Threatening to Offshore in a Search Model of the Labor Market

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*The views expressed in this paper are those of the authors should not be attributed to the Federal Reserve Bank of San Francisco or the Federal Reserve System.*
Threatening to offshore

- In September 2010, Fiat warned its unions that it would move all its Italian production to Serbia and Poland if costs were not lowered.

- Fiat obtained major concessions: more flexible workforce and lower wages.

- “Offshorability” might be as relevant as actual offshoring.

- Blinder (2006):
  “…it is not necessary actually to move jobs to low-wage countries in order to restrain wage increases, the mere threat of offshoring can put a damper on wages.”
How important is the threat of offshoring?

- Difficult to measure empirically (off equilibrium outcomes)
  - Blinder (2006)

- Standard models are also ill-suited to address this issue
What we do in this paper

1. Methodological: Develop a model that captures the threat of offshoring in a tractable manner

2. Quantitative: a) Assess the importance of this channel for the labor market

   b) Under what conditions is the threat more important?
Findings

- Long-run effect on wages is however very small due to free entry and adjustment in capital stocks.

- Short-run effect on wages is sizeable even when actual offshoring is small.

- Rise in wages mitigated by more than 30 percent following productivity increases or trade liberalizations.
Overview of the model

- 2 countries each producing a final traded good

- At Home, multinational engages in int’l production sharing
  - Operates domestic and foreign plants
    (Antràs and Helpman (2004), Burstein, Kurtz, and Tesar (2008))
  - Plants use capital and labor to produce intermediate goods

- Search frictions in labor markets
  - Entry costs in job creation
  - Fraction $\Omega$ of Home jobs can be offshored
  - Sequential labor markets
Timeline: Sequential search

- Home HH
- Home Multinational
- Foreign HH
- Foreign Firm

Market for Domestic Jobs (Morning)

Morning

Evening

$t$

$t+1$
Timeline: Sequential search

- Home HH
  - Market for Domestic Jobs (Morning)
- Home Multinational
  - Morning
- Foreign HH
  - Market for Offshored Jobs (Evening)
- Foreign Firm
  - Market for Domestic Jobs (Morning)

Leduc & Wilson
Roads to Prosperity or Bridges to Nowhere?
Timeline: Sequential search

Home HH → Market for Domestic Jobs (Morning)

Home Multinational

Foreign HH → Market for Offshored Jobs (Evening)

Foreign Firm → Market for Domestic Jobs (Morning)

timeline diagram with Home HH and Multinational connected to Morning andEvening markets, with Foreign HH and Firm connecting to Offshored and Domestic jobs.
Home Households

- Aggregate consumption: 
  \[ c_t = \left( \frac{1}{\lambda^\xi} c_{H,t}^{\xi^\xi} + (1 - \lambda)^\xi c_{F,t}^{\xi^\xi} \right) \]

- HH maximizes: 
  \[ E_0 \sum_{t=0}^{\infty} \beta^t \left[ u(c_t) - h(lfp_t) \right] \]

- Budget Cons.: 
  \[ pc_t + I_t + \int p_{bt,t+1} b_{t+1} = w_{d,t} n_{d,t} + r_t k_{d,t} + (1 - \kappa^h(\theta_{d,t})) s_{d,t} \chi + b_t \]

- Employment LOM: 
  \[ n_{d,t} = (1 - \rho)n_{d,t-1} + \kappa^h(\theta_{d,t}) s_{d,t} \]
  \[ \theta_{d,t} = \frac{v_{d,t}}{s_{d,t}} \]
Home multinational firm: Production

- Final good
  (offshoring at the intensive margin)

- Domestic and foreign plants’s production:

\[ y_t = z_t f(y_{d,t}, y_{o,t}^*) \]

\[ y_{d,t} = z_{d,t} g(n_{d,t}, k_{d,t}) \]

\[ y_{o,t}^* = z_{o,t}^* g(n_{o,t}^*, k_{o,t}^*) \]
Home multinational firm: Entry

- Capital must be installed to create a vacancy:
  \[ V_{d,t} = r_t^k k_{d,t} \quad V_{o,t}^* = q_t r_t^{k*} k_{o,t}^* \]

- Implications:
  - Value of firm’s outside option not driven to zero under free entry
  - Vacancies are a predetermined variable

\[
v_{d,t} = (1 - \rho^x) \rho^n n_{d,t-1} + (1 - \rho^x)(1 - \kappa^f (\theta_{d,t-1}))(1 - \Omega \kappa^f (\theta_{o,t-1}^*))v_{d,t-1} + ne_{d,t}
\]

\[
v_{o,t}^* = (1 - \rho^x) \rho^n n_{o,t-1}^* + (1 - \kappa^f (\theta_{o,t-1}^*))v_{o,t-1}^* + ne_{o,t}^*
\]
Home multinational firm: Optimization

\[
\max E_0 \sum_{t=0}^{\infty} \beta^t \frac{\lambda_t}{\lambda_0} \left[ y_t - \left( w_{d,t} n_{d,t} - r^k k_{d,t} - \gamma_d v_{d,t} \right) - \left( q_t w_{o,t}^* n_{o,t}^* - r^k k_{o,t}^* - \gamma_o \tilde{v}_{o,t}^* \right) \right]
\]

Subject to:

\[
n_{d,t} = (1 - \rho^n)(1 - \rho^x)n_{d,t-1} + v_{d,t} k^f(\theta_{d,t})
\]

\[
n_{o,t}^* = (1 - \rho)(1 - \rho^x)n_{o,t-1}^* + \tilde{v}_{o,t}^* k^f(\theta_{o,t}^*)
\]

\[
\tilde{v}_{o,t}^* = v_{o,t}^* + \Omega(1 - k^f(\theta_{d,t}))v_{d,t}
\]

\[
\theta_{o,t}^* = \frac{\tilde{v}_{o,t}^*}{s_{o,t}^*}
\]

