Advanced International Trade: Lesson 4

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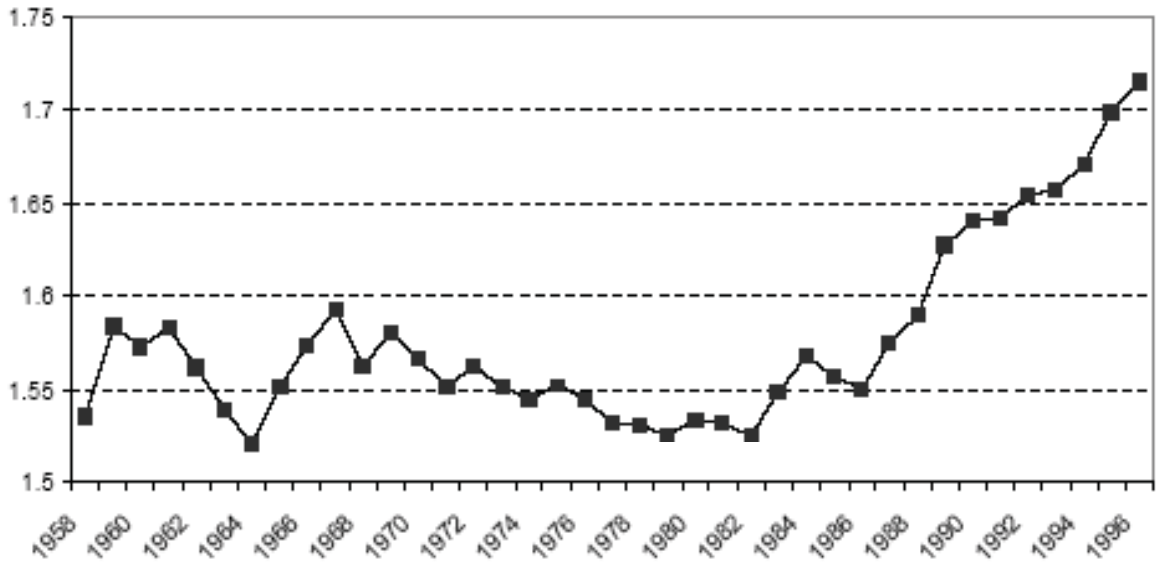
Lesson 4: trade liberalization and wages

- Empirical Evidence
- The effect of trade liberalisation on firms' wages and wage inequalities

Stylized facts I

- Increase of wage gap in the USA, between 1979 and 1995:
  - Real wage of workers with less than 12 years of education fell by 20.2%
  - Real wage of workers with more than 16 years of education rose by 3.4%



Relative wage of non-production / production workers, U.S. manufacturing

Source: NBER data, Feenstra, 2005

Stylized facts I: US

- Berman, Bound and Griliches (1994)
  - Decomposition of the change in relative employment within and between industries

Table 4.1. Industry Level Decomposition of the Change in the Share of Employment and Wages of Non-Production Workers, 1973-79 and 1979-87

All variables are in percentage changes per year

Year	Employment		Wages	
	Between	*Within*	*Between*	*Within*
1973-79	0.12	0.20	0.12	0.21
Total	*0.32*		*0.38*	
1979-1987	0.18	0.36	0.31	0.41
Total	*0.55*		*0.72*	

Relative employment and wages of non-prod workers increased

... but mainly within industries

Trade, Inequalities and Labor Market Institutions

Wage inequality also rose in developing countries.

- Goldberg and Pavcnik (JEL, 2001):
- Review evidence on trade openness and inequality for several developing countries (Mexico, Colombia, Argentina, Brazil, Chile, India, and Hong Kong)
- All these countries have experienced increases in the skill premium during the 80s and 90s.
- Returns to university education (relative to primary education):
- Mexico: + 68% between 1987 and 1993 (Cragg and Epelbaum (1996).
- Colombia: +16% between 1986 and 1998 (Attanasio et. al. (2004)
- Argentina: + 20% between 1992 and 1998 (Gasparini 2004),
- India: +13% in India between 1987 and 1999 (Kijima (2006)
- Brazil: +10% (Gasparini (2003)

Stylized facts I: Chile, within industry

Table 4: Decomposition of Relative Demand for Skilled labor (H/L): 1990-1999

	Total	**Between**	**Within**	**Within/Total**
Industries at 2 digit	0.056	0.001	0.055	0.983
Industries at 3 digit	0.068	0.002	0.066	0.969
Firms	0.044	-0.083	0.127	2.846

Notes: The relative demand for skilled labor is measured by the ratio between non-production and production workers. The growth in the relative skilled labor demand uses the decomposition approach developed by Machin and Van Reenen (1998). *Between* measures the between-industry variation indicator and *Within* is the within-industry variation indicator.

