

# Frish Lecture: Trade and Labor Market Outcomes

Elhanan Helpman, Oleg Itskhoki and Stephen Redding

July 28, 2010

# Approaches to Trade

- Traditional explanations of trade:
  - differences in technology (Ricardo);
  - differences in factor endowments (Heckscher-Ohlin, Jones, Samuelson).
- In the 1980s factor proportions were merged with economies of scale and monopolistic competition (Dixit-Norman, Helpman, Krugman, Lancaster), featuring:
  - similar firms within industries;
  - “universal” exporting by firms.
- More recently, firm heterogeneity has been added (Melitz, Bernard-Eaton-Jensen-Kortum):
  - only a fraction of firms export;
  - exporters are bigger and more productive than non-exporters.

**Table:** Share of manufacturing firms that export, in percent

Country	Year	Exporting firms, in percent
U.S.A.	2002	18.0
Norway	2003	39.2
France	1986	17.4
Japan	2000	20.0
Chile	1999	20.9
Colombia	1990	18.2

Source: WTO (2008, Table 5)

**Table:** Share of exports of manufactures, in percent

Country	Year	Top 1% of firms	Top 10% of firms
U.S.A.	2002	81	96
Belgium	2003	48	84
France	2003	44	84
Germany	2003	59	90
Norway	2003	53	91
U.K.	2003	42	80

Source: WTO (2008, Table 6)

# Within Industry Variation

- Selection into exporting, into FDI.
- Lower trade costs  $\implies$  exit, within industry market share reallocation  $\implies$  higher productivity.
  - Evidence: Pavcnik (2002), Trefler (2004).
- Exports/(Subsidiary Sales) depends on proximity concentration tradeoff + productivity dispersion.
  - Evidence: Helpman, Melitz and Yeaple (2004), Yeaple (2009).
- Contractual frictions determine offshoring and integration decisions.
  - Evidence: Antràs (2003), Nunn and Trefler (2008).

# Labor Market Features

- Most of this literature assumes frictionless labor markets.
- Three prominent features of labor markets are:
  - ① substantial differences in workforce composition across firms;
  - ② variation in wages for workers with the same observed characteristics;
  - ③ unemployment rate varies across industries (see BLS).
- In addition, macro studies find that:
  - ① to explain unemployment in European economies, it is necessary to allow for interactions between shocks and differences in labor market institutions; Blanchard and Wolfers (2000).
  - ② changes over time in labor market institutions are important determinants of the evolution of unemployment in OECD countries; Nickel, et al. (2003).

# Labor Market Rigidities

There are substantial differences across countries in labor market rigidities

Country	Difficulty of Hiring	Rigidity of Hours	Difficulty of Redundancy
United States	0	0	0
Uganda	0	0	0
Rwanda	11	0	10
United Kingdom	11	20	0
Japan	11	7	30
<b>OECD</b>	<b>27</b>	<b>30</b>	<b>23</b>
Italy	33	40	40
Mexico	33	20	70
Russia	33	40	40
Germany	33	53	40
France	67	60	30
Spain	78	40	30
Morocco	89	40	50

Source: Botero et al. (2004), downloaded from the World Bank's website <http://www.doingbusiness.org/ExploreTopics/EmployingWorkers/>, September 25, 2009.

# The European Context

- Member states of the European Union have focused on labor market policies for more than a decade.
  - The Luxembourg Extraordinary European Council Meeting on Employment took place in 1997.
- It led to the European Employment Strategy, which was incorporated into the broader Lisbon Strategy, designed to turn Europe into a more competitive and dynamic economy, with more and better jobs.
- To think about such issues, we need theoretical models that pay more attention than usual to features of labor markets.
- And we need to understand how labor market policies in one country affect its trade partners.

- I will focus my discussion on the following question: How do labor market frictions impact interdependence across countries?
- In particular:
  - what is the impact of trade on inequality and unemployment?
  - what are the impacts of one country's labor market frictions on its trade partners?
  - how does the removal of trade impediments impact countries with different labor market frictions?

