Multinationals and the Globalization of Production

Multinational Data

Penn State // Fall 2017

A few administrative things

- Attendance starts next week (after add/drop dates)
- Attendance is **not** a part of your grade
- Attendance data useful to track outliers
  - Arkaive.com
  - Apps available for Android, iOS
  - Enrollment code is 84ST
- If you missed Tuesday: kimjruhl.com/multinationals-f17
  - Read the syllabus
  - Let me know if you have questions

Question of the day

You: Name + one other class this semester

Roadmap

- Tuesday: OLI Framework
  - Ownership
  - Location
  - Internalization
- Today: Multinational facts
  - Section 2 in Antras and Yeaple (2013)
  - Where, and what goods, do MNEs produce?
  - What do parents and affiliates do?

Walmart USA = parent
Walmart MX = affiliate
↑
foreign

Six facts about multinational production

- Six questions to get to six facts
  1. Where do MNEs operate?
  2. What goods do MNEs produce?
  3. How far do MNEs go from home?
  4. How do MNEs compare to domestic firms?
  5. What do parents do? Affiliates?
  6. How do multinationals expand?
- How do we answer these? What data are out there?
- Later in the semester: What are the economics behind these facts?

Fact #1: Where do MNEs operate?

- What data do we need? [Country-level]
- FDI stocks in each country
  - Stock as in stocks vs. flows — not equity shares!
  - Stock is the value of all foreign owned direct investment assets
  - Inward FDI and outward FDI
  - Hard to measure stocks, accumulate flows

$$K_{t+1} = K_t - \delta K_t + I_t$$

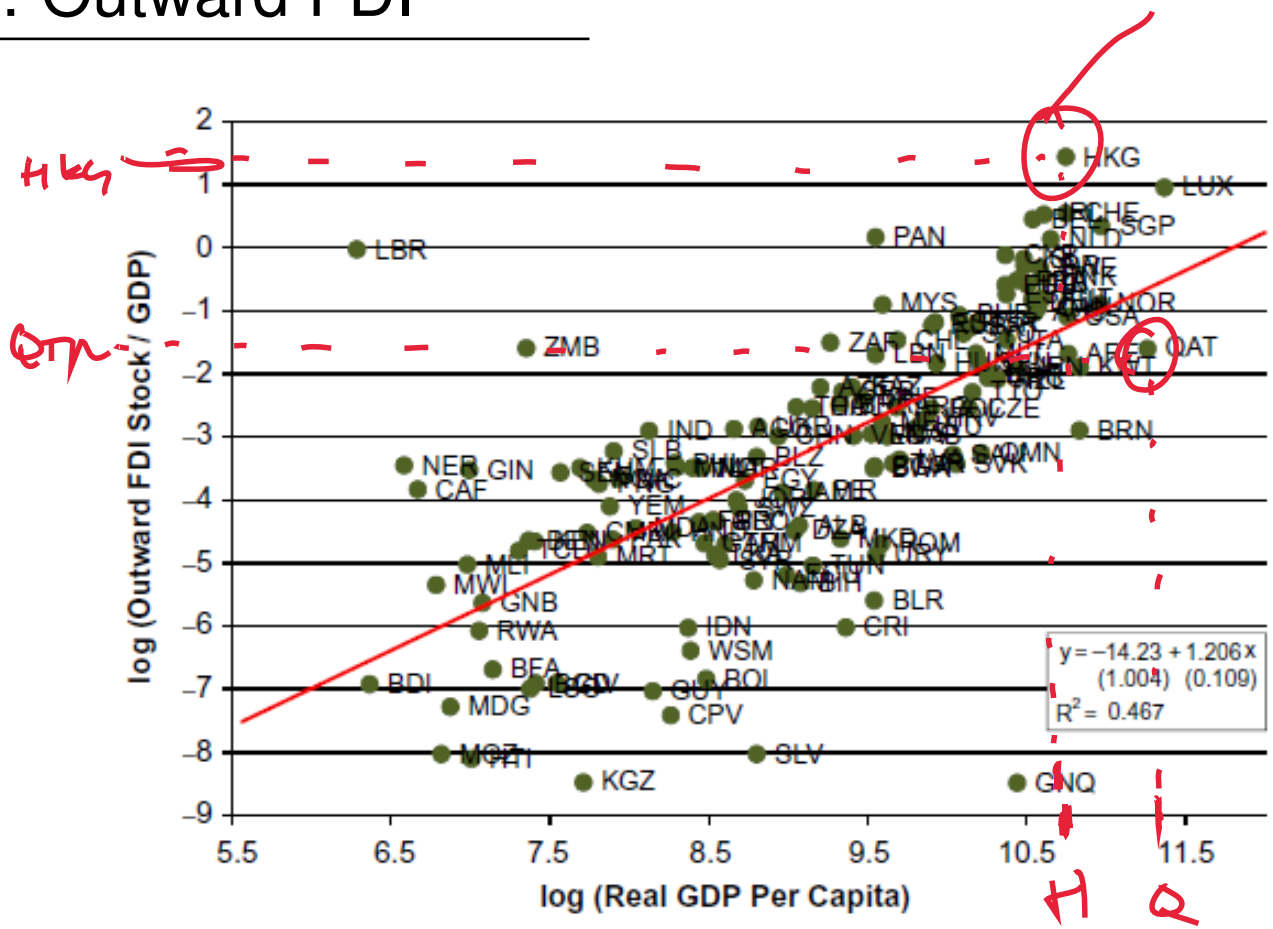
$$FDI_{t+1} = FDI_t - \text{DEP. OF FDI} + IFDI_t$$

