

Do Firms Learn from International Trade?

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Do firms gain access to foreign technological knowledge through trade?

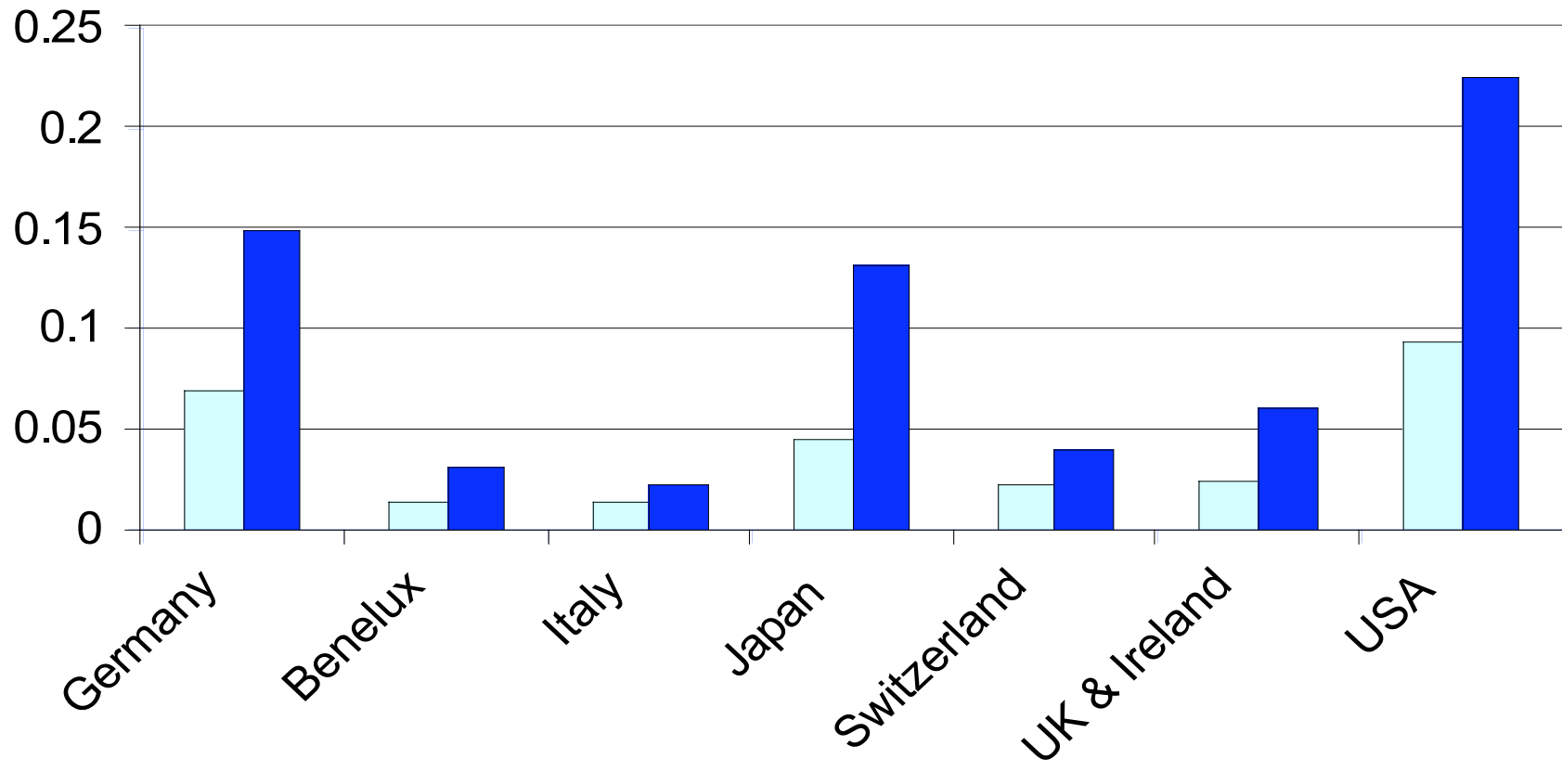
- Exporters have higher TFP than non-exporters, after controlling for other characteristics
 - Bernard & Jensen (1998), Clarides, Lach & Tybout (1998), Kraay (1997), Bigsten et al. (1999), Van Biesebroeck (2005)
- Does enhanced access to foreign technological knowledge explain this productivity advantage?
- This paper uses patent citations as an indicator of a firm's access to information about foreign technology
 - Related work: Frost (2001), Branstetter (2006), Singh (2007)

