



Joseph L. Rotman School of Management
University of Toronto

Rotman

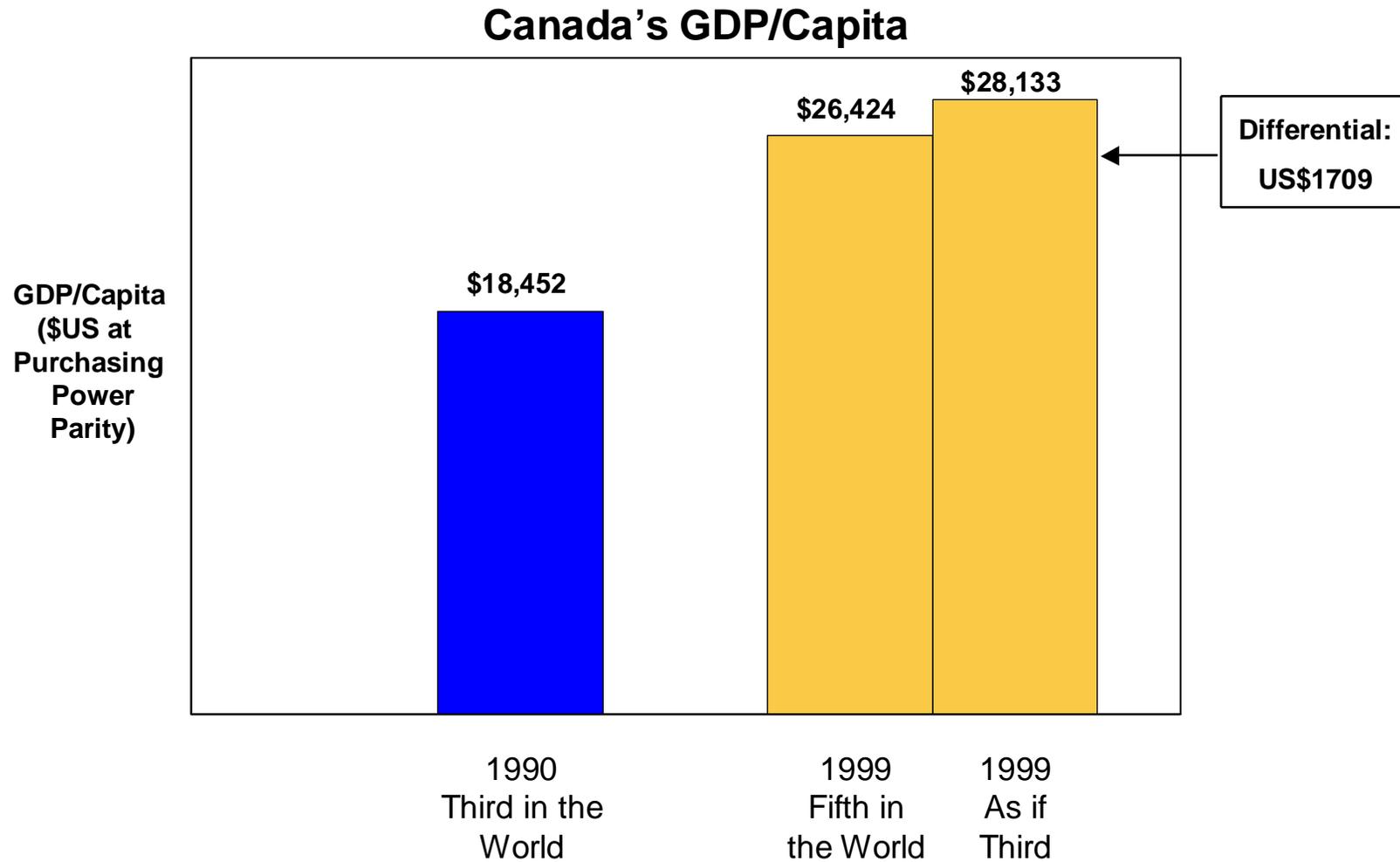
Innovation, Competitiveness and Prosperity

