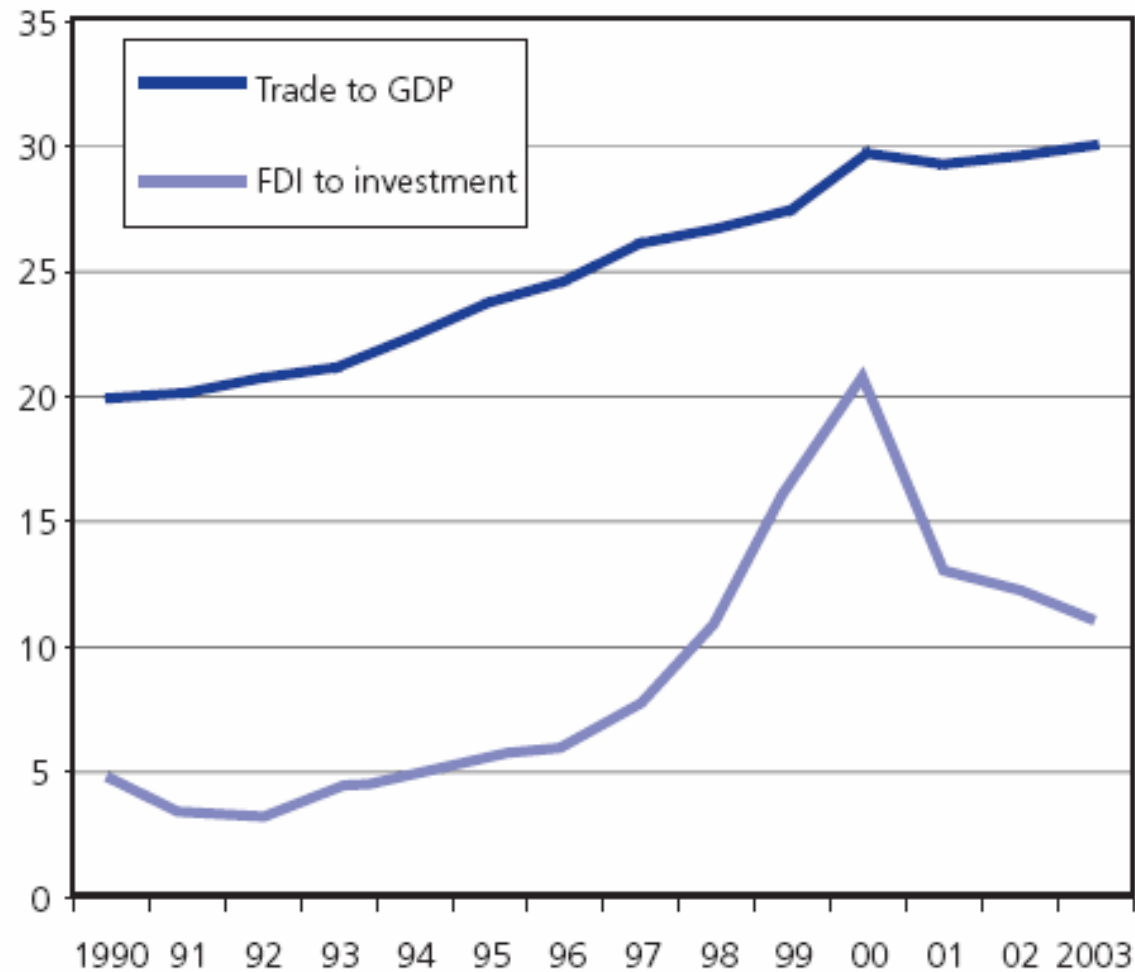# The International Organization of Production

Elhanan Helpman

Ratio of world trade to GDP and ratio of global FDI flows to world fixed investment, 1990-2003

(Percentage)

Traditional Explanations of Trade

- Differences in technology
- Differences in factor endowments
- Added in the 1980s: economies of scale and monopolistic competition

- New features: within industry heterogeneity, organizational features, and contracting institutions

Traditional Explanations of FDI

- Horizontal FDI: Proximity-concentration tradeoff (Brainard, 1997)

- Vertical FDI: endowment (cost) differences (Yeaple, 2003)

- New features: within industry heterogeneity and organizational structures ⟶

- Horizontal vs Vertical FDI is now a less helpful distinction

United States: Business services exports by sub-sector, 1997-2002

(Billion dollars)

	1997	2000	2002
Business, professional, and technical services	**44.0**	**55.2**	**65.4**
Unaffiliated	**21.5**	**25.3**	**28.8**
Affiliated	**22.4**	**29.9**	**36.6**
Computer and information services	5.1	6.8	6.9
Unaffiliated	3.5	5.6	5.4
Affiliated	1.6	1.2	1.5
Management and consulting services	n.a.	n.a.	3.7
Unaffiliated	1.6	1.7	1.7
Affiliated	n.a.	n.a.	2.0
Research and development and testing services	n.a.	n.a.	6.3
Unaffiliated	0.9	0.9	1.1
Affiliated	n.a.	n.a.	5.2
Operational leasing	3.6	5.2	5.9
Unaffiliated	2.0	3.1	3.6
Affiliated	1.5	2.1	2.3
Other business, professional, and technical services	32.8	40.6	42.5
Unaffiliated	13.5	14.0	17.0
Affiliated	19.3	26.6	25.5

Source: BEA (2003).

Table 1. Industry Average Spending on Outsourcing[*]

Type of Service	1992	1997	$\frac{1997}{1992}$
All Purchased Services	4.25%	10.68%	2.51
Accounting & Bookkeeping	0.14%	1.95%	13.93
Communications	0.35%	2.82%	8.06
Advertising	0.87%	2.41%	2.77
Refuse Services	0.33%	0.43%	1.30
Software Services	0.28%	0.35%	1.25
Machine Repair	1.69%	2.09%	1.24
Legal Services	0.28%	0.32%	1.14
Buildings Repair	0.40%	0.32%	0.80