- GDP [Quick check: What is this?]

GERMANY = Outward FDI $500 m.

FRANCE = Inward FDI

Fact #1: Outward FDI



- What are the axis? Why divide FDI stock by GDP? Why logs?
- Interpret one point on the graph.
- How are outward FDI and income related?

$$y = 2.7^x$$

$$\ln(y) = x$$

$$\ln(125) = x$$

Regression

$y = 1.21x - 14$

1% ↑ in gdp/capita

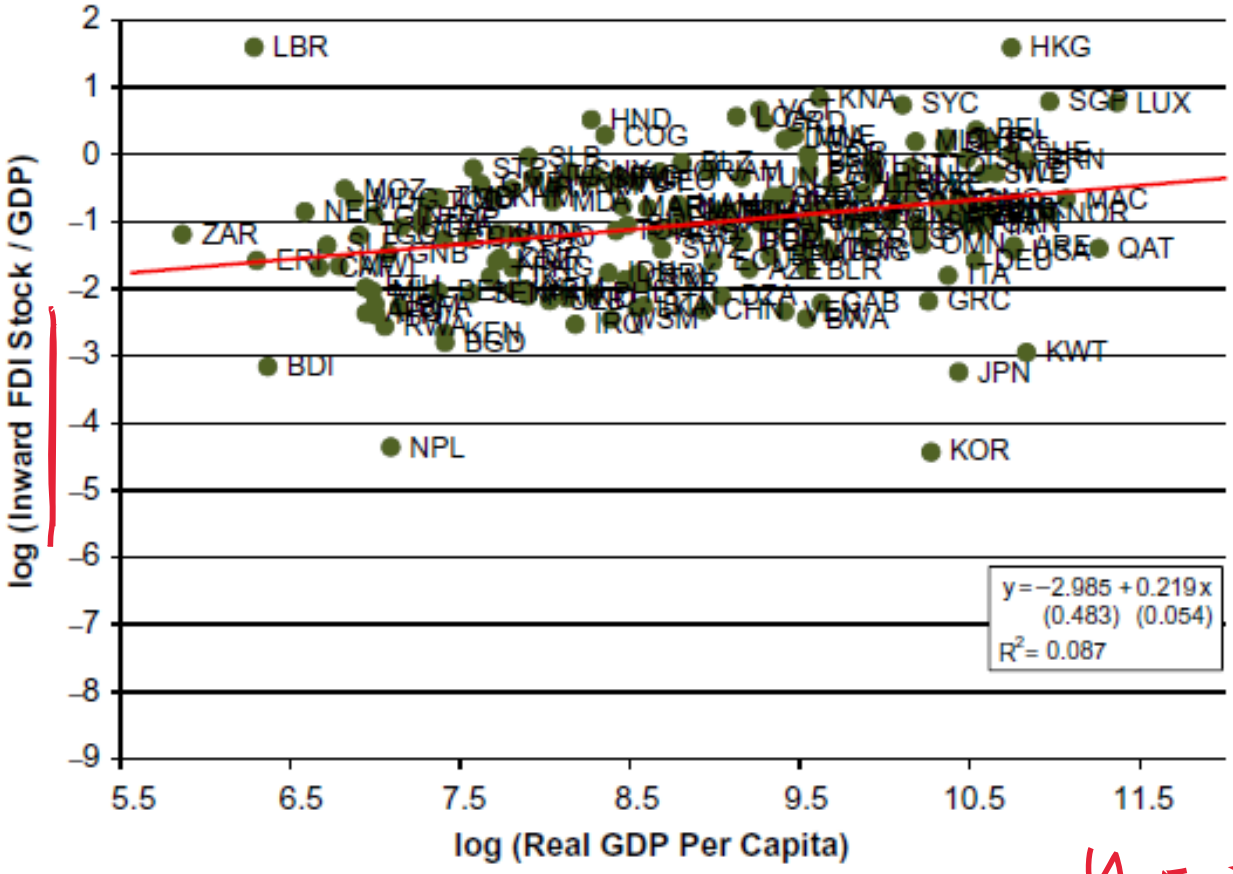
⇒ 1,21% ↑ in $\frac{\text{OECD}}{\text{GDP}}$