Canadian Institute for Telecommunications Research

August 27, 2001

***Roger L. Martin, Dean
Rotman School of Management
University of Toronto***

Falling Relative Prosperity for Canada



The Crux of the Issue

Replication

Versus

Innovation

A Tale of Two Industries: 1991-2000

Newsprint

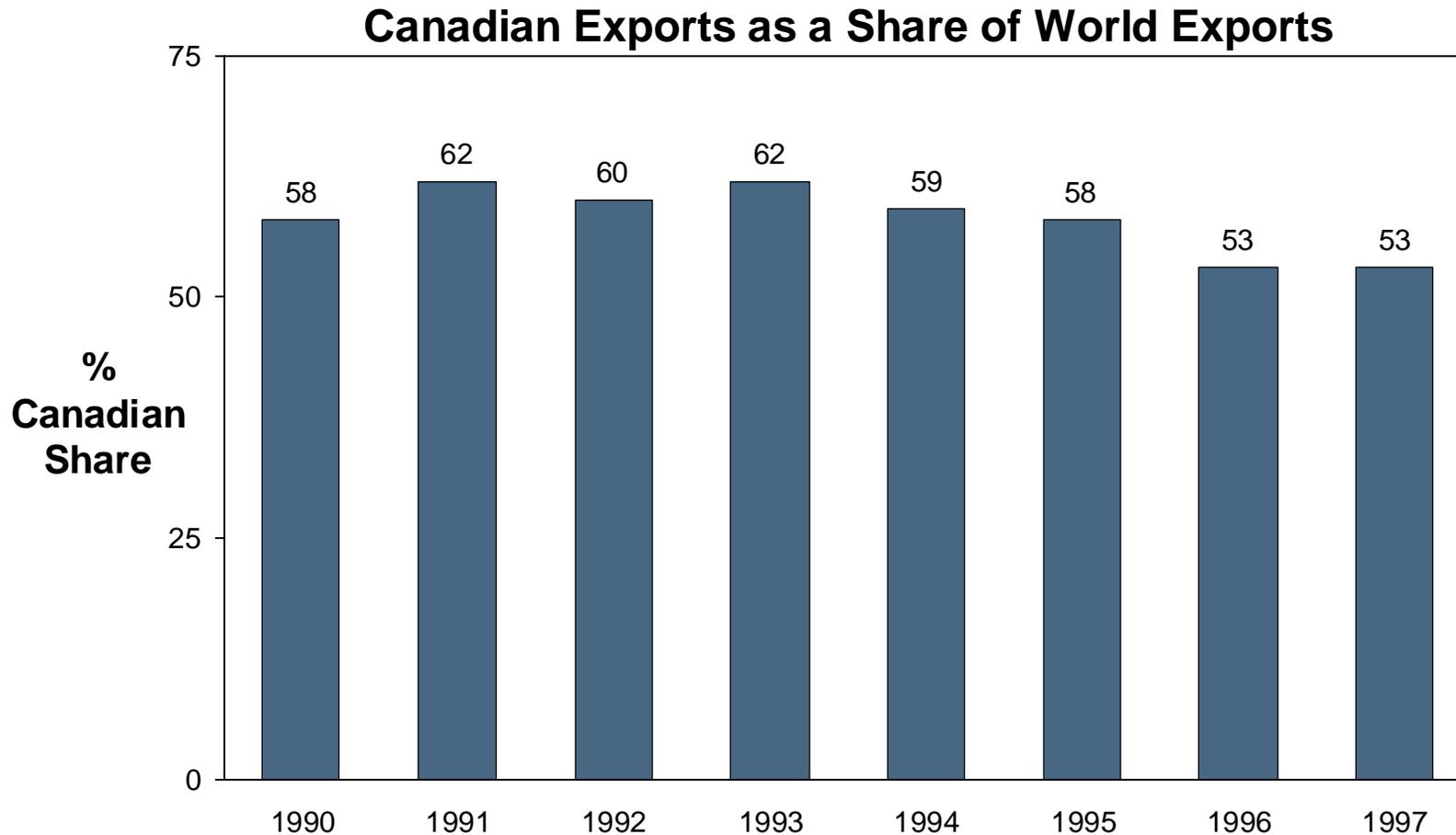
Versus

**Central Office
Switching**

Newsprint in 1991