Empirical Approach

- European Patent Office patents and citations matched to administrative data on the universe of French firms
- Customs data
 - New data on French firms' cross-border sales and purchases by country, product and year 1986-92
- Balance-sheet information
 - Sales, capital stock, employment, wages, etc.
- Innovation survey

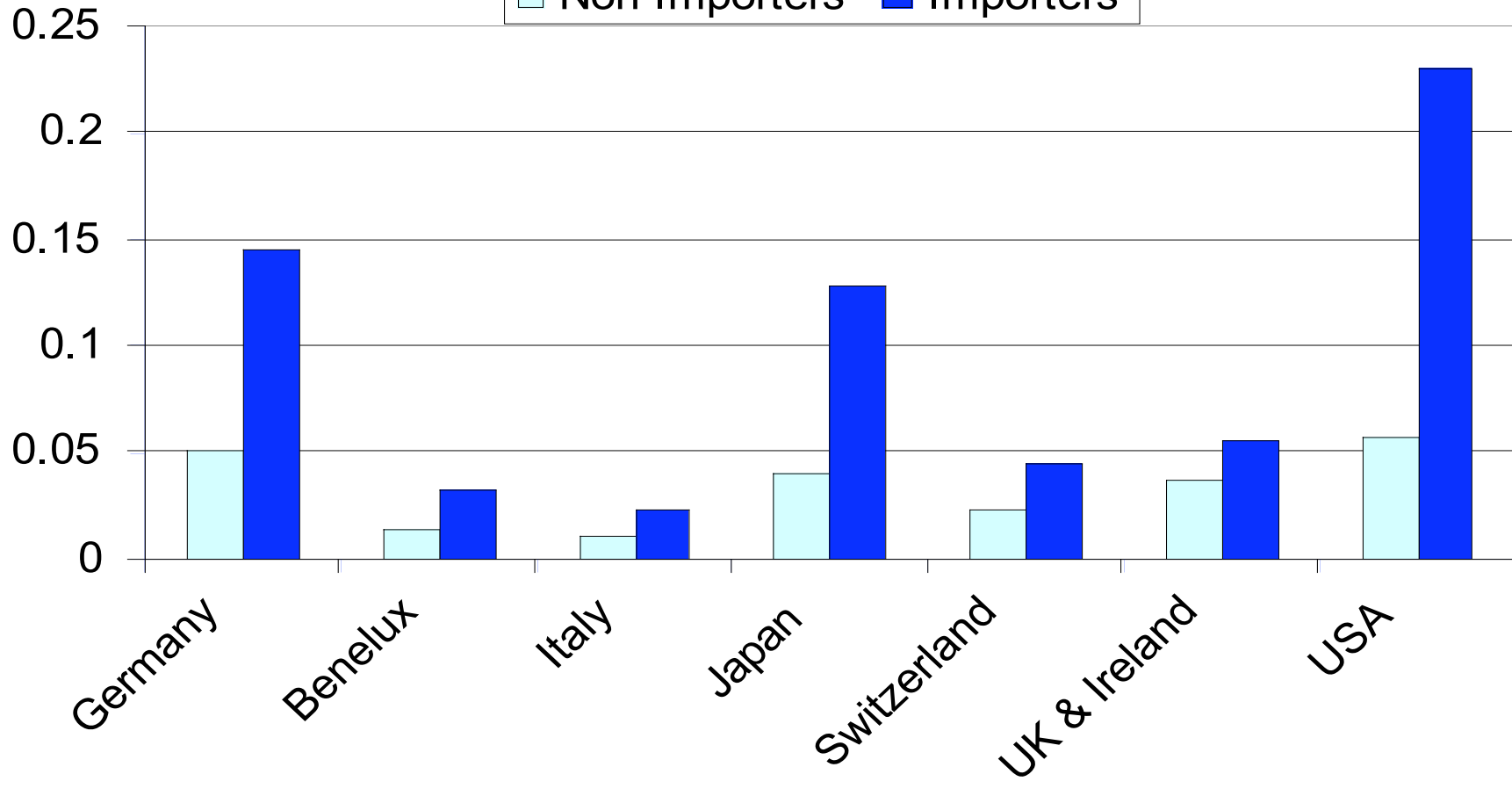
Mean Backward Citations per Patent (b_{ist} / P_{it}), by Country and Export Status

