Multinationals and the Globalization of Production
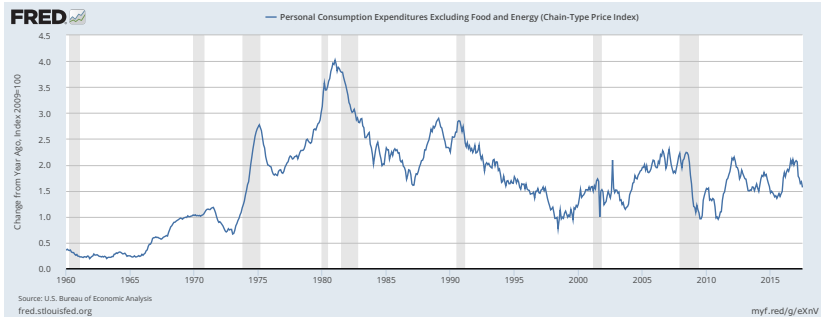
Horizontal FDI: I

Penn State // Fall 2017

Administrative things

▶ Arkaive.com course code: 84ST

    ▶ Please sign in

▶ Problem set #1: due Thursday September 7, end of class

    ▶ Available this afternoon

    ▶ Print out copy, hand in to folder (no e-submission)

    ▶ Can discuss with classmates, but turn in your own work

    ▶ Read "problem set guidelines"

August 2017 Employment Situation

- ► Released on Friday // Key data:
    - ► Change in payroll — net number of jobs created
    - ► Unemployment statistics

- ► What happened?
    - ► Net change in payroll = 156,000 (expected 180,000 or so)
    - ► Unemployment rate about the same = 4.4%
    - ► Data collected pre-hurricane

- ► FOMC meeting September 19–20
    1. "Stable prices"
    2. "Full employment"

- ► How will this affect FOMC decisions?

CPI inflation

Nonfarm payroll
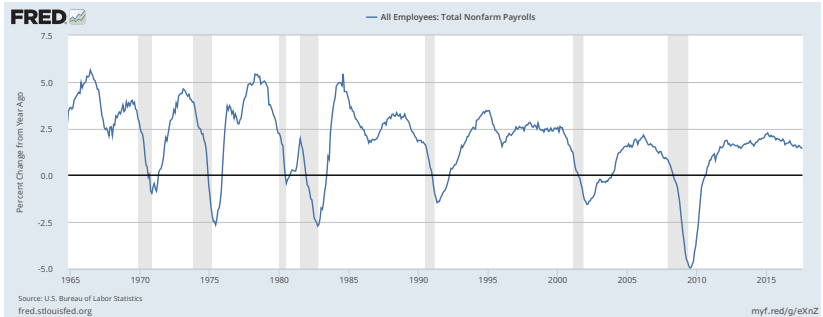
Roadmap

- ▶ Past: OLI framework
    - ▶ Identify MNE advantage
    - ▶ High-level analysis

- ▶ Past/present: MNE facts
    - ▶ Lays the foundation for model features
    - ▶ Way to asses model successes

- ▶ Present: Towards a model of horizontal FDI
    - ▶ Introduce a model of competition
    - ▶ The closed economy
    - ▶ Open economy with exporters and MNEs

Horizontal FDI

- ► Horizontal FDI: Use affiliates to serve foreign market

- ► Relevant facts

  - ► More multinational activity in bigger markets

  - ► More multinational activity (compared to exports) with distance

- ► Important model ingredients

  - ► Exporting requires additional costs

  - ► Building a foreign affiliate requires a fixed cost

- ► Key tradeoff in the model

  - ► Saving on transport costs vs. saving on production fixed costs

  - ► Called the "proximity-concentration tradeoff"

Model overview

► A firm would like to serve a foreign market. How?

  ► Should it produce at home and export? (an exporter)

  ► Should it produce abroad? (an MNE)

► The firm makes an either-or decision

  ► We call these *discrete choice models*

► To solve a discrete choice model

  ► Compute the profit from each choice (exporter, MNE)

  ► Choose the one with the highest profit

Exporters

- Pay export fixed costs, pay trade cost τ

- How much profit does the firm earn from exporting?

- Choose prices p and p_e to maximize profit

$$\pi_1^e(\varphi) = \left(p - \frac{w_1}{\varphi} \right) E_1 p^{-\epsilon_1} + \left(p_e - \frac{w_1}{\varphi}(1 + \tau) \right) E_2 p_e^{-\epsilon_2} - w_1 f^e - w_1 f^p$$

- The solution is a mark-up over marginal cost

$$p = \frac{w_1}{\varphi} \frac{\epsilon_1}{\epsilon_1 - 1} \qquad p_e = \frac{w_1}{\varphi} \frac{\epsilon_2}{\epsilon_2 - 1}(1 + \tau)$$

- Price rises to offset export costs (similar to having smaller φ)

Exporting firms

▶ Substitute prices back into profit function

$$\pi_1^e(\varphi) = \frac{1}{\epsilon_1}\left(\frac{\epsilon_1}{\epsilon_1 - 1}\frac{w_1}{\varphi}\right)^{1-\epsilon_1} E_1 + \frac{1}{\epsilon_2}\left(\frac{\epsilon_2}{\epsilon_2 - 1}\frac{w_1}{\varphi}(1+\tau)\right)^{1-\epsilon_2} E_2 - w_1 f^p - w_1 f^e$$

▶ How do profits change with productivity?