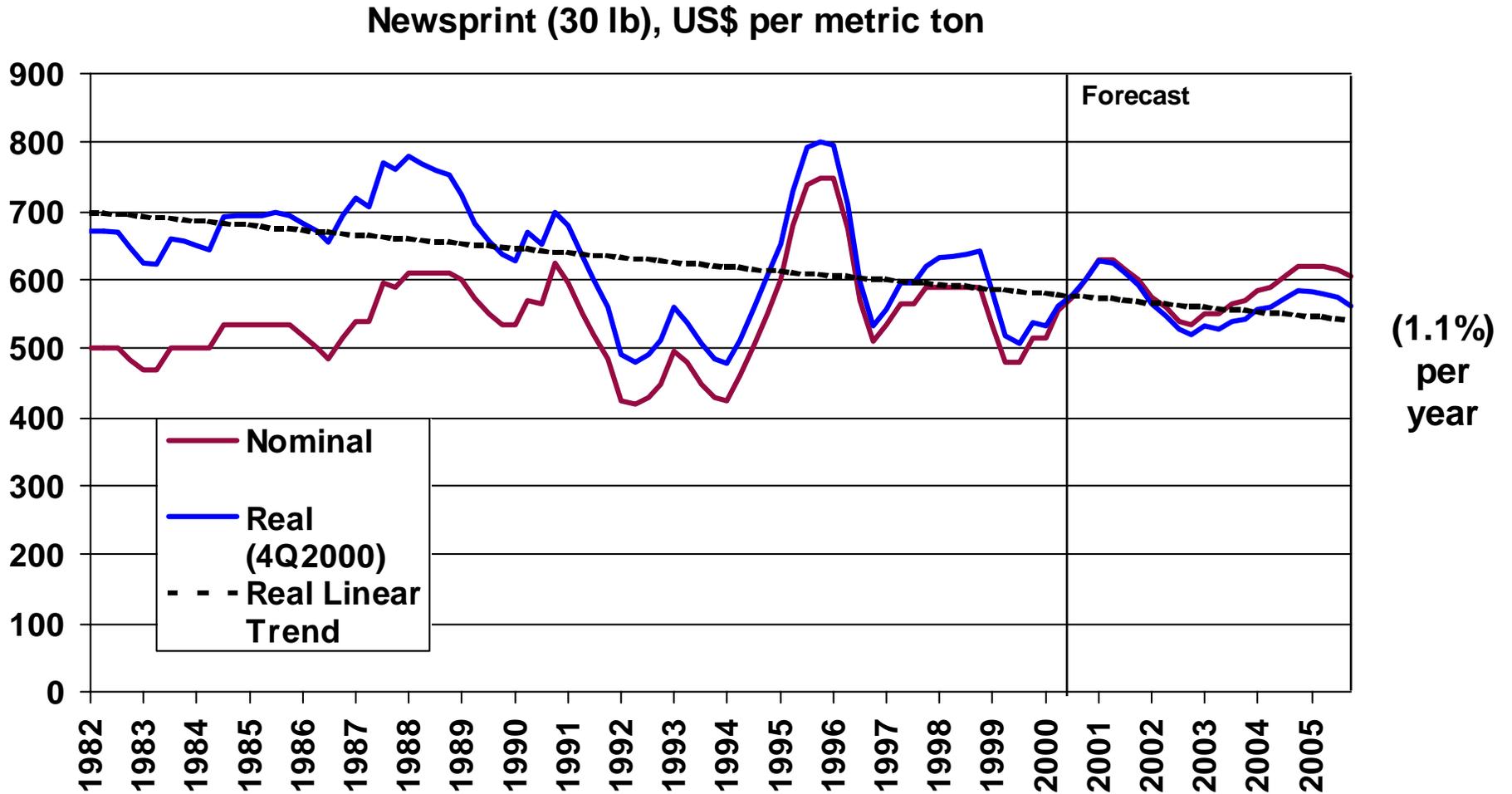
- **A major Canadian export industry**
- **Seven substantial Canadian players**
 - **Canadian Pacific Forest Products**
 - **Abitibi-Price**
 - **Fletcher Challenge Canada**
 - **Stone Consolidated**
 - **QUNO**
 - **Kruger**
 - **MacMillan Bloedel**
- **Leading the world in export market share**
- **However, some key vulnerabilities**