[*]As percentage of total value added

Source: Bartel, Lach and Sicherman 2005

Producer Export Participation: 1986, 1987

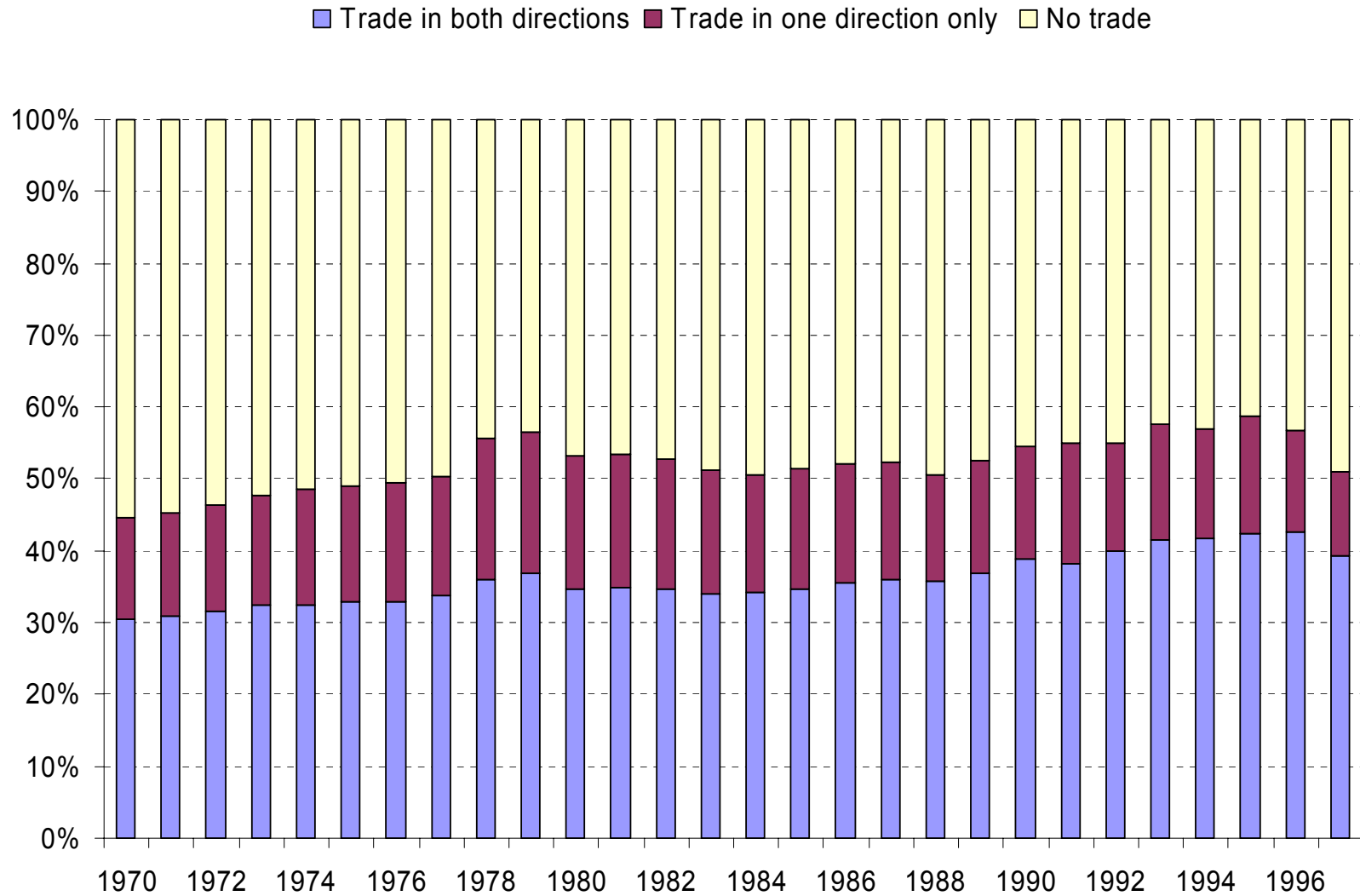|	Percentage that export	
	France	U.S.A.
Food, tobacco	5.5	13.1
Chemicals	55.4	30.3
Manufactures	17.4 (21.6)	14.6 (10.3)

Source: Eaton, Kortum and Kramarz, 2004

Evidence on the Extensive Margin of Trade

Source: Eaton, Kortum, and Kramarz (AER 2004, P&P)

5

Fractions of Country Pairs by Trading Status: 1986

■ Trade in both directions ■ Trade in one direction only □ No trade

Source: Helpman, Melitz and Rubinstein, 2004

TABLE 1—PRODUCTIVITY ADVANTAGE OF MULTINATIONALS AND EXPORTERS

Multinational	0.537
	(14.432)
Nonmultinational exporter	0.388
	(9.535)
Coefficient difference	0.150
	(3.694)
Number of firms	3,202

Notes: T-statistics are in parentheses (calculated on the basis of White standard errors). Coefficients for capital intensity controls and industry effects are suppressed.