$$y = \alpha x^{\beta}$$

$$y = 5x^3$$

$$\ln(y) = \ln(5) + 3\ln(x)$$

Fact #1: Inward FDI



$y = -3 + 0.2x$

- What are the axis? Interpret one point on the graph.
- How are inward FDI and income related?
- Differences with outward FDI?

Fact #1: Where do MNEs operate?

Multinational activity is primarily concentrated in developed countries where it is mostly two-way. Developing countries are more likely to be the destination of multinational activity than the source.

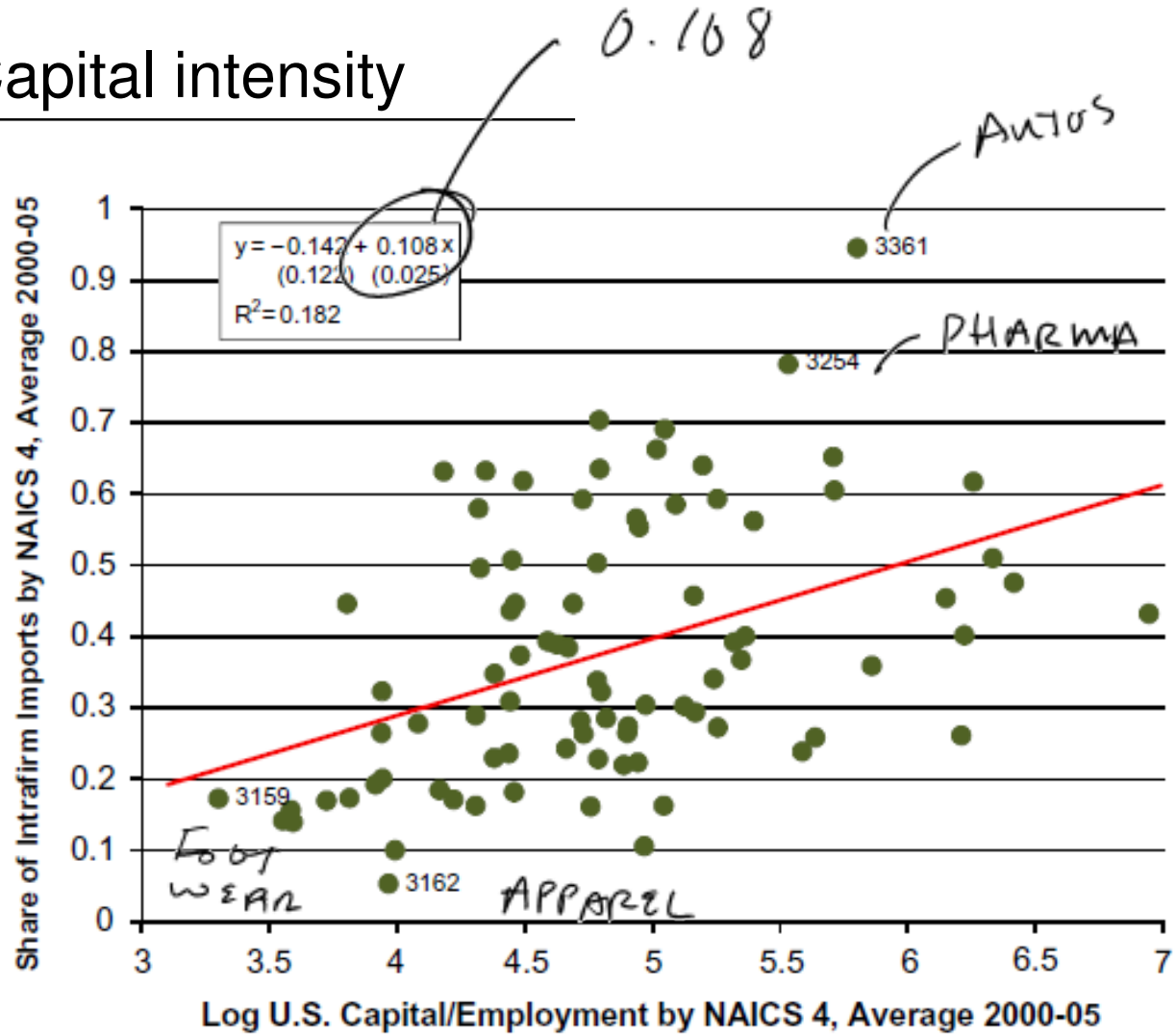
Fact #2: What goods do MNEs produce?