Trade, Inequalities and Labor Market Institutions

- (1) Increasing wage inequalities in both developed and developping countries
- (2) Growing wage inequalities between skilled and unskilled labor due to a higher proportion of skilled workers within industries following trade liberalization.
- **Between industry** increase in relative demand for skilled labor $\rightarrow$ reallocation across sectors
- **Within industry** increase in relative demand for skilled labor $\rightarrow$ reallocation across firms in the same sector.
- $\Leftrightarrow$ Micro-determinants: heterogeneous firms, firms' decisions
- Theoretical explanations

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- Theoretical Explanations
- Predictions of the "New new trade theory": Firm heterogeneity +
- (1) Trade induced SBTC
- (2) Imperfections labor Market

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- Amiti, M. and Davis, D., 2012. Trade, Firms, and Wages: Theory and Evidence, Review of Economic Studies, vol. 79(1) 1 -36.

- Aim:

- To test the differentiated effects of trade liberalization on wages across firms depending on their trade status or mode of globalization (importer, exporter or domestic firm).

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Theoretical model

- Combines Melitz (2003) with domestic and imported inputs (Kasahara and Lapham, 2007) and efficiency wage theory in labor market
- Firms are ready to pay higher wages to create an incentive for the effort of workers (Akerlof, 1982) $- - - >$ fair-wage constraint

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- Relationship between profits and wages
- (1) Production side
- (2) Labor market: eficiency wage

The fair-wage constraint and the labour market

- Main assumption: the nominal wage on offer at any zero-profit firm is unity while that at any other firm is an increasing function of the profitability of that firm

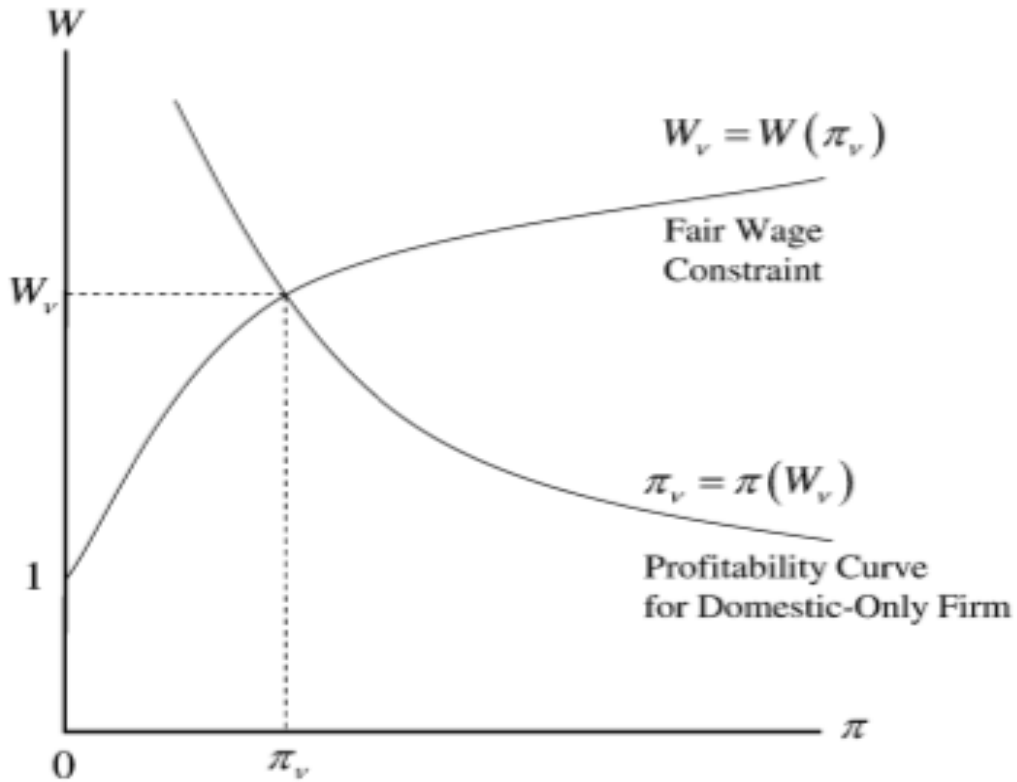

FIGURE 1
Determination of firm wage and profit for given mode of globalization

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Production

- Monopolistic competition and heterogeneous firms as in Melitz
- Firms can produce final goods with domestic and imported inputs
- Marginal costs are Cobb-Douglas in the input prices (wages and intermediate goods):

$$c_v = \frac{1}{\phi_v}\left(\frac{W_v}{\alpha}\right)^{\alpha}\left(\frac{P_{Mv}}{1-\alpha}\right)^{1-\alpha} = \frac{\kappa W_v^{\alpha} P_{Mv}^{1-\alpha}}{\phi_v}, \text{ where } \kappa \equiv \alpha^{-\alpha}(1-\alpha)^{-(1-\alpha)}. \quad (5)$$