- There is a large literature on trade and labor market frictions:
  - minimum wages, Brecher (1974);
  - implicit contracts, Matusz (1986);
  - efficiency wages, Copeland (1989);
  - fair wages, Agell and Lundborg (1995) and Kreickemeier and Nelson (2006);
  - search and matching, Davidson, Martin and Matusz (1988,1999).
  - volatility and labor immobility, Cuñat and Melitz (2009).
- More recently, a surge of papers incorporating labor market frictions into models with heterogeneous firms:
  - fair wages, Egger and Kreickemeier (2006), Amiti and Davis (2008);
  - efficiency wages, Davis and Harrigan (2007);
  - search and matching, Helpman and Itskhoki (2010), Helpman, Itskhoki and Redding (2010), Mitra and Ranjan (2010), Felbermayr, Prat and Schmerer (2008).

- **Inequality**, based on: Helpman, Itskhoki and Redding, “Inequality and Unemployment in a Global Economy,” *Econometrica*, 2010.
- **Interdependence**, based on: Helpman and Itskhoki, “Labor Market Rigidities, Trade and Unemployment,” *Review of Economic Studies*, 2010.
- **Policy** issues.

- An examination of the link between trade and inequality requires new thinking; Stolper-Samuelson effects fail to provide an adequate explanation of inequality trends around the globe (putting aside the Technology vs Trade debate).
- Trade liberalization raises wage inequality in **developed and developing** countries, Goldberg and Pavcnik (2007). It cannot result from a standard Stolper-Samuelson effect on the relative wage of skilled workers.
- Trade liberalization raises **within group** wage inequality, Attanasio, Goldberg and Pavcnik (2004) and Menezes-Filho, Muendler and Ramey (2008).

- Consider a differentiated-product sector:
  - brands are produced by heterogeneous firms, which differ in productivity;
  - fixed entry and production costs, fixed and variable trade costs;
  - monopolistic competition in the product market;
  - search and matching in the labor market;
  - wage bargaining.
- Preferences:

$$Q = \left[ \int_{\omega \in \Omega} q(\omega)^\beta d\omega \right]^{\frac{1}{\beta}}, \quad 0 < \beta < 1.$$

# Heterogeneity

- Workers are homogeneous *ex ante*, but draw an ability  $a$  which is match-specific in the differentiated sector.
- The ability  $a$  is observed neither by the worker nor by the firm.
- Firms are homogeneous *ex ante*, but draw a productivity  $\theta$  upon entry in the differentiated sector.
- **Production:** the production function is:

$$y = \theta h^\gamma \bar{a}, \quad 0 < \gamma < 1,$$

(interpretation: human capital externalities or fixed managerial time at the level of the firm).

- **Screening:** a firm can identify workers with productivity above  $a_c$  at cost

$$\frac{c}{\delta} a_c^\delta.$$

- Firm productivity and worker ability are distributed Pareto.

- There is a Cobb-Douglas matching function.
- It yields a cost of hiring:

$$b = \zeta x^\alpha.$$

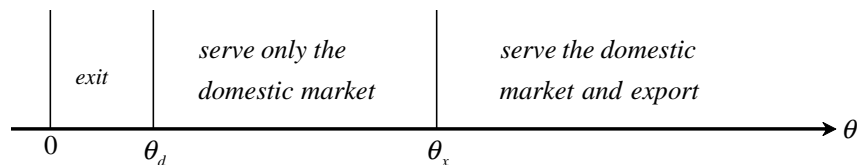
- $\zeta$  is a parameter, rising in the cost of posting vacancies and declining in the Hicks-neutral efficiency of the matching process;
- $\alpha$  is the ratio of the Cobb-Douglas coefficients on labor and vacancies;
- $x = N/L$  is the ratio of the number of matched workers to the number of searching workers; our measure of tightness in the labor market.