- What data do we need? [Industry-level]
- North American Industry Classification System (NAICS)
- How are industries different?
  - Physical capital intensity: capital-labor ratio $\frac{\$K}{\#\text{hours}}$
  - Intellectual capital intensity: R&D spending/sales
- Ideally, how much production in each NAICS code is by MNE?
- Production data like this not commonly available
  - FA account for 1/4 of French manufacturing employment
  - FA account for 1/3 of French employment in chem. & mach.
  - FA account for 1/8 of French employment in food. & textiles

Fact #2: MNEs across industries

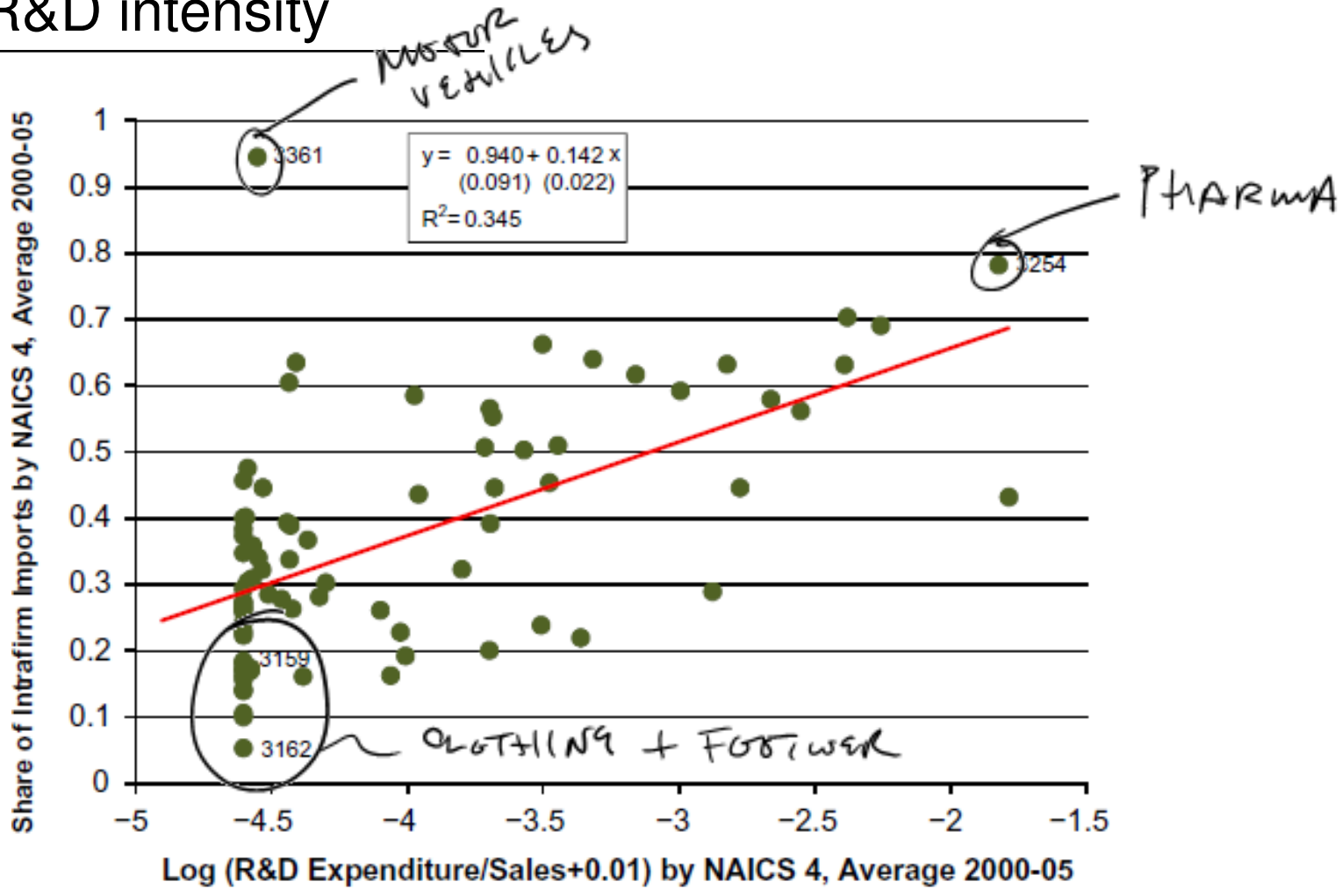
- Could also look at this in foreign trade
- Ideally, how much trade in each NAICS code is by MNE?
- U.S. Customs tracks which imports are between related parties

Fact #2: Capital intensity



- What are the axes? Interpret one point on the graph.
- How is MNE "activity" and capital intensity related?

