Threatening to Offshore in a Search Model of the Labor Market

David Arseneau
(Federal Reserve Board)
Sylvain Leduc
(Federal Reserve Bank of San Francisco)

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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 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?

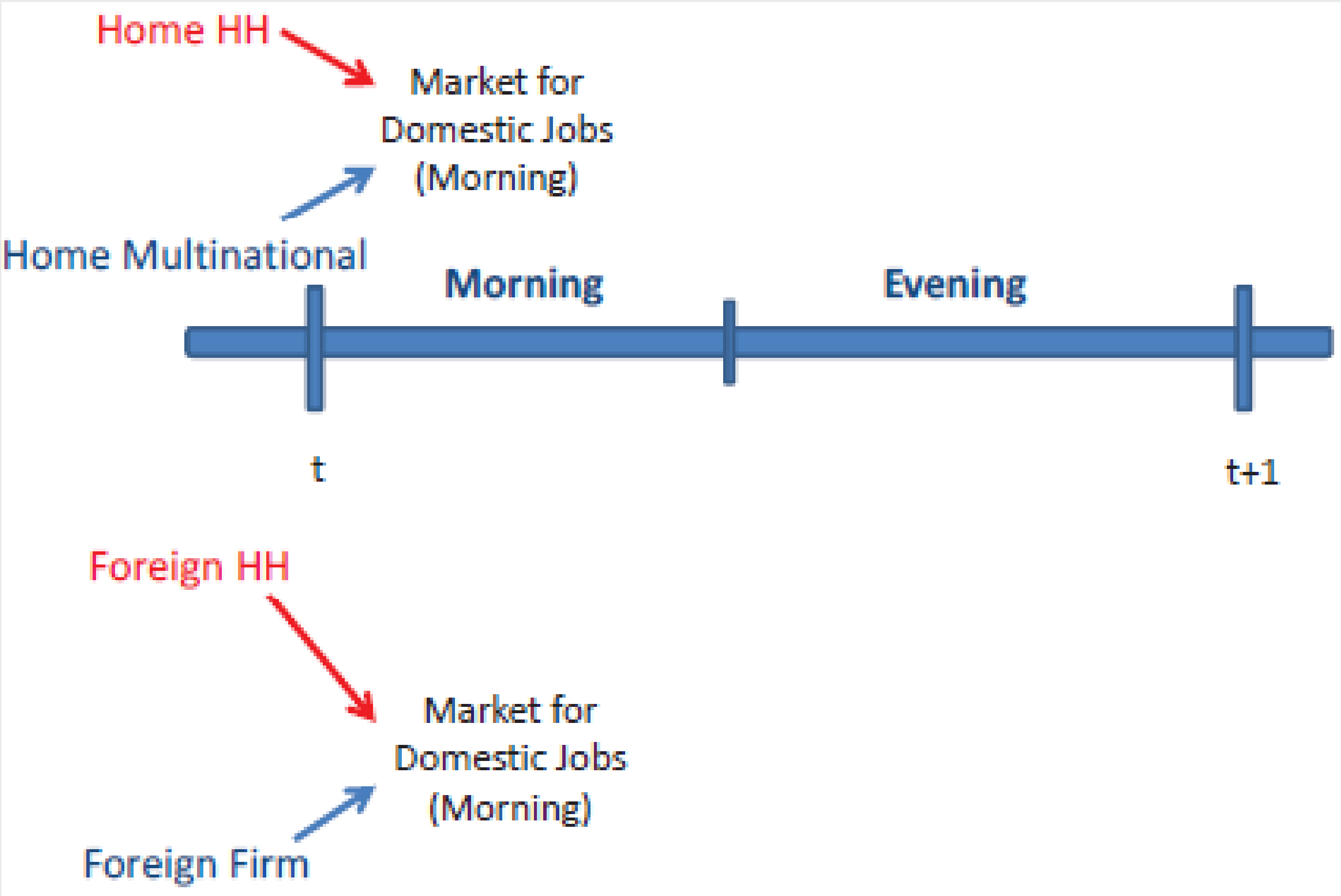
Findings

- 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

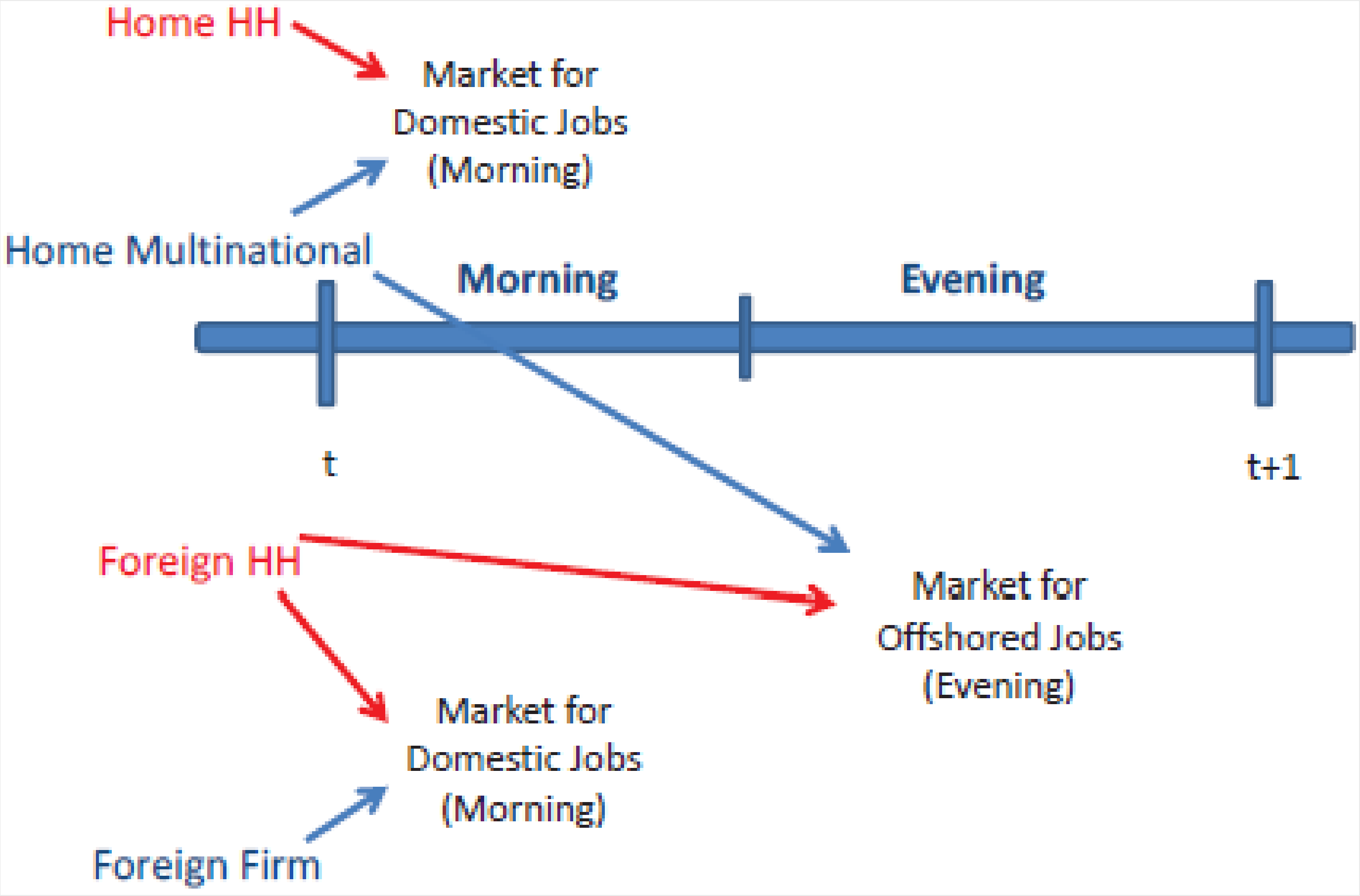
Overview of the model

- 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 Ω of Home jobs can be offshored
  - Sequential labor markets