A Slowly Declining Canadian Market Share



SOURCE: UN SITC TRADE STATISTICS, REVISION 2; CLUSTER MAPPING PROJECT AT THE INSTITUTE FOR STRATEGY AND COMPETITIVENESS, HARVARD BUSINESS SCHOOL.

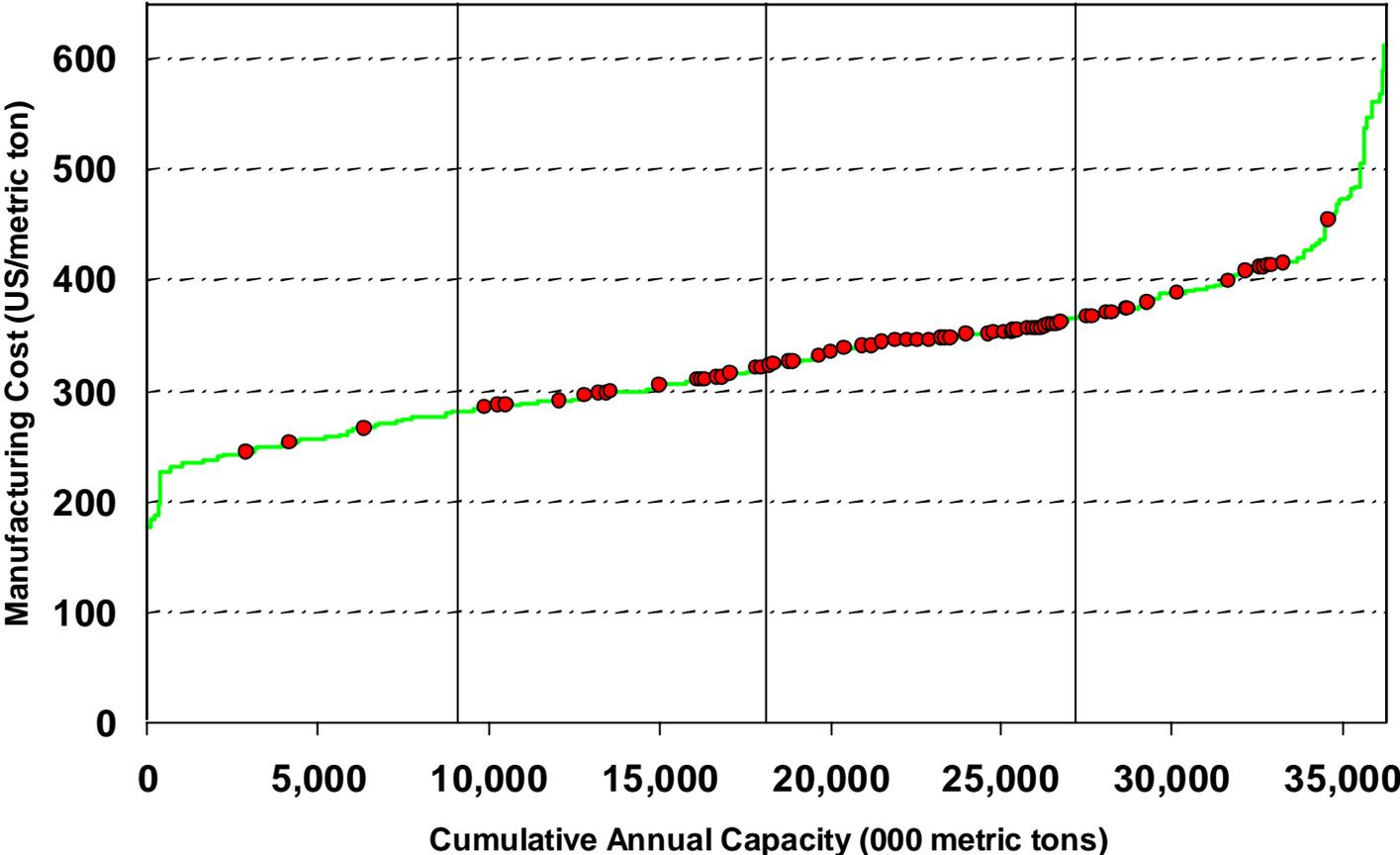
A Slowly Declining Real Value of the Product