Fact #2: R&D intensity



- What are the axes? Interpret one point on the graph.
- How is MNE "activity" and capital intensity related?

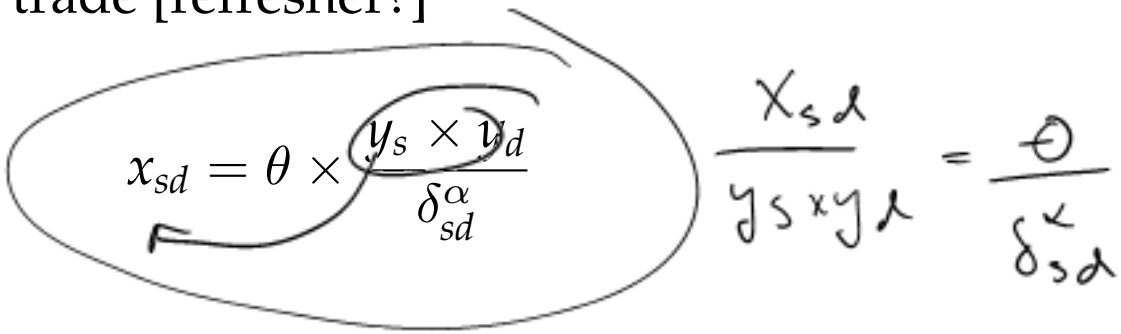
Fact #2: What goods do MNEs produce?

The relative importance of multinationals in economic activity is higher in capital-intensive and R&D intensive goods.

How might this be related to fact #1?

Fact #3: How far do MNEs go?

- The gravity model of trade [refresher?]



- In logs

$$\log\left(\frac{x_{sd}}{y_s \times y_d}\right) = \log(\theta) - \alpha \log(\delta_{sd})$$

- x_{sd} is exports from country s to d
- y_s is GDP in s
- θ is a constant
- δ_{sd} is distance between s and d
- α controls how sensitive trade is to distance