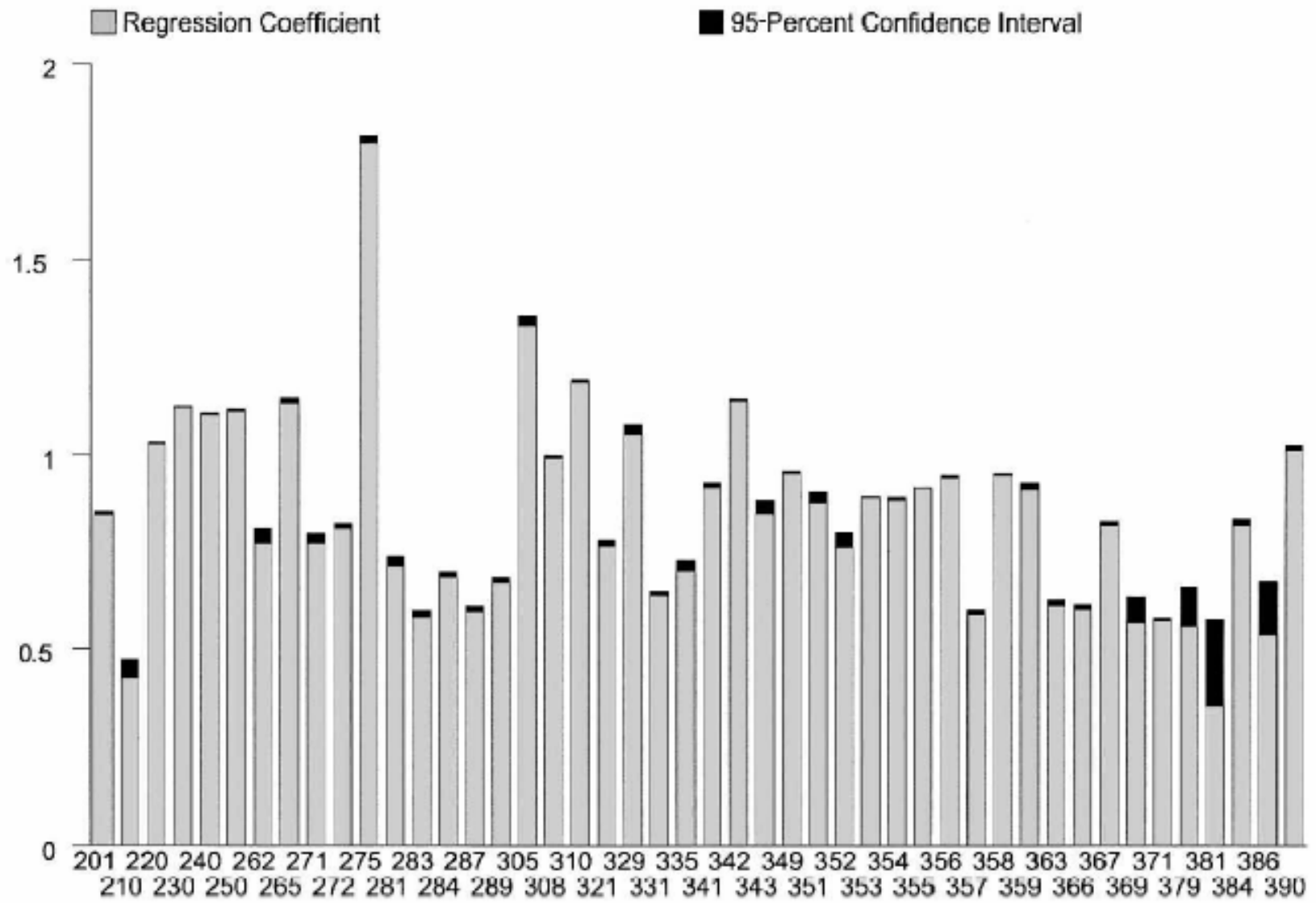Source: Helpman, Melitz and Yeaple, 2004

FIGURE 3. REGRESSION FIT TO THE PARETO DISTRIBUTION

Source: Helpman, Melitz and Yeaple, 2004

- New theories have been developed to explain these changes.
- The new theories do not replace the old; they bring a new focus on *the organizational choices of individual firms*.
- By focusing on the characteristics of individual firms, the theory can address new questions:
1. Which firms serve foreign markets?
2. Which choose to export? Which choose FDI?
3. Do they outsource or integrate?
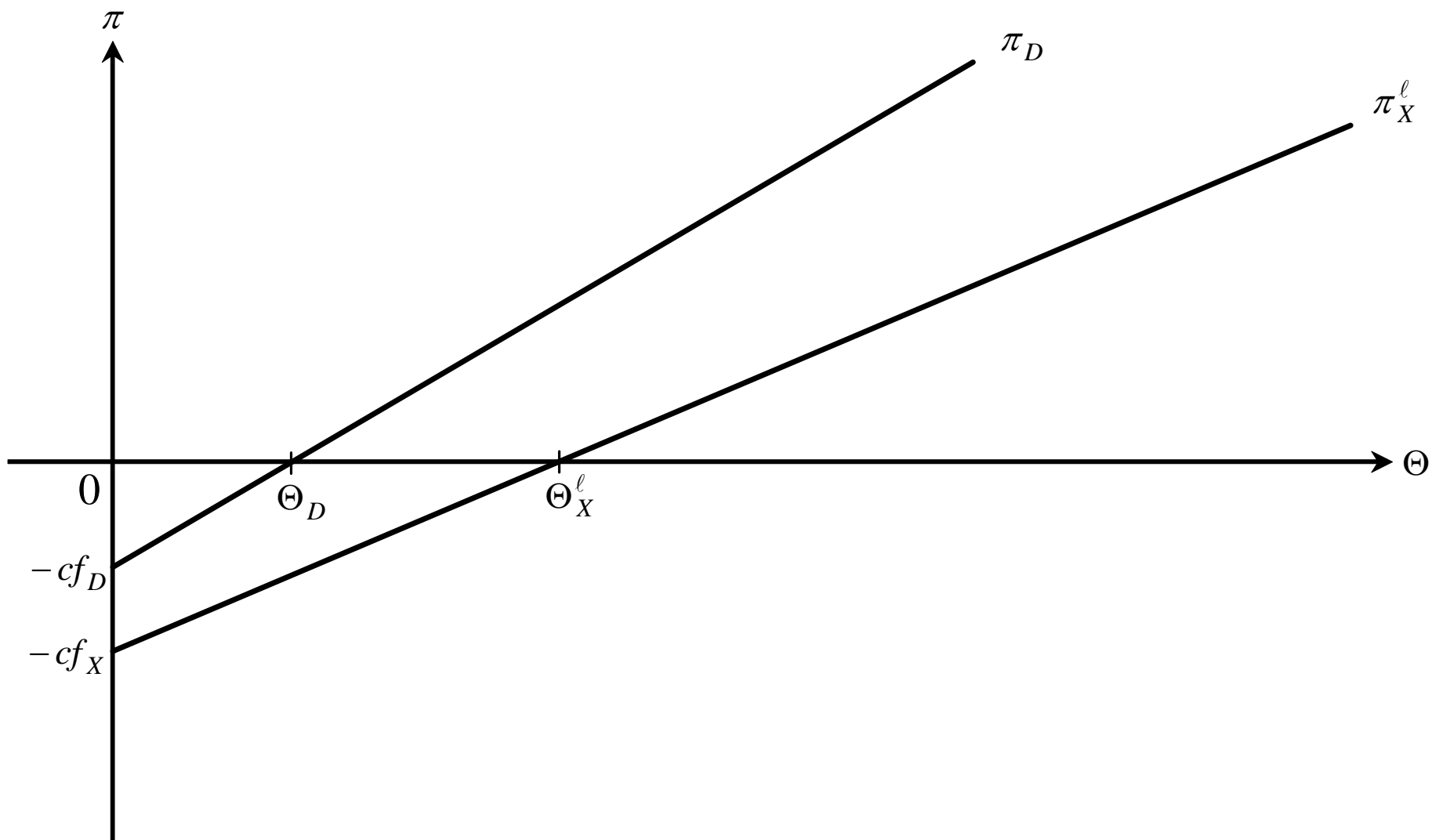4. Do they source at home or abroad?

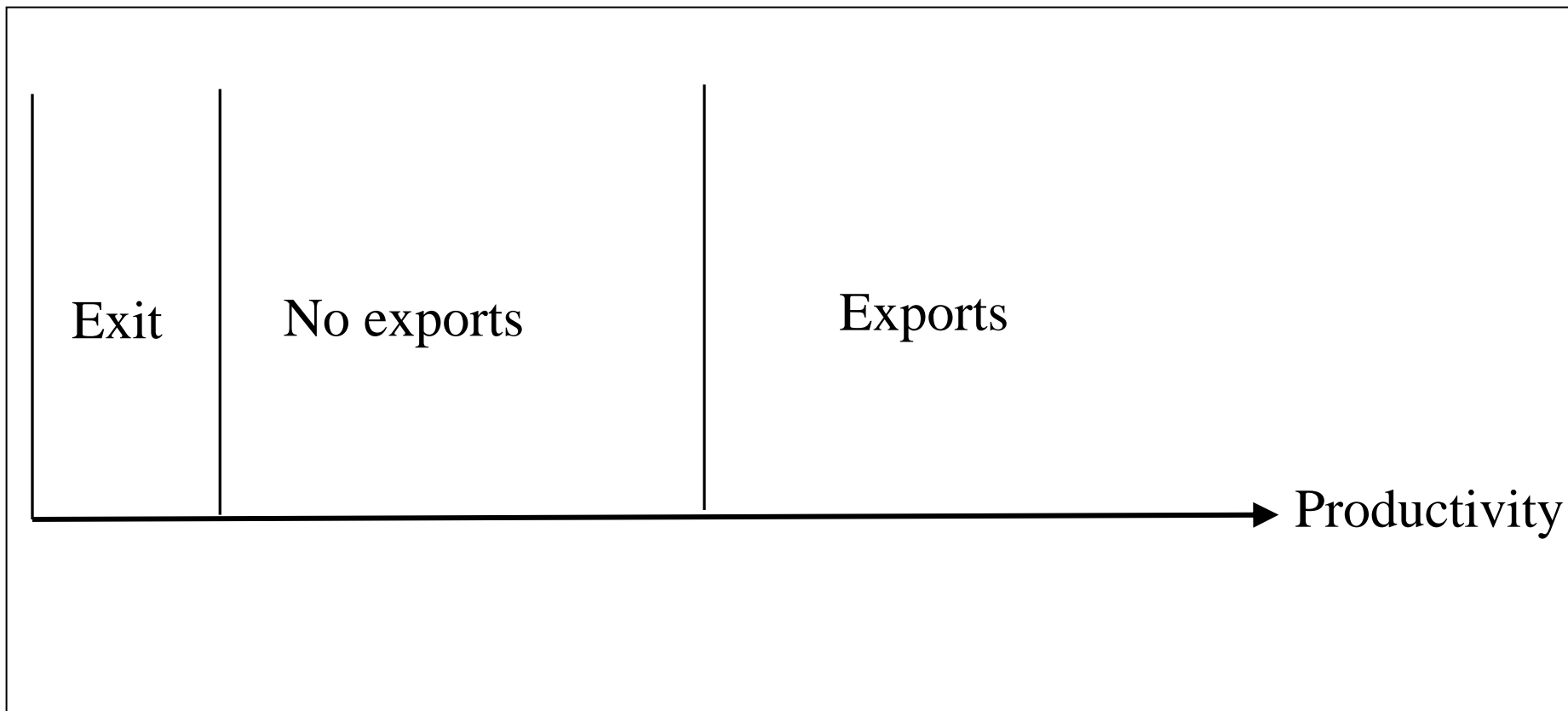|	V	O
H		
F		

Impact of Heterogeneity

Melitz (2003):