# Sequence of Moves

- Firms and workers enter the differentiated sector, firms learn  $\theta$ ;
  - the outside option of firms is zero;
  - the outside option of workers is an expected income  $\omega$  in other employment (assuming risk neutrality), determined in general equilibrium.
- Firms chose to leave or stay. If stay, post a measure of vacancies, choose to serve the domestic market or also export.
- Workers match with firms. Unmatched workers are unemployed and receive unemployment benefits of zero.
- Every firm screens its  $n$  matched workers, by choosing  $a_c$ . Workers with lower ability become unemployed.
- The remaining  $h$  workers of a firm engage in multilateral wage bargaining with the firm, as in Stole and Zwiebel (1996).
- Output is produced and markets clear.

# Equilibrium Structure

- It is possible to obtain closed-form solutions for all the firm-specific variables, and use these solutions to calculate the wage distribution.
- Firms select into exporting, as in Melitz (2003):



- More productive firms post more vacancies, match with more workers, screen to higher ability cutoffs, employ more workers (assuming  $\delta > k$ ), and pay higher wages because they have workforces of higher ability:  $\bar{a}$  **increases** in  $\theta$ .

# Wages

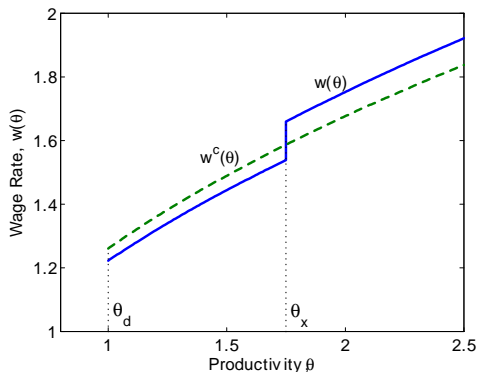
- Moreover:

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

- Therefore:

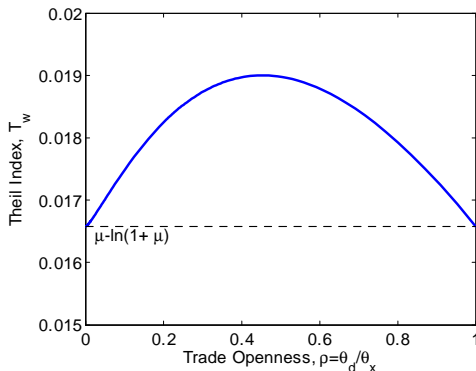
$$bx = \omega, \quad b = \bar{\zeta} x^\alpha \implies (b, x).$$

- Wage schedule:



# Results: Inequality of Wages

- The distribution of wages is more unequal in the trade equilibrium than in autarky if only a fraction of firms export;
  - inequality of the wage distribution is the same in the trade equilibrium and in autarky when all firms export.
- Inequality vs openness:



# Results: Unemployment and Welfare

- Sectoral unemployment rate:

$$u = 1 - \sigma_c x.$$

- The average retention rate  $\sigma_c$  is lower in the trade equilibrium than in autarky.
- The tightness of the labor market  $x$  can be the same in the trade equilibrium and in autarky, or higher in the trade equilibrium; depending on the general equilibrium structure.
- Welfare is higher in the trade equilibrium.
  - **Implication:** trade leads to more wage inequality, and possibly to higher unemployment, but is beneficial nevertheless.

# Interdependence

- Consider a simplified version of this model, with no worker heterogeneity, no screening, and production function:

$$y = \theta h.$$

- There are two sectors, one as above, the other produces homogenous goods with one unit of labor per unit output and **no trade costs**.
- Labor market frictions in the homogeneous sector are similar to the differentiated sector, except that  $\tilde{\zeta}$  can be different. In the homogeneous sector the cost of hiring is:

$$b_0 = \tilde{\zeta}_0 x_0^\alpha$$

and there is free entry.

- Preferences are quasi-linear:

$$\mathbb{U} = q_0 + \frac{1}{\zeta} Q^\zeta, \quad \zeta < \beta < 1.$$

- There are two countries,  $A$  and  $B$ , that differ **only** in labor market frictions  $(\tilde{\zeta}_0, \tilde{\zeta})$ .