$\Rightarrow$ **trade between countries declines with distance**

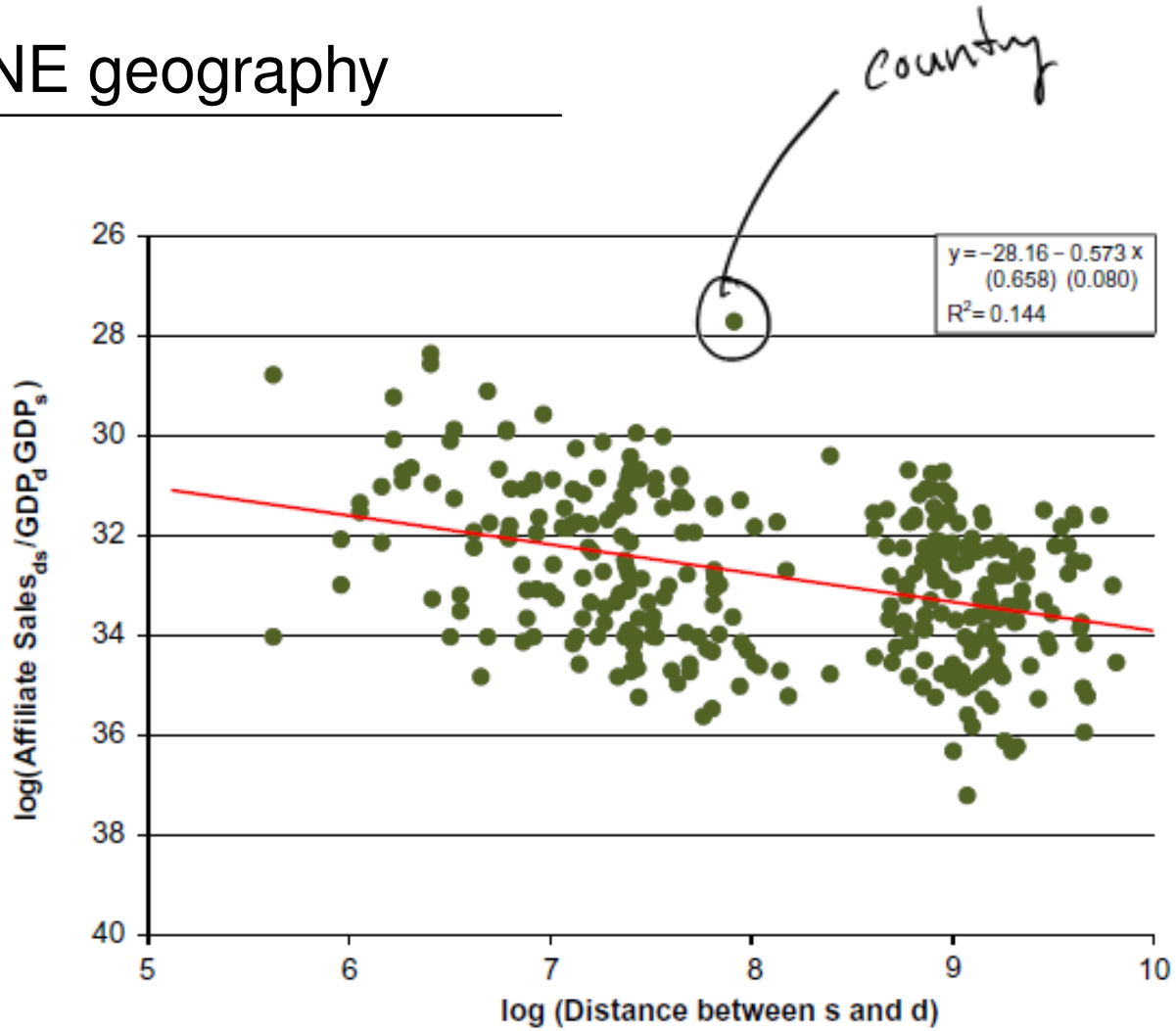
Fact #3: MNE geography

- Gravity and foreign affiliate sales

$$\log\left(\frac{AS_{sd}}{y_s \times y_d}\right) = \log(\theta) - \alpha \log(\delta_{sd})$$

- Now AS_{sd} is total sales of foreign affiliates from s in d
- Plot the left-hand variable and distance (km between capital cities)

Fact #3: MNE geography



- What are the axes? Interpret one point on the graph.
- How are affiliate sales and distance related?

Fact #3: MNE geography

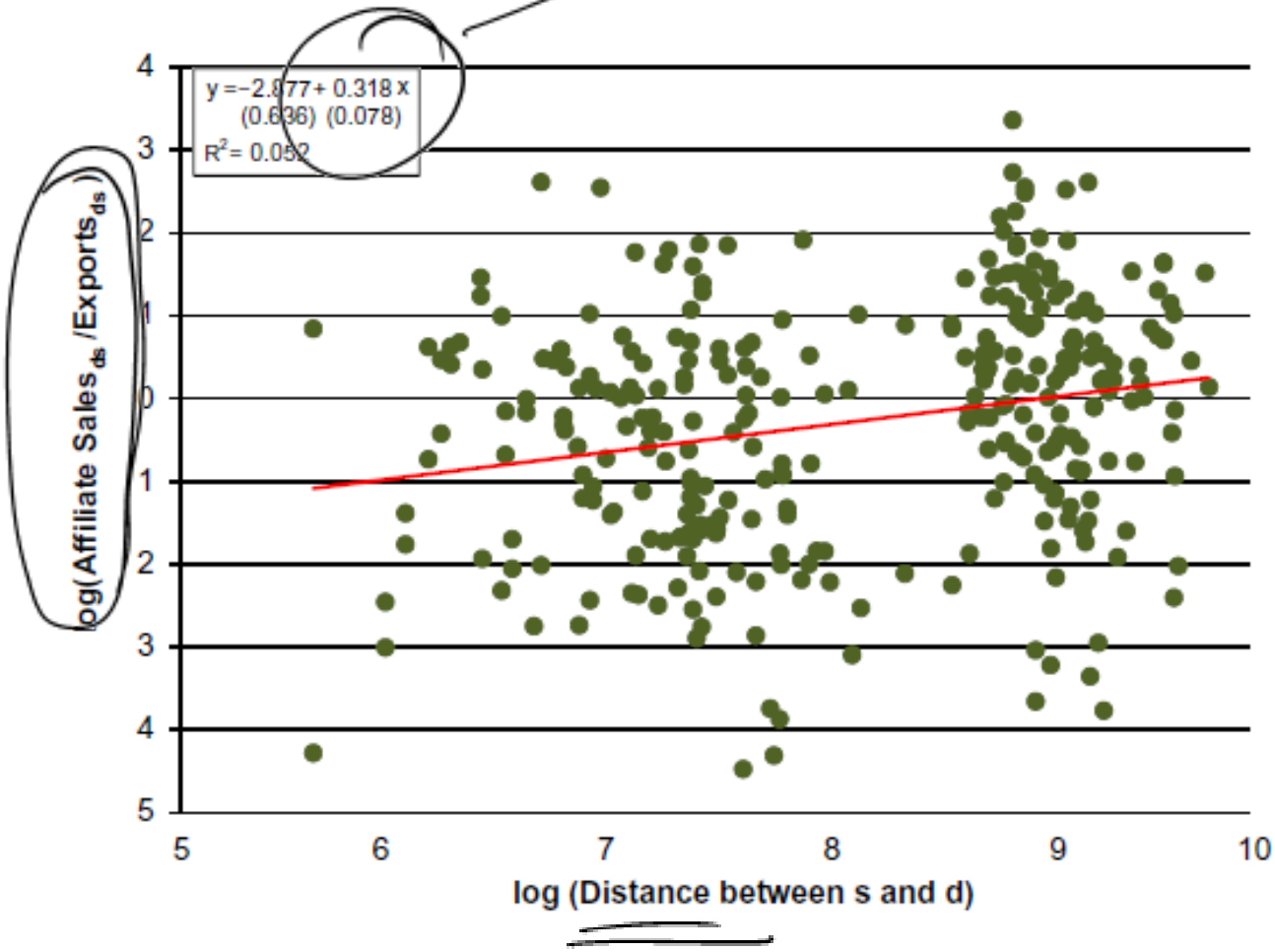
- Serve a market by foreign affiliate sales or exports?