$$\pi_D(\Theta) = \Theta B - cf_D$$

$$\pi_X^{\ell}(\Theta) = \tau^{1-\varepsilon}\Theta B^{\ell} - cf_X$$

Export Decision

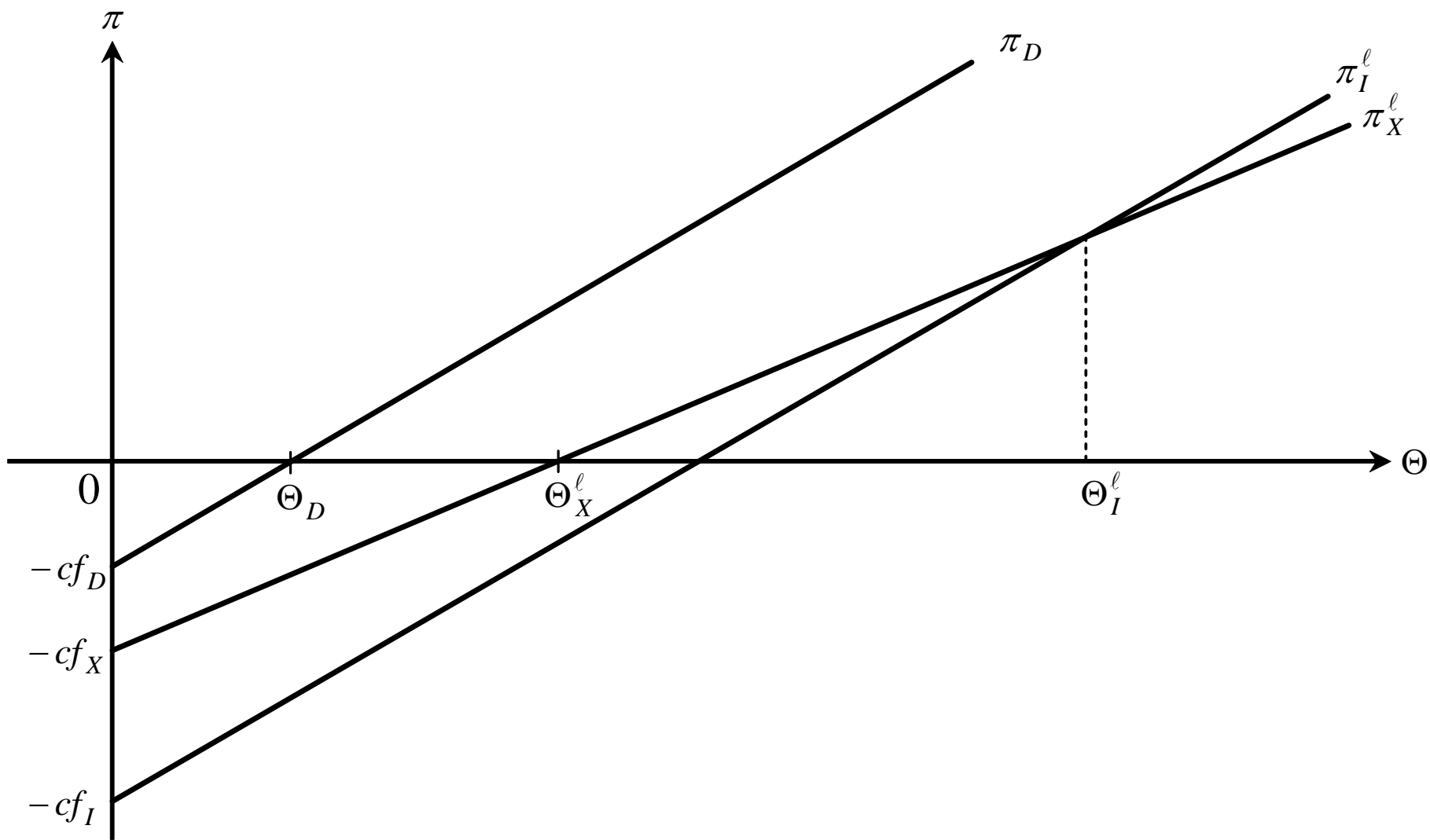Exit | No exports | Exports → Productivity

Implications

- Exporters vs Nonexporters
- Trade liberalization: entry, exit, reallocation (e.g., free trade agreements, Trefler 2004).
- Turnover
- Technology upgrading (Bustos 2005)
- Complex integration (Yeaple 2003; Grossman, Helpman and Szeidl 2005)
- Variable markups (Melitz and Ottaviano 2005)
- Factor proportions (Bernard, Redding and Schott 2005)
- Estimating gravity equations (Helpman, Melitz and Rubinstein 2006)
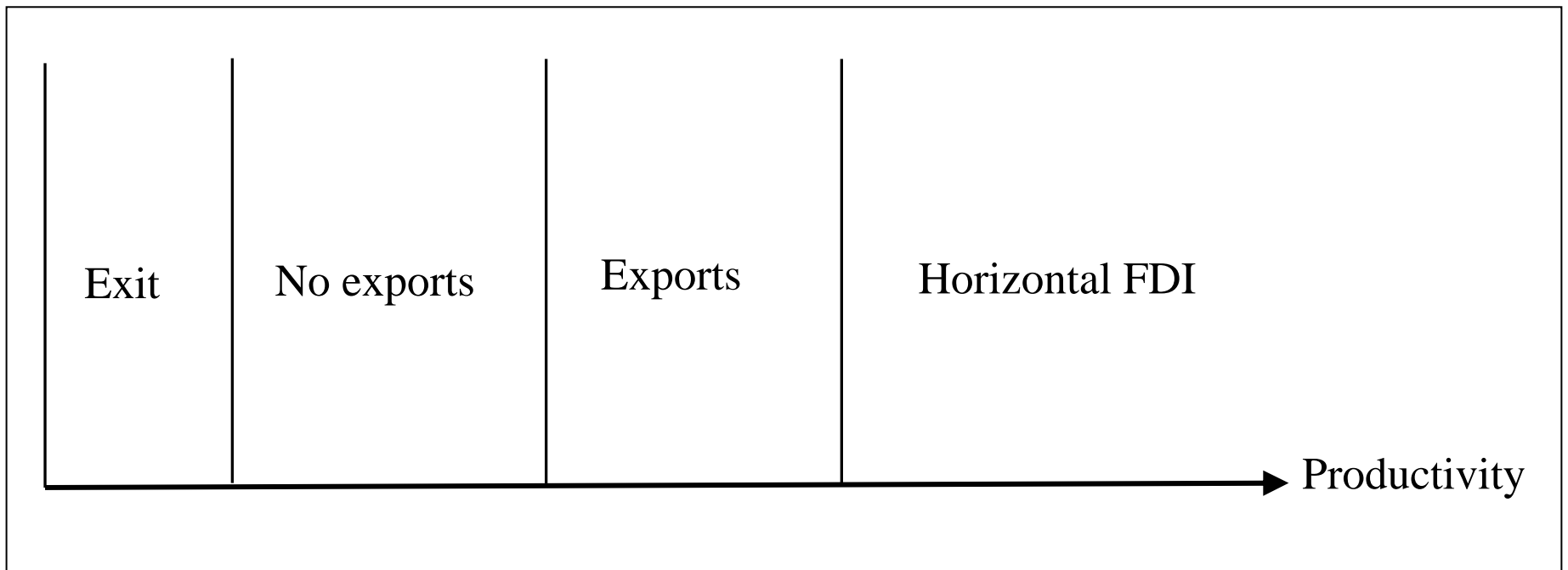
Helpman, Melitz and Yeaple (2004):