Source: Jaakko Poyry Consulting

Cost Position Supported by a Falling Canadian Dollar

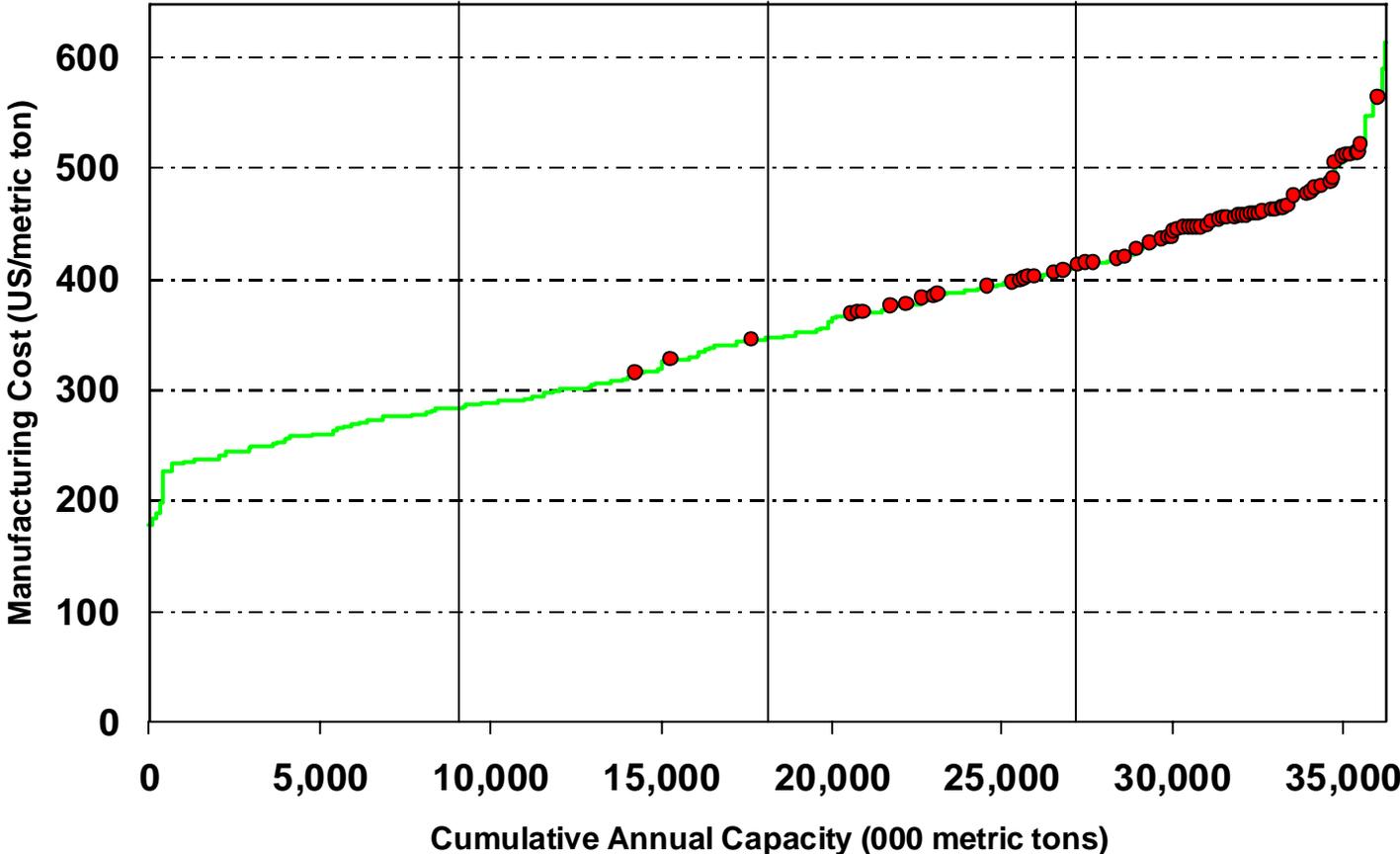
**Canadian Newsprint Mill Cost Competitiveness:
Canadian Dollar at US\$.66**