$$\log\left(\frac{AS_{sd}}{x_{sd}}\right) = \log(\theta) - \alpha \log(\delta_{sd})$$

Affiliate sales; exports; dist

- Plot the left-hand variable and distance (km between capital cities)
- When $-\alpha$ is positive, sales relative to exports are more important the farther away are the two countries

Fact #3: MNE geography



- What are the axes? Interpret one point on the graph.

Fact #3: How far do MNEs go?

The production of the foreign affiliates of multinationals falls off in distance, but at a slower rate than aggregate exports.

[We skipped something about intermediate inputs. We will look at that later.]

Fact #4: How do MNEs compare to domestic firms?

- What data do we need? [Firm-level]
- Data on each firm's sales, employment, capital investment, R&D spending, exports, etc…
- Compare MNE parents to domestic firms (U.S., manufacturing)
  - MNE's $< 1\%$ of all firms, domestic $> 99\%$
    - MNE = 62% of total value added, domestic = 38%
    - MNE = 58% of total employment, domestic = 42%
- Compare MNE affiliates to domestic firms

MNE = rare & Big

Fact #4: MNE affiliates versus domestic firms

- As a share of the total

	Finland	France	Ireland	Holland	Poland	Sweden
Enterprises	1.6	2.0	13.4	3.4	16.0	2.8
Employment	17.2	26.2	48.0	25.1	28.1	32.4
Sales	16.2	31.8	81.1	41.1	45.2	39.9
R&D Spend	13.1	27.4	77.3	35.8	20.9	52.0
Exports	17.5	39.5	92.3	60.0	69.1	45.8

share of total firms that MNE

Fact #4: How do MNEs compare to domestic firms?

MNE are rare.