$$\pi_D(\Theta) = \Theta B - cf_D$$

$$\pi_X^\ell(\Theta) = \tau^{1-\varepsilon}\Theta B^\ell - cf_X$$

$$\pi_I^\ell(\Theta) = \Theta B_I^\ell - cf_D$$

Export Vs FDI

Implications

- Explains productivity differences across exporters and MNCs

- Export/Subsidiary Sales varies across sectors, depending on productivity dispersion

- Richer trade and FDI predictions

TABLE 4—"BETA" COEFFICIENTS: NARROW SAMPLE WITH CONTROLS

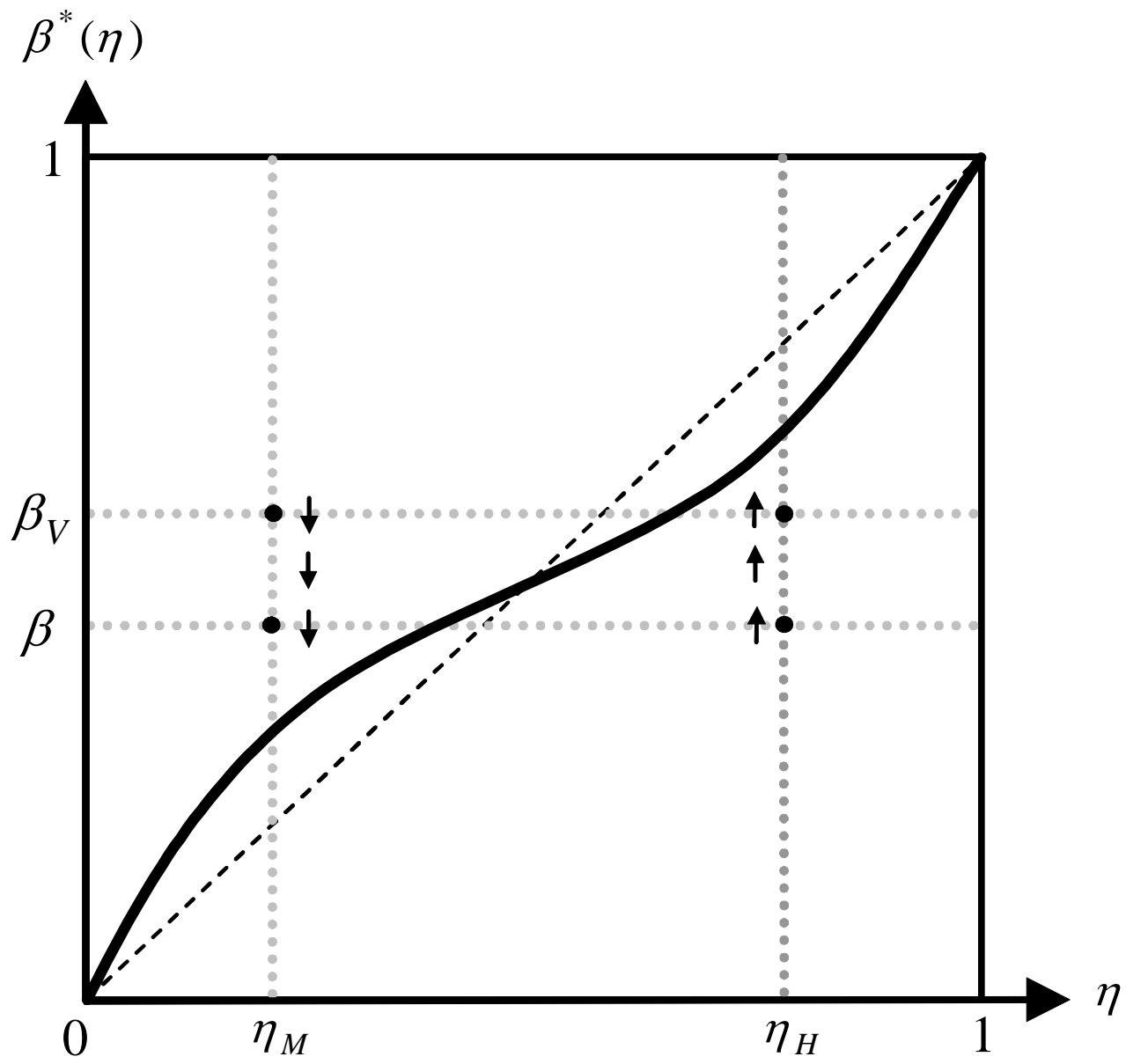|	Mean	Standard deviation	"Beta" coefficient
Dependent variable	−0.595	2.375	
FREIGHT	1.863	0.653	−0.271
TARIFF	2.015	1.020	−0.205
FP	3.321	0.785	0.325
U.S. s.d.	1.749	0.316	−0.312
Europe s.d.	1.198	0.276	−0.250
France s.d.	1.224	0.375	−0.325
Europe reg.	1.260	0.333	−0.210
France reg.	1.257	0.336	−0.211

Source: Helpman, Melitz and Yeaple, 2004

Contractual Frictions

Antràs (2003), Antràs and Helpman (2004)

$$z(j) = \theta \left[\frac{h(j)}{\eta} \right]^{\eta} \left[\frac{m(j)}{1-\eta} \right]^{1-\eta},$$

Stage game:

1. Intermediate inputs are produced

2. Bargaining over revenue (outcome depends on organizational form)

Implications

Antràs (2005): Vernon type product cycle

Antràs (2003): Combined with a Helpman-Krugman style trade model derives

- Implications for correlation between capital intensity of sector and share of intra-firm trade