Timeline: Sequential search



Timeline: Sequential search



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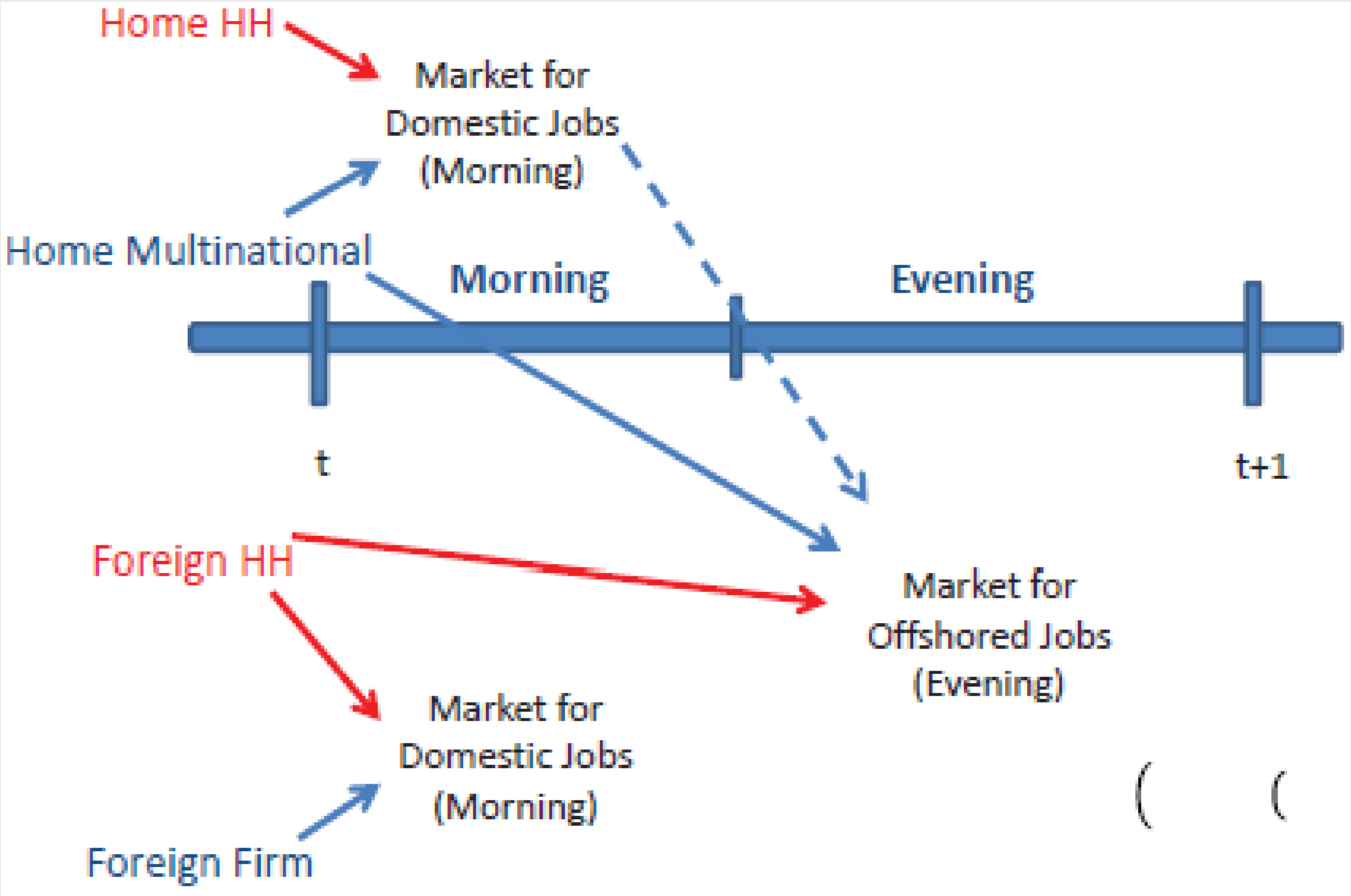


