Global Diffusion of ISO 9000 and ISO 14000 Certification

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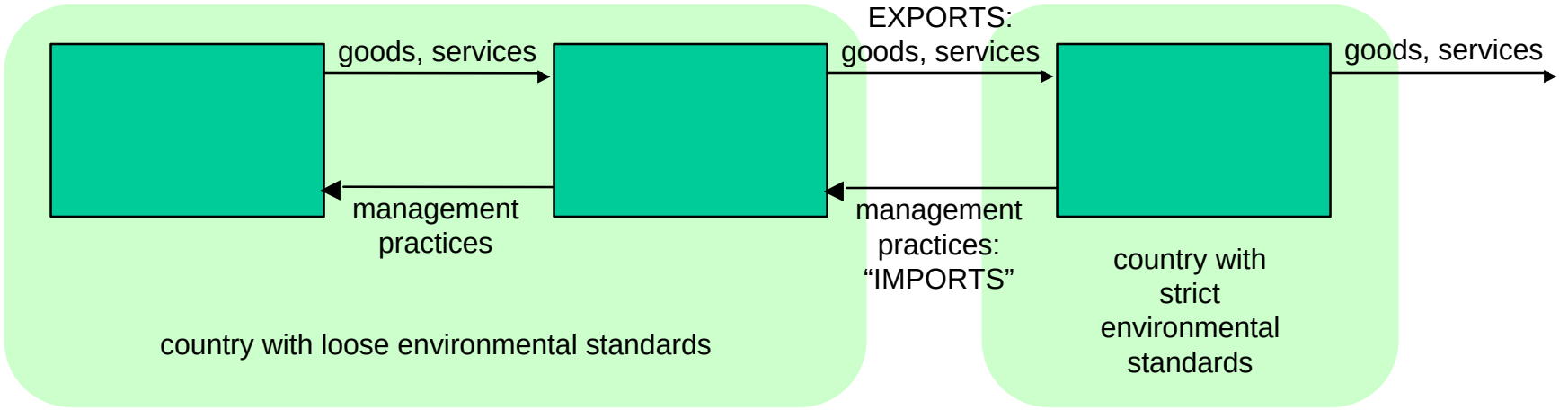
Why study global diffusion of ISO 9/14000?

- "Greening the supply chain": can countries export environmental practices to emerging economies?



- This paper: argues that firms that export goods or services to a country may import some of that country's management practices into their own country
- Use ISO 9000/ISO 14000 as test case: relatively good data available on global diffusion

Data

- National certification counts since 1993: ISO
- GDP, population (deflators): World Bank
- Firm-level data: global survey
  - Pilot in US, Summer 1999 (200 firms, 23 responses)
  - Survey form modified; total 9 pages
  - Partners in approx. 15 other countries: translate and administer survey locally
  - US survey: Winter 2001; $1 incentive, postcard from UCLA; telephone follow-up among 100 non-respondents, 37 responses
  - Other countries: other practices

Global survey: response rates

- Combining / eliminating countries with limited observations; 9 countries in final sample:

country	***questionnaires mailed***	***usable responses received***	***response rate***
Australia / New Zealand	3000	611	20.4%
Canada	561	198	35.3%
France	2000	445	22.3%
Hong Kong	1200	131	10.9%
Japan	5000	2261	45.2%
Korea	1361	120	8.8%
Sweden	268	135	50.4%
Taiwan	2142	455	21.2%
US	5000	939	18.8%
Total	**20,532**	**5,295**	**25.8%**

Hypothesis 2: motivations

- Hypothesis 2 (motivations):
  - In countries where diffusion started relatively late, early adopters are more heavily motivated by the cross-country effect, (ie., export considerations) than late adopters.
- Which countries are late adopters? Use certifications in 1993 (earliest available) or 1994, and use either GDP or population as deflator. Ranking:
  - Relatively early: France, Sweden, Australia/NZ, Canada, HK
  - Relatively late: Japan, Korea, Taiwan, US
- Early adopting firms? Take 1st quartile by certification year (within country)
- Survey: “how important was reason A,B,... in deciding to seek certification?”