- Implications for correlation between capital abundance of exporter and share of intra-firm trade
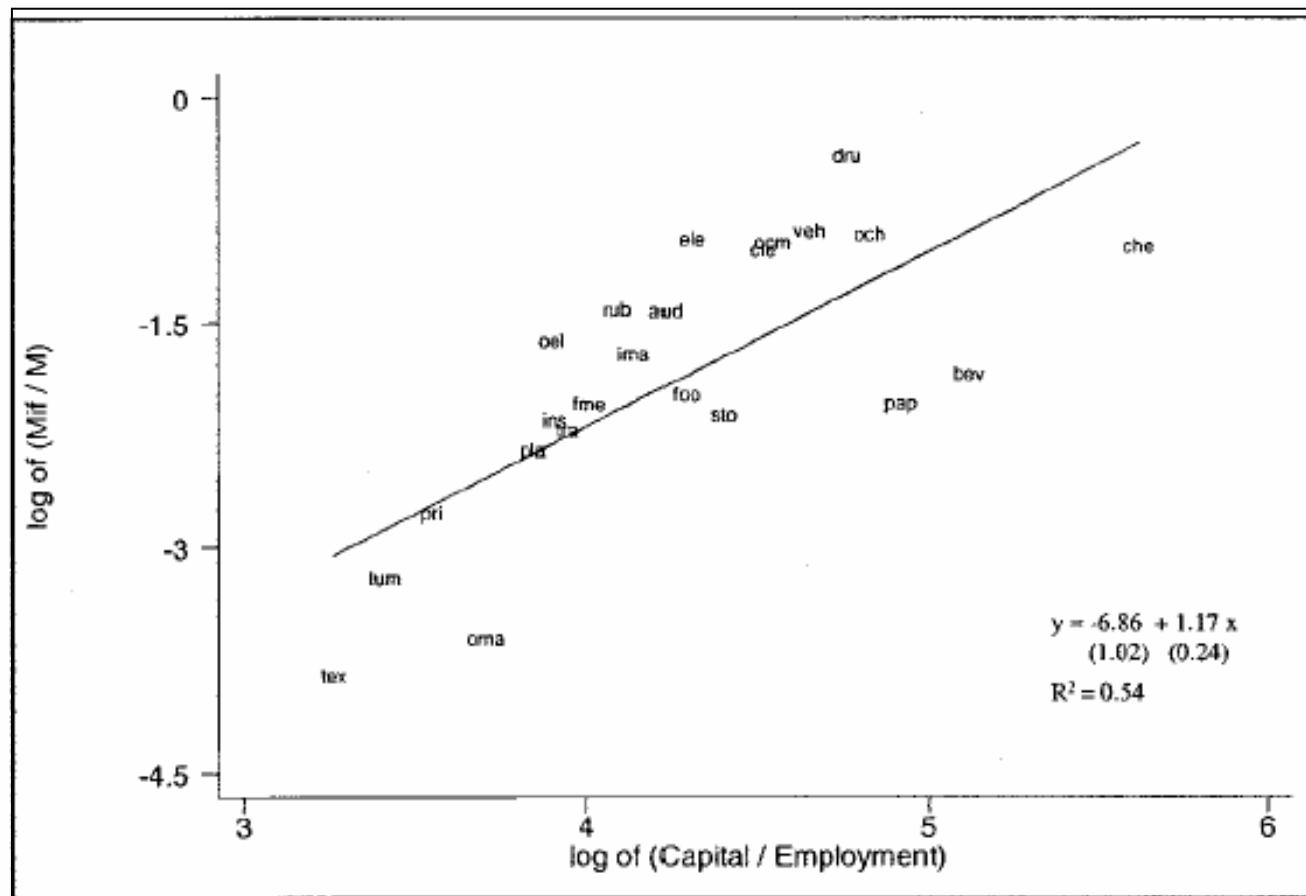
FIGURE I

Share of Intrafirm U. S. Imports and Relative Factor Intensities

The Y-axis corresponds to the logarithm of the share of intrafirm imports in total U. S. imports for 23 manufacturing industries averaged over four years: 1987, 1989, 1992, 1994. The X-axis measures the average log of that industry's ratio of capital stock to total employment, using U. S. data. See Appendix 4 for industry codes and Appendix 3 for data sources.
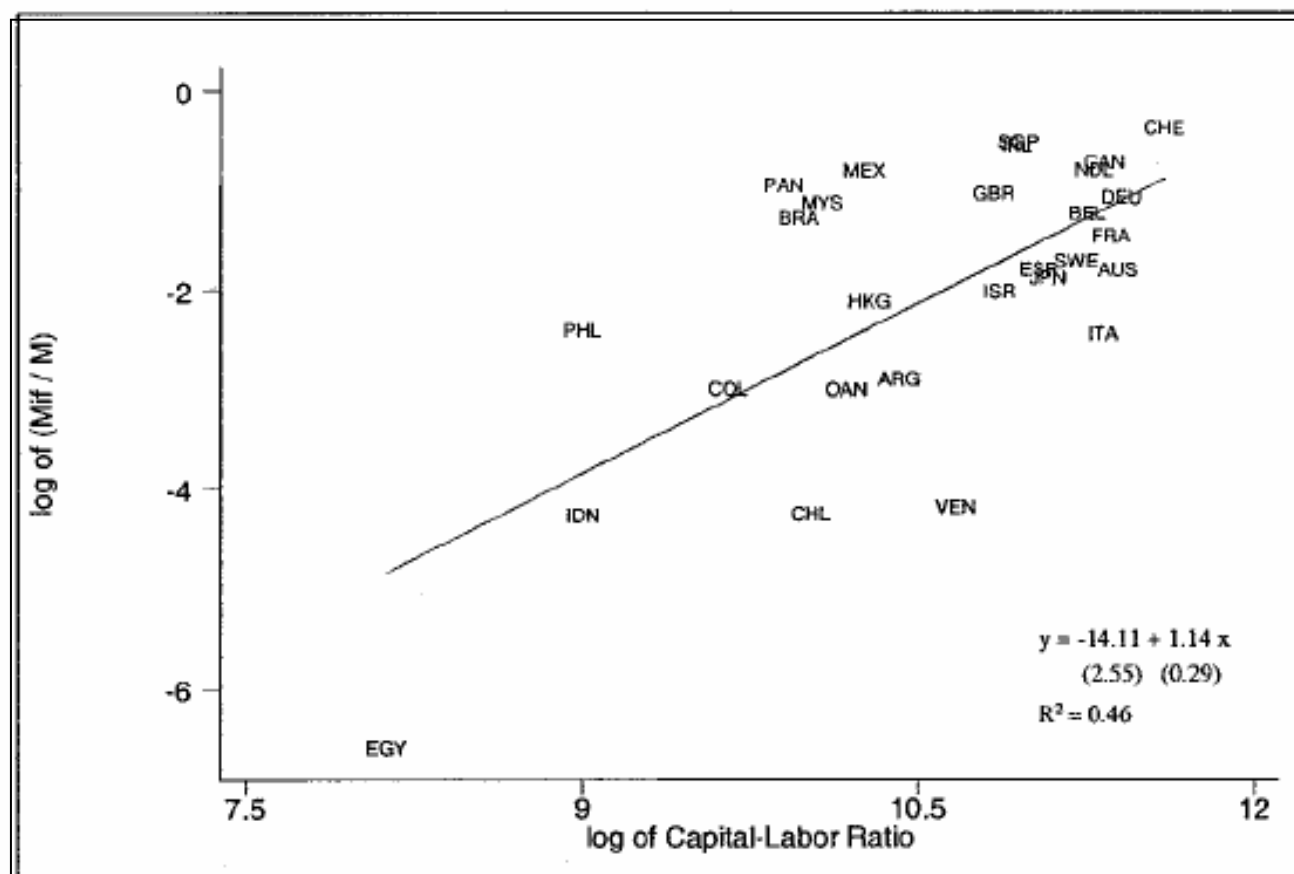
Source: Antras, 2003