- Imported and domestic inputs are combined by a CES
- A firm that uses domestic inputs only has $PMv = 1$, while a firm that imports intermediates has $PMv = [1 + n\tau_{Mv}^{1-\gamma}]^{1/(1-\gamma)} < 1$

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- Fixed and variable costs to export and import

$$\pi_v(W_v) = \begin{cases} 0 & \text{if a firm exits without producing,} \\ \pi_{vd\text{Var}} - f & \text{domestic only,} \\ \Gamma_{Mv}\pi_{vd\text{Var}} - (f + nf_M) & \text{imported intermediates,} \\ \Gamma_{Xv}\pi_{vd\text{Var}} - (f + nf_X) & \text{exported final goods,} \\ \Gamma_{Xv}\Gamma_{Mv}\pi_{vd\text{Var}} - [f + n(f_X + f_M)] & \text{imp'd interm's \& exp'd final goods.} \end{cases} \quad (6)$$

- Theoretical predictions

Theoretical predictions

- Wages, productivity and trade status
- (1) Pure domestic firms: low-productivity firms selling only in the domestic market paying low wages.
- (2) Importers of inputs: trade off (fixed cost- marginal cost), only more productive firms are able to import and increase revenues and pay higher wages
- (3) Exporters: fixed cost of exporting, only most productive firms export, have larger revenues and pay higher wages.

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Propositions

- (1) An autarky fair-wage equilibrium exists and is unique.
- (2) The fair-wage equilibrium with trade in final and intermediate goods exists and is unique
- (3) A move to costly trade from autarky raises the equilibrium cutoff

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Propositions

- (4) A move to costly trade from autarky leads to:
  - Exit of the least productive firms,
  - A decline in wages at all firms that serve only the domestic market.
  - A decline in wages at marginal importers and marginal exporters.
  - A rise in wages for sufficiently large exporters or importers.
- (5) A firm that exports a larger share of its output or imports a higher share of its inputs will have higher profits and wages.

Tested channels

- Output tariffs lowers wages at import-competing firms (foreign competition effect)
- but boosts wages at exporting firms (market access effect)
- A fall in input tariffs raises wages at import-using firms relative to those at firms that only source inputs locally (Revenue effect)

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Data

- Indonesian firms manufacturing census 1991-2000
- Matched with the census on importers and exporters.
- Indonesia's unilateral trade liberalization in the early 90s'.
- Output and Input tariffs constructed using IO tables
- Endogeneity issue of tariffs

Data

- Possible instruments

Endogeneity

- It could be argued that firms in low-wage growth industries lobby for protection,
- which would lead to reverse causality and a negative bias on the output tariff coefficient.
- Solution: following Trefler (2004) who proposes using initial tariffs and industry-level characteristics as instruments in a differenced equation to instrument changes in tariffs.
- Other instruments non tariffs barriers

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Estimation

- Take five-period differences and estimate the following equation using instrumental variables (IV):

- $\Delta Wage_{t,t-5} = \gamma_1 \Delta Output\tau_{t,t-5} + \gamma_2 \Delta Output\tau_{t,t-5} \times FX + \gamma_3 \Delta Input\tau_{t,t-5} + \gamma_4 \Delta Input\tau_{t,t-5} \times FM + \Delta Z_{i,t,t-5} + \epsilon_{i,t}$

- FX anf FM dummy variables equal to one if the firm export or import intermediate goods.

- Instruments:
- The 1991 share of production workers in total industry employment, and this variable interacted with the five-period lagged export status dummy
- a non-tariff barriers
- the 1991 input tariff level and its interaction with the five-period lagged import status indicator.