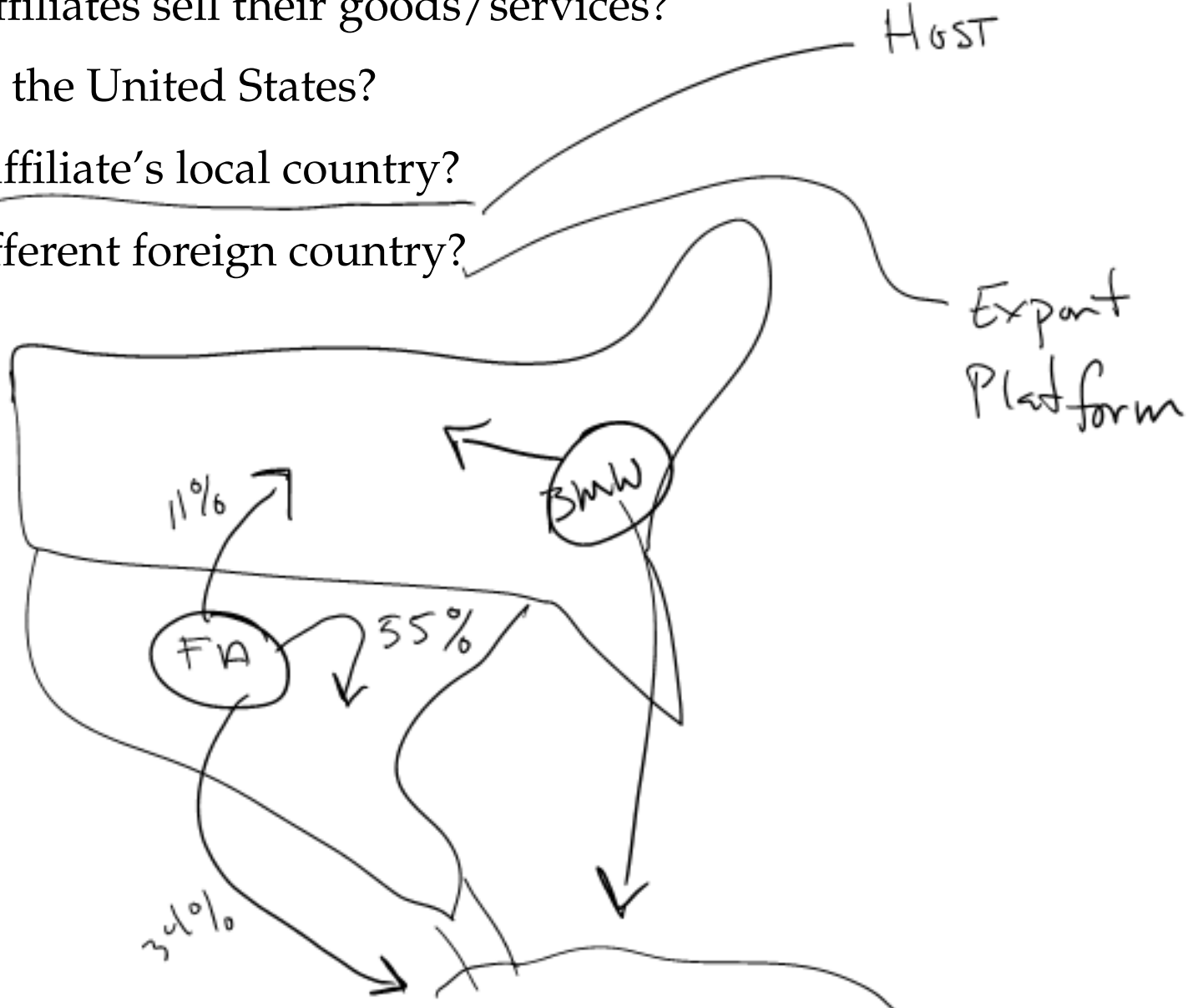
Both the parents and the affiliates of multinational firms tend to be larger, more productive, more R&D intensive and more export oriented than non-multinational firms.

Fact #5: What do parents do? Affiliates?

- What data do we need? [U.S. Parents and affiliates]
- Data on parent and affiliate sales, employment, capital investment, R&D spending, exports, etc. . . [same as in #4]
  - Parents = 65% of MNE sales, affiliates = 35%
  - Parents = 68% of MNE value added, affiliates = 32%
  - Parents = 68% of MNE employment, affiliates = 32%
  - Parents = 84% of MNE R&D spending, affiliates = 16%
- Parents specialize in R&D; do a large share of production

Fact #5: What do parents do? Affiliates?

- Where do affiliates sell their goods/services?
  - Back to the United States?
  - In the affiliate's local country?
  - To a different foreign country?



Fact #5: What markets do affiliates serve?

- As a share of the total affiliate sales

Sales to host / TOTAL FA Sales

	Host country	Other foreign	United States
Total manufacturing	55	34	11
Textile and apparel	45	35	19
Metals and minerals	60	32	8
Chemicals and plastics	58	36	6
Machinery	49	36	15
Computers and electronics	40	43	16
Electronic equipment	47	40	13
Transport equipment	47	35	19
Other	66	26	8

Fact #5: What do parents do? Affiliates?

Within multinational enterprises, parents are relatively specialized in R&D while affiliates are primarily engaged in selling goods in foreign markets, particularly in their host market.

Fact #6: How do multinationals expand?

- Parent can build a new facility abroad: *greenfield investment*
- Parent can buy an existing facility abroad: *merger or acquisition (m&a)*

- Cross-border m&a $> 50\%$ of total FDI
- In developed countries m&a = 68% of total FDI
- In developing countries m&a = 18% of total FDI

Fact #6: How do multinationals expand?

Cross-border mergers and acquisitions make up a large fraction of FDI and are a particularly important mode of entry into developed countries.

Takeaways

1. Multinationals are concentrated in developed countries
2. Multinationals are concentrated in R&D- and capital-intensive goods
3. Multinational activity falls off in the distance from the parent
4. MNE parents and affiliates, compared to domestic firms, are larger, more productive, more R&D intensive, and more likely to export
5. MNE parents specialize in R&D, affiliates in selling to foreign markets
6. Mergers and acquisitions make up a large part of MNE expansion