Home Households

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

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

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

- 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)

$$y_t = z_t f(y_{d,t}, y^*_{o,t})$$

- Domestic and foreign plants's production:

$$y_{d,t} = z_{d,t} g(n_{d,t}, k_{d,t})$$

$$y^*_{o,t} = z^*_{o,t} g(n^*_{o,t}, k^*_{o,t})$$

Home multinational firm: Entry

- Capital must be installed to create a vacancy:

$$V_{d,t} = r_t^k k_{d,t} \qquad V_{o,t}^* = q_t r_t^{k*} k_{o,t}^*$$

- 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

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

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

$$\left(W_{i,t} - U_{i,t}\right)^{\eta}\left(J_{i,t} - V_{i,t}\right)^{1-\eta}$$

- Generalized Nash sharing rule for market *i*

$$W_{i,t} - U_{i,t} = \frac{\eta}{1-\eta}\left(J_{i,t} - V_{i,t}\right)$$

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

$$J_{d,t} = f_{n_d,t} - w_{d,t} + \beta(1-\rho^x)E_t\left(\frac{u'_{t+1}}{u'_t}\left(\rho^n V_{d,t+1} + (1-\rho^n)J_{d,t+1}\right)\right)$$

- Value of a unfilled vacancy

$$\begin{aligned} V_{d,t} &= -\gamma + \kappa^f(\theta_{d,t})J_{d,t} \\ &+ \Omega(1-\kappa^f(\theta_{d,t}))\left(\kappa^f(\theta^*_{o.t})J_{o,t} - \gamma^*_o\right) \\ &+ (1-\kappa^f(\theta_{d,t}))(1-\Omega\kappa^f(\theta^*_{o,t}))(1-\rho)\beta E_t\left(\frac{u'_{t+1}}{u'_t}V_{d,t+1}\right) \end{aligned}$$

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

$$-\eta\Omega(1-\kappa^f(\theta_{d,t}))\left(\kappa^f(\theta^*_{o.t})J_{o,t} - \gamma^*_o\right)$$

2. Threat

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

- Long-run wage

3. Vacancy persistence

$$w_{d,t} = (1-\eta)\frac{h'(lfp_t)}{u'(c_t)} + \eta f_{n_d,t} - \eta\left(1-\beta(1-\rho^x)\right)r_t^k k_t$$

Calibration to US and Mexican data

- Final goods production

$$y_t = z_t\left(\Gamma y_{d,t}^{\vartheta} + (1-\Gamma) y_{o,t}^{\vartheta}\right)^{\frac{1}{\vartheta}}$$

$$\Gamma = 0.99$$
$$\vartheta = 1$$

- Plant production

$$y_{d,t} = z_{d,t} n_{d,t}^{\alpha} k_{d,t}^{\alpha} \qquad y_{o,t} = z_{o,t} n_{o,t}^{\alpha^*} k_{o,t}^{\alpha^*}$$

$$\alpha = 0.7$$
$$\alpha^* = 0.85$$

- 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 (Ω=0.2) to responses without threat effect (Ω=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

$$-\eta\Omega(1-\kappa^f(\theta_{d,t}))\left(\kappa^f(\theta^*_{o.t})J_{o,t} - \gamma^*_o\right)$$