FIGURE II

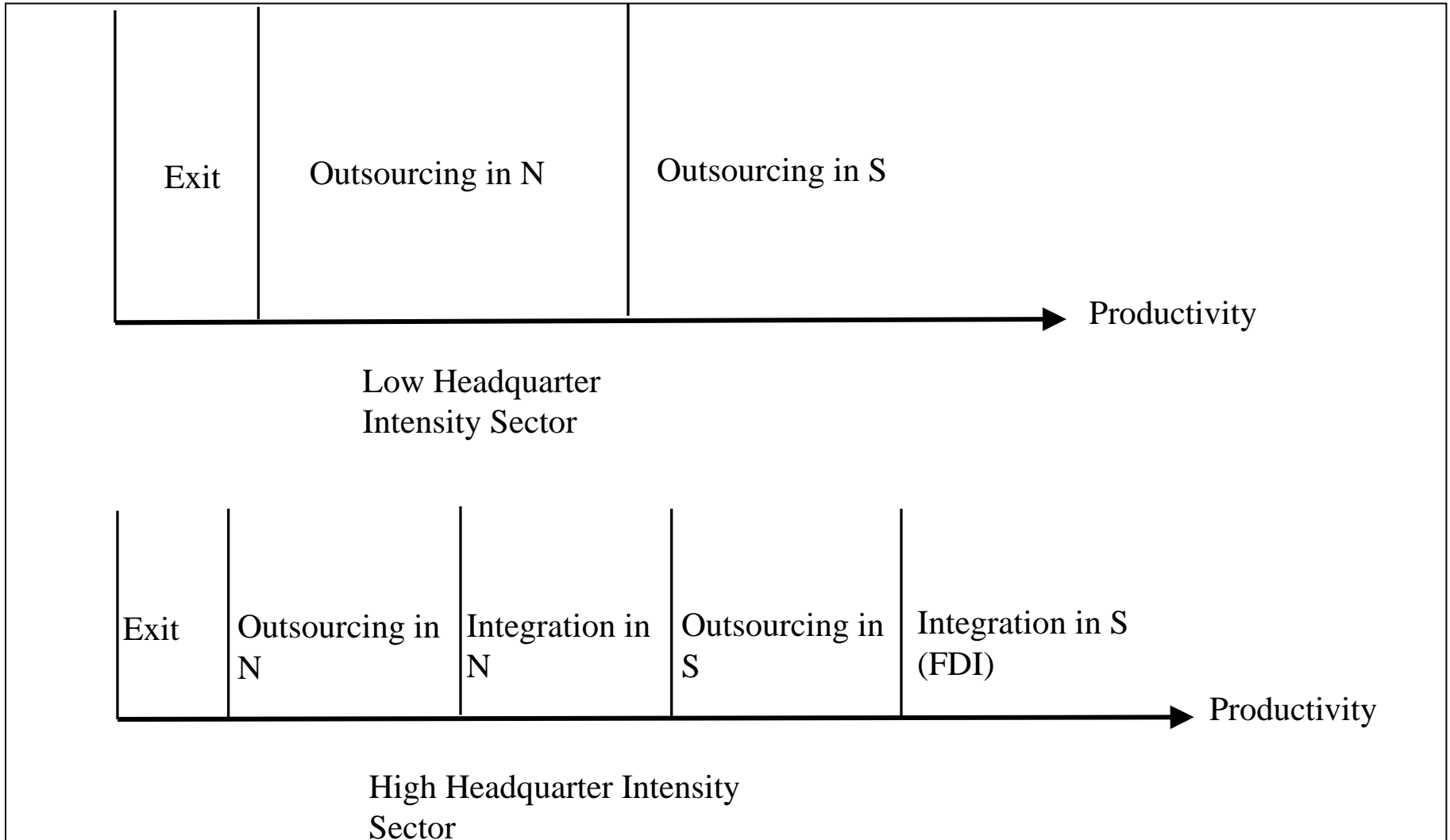Share of Intrafirm U. S. Imports and Relative Factor Endowments

The Y-axis corresponds to the logarithm of the share of intrafirm imports in total U. S. imports for 28 exporting countries in 1992. The X-axis measures the log of the exporting country's physical capital stock divided by its total number of workers. See Appendix 5 for country codes and Appendix 3 for details on data sources.

Source: Antras, 2003

Implications

Antràs and Helpman (2004): Combine with Melitz type heterogeneity to derive sorting patterns into all four organizational forms

- Integration at home

- Outsourcing at home

- Integration abroad

- Outsourcing abroad

Organizational Forms with Contracting Frictions

Exit | Outsourcing in N | Outsourcing in S → Productivity

Low Headquarter
Intensity Sector

Exit | Outsourcing in N | Integration in N | Outsourcing in S | Integration in S (FDI) → Productivity
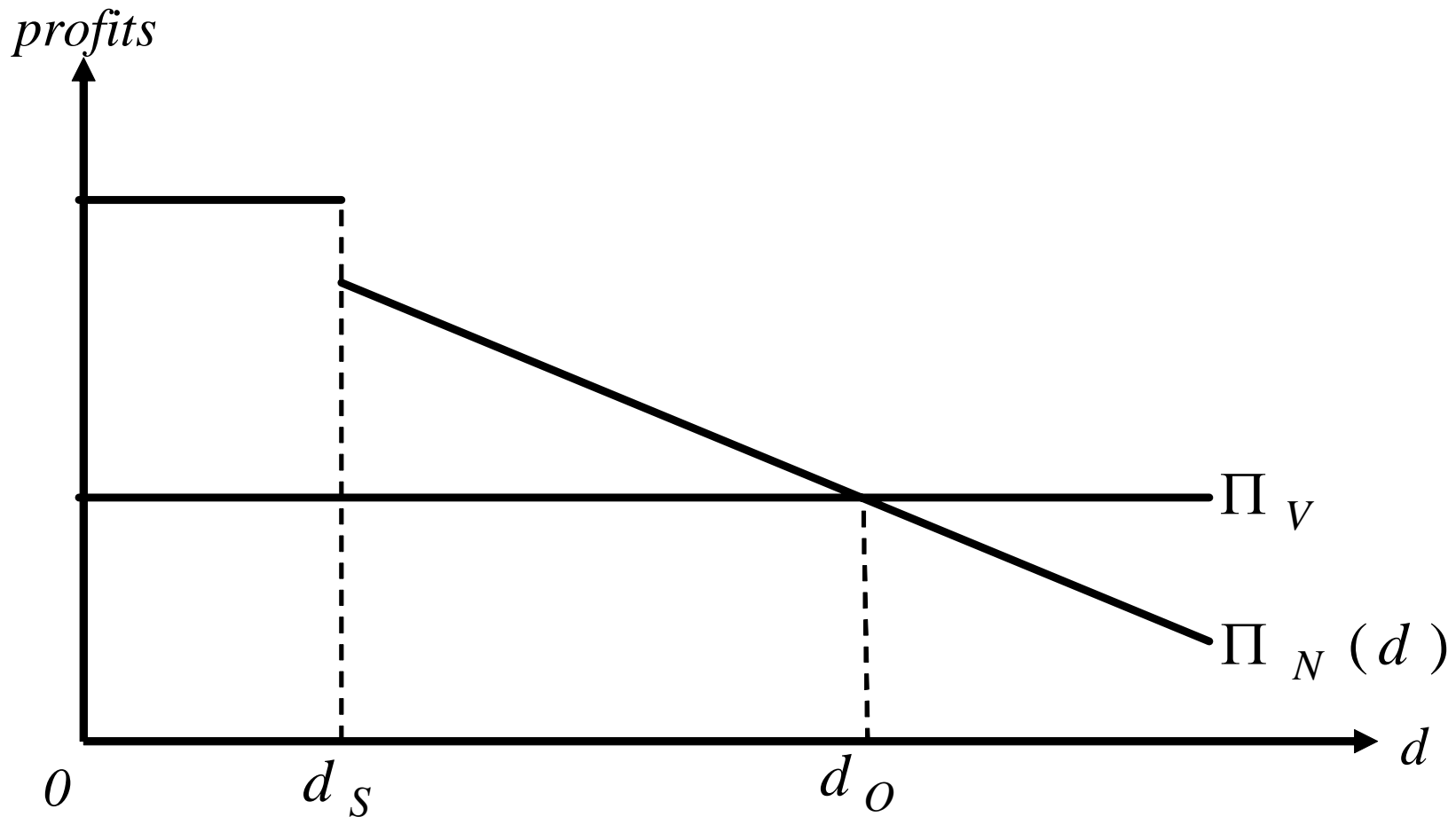
High Headquarter Intensity
Sector