SOURCE: Jaakko Poyry Consulting. Cost curve and Canadian dollar as of December 2000.

Cost Position Supported by a Falling Canadian Dollar

**Canadian Newsprint Mill Cost Competitiveness:
Canadian Dollar at US\$.85**



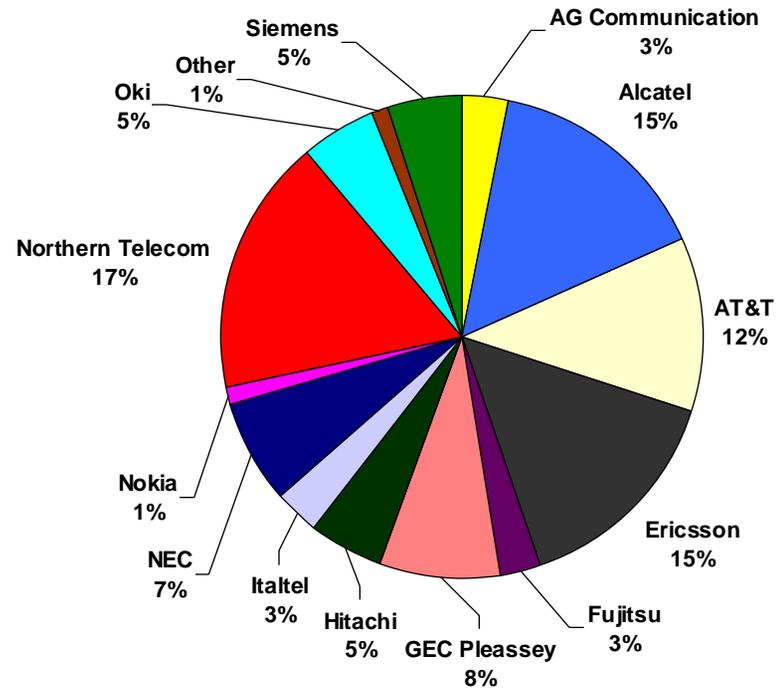
SOURCE: Jaakko Poyry Consulting. Cost curve as of December 2000, Canadian dollar adjusted to US\$.85

Little Participation in the Globalization of the Industry

- **Stora Enso**
 - Consolidated Papers
- **Norske Skog**
 - Fletcher Challenge Canada
 - Pacifica Papers
- **UPM- Kymenae**
 - Repap Canada
- **Bowater**
 - Avenor
- **Weyerhaeuser**
 - MacMillan Bloedel

Central Office Switching in 1991

