Labor Market Rigidities, Trade and Unemployment

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Motivation

• Institutional differences as a source of comparative advantage

• Conversely, trade may affect differently countries with different institutions

• Substantial differences across countries in labor market institutions:
  — e.g., hiring costs, firing costs, and flexibility of hours

• Types of questions we want to address:
  — How is a country affected by a change in its trade partner’s labor market institutions?
  — How does reduction in trade costs impact countries with different labor market frictions?

• Propose a framework to think about trade and labor market outcomes
Related Literature

• Institutions and Trade:
  – Labor market: Cuñat and Melitz (2007)

• Long-run structural unemployment:
  – Blanchard and Wolfers (2000) and Nickell et al. (2002)

• Trade and Unemployment:
  – Implicit contracts: Matusz (1986)
  – Search and matching: Davidson, Martin and Matusz (1999)
  – Trade and unemployment with heterogeneous firms:
New Theoretical Framework

- Two countries with different degrees of labor market frictions
- Long-run (static) model; countries are linked only via trade
- Two sectors:
  - DMP labor market frictions and wage bargaining
  - Outside sector produces homogenous good under CRS
  - Differentiated-good sector as in Melitz: monopolistic competition, increasing returns, heterogenous firms
- Labor market frictions: hiring/firing costs, productivity of matching, unemployment benefits, etc.
- Two types of “shocks”: labor market frictions and trade impediments
Main Results

• Differences in labor market frictions constitute a source of comparative advantage

• Both countries gain from trade, but country with a more flexible labor market benefits the most
  — policy complementarity within country

• A country benefits from improvements in its labor market flexibility, but this harms its trade partner
  — terms of trade vs. competitiveness effects

• However, both countries gain from a simultaneous proportional improvement in labor markets
  — policy complementarity across countries

• Flexible labor market leads to higher productivity
  — both at the firm level and selection at the aggregate

• Interactions of trade and labor market frictions generate rich patterns of unemployment
Extensions

1. Optimal labor and product market policy
   — Helpman, Itskhoki and Redding (2011)
     “Trade and Labor Market Outcomes”

2. Political economy of labor market rigidity

3. Dynamics of adjustment to trade

4. Trade, inequality and redistribution
   — Helpman, Itskhoki and Redding (2010)
     “Inequality and Unemployment in a Global Economy”
   — with Marc Muendler: Empirics of trade and inequality
   — Itskhoki (2010) “Optimal Redistribution in an Open Economy”
Preferences and Demand

- Utility:
  \[ U = q_0 + \frac{1}{\zeta} Q^\zeta, \quad 0 < \zeta < 1 \]

- Differentiated Good Aggregator:
  \[ Q = \left[ \int_{\omega \in \Omega} q(\omega)^\beta d\omega \right]^{1/\beta}, \quad \zeta < \beta < 1 \]

- Indirect utility function:
  \[ V = E + \frac{1-\zeta}{\zeta} P^{-\frac{\zeta}{1-\zeta}} = E + \frac{1-\zeta}{\zeta} Q^\zeta \]
Production and Market Structure

• Labor is the only factor of production

• Homogenous good requires one unit of labor: $q_0 = H_0$

• Differentiated product market is as in Melitz (2003):
  - $f_e$ is a fixed cost of entry with a variety $\omega$
  - upon entry productivity $\theta$ is drawn from $G_\theta(\theta)$: $y = \theta h$
  - $f_d$ is the fixed cost of production
  - $f_x$ is the fixed cost of entry into the foreign market
  - $\tau > 1$ is the variable iceberg trade cost
  - Revenue is

$$R_j(\theta) = \left[ Q_j^{\frac{-\beta - \kappa}{1 - \beta}} + l_{xj}(\theta) \cdot \tau^{\frac{-\beta}{1 - \beta}} Q_{(-j)}^{\frac{-\beta - \kappa}{1 - \beta}} \right]^{1 - \beta} (\theta h)^\beta$$
Labor Market
Homogenous sector

• Upon matching and production, surplus is split equally:

\[ \pi_0 = w_0 = \frac{1}{2} \]

• Cost of hiring:

\[ b_0 = \frac{1}{2} a_0 x_0^\alpha, \quad x_0 = \frac{H_0}{N_0}, \quad a_0 \equiv \frac{2\nu_0}{m_0^{1+\alpha}} \]

• Free entry of firms:

\[ \pi_0 = b_0 = \frac{1}{2} \quad \Rightarrow \quad x_0 = a_0^{-1/\alpha} \]

• Expected worker income:

\[ \omega_0 = x_0 w_0 = b_0 x_0 \]
Labor Market
Differentiated sector

- Hiring cost:
  \[ C(h) = bh, \quad b = \frac{1}{2} ax^\alpha \]

- Stole and Zwiebel (1996) bargaining:
  \[ w(h, \theta) = \beta R(h, \theta) \frac{h}{1 + \beta} = b \]

- Expected workers income: \( \omega = xw = bx \)