Hypothesis 2

- Further test: do early and late adopters differ with respect to other relative motivation factors?

	relative motivation factors: see question 9b in the Appendix										
country	cost	qual	mkt	cust	comp	ben	exp	knl	auth	com	img
Australia / NZ		--		+++			+++		-	---	---
Canada					--		++		+		
France*	-			++	++		+			--	
Hong Kong			+				--				+
Japan	--	---		+++		+	+++	---	---	---	---
Korea				+			+++	--	--	--	
Sweden						---					
Taiwan		--		++	-		+++				
US					--		+++				

- Conclusion: main difference in motivations between early and late adopters is importance of exports; H2 supported

Hypothesis 3: actual certification behavior

- Hypothesis 3 (behavior):
  - In countries where diffusion started relatively late, firms with high exports certify earlier than firms with low exports (controlling for firm size).
- Which countries are late adopters? Ranking:
  - Relatively early: France, Sweden, Australia/NZ, Canada, HK
  - Relatively late: Japan, Korea, Taiwan, US
- Variables:
  - ISO9Year = year of certification
  - "GlobalExports" = sum of exports to all regions
  - several variables for "size"
- Model: $ISO9Year = ß_0 + ß_1 \times GlobalExports + ß_2 \times size$
- Truncated regression, maximum likelihood; PROC QLIM

Hypothesis 3: exports and early certification

- H3: GlobalExports significant in late-adopting countries (Japan, Korea, Taiwan, US)

country	*N*	intercept		Large		GlobalExports	
		estimate	*p*-value	estimate	*p*-value	estimate	*p*-value
Australia/NZ	576	***1996***	<0.0001	***-1.2535***	<0.0001	-0.0210	0.4177
Canada	169	***2001***	<0.0001	-2.0000	0.0687	-0.1693	0.1077
France*	424	***2008***	<0.0001	***-2.4362***	0.0014	***-0.5460***	<0.0001
Hong Kong	112	***1999***	<0.0001	***-4.7858***	0.0001	0.0627	0.5732
Japan	2164	***2005***	<0.0001	***-2.0788***	<0.0001	***-0.3127***	<0.0001
Korea	111	***1998***	<0.0001	*-0.8685*	0.0199	***-0.1018***	0.0014
Sweden	133	***1999***	<0.0001	***-3.0365***	0.0001	-0.0641	0.3255
Taiwan	434	***1998***	<0.0001	***-0.5728***	0.0076	***-0.1104***	<0.0001
US	891	***1998***	<0.0001	***-0.9473***	<0.0001	***-0.0780***	<0.0001

- Observe: H3 supported

Summary of results

- Findings robust: high significance, sensitivity analysis
- Diffusion of ISO 9000 started in Europe; forced suppliers in other countries to adopt; those suppliers imposed upon *their* suppliers, started domestic diffusion in other countries
  - H1: mixed evidence that higher penetration leads to higher pressure on suppliers
  - H2: in late-adopting countries, early adopters more heavily motivated by exports; no difference on other motivations
  - H3: in late-adopting countries, higher exports lead to earlier adoptions
- Tentatively: it *is* possible to “export” best practices; so it *may* be possible to “green the supply chain”
- Other ongoing work: financial impact of ISO 9000 (20,000 certifications in US, COMPUSTAT data, event study)

Does ISO 9000 certification pay?

- Data:
  - all ISO 9000 certifications in US (21,000+)
  - Compustat financials 1988-1997
  - selected main sectors; final 3,000 firms, and 550 certifications
- Event-study methods
  - Hendricks & Singhal (TQM)
  - Barber & Lyon (JFE, 1996): event-studies for operating performance
  - performance-matched control group
- Findings:
  - ISO 9000 leads to significant abnormal performance in ROA
  - mostly: performance of firms that *don't* get certified deteriorates

ISO 9000 in the chemical industry (SIC 28)