Non-Exporters Exporters



Mean Backward Citations per Patent (b_{ist} / P_{it}), by Country and Import Status

Non-Importers Importers



Neg. Bin. regression of backward citations on trade & investment variables

	Random Effects	Fixed Effects	F. E., restricted sample	
D(Exports)	0.042 (0.051)	0.006 (0.060)		
D(Imports)	0.312 ^{***} (0.060)	0.264 ^{***} (0.069)		
ln(Exports)			-0.012 ^{***} (0.004)	-0.010 (0.007)
ln(Imports)			0.059 ^{***} (0.008)	0.058 ^{***} (0.013)
D(Parent)	0.223 ^{**} (0.099)	0.308 ^{***} (0.103)	0.335 ^{***} (0.103)	0.278 [*] (0.158)
D(Subsidiary)				-0.009 (0.077)
D(JV)				-0.101 (0.093)
Observations	127656	127656	127656	12208

- Exporters do not cite significantly more foreign patents; Importers *do* cite approx. 30% more foreign patents
- Subsidiaries of foreign parents cite more foreign patents
- The elasticity of citation with respect to importing is small

Auxiliary Evidence from the Community Innovation Survey (CIS-1)

- 4,000 firms responded to questions about acquisitions of new technology by geographic origin and by channel of acquisition (i.e. R&D collaboration, employee mobility, consulting, etc.)
- Importers learn through a several channels; most important are “communication with foreign suppliers”, and “contract/collaborative R&D”
- Exporters report more limited knowledge acquisition through “communication with foreign buyers”, as well as by “analyzing competing products”.

Limitations of this research

- The focus on patent citations means only a narrow part of “knowledge diffusion” is captured
- We'd like to know the extent to which trade and FDI speed diffusion to lower-wage countries, and which policies make this more likely
- We'd also like to know what effect the diffusion of knowledge *from* U.S. firms *to* foreign firms has on the U.S.

How can Industry Studies Help?

- What is the nature of the technological knowledge exchanged by buyers and suppliers?
- What role does this knowledge play in the movement up quality ladders?
- Data on the use of specific production processes and techniques in different countries?
- Comparisons of similar firms in countries with different policies regarding technology transfer?

Evidence from the Community Innovation Survey (1993)

TABLE C1.—ACQUISITIONS OF FOREIGN TECHNOLOGY, BY SOURCE

Channel	log(<i>Exports</i>)	log(<i>Imports</i>)
R&D outsourcing	0.058 (0.041)	0.263*** (0.074)
Collaborative R&D	0.015 (0.036)	0.130** (0.055)
Patents and licenses	0.017 (0.029)	0.249*** (0.053)
Analyzing competing products	0.047** (0.022)	0.086*** (0.028)
Equipment purchases	0.037 (0.038)	0.187*** (0.066)
Hiring employees	0.000 (0.052)	0.025 (0.076)
Foreign suppliers	0.055 (0.037)	0.338*** (0.065)
Foreign buyers	0.226*** (0.071)	0.042 (0.027)
Mergers and acquisitions	-0.027 (0.049)	0.251*** (0.098)
Joint ventures and alliances	0.068 (0.061)	0.139** (0.070)

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- Exporters report knowledge acquisition through “communication with foreign buyers”, as well as by “analyzing competing products”.