Lesson 4: Baseline results

TABLE 2A
Tariffs and wages—baseline regressions

Dependent variable: $\ln(\text{wage})_{f,i,t} - \ln(\text{wage})_{f,i,t-5}$					
	Instrumental variables estimation				
	Output tariff (1)	With exporters (2)	Input tariffs (3)	With importers (4)	Both tariffs (5)
ΔOutput $\text{tariff}_{i,t}$	0·158	0·271			0·244
	(0·184)	(0·186)			(0·187)
$\Delta(\text{Output tariff}_{i,t} \times \text{FX}_{f,i,t})$		–0·583***			–0·482***
		(0·098)			(0·096)
ΔInput $\text{tariff}_{i,t}$			–0·333*	–0·209	–0·227
			(0·190)	(0·188)	(0·196)
$\Delta(\text{Input tariff}_{i,t} \times \text{FM}_{f,i,t})$				–0·694***	–0·520***
				(0·131)	(0·124)
$\Delta\text{FX}_{f,i,t}$	0·019***	0·129***	0·019***	0·022***	0·112***
	(0·007)	(0·019)	(0·007)	(0·007)	(0·018)
$\Delta\text{FM}_{f,i,t}$	0·033***	0·031***	0·033***	0·112***	0·090***
	(0·008)	(0·008)	(0·008)	(0·016)	(0·015)
Joint Significance tests Ho: sum of coefficients on tariff variables equals zero					
Output tariffs		–0·312**			–0·238
		(0·154)			(0·168)
Input tariffs				–0·903***	–0·748***
				(0·217)	(0·222)

Lesson 4: Other outcome variables

Dependent variable	ln(revenue)$_{f,i,t}$	ln(wu)$_{f,i,t}$	ln(ws)$_{f,i,t}$	ln(wage)$_{f,i,t}$	ln(wage)$_{f,i,t}$	ln(wage)$_{f,I,t}$
				1995–1997	1995–1997	1995–1997
					With skill share	With education share
	(1)	(2)	(3)	(4)	(5)	(6)
Output tariff$_{i,t}$	–0·028	0·119**	0·134***	0·452***	0·460***	0·463***
	(0·076)	(0·051)	(0·053)	(0·132)	(0·131)	(0·130)
Output tariff$_{i,t}$ x FX$_{f,i,t}$	–0·399***	–0·202***	–0·147***	–0·277***	–0·272***	–0·264***
	(0·072)	(0·045)	(0·057)	(0·099)	(0·098)	(0·094)
Input tariff$_{i,t}$	0·130	–0·085	–0·014	–0·529*	–0·516*	–0·524*
	(0·168)	(0·097)	(0·099)	(0·310)	(0·306)	(0·302)
Input tariff$_{i,t}$ x FM$_{f,i,t}$	–0·649***	–0·573***	–0·225**	–0·600***	–0·613***	–0·600***
	(0·130)	(0·095)	(0·100)	(0·215)	(0·215)	(0·203)
FX$_{f,i,t}$	0·148***	0·047***	0·072***	0·069***	0·068***	0·065***
	(0·015)	(0·010)	(0·011)	(0·018)	(0·018)	(0·017)
FM$_{f,i,t}$	0·251***	0·092***	0·077***	0·100***	0·100***	0·098***
	(0·019)	(0·012)	(0·014)	(0·027)	(0·027)	(0·026)
skillshare$_{f,i,t}$	0·050	0·570***	–1·595***		0·270***	
	(0·034)	(0·020)	(0·033)		(0·042)	
Δln(labour)$_{f,i,t}$	0·794***	–0·062***	0·002***	–0·128***	–0·126***	–0·121***
	(0·016)	(0·006)	(0·006)	(0·014)	(0·014)	(0·014)
Exit$_{f,i,t}$ if exit in t+1	–0·082***	–0·052***	–0·026***	–0·054***	–0·054***	–0·053***
	(0·009)	(0·006)	(0·008)	(0·009)	(0·009)	(0·008)
Education shares$_{f,i,t}$						
Production_1						–0·938***
Production_2						–0·929***
Production_3						–0·890***
Production_4						–0·835***
Production_5						–0·599***
Non-production_1						–0·831***
Non-production_2						–0·926***
Non-production_3						–0·669***
Non-production_4						–0·446***

Quantification

- A 10 percentage point fall in output tariffs decreases wages by 3 percent in firms oriented exclusively toward the domestic economy;
- But the same fall in the output tariff increases wages by up to 3 percent in firms that export;
- A 10 percentage point fall in input tariffs has an insignificant effect on firms that do not import, but increases wages by up to 12 percent in firms that do import

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Conclusion

- The first work to disentagle the effects of output and input tariffs on firms' wages
- depending on trade orientation of the firm
- Find that trade status matter to understand the differential impact of trade liberalization on wages
- Some firms-workers loose from trade liberalization (import-oriented)
- Other firms-workers win (export oriented and imported inputs intensive)