- As a result of free entry and the same distribution of surplus,  $b_0$  is the same in both countries, independently of the trade regime; fixes  $\omega$ .
- In the differentiated sector:

$$w_j = b_j = b_0 \left( \frac{\xi_j}{\xi_{0j}} \right)^{\frac{1}{1+\alpha}}, \quad x_j = x_{0j} \left( \frac{\xi_j}{\xi_{0j}} \right)^{-\frac{1}{1+\alpha}}, \quad j = A, B,$$

independently of the trade regime.

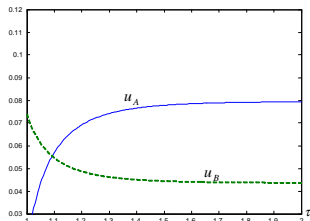
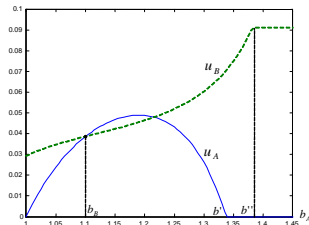
- Without loss of generality, assume  $b_A > b_B$ , i.e., labor market frictions in the differentiated sector are relatively larger in country A.

- A larger fraction of differentiated-sector firms export in country  $B$ .
- Country  $B$  exports differentiated products on net and imports homogeneous goods.
- The share of intra-industry trade is smaller the larger  $b_A/b_B$  is.

- Both countries gain from trade.
- A reduction in  $\xi_j$  ( $\implies$  reduction in  $b_j$ ) raises  $j$ 's welfare and reduces the welfare of its trade partner.
- A simultaneous proportional reduction in  $\xi_A$  and  $\xi_B$  raises welfare in both countries.
- A reduction in  $\xi_j$  and  $\xi_{0j}$  at a common rate ( $\implies b_j$  does not change) raises  $j$ 's welfare and does not affect the welfare of its trade partner.
- A reduction of trade impediments raises welfare in both countries.

# Unemployment

- The rate of unemployment is a weighted average of sectoral rates of unemployment.
- Variation in  $b_A$  and  $\tau$ :



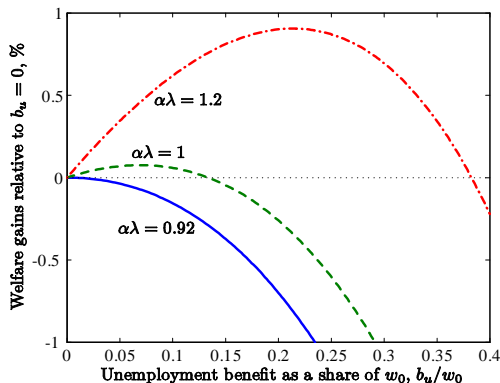
# Unemployment Benefits

- The cost of hiring workers changes with unemployment benefits, and the cost of hiring impacts welfare of both countries.
- This raises two questions:
  - Is it beneficial to have unemployment benefits?
  - How do unemployment benefits in a country impact its trade partner?
- Unemployment benefits affect wages, because they increase the outside option of workers at the bargaining stage. And they impact the decision of a worker to search for a job in the homogeneous or differentiated sector.
- Now the relevant definition is ( $\lambda$  is the relative bargaining weight of employers):

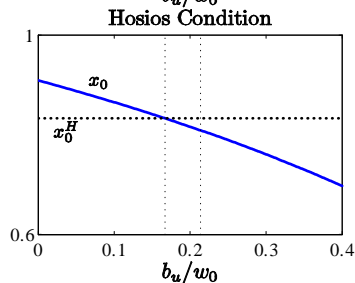
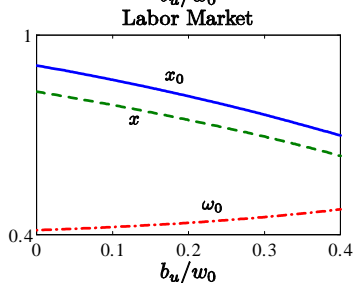
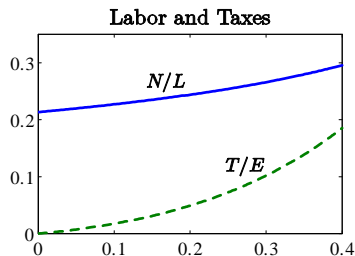
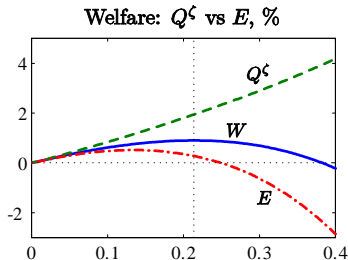
$$b_j = \zeta_j x_j^\alpha + \frac{\lambda}{1 + \lambda} b_{uj}.$$

- $b_{uj}$  raises  $b_j$  directly, and reduces  $b_j$  indirectly via the decline of  $x_j$ .