▶ How does τ impact profit?

Multinational firms

▶ Pay export production fixed cost abroad; avoid τ and f^e

▶ How much profit does the firm earn from affiliate sales?

▶ Choose prices p and p_m to maximize profit

$$\pi_1^m(\varphi) = \left(p - \frac{w_1}{\varphi}\right) E_1 p_m^{-\epsilon_1} + \left(p_m - \frac{w_2}{\varphi}\right) E_2 p_m^{-\epsilon_2} - w_1 f^p - w_2 f^p$$

▶ The solution is a mark-up over marginal cost

$$p = \frac{w_1}{\varphi} \frac{\epsilon_1}{\epsilon_1 - 1} \qquad p_m = \frac{w_2}{\varphi} \frac{\epsilon_2}{\epsilon_2 - 1}$$

▶ Marginal cost now w_2/φ

Multinational firms

▶ Substitute price back into profit function

$$\pi_1^m(\varphi) = \frac{1}{\epsilon_1} \left(\frac{\epsilon_1}{\epsilon_1 - 1} \frac{w_1}{\varphi} \right)^{1-\epsilon_1} E_1 + \frac{1}{\epsilon_2} \left(\frac{\epsilon_2}{\epsilon_2 - 1} \frac{w_2}{\varphi} \right)^{1-\epsilon_2} E_2 - w_1 f^p - w_2 f^p$$

▶ How do profits change with productivity?

▶ How does this compare to export profit?

Exporting vs. multinational production

▶ Exporter

$$\pi_1^e(\varphi) = \frac{1}{\epsilon_1} \left(\frac{\epsilon_1}{\epsilon_1 - 1} \frac{w_1}{\varphi} \right)^{1-\epsilon_1} E_1 + \frac{1}{\epsilon_2} \left(\frac{\epsilon_2}{\epsilon_2 - 1} \frac{w_1}{\varphi} (1 + \tau) \right)^{1-\epsilon_2} E_2 - w_1 f^p - w_1 f^e$$

▶ MNE

$$\pi_1^m(\varphi) = \frac{1}{\epsilon_1} \left(\frac{\epsilon_1}{\epsilon_1 - 1} \frac{w_1}{\varphi} \right)^{1-\epsilon_1} E_1 + \frac{1}{\epsilon_2} \left(\frac{\epsilon_2}{\epsilon_2 - 1} \frac{w_2}{\varphi} \right)^{1-\epsilon_2} E_2 - w_1 f^p - w_2 f^p$$

▶ Which method delivers the greatest profit?

▶ Domestic profits are the same in each case, so we can ignore them

Exporting vs. multinational production

▶ Exporter: $p_e = \frac{w_1}{\varphi} \frac{\epsilon_2}{\epsilon_2 - 1}(1 + \tau)$

$$\Delta \pi_1^e(\varphi) = \frac{1}{\epsilon_2} \left(\frac{\epsilon_2}{\epsilon_2 - 1} \frac{w_1}{\varphi}(1 + \tau) \right)^{1-\epsilon_2} E_2 - w_1 f^e$$

▶ MNE: $p_m = \frac{w_2}{\varphi} \frac{\epsilon_2}{\epsilon_2 - 1}$

$$\Delta \pi_1^m(\varphi) = \frac{1}{\epsilon_2} \left(\frac{\epsilon_2}{\epsilon_2 - 1} \frac{w_2}{\varphi} \right)^{1-\epsilon_2} E_2 - w_2 f^p$$

In class problem: exporting vs. MNE

► 5-10 min, work with those around you

► $w_1 = w_2 = 2$, $E_2 = 50$, $\epsilon_2 = 3$, $f^p = 1.7$, $f^e = 0.6$, $\tau = 0.3$

1. Should a firm with $\varphi = 1.5$ export to serve the foreign market or use a foreign affiliate?

2. Should a firm with $\varphi = 2.0$ export to serve the foreign market or use a foreign affiliate?

In class problem: exporting vs. MNE

▶ $w_1 = w_2 = 2$, $E_2 = 50$, $\epsilon_2 = 3$, $f^p = 1.7$, $f^e = 0.6$, $\tau = 0.3$

1. Should a firm with $\varphi = 1.5$ export to serve the foreign market or use a foreign affiliate?

In class problem: exporting vs. MNE

- $w_1 = w_2 = 2$, $E_2 = 50$, $\epsilon_2 = 3$, $f^p = 1.7$, $f^e = 0.6$, $\tau = 0.3$

2. Should a firm with $\varphi = 2.0$ export to serve the foreign market or use a foreign affiliate?

$\Delta \pi_1^m(\varphi)$ vs. $\Delta \pi_1^e(\varphi)$

profit from MNE

profit from exporting

profit

firm productivity, phi