Implications

1. Offshoring declines with headquarter intensity η.

2. More productivity dispersion leads to more offshoring.

3. In headquarter intensive sectors, where there is both outsourcing and integration, more productivity dispersion leads to more integration and less outsourcing.

4. An improvement in the competitive advantage of South raises offshoring in all sectors, and in headquarter-intensive sectors, outsourcing of components from foreign suppliers rises proportionately more than purchases of intermediate inputs from foreign affiliates.

Matching and Thick Market Effects

McLaren (2000), Grossman and Helpman (2002, 2003, 2005)

Implications

• Positive correlation between outsourcing and market size

• Positive correlation between outsourcing and the quality of contracting institutions (which render larger fractions of the customization costs contractible)
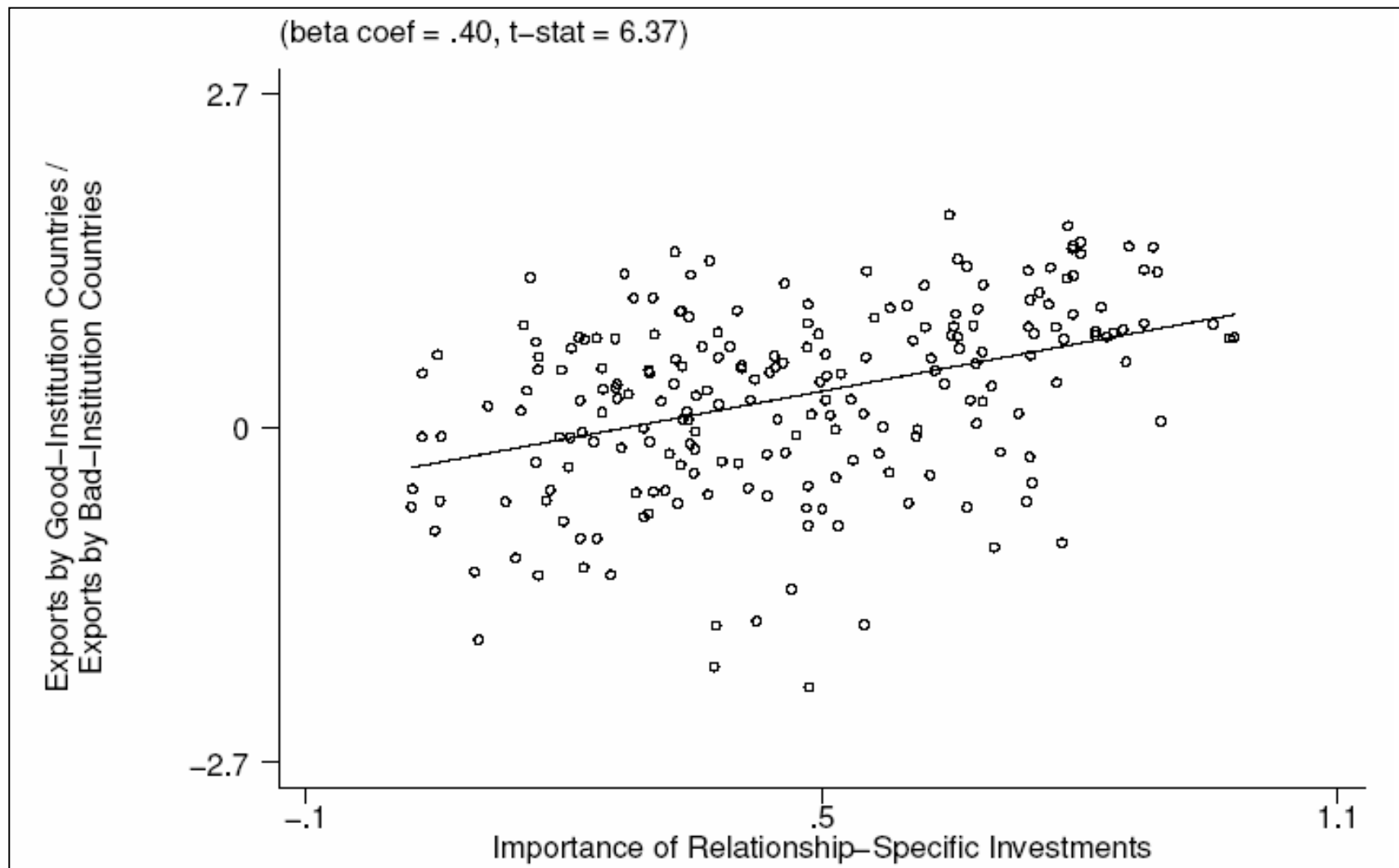
Ricardian Comparative Advantage

•   Ricardian comparative advantage can arise as a result of institutional variation across countries in the quality of the legal system when the relative requirement of contract-dependent inputs varies across sectors.

• Nunn (2005) provides a detailed empirical analysis of the impact of the degree of contract incompleteness on international trade flows, by interacting sectoral measures of contract dependence with country measures of the rule of law.

Table 5: Controlling for factor endowments. Dependent variable is $\ln\left(\frac{x_{ic}}{x_{ic'}}\right)$.

	(1)	(2)	(3)	(4)	(5)
Judicial quality interaction: $z_i(\gamma_c - \gamma_{c'})$	.22		.21		.20
	(20.5)		(17.6)		(17.3)
Skill interaction: $h_i(h_c - h_{c'})$		.20	.13	.21	.14
		(15.0)	(9.69)	(15.5)	(10.2)
Capital interaction $k_i(k_c - k_{c'})$		.02	.10	−.01	.07
		(.98)	(5.76)	(−.56)	(4.26)
Materials interaction: $r_i(r_c - r_{c'})$				.13	.11
				(6.43)	(5.51)
Country-pair FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R^2	.84	.83	.84	.83	.84
Number obs.	10,518	10,518	10,518	10,518	10,518

Beta coefficients are reported, with t-statistics in brackets. The contract-intensity measure used is z_i^{rs1}.

Source: Nunn, 2005

Rule of Law Encourages Export of Goods Intensive in Relationship-Specific Investment

(beta coef = .40, t–stat = 6.37)

Y-axis: Exports by Good–Institution Countries / Exports by Bad–Institution Countries

Values: 2.7, 0, −2.7

X-axis: Importance of Relationship–Specific Investments

Values: −.1, .5, 1.1