

# **The Formation and Operation of the Multinational Enterprise**

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Lecture 1: Introduction to the theory of  
multinational enterprise. Horizontal and  
Vertical FDI

# Outline of the course

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1. Introduction to the theory of the MNE. Models of horizontal and vertical FDI.
  - *Lecturer: KE*
2. Recent approaches to the analysis of the MNE. Firm heterogeneity and the organization of production.
  - *Lecturer: KE & MM*
3. Empirical analysis of the MNE. Effects of FDI for labor demand.
  - *Lecturer: MM*

# Outline of lecture 1

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1. Why study MNEs?
2. Patterns of FDI which theory needs to explain
3. “Traditional” approaches to the analysis of the MNE
  - Models of horizontal and vertical FDI
  - A simple model of horizontal FDI

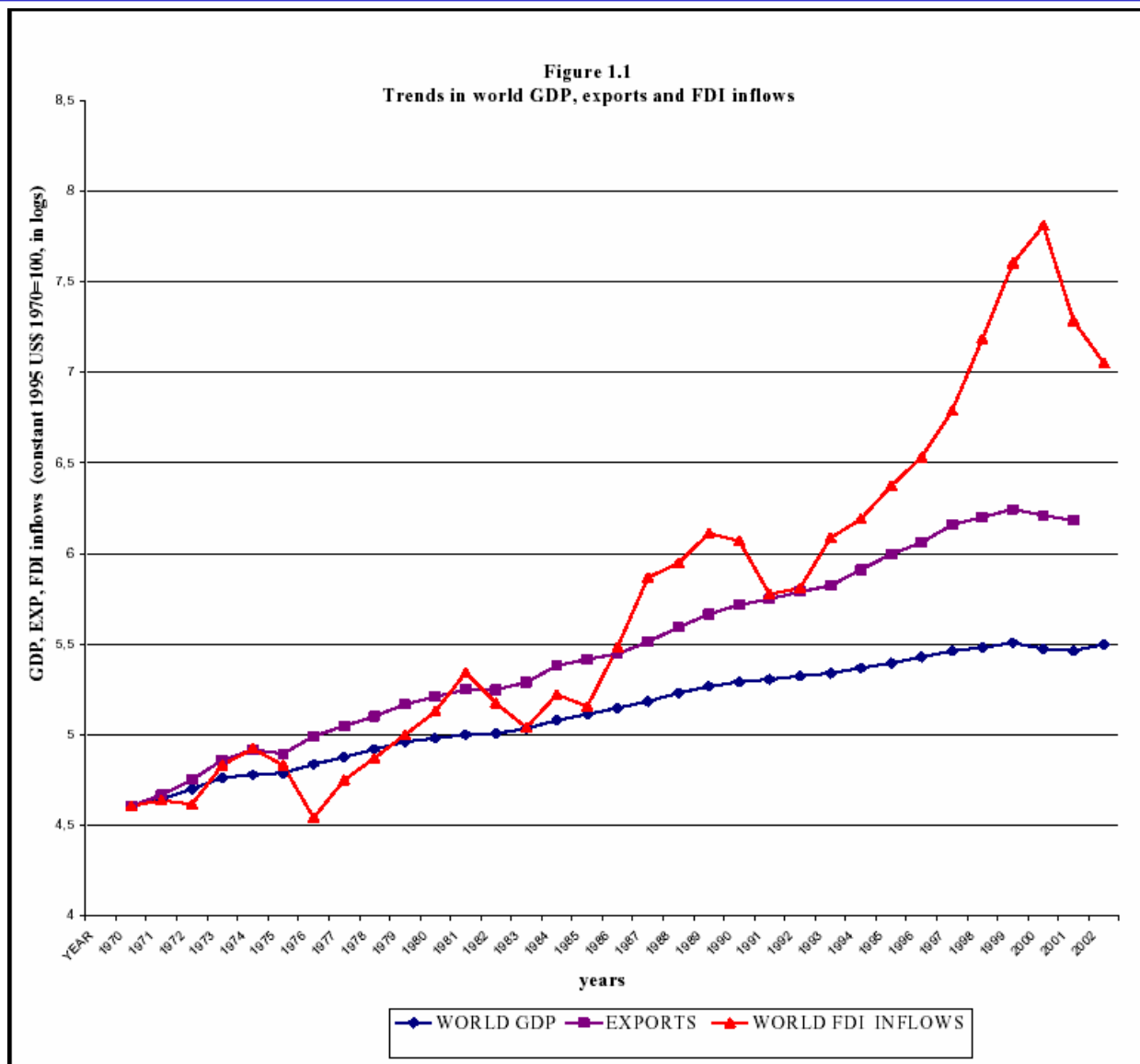
# Why study multinationals?