- Indifference of workers \( (\omega_0 = \omega) \):
  \[ b_0 x_0 = bx \quad \Rightarrow \quad b = b_0 \left( \frac{a}{a_0} \right)^\frac{1}{1+\alpha} \]
Labor Market

Digression: Dynamic Model

• Wages:

\[ w = (r + s)b + (b_u + xb) \]

• Labor market equilibrium:

\[ 2(r + s_0)b_0 + x_0b_0 = 1 - b_u, \quad b_0 = a_0x_0^\alpha \]

\[ b = b_0 \left( \frac{a}{a_0} \right)^{\frac{\alpha}{1+\alpha}} \]

• Comparative advantage:

\[ \Phi = (r + s)b - (r + s_0)b_0 \]

\[ = (s - s_0)b \quad \text{if} \quad b = b_0 \]
Differentiated Sector
Firm's problem

• Profit maximization

\[ \pi(\theta) = \max_{h,l_x \in \{0,1\}} \left\{ \frac{1}{1 + \beta} R(h, l_x; \theta) - bh - f_d - l_x f_x \right\} \]

• Exit if

\[ \pi(\theta) < 0 \]

• Free entry:

\[ \int \max\{\pi(\theta), 0\} dG(\theta) = f_e \]
Equilibrium Conditions

- Operating profits:

\[
\pi_{dj}(\Theta) = \phi_1 \phi_2 b_j^{\frac{-\beta}{1-\beta}} Q_j^{\frac{-\beta-\zeta}{1-\beta}} \Theta - f_d,
\]

\[
\pi_{xj}(\Theta) = \phi_1 \phi_2 b_j^{\frac{-\beta}{1-\beta}} \tau^{\frac{-\beta}{1-\beta}} Q_{(-j)}^{\frac{-\beta-\zeta}{1-\beta}} \Theta - f_x
\]

where \( \Theta \equiv \theta^{\frac{\beta}{1-\beta}} \)

- Two cutoff conditions:

\[ \pi_{dj}(\Theta_{dj}) = 0 \quad \text{and} \quad \pi_{xj}(\Theta_{xj}) = 0 \]

- Free entry condition:

\[
\int_{\Theta_{dj}}^{\infty} \pi_{dj}(\Theta) dG(\Theta) + \int_{\Theta_{xj}}^{\infty} \pi_{xj}(\Theta) dG(\Theta) = f_e
\]
Production and Export Cutoffs

Figure: Cutoffs in a trading equilibrium
Welfare and Gains from Trade

Proposition

(i) Welfare is higher in the flexible country;
(ii) An improvement in labor market institutions in one country raises its welfare and reduces the welfare of its trade partner — terms of trade vs. competitiveness effects
(iii) A simultaneous proportional improvement in labor market institutions in both countries raises welfare in both countries;
(iv) A reduction in trade impediments raises welfare in both countries, however, the flexible country benefits proportionately more

Proposition

Both countries gain from trade
Proposition

(i) There are more firms and a larger fraction of firms export in the flexible country

(ii) The flexible country exports differentiated products on net and imports homogenous good

(iii) The share of intra-industry trade is smaller the larger the proportional gap in labor market institutions

(iv) Assuming Pareto-distributed productivity, total volume of trade increases in the proportional gap in labor market institutions and decreases in the trade costs
Productivity

Consider the following measure of productivity:

\[
TFP_j \equiv \frac{M_j}{H_j} \left[ \int_{\Theta_{dj}}^{\infty} \Theta \frac{1-\beta}{\beta} h_{dj}(\Theta) dG(\Theta) + \int_{\Theta_{xj}}^{\infty} \Theta \frac{1-\beta}{\beta} h_{xj}(\Theta) dG(\Theta) \right]
\]

Proposition

(i) \( TFP_j \) does not depend on \( b_j \) in the closed economy;
(ii) \( TFP_j \) is higher in any trading equilibrium than in autarky.

Proposition

Assuming individual productivity draws are distributed Pareto:

(i) \( TFP_j \) is higher in the flexible country;
(ii) An improvement in \( b_j \) raises \( TFP_j \) and reduces \( TFP_{(-j)} \);
(iii) A reduction in \( \tau \) raises \( TFP_j \) in both countries.
Unemployment

- Unemployment rate:

\[ u = (1 - x_0) \frac{L - N}{L} + (1 - x) \frac{N}{L} \]

- Two effects:
  - Sectoral labor market tightness, \( x \) and \( x_0 \)
  - Compositional effect across sectors, \( N/L \)

- Symmetric countries, \( b_A = b_B = b \):
  1. Hump-shaped response of \( u \) to \( b \)
  2. Trade raises unemployment iff \( x < x_0 \)
Figure: Unemployment as a function of labor market frictions
Figure: Unemployment as a function of $\tau$: $b_A = 0.7 > b_B = 0.55$
Labor Market Institutions

- Unemployment Benefits: \( b_u \) if not matched w/p \( 1 - x \)
- Firing Costs:
  - with probability \( \sigma \) match is unproductive
  - firm bears administrative cost of firing \( b_f \) and severance pay \( b_p \)
  - fired worker receives \( b_p + \eta b_u > b_u \)