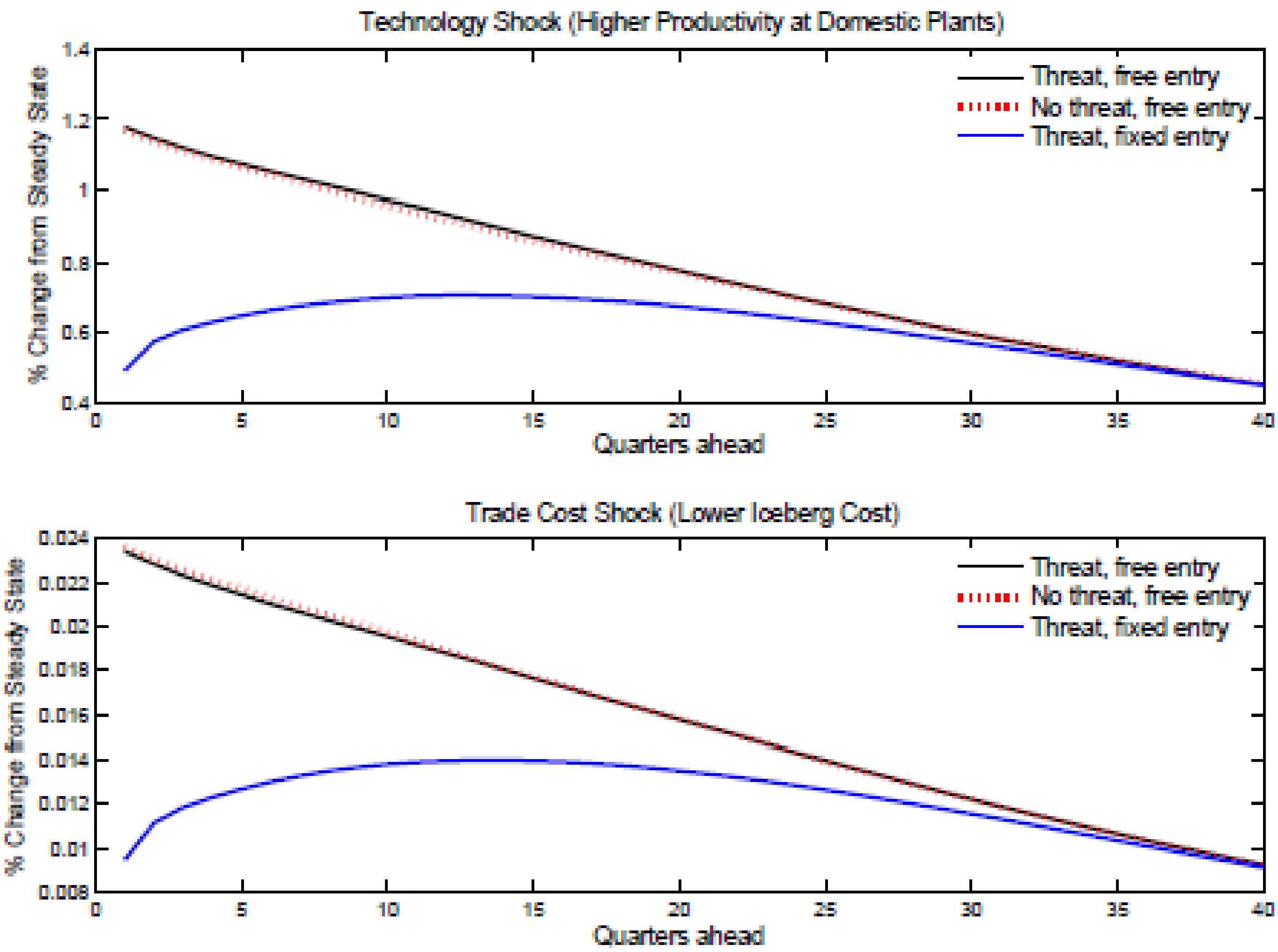
2. Threat

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

3. Vacancy persistence

- *Ceteris paribus*, threat effect lowers steady-state wage by 8 percent

Threat effect on wages: temporary shocks



Threat effect: Permanent technology shock

	Fixed Entry		Free Entry	
	No threat	Threat / No threat	No threat	Threat / No threat
Wage	16.1	0.7	14.4	1.0
Unemp.	-0.8	0.3	-0.7	1.0
LFP	-0.8	1.3	-0.7	1.0
Emp.	-0.3	4.0	-0.3	1.0
Cons.	11.4	0.8	10.2	1.0

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