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- **They are important.**

- Growth in FDI has surpassed growth in both trade and production.
- The top 10 multinationals account for about one percent of world GDP.
- About a third of world trade is estimated to take place within MNEs. 43 percent of US imports is intra-firm (Zeile, 1997).
- The increased importance of multinationals constitute the perhaps only truly new aspect of globalization compared with the 1870-1913 period.

# World GDP, exports and FDI inflows



Source: Barba Navaretti and Venables (2004)

## Share of value added of in world GDP

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	1990	2000
Top 10 multinational enterprises	1.0	0.9
Top 20 multinational enterprises	1.8	1.5
Top 50 multinational enterprises	2.9	2.8
Top 100 multinational enterprises	3.5	4.3

UNCTAD (2002)

# Why study multinationals? (cont.)

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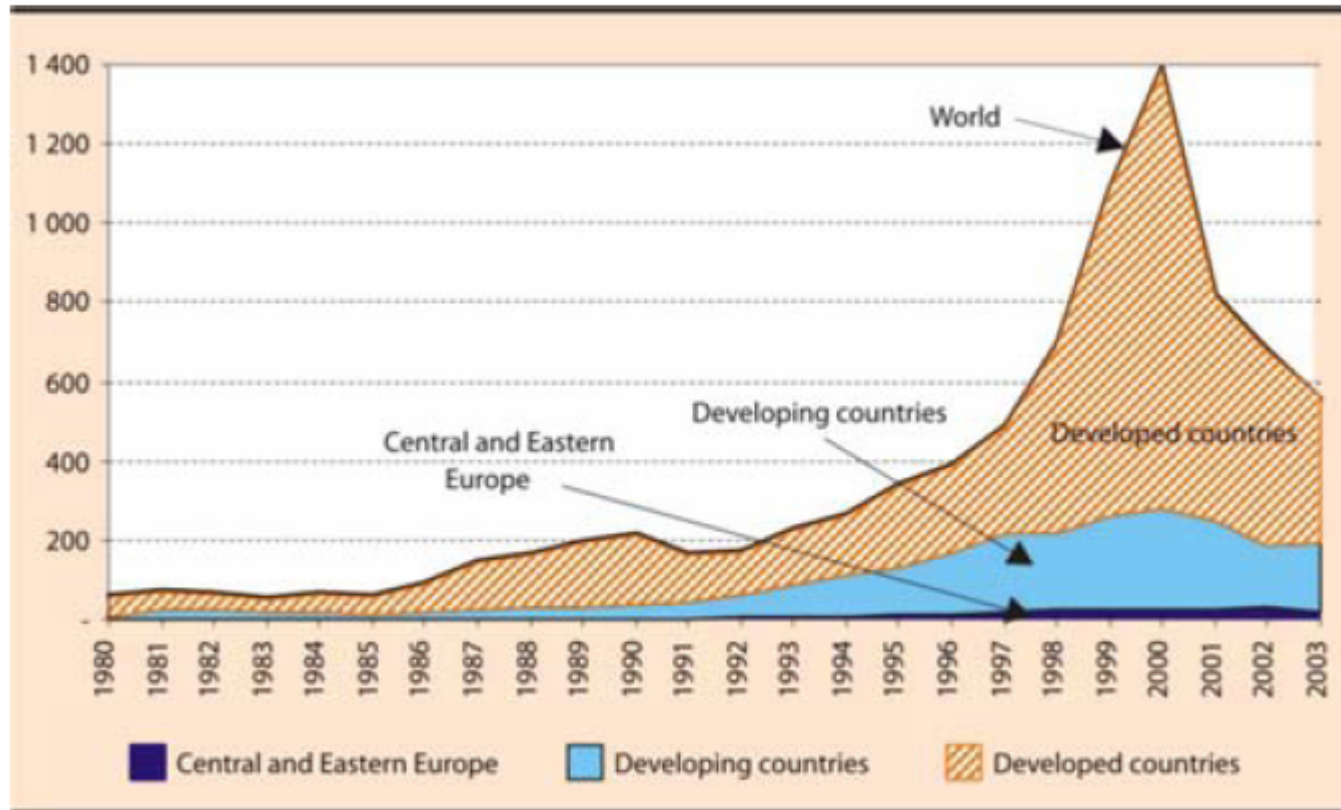
- **Many important issues in international economics today are related to the formation and operations MNEs.**
  - Do MNEs relocate production to low-wage countries? What are the consequences for employment, wages, productivity and growth?
  - Do attempts to attract FDI lead to a “race to the bottom” regarding corporate taxes and firm regulation?
  - Does FDI make the tax base so elastic that it becomes impossible to maintain a European style welfare state?
  - Are foreign firms more footloose than domestic ones? Do they tend to locate strategic functions in their home countries?
  - Does FDI serve as a channel for technology transfer leading to better technologies and products? Or do they simply crowd out local competitors.