- Labor market equilibrium:

\[
b = \frac{ax^\alpha + \sigma(b_f + b_p)}{1 - \sigma} + \frac{1}{2} b_u, \\
w = \frac{\beta R}{1 + \beta} + \frac{1}{2} b_u = b + \frac{1}{2} b_u, \\
x\left[(1 - \sigma)w + \sigma(b_p + \eta b_u)\right] + (1 - x)b_u = \omega_0
\]
• Sufficient statistic $(x, b)$:

\[
b = \frac{ax^\alpha + \sigma(b_f + b_p)}{1 - \sigma} + \frac{1}{2} b_u, \tag{C}
\]

\[
x[(1 - \sigma)b + \sigma(b_p + \eta b_u - b_u)] = \omega_0 - b_u \tag{l}
\]

• Comparative statics:
  
  - $a$, $b_f$, $b_p$ and $b_u$ reduce $x$, i.e. slacken the labor market
  - $a$ and $b_f$ raise $b$, i.e. reduce competitiveness
  - $b_p$ and $b_u$ may raise or reduce $b$, that is by slackening the labor market they may increase competitiveness
Optimal Policy I
Constrained efficiency

• Distortions:
  1. Search externalities
  2. Monopolistic distortion vs. Stole-Zweibel overhiring

• Policy in labor market:
  — Hosios condition: $\lambda = 1/\alpha$ (relative bargaining power of firm)
  — Vacancy posting subsidy: $s_b = \frac{1 - \alpha \lambda}{1 + \lambda}$
  — Unemployment benefits: $b_u = \frac{\alpha \lambda - 1}{(1 + \alpha)\lambda}$

• Policy in product market (with $s_b$ in place):

\[ s_r = \frac{1 - \beta}{\beta} \frac{\lambda}{1 + \lambda} \quad \text{and} \quad s_f = \frac{1}{1 + \lambda} \]
Optimal Policy II

Second best policy: unemployment benefits only

Figure: Welfare gains and losses from $b_u$
Optimal Policy II
Second best policy: unemployment benefits only

Welfare: $Q^\xi$ vs $E$, %

Labor and Taxes

Labor Market

Hosios Condition

Figure: Effects of $b_u$
Additional extensions

Political economy of regulatory gridlock

- Why keep inefficient labor market institutions?
- Standard answer: unions, insiders and labor parties
- Our answer: large firms support rigid labor markets as effective entry barriers for smaller firms

Result:

\[ \pi = \pi(\theta; A(b), b) \]

Consider linear demand. For large enough \( \theta \), full effect of \( b \) on \( \pi \) is positive.
Additional extensions

*Large firms and the Shimer puzzle*

- Wage rate
  \[ w = b_u + \frac{\phi}{1 - \phi} \left( r + s + x \right) b \]

- Optimal employment of firms:
  \[ (1 - \phi) \left( \frac{\beta}{(1 - \phi)} + \phi \beta \left( \frac{A(z\theta h)^\beta}{h} - b_u \right) \right) = (r + s + \phi x) b \]

- Elasticity of $b$ with respect to $p$ does not depend on $\beta$, independently of free entry and other details

- Caveats: (1) $b$ dynamics, and (2) non-hiring firms
Additional extensions

Labor market dynamics of adjustment to trade

- Reallocation both across and within sectors
- Empirically most reallocation is within
- Tentatively, search frictions affect volume of trade but have little affect on welfare
Summary and Policy Implications

- Interaction of labor market rigidities and trade frictions generate rich patterns of unemployment
- Trade may raise unemployment in both countries
- Both countries gain from trade, but more flexible country gains proportionately more
- Improvements in a country’s labor market institutions raises its welfare and hurts the trade partner
- Yet, a simultaneous proportional improvement in both labor markets raises welfare in both countries

- Trade liberalization and labor market deregulation are complementary
- Labor market reforms in one country are likely to encourage labor market reforms in its trade partners
Trade and inequality
Helpman, Itskhoki and Redding (2010)

• Wage equals replacement cost of a worker:

\[ w(\theta) = \frac{b}{h(\theta)/n(\theta)} = ba_c(\theta)^k \]

• Additional ingredients:
  — unobservable worker heterogeneity (match effects)
  — production complementarities
  — costly imperfect screening
Trade and inequality
Helpman, Itskhoki and Redding (2010)

Figure: Wage schedule: size and export wage premia
Trade and inequality

Helpman, Itskhoiki and Redding (2010)

\[ \rho = \frac{\theta_d}{\theta_x} \]

\[ T_w = \bar{\mu} - \ln(1 + \bar{\mu}) \]

Figure: Trade openness and inequality
Figure: Wage inequality in Brazil: Within vs Between Occupations
Trade and inequality
Helpman, Itskhoki, Muendler and Redding (2011)

Figure: Wage inequality in Brazil: Within vs Between Sectors
Figure: Wage inequality in Brazil: Within vs Between Firms