Plus two previous LOM for vacancies
Wage determination

- Wage is determined via bargaining over the total surplus of a match

\[
(W_{i,t} - U_{i,t})^\eta (J_{i,t} - V_{i,t})^{1-\eta}
\]

- Generalized Nash sharing rule for market \( i \)

\[
W_{i,t} - U_{i,t} = \frac{\eta}{1-\eta} (J_{i,t} - V_{i,t})
\]
Home worker’s value functions

- Value of unemployment

\[ U_t = 0 \]

(free entry into the labor force)

- Value of a domestic employment relationship

\[ W_{d,t} = w_{d,t} - \frac{h_t'}{u_t'} + (1 - \rho^x)(1 - \rho^n) \beta E_t \left( \frac{u_{t+1}'}{u_t'} W_{d,t+1} \right) \]
Multinational’s value function

- Value of a Home filled position

\[ J_{d,t} = f_{n_{d},t} - w_{d,t} + \beta(1 - \rho^x)E_t \left( \frac{u_{t+1}}{u_t} \right) \left( \rho^n V_{d,t+1} + (1 - \rho^n)J_{d,t+1} \right) \]

- Value of a unfilled vacancy

\[ V_{d,t} = -\gamma + \kappa^f(\theta_{d,t})J_{d,t} \]
\[ + \Omega(1 - \kappa^f(\theta_{d,t}))(\kappa^f(\theta_{o,t}^*)J_{o,t} - \gamma_{o}^*) \]
\[ + (1 - \kappa^f(\theta_{d,t}))(1 - \Omega \kappa^f(\theta_{o,t}^*))(1 - \rho) \beta E_t \left( \frac{u_{t+1}}{u_t} \right) V_{d,t+1} \]
Wages in the short and long run

- **Short-run wage**

\[ w_{d,t} = (1 - \eta) \frac{h'(lfp_t)}{u'(c_t)} + \eta f_{n_d,t} - \eta \kappa^f(\theta_{d,t})J_{d,t} \]

- **Core**

\[ - \eta \Omega (1 - \kappa^f(\theta_{d,t})) (\kappa^f(\theta^*_o)J_{o,t} - \gamma^*_o) \]

- **Threat**

\[ + \eta (1 - \rho) (\kappa^f(\theta_{d,t}) + (1 - \kappa^f(\theta_{d,t})) \kappa^f(\theta^*_o)) \beta E_t \left( \frac{u'_{t+1}}{u'_t} V_{d,t+1} \right) \]

- **Long-run wage**

\[ w_{d,t} = (1 - \eta) \frac{h'(lfp_t)}{u'(c_t)} + \eta f_{n_d,t} - \eta (1 - \beta (1 - \rho^x)) r^k_t k_t \]

- **Vacancy persistence**

**1. Core**

**2. Threat**

**3. Vacancy persistence**
Calibration to US and Mexican data

- **Final goods production**
  \[ y_t = z_t \left( \Gamma y_{d,t}^g + (1 - \Gamma) y_{o,t}^g \right)^{\frac{1}{\vartheta}} \]
  \[ \Gamma = 0.99 \]
  \[ \vartheta = 1 \]

- **Plant production**
  \[ y_{d,t} = z_{d,t} n_{d,t}^{\alpha} k_{d,t}^{\alpha} \]
  \[ y_{o,t} = z_{o,t} n_{o,t}^{\alpha^*} k_{o,t}^{\alpha^*} \]
  \[ \alpha = 0.7 \]
  \[ \alpha^* = 0.85 \]

- **Blinder (2006):**
  \[ \Omega = 0.2 \]

- **Foreign workers have less bargaining power:**
  \[ \eta = 0.5 \]
  \[ \eta^* = 0.25 \]
Quantitative analysis of the threat of offshoring

- How does the threat effect influence the responses to shocks
  - Increase in Home TFP
  - Trade liberalization (fall in iceberg cost)

- Compare responses with threat effect ($\Omega=0.2$) to responses without threat effect ($\Omega=0$)
Wages in the short and long run

- Short-run wage

\[ w_{d,t} = (1 - \eta) \frac{h'(lfp_t)}{u'(c_t)} + \eta f_{n_{d,t}} - \eta \kappa_f (\theta_{d,t}) J_{d,t} \]

1. Core

\[ - \eta \Omega (1 - \kappa_f (\theta_{d,t})) (\kappa_f (\theta_{o,t}^*) J_{o,t} - \gamma_o^*) \]

2. Threat

\[ + \eta (1 - \rho) \left( \kappa_f (\theta_{d,t}) + (1 - \kappa_f (\theta_{d,t})) \kappa_f (\theta_{o,t}^*) \right) \beta E_t \left( \frac{u_{t+1}'}{u_t'} V_{d,t+1} \right) \]

3. Vacancy persistence

- Ceteris paribus, threat effect lowers steady-state wage by 8 percent
Threat effect on wages: temporary shocks

Technology Shock (Higher Productivity at Domestic Plants)

Trade Cost Shock (Lower Iceberg Cost)
### Threat effect: Permanent technology shock

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Effects are similar for a trade liberalization.
Conclusion

1. Develop a model that captures the threat of offshoring in a tractable manner

2. Threat of offshoring has sizeable effects on labor market in the short run
   1. Mitigate wage increase by roughly 30 percent following rise in productivity or trade liberalization
   2. Lower wages accompanied by less decline in unemployment

3. Minimal effects in the long run when entry and capital stock are free to adjust