- The equilibrium conditions imply that  $b_j$  is increasing in unemployment benefits if and only if  $\xi_{0j} > \xi_j$ .
- **Interdependence:** The foreign country gains from  $j$ 's unemployment benefits if and only if  $\xi_{0j} > \xi_j$ .
- **Own effect:** Country  $j$  may gain or lose from unemployment benefits; impact  $Q$ ,  $\omega$ , and tax burden  $T$ :



# Decomposition



- Consider a constrained optimum that maximizes joint welfare of the two countries subject to the constraint that labor is allocated to firms via the matching technology.
- What policies implement this allocation?
- In the market economy there are potential distortions in
  - labor markets (tightness need not be optimal);
  - product markets (markups in the differentiated sectors);
  - choice of entry in the differentiated sector;
  - choice of exit in the differentiated sector;
  - choice of exporting in the differentiated sector.
- A single policy instrument, such as unemployment benefits, cannot correct the labor market and product market distortions.

# No Labor Market Distortions

- When the Hosios condition is satisfied, i.e.,  $\alpha\lambda = 1$ , tightness is optimal in labor markets and no labor market policies are called for.
  - The Hosios condition also applies to the Stole-Zwiebel bargaining game.
- Under these circumstances optimal policies are:
  - ad valorem output subsidy:

$$s_o = \frac{1 - \beta}{\beta(1 + \alpha)},$$

does not differentiate between exporters and nonexporters;

- the same ad valorem subsidy to all fixed costs (entry, production, export):

$$s_f = \frac{\alpha}{1 + \alpha}.$$

# Labor Market Distortions

- Let  $\alpha\lambda \neq 1$ . Then a number of labor market policies can be used to secure optimal tightness. In particular:

- subsidies to posting vacancies or to the cost of hiring, are the most direct:

$$s_b = \frac{1 - \alpha\lambda}{1 + \lambda} \geq 0;$$

- unemployment benefits, which work only if  $\alpha\lambda > 1$ :

$$b_u = \frac{\alpha\lambda - 1}{(1 + \alpha)\lambda}.$$

- The remaining optimal policies are ad valorem output subsidies and subsidies to fixed costs; with the details depending on whether  $s_b$  or  $b_u$  is used in the labor market.
- If the optimal  $s_b$  is used in the labor market, then:

$$s_o = \frac{(1 - \beta)\lambda}{\beta(1 + \lambda)}, \quad s_f = \frac{1}{1 + \lambda}.$$

This requires less information than the policies with  $b_u$ ; the latter also requires knowledge of  $\zeta_0$  and  $\zeta$ .

# Concluding Remarks

- Differences in labor market frictions can be a source of comparative advantage.
- While trade with labor market frictions is beneficial, it can raise unemployment and inequality.
- Increased wage inequality due to unobserved worker heterogeneity may result from:
  - technological change that increases the dispersion of firm productivity;
  - declining costs of international trade.
- In a cross-section of countries, differences in unemployment do not necessarily reflect differences in labor market frictions (e.g., U.S. versus Portugal at different points in time).

# Concluding Remarks

- As an isolated policy instrument, unemployment benefits can be beneficial or detrimental.
  - If beneficial, there exists an optimal level of unemployment benefits.
- There exists a simple set of policies that support a constrained Pareto optimum.
- Generalizing macro models to include trade and multiple sectors is useful for assessing active labor market policies:
  - interdependence across countries implies that a country's labor market policies affect its trade partners;
  - there exist potential gains from coordination of labor market policies, such as in the EU countries.