# Patterns of FDI which theory needs to explain

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- The developed countries are the most important *source of* as well as *destinations for FDI*.
  - But developing countries have become more important as source countries.
- An increasingly large share of the foreign affiliates have been established through *M&As* rather than *greenfield investment*
  - Especially in the developed countries.
- Most FDI is concentrated in *services* and *skill- and technology intensive* manufacturing.
- MNEs are *larger* and tend to be *more productive* than national firms
- MNEs seem to be increasingly engaged in *international production networks*.

**Figure I.1. FDI inflows, global and by group of countries, 1980–2003**  
(Billions of dollars)



Source: UNCTAD, FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

# Industry distribution of FDI inward stock

**Table 1.5: World FDI inward stock by industry, 1999**

<i>Industry</i>	<i>Share of World FDI inward stock (%)</i>
<b>Total</b>	<b>100</b>
<b>Manufacturing</b>	<b>41.6</b>
Food, beverages and tobacco	2.8
Textiles, clothing and leather	1.0
Wood and wood products	1.5
Publishing, printing and reproduction of recorded media	1.0
Coke, petroleum products and nuclear fuel	1.9
Chemicals and chemical products	6.7
Rubber and plastic products	0.6
Non-metallic mineral products	1.0
Metal and metal products	3.0
Machinery and equipment	2.5
Electronic and electronic equipment	3.6
Precision instruments	1.4
Motor vehicles and other transport equipment	3.0
Other manufacturing	11.6
<b>Services</b>	<b>50.3</b>
Trade	10.5
Transport, storage and communications	5.9
Finance	15.9
Business activities	10.4
Other Services	7.6
<b>Primary sector</b>	<b>8.1</b>

Source: UNCTAD (2001)

Note: Shares are only reported for a selected number of industries.

# Theory of FDI – general ideas

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- FDI is associated with cross-border transfers of a bundle of capital, technology, know-how etc.
  - The capital aspect is disregarded
- A conceptual framework to explain FDI is the OLI-approach (Dunning 1977, 1981)
  - *Ownership advantages (of a product or a process)*: An MNE must enjoy some advantage over a potential local firm with presumably better knowledge of local conditions.
  - *Location advantage*: Location of production abroad must yield advantages such as lower production costs or avoidance of trade costs.
  - *Internalization advantages*: Owning the foreign firm must be preferred over licensing or sub-contracting.

# Models of horizontal and vertical FDI – general ideas and basic references

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- **Horizontal FDI (HFDI)**

- FDI involving the duplication of part of a firm's activities in a foreign country.
- Driven by the firm's desire to get better market access to the host country.
- Modeled as a trade-off between savings on trade costs and additional fixed costs involved in setting up additional plants (proximity-concentration tradeoff).
- Basic references: Horstmann and Markusen, 1992 (JIE); Brainard, 1993 (1997, AER), Markusen and Venables, 1998, 2000 (JIE).

# Models of horizontal and vertical FDI – general ideas and basic references (cont.)

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- **Vertical FDI (VFDI)**

- FDI involving the transfer abroad of one or more of a firm's stages of production.
- Driven by the firm's desire to access low-cost inputs.
- Modeled in a "Heckscher-Ohlin" way allowing for comparative advantages based on differences in relative factor endowments.
- Firms typically face a trade-off between cost savings due to lower input prices and increases in trade costs.
- Basic references: Helpman (1984 (JPE), 1985 (RES)), same as for fragmentation of production (e.g. Jones).

# Simple model of HFDI

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## Assumptions:

- There are two countries: 1 and 2
  - May differ in terms of cost level ( $c_1$  and  $c_2$ ) and in terms of market size ( $E_1$  and  $E_2$ ).
- There is a fixed number of firms headquartered in each country producing different varieties of a good.
- Fixed costs at both firm and plant level  $\Rightarrow$  *multiplant economies of scale*

**Decision problem:** The firm has to decide between the following two strategies:

1. All output is produced in one country (national firm).
2. Output is produced in both countries (multinational firm)

Two-stage game: location decision followed by competition in the market

## Simple model of HFDI (cont.)

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**Profit of national firm headquartered in 1:**

$$\Pi_1^N = \pi_{11} + \pi_{12} - (H + F)c_1$$

**Profit of multinational firm headquartered in 1:**

$$\Pi_1^M = \pi_{11} + \pi_{22} - (H + F)c_1 - Fc_2$$

$\pi_{ij}$  is operating profits related to output produced in  $i$  and sold in  $j$

$H$  is fixed costs (in terms of input requirements) associated with running the headquarters

$F$  is fixed costs (in terms of input requirements) associated with setting up a plant

$c$  is marginal costs (assumed to be constant) and also captures the factor price level in the economy

## Simple model of HFDI (cont.)

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- A firm in 1 will set up an affiliate in 2 if:

$$\pi_{22} - \pi_{12} > Fc_2$$

that is, if the difference in operating profits from sales in market 2 between local production and exports is greater than the additional fixed costs involved in a multiplant strategy

- Operating profits:

$$\pi_{22} = \frac{p_2 x_{22}}{\varepsilon_{22}} = \frac{s_2 E_2}{\varepsilon_{22}} = \frac{s_2 E_2}{\varepsilon(s_2)}$$

$$\pi_{12} = \frac{p_2 x_{12}}{\varepsilon_{12}} = \frac{s_2 \varphi_1 E_2}{\varepsilon_{12}} = \frac{s_2 \varphi_1 E_2}{\varepsilon(s_2 \varphi_1)}$$

$\varepsilon$  is the perceived elasticity of demand

$s_2 \varphi_1$  is the market share in 2 of an exporter from 1,  $\varphi_1 \leq 1$

# Simple model of HFDI (cont.)

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## Conclusion:

- The firm will set up an affiliate in 2 if:

$$s_2 E_2 \left[ \underbrace{\frac{1}{\varepsilon(s_2)} - \frac{\varphi_1}{\varepsilon(\varphi_1 s_2)}}_{\geq 0} \right] - F c_2 > 0$$

- Factors affecting the choice:
  - the level of trade costs ( $\tau$ ), which affects  $\varphi_1$
  - the size of the foreign market ( $E_2$ ) and the market share ( $s_2$ )
  - the foreign cost level ( $c_2$ )
  - the size of plant-level fixed costs ( $F$ )
- Trade-off between low unit cost of supply and high fixed costs go through for monopoly, but strategic interaction may reinforce the benefits of local production

## Simple model of HFDI (cont.)

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- Suppose there are  $N_1$  firms in country 1 and  $N_2$  firms in country 2
- These firms can be either national or multinational.
- **Profits:**  $\Pi_i^N(n_1, n_2, m)$        $\Pi_i^M(n_1, n_2, m)$        $i=1, 2$ 
  - The headquarters of multinationals have no effect on profits
- Market shares sum to one:

$$(n_1 + m_1 + m_2 + n_2\varphi_2)s_1 = 1$$

$$(n_2 + m_1 + m_2 + n_1\varphi_1)s_2 = 1$$

## Simple model of HFDI (cont.)

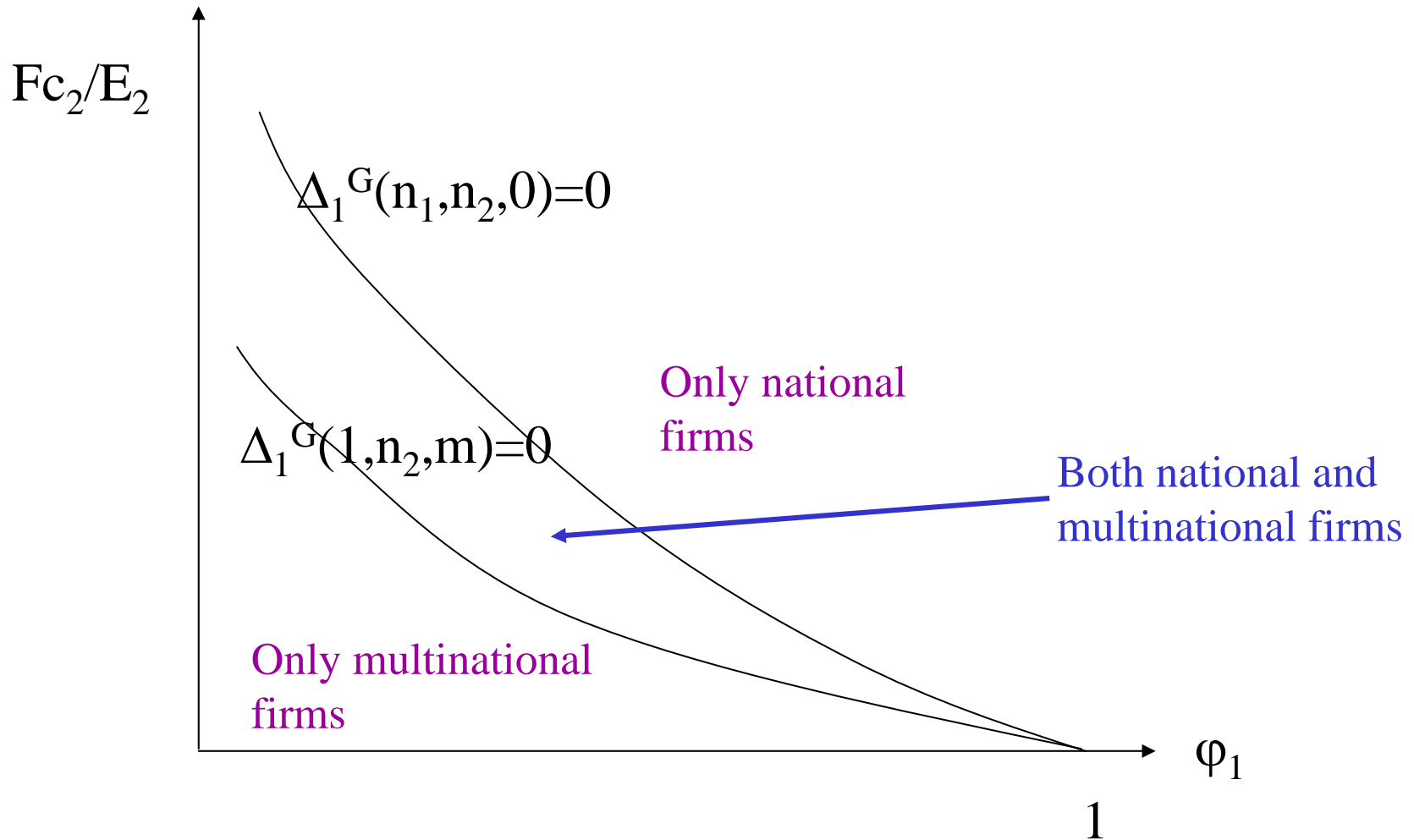
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- Finding equilibrium:
  - Suppose there are  $n_1$  and  $n_2$  national firms and  $m$  multinational firms
  - If neither type of firm has incentive to change strategy, we have a Nash equilibrium.
- Let us ask whether a  $n_1$ -type firm has incentive to become a  $m_1$ -type firm?
  - It has if  $\Pi_1^M(n_1 - 1, n_2, m + 1) - \Pi_1^N(n_1, n_2, m) > 0$
  - Note that this would be a greenfield investment since  $n_2$  is unaffected.
  - Suppose  $\varepsilon$  is a constant (called  $\sigma$ ).
  - This condition can be written as:

$$\Delta_1^G \equiv \frac{E_2}{\sigma} \left[ \frac{1}{n_2 + m + n_1 \varphi_1} - \frac{1}{n_2 + m + 1 + (n_1 - 1) \varphi_1} \right] - Fc_2 > 0$$

- The term in square brackets is decreasing in  $m$  and increasing in  $n_1$

# Simple model of HFDI (cont.)



## Simple model of HFDI (cont.)

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- Hypotheses derived from this theory:
  - The relative importance of multinationals increases with
    - trade costs
    - the size of the market
    - the cost (wage) differential
  - It decreases with
    - plant-level fixed costs
- Largely supported by empirical evidence
  - But,
    - Trade costs often found to reduce probability of observing FDI, but increases the share of affiliate sales to exports conditioned on there being FDI.
    - Wage differentials rarely found to be important factor (and sometimes found to attract FDI, most likely because of lack of control for productivity/skills)

# (Relatively) straightforward extensions

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- FDI carried out through M&A.
  - Saves on fixed costs but leads to a loss of market share
- Entry and exit of firms.
  - Firms of different types enter until profits exhausted (model as complementary slackness problem)
  - The level of firm-level fixed costs relative to plant-level fixed costs important determinant of HFDI.
  - Similarity in terms of factor costs and market size makes HFDI more likely.
- Put structure on demand and firm behavior.
  - E.g. Dixit-Stiglitz specification for demand for differentiated products
- Allow for firm heterogeneity w r t technology (Helpman, Melitz and Yeaple).