and Redding (2010)

Wages and Productivity

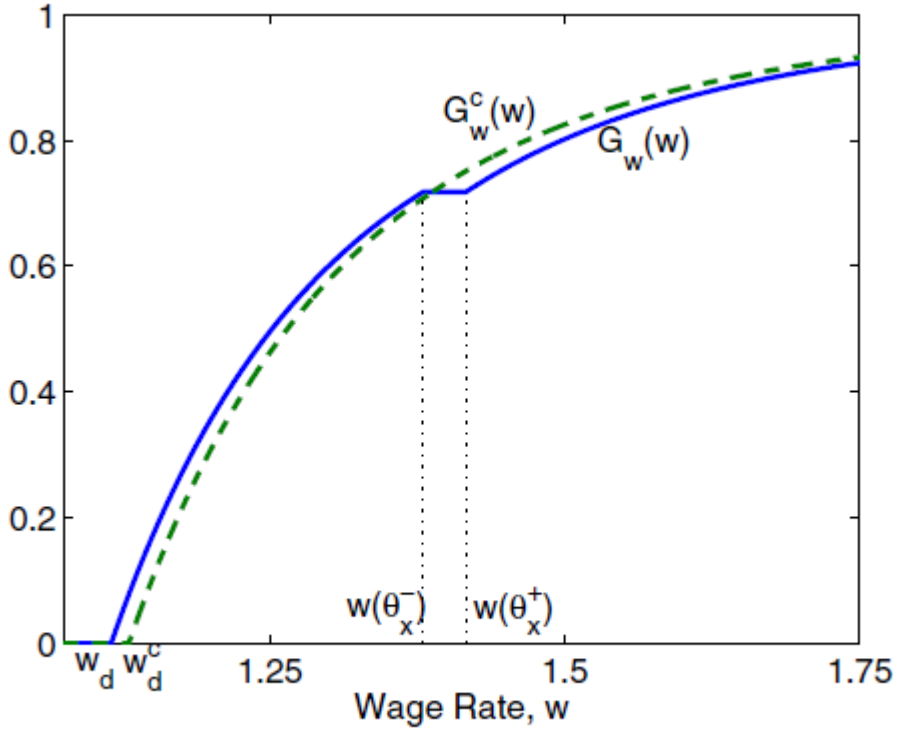

FIGURE 2.—Cumulative distribution function of wages.

Helpman, Itskhoki, and Redding (2010)

Theil Index

Index of Wage Inequality across Sectors

$$T_w = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{w_i}{\overline{w}} \times \log\left(\frac{w_i}{\overline{w}}\right)\right)$$

- If wages equal across all sectors then $T_W = 0$

Sectoral Wage Inequality and Trade Openess

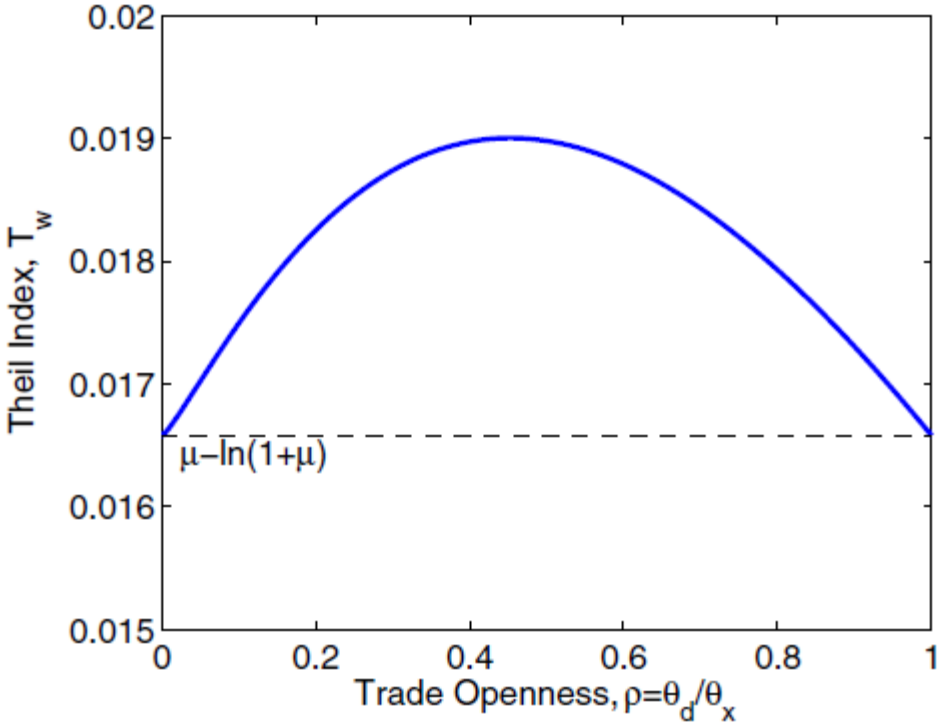

FIGURE 3.—Trade openness and sectoral wage inequality.

Helpman, Itskhoki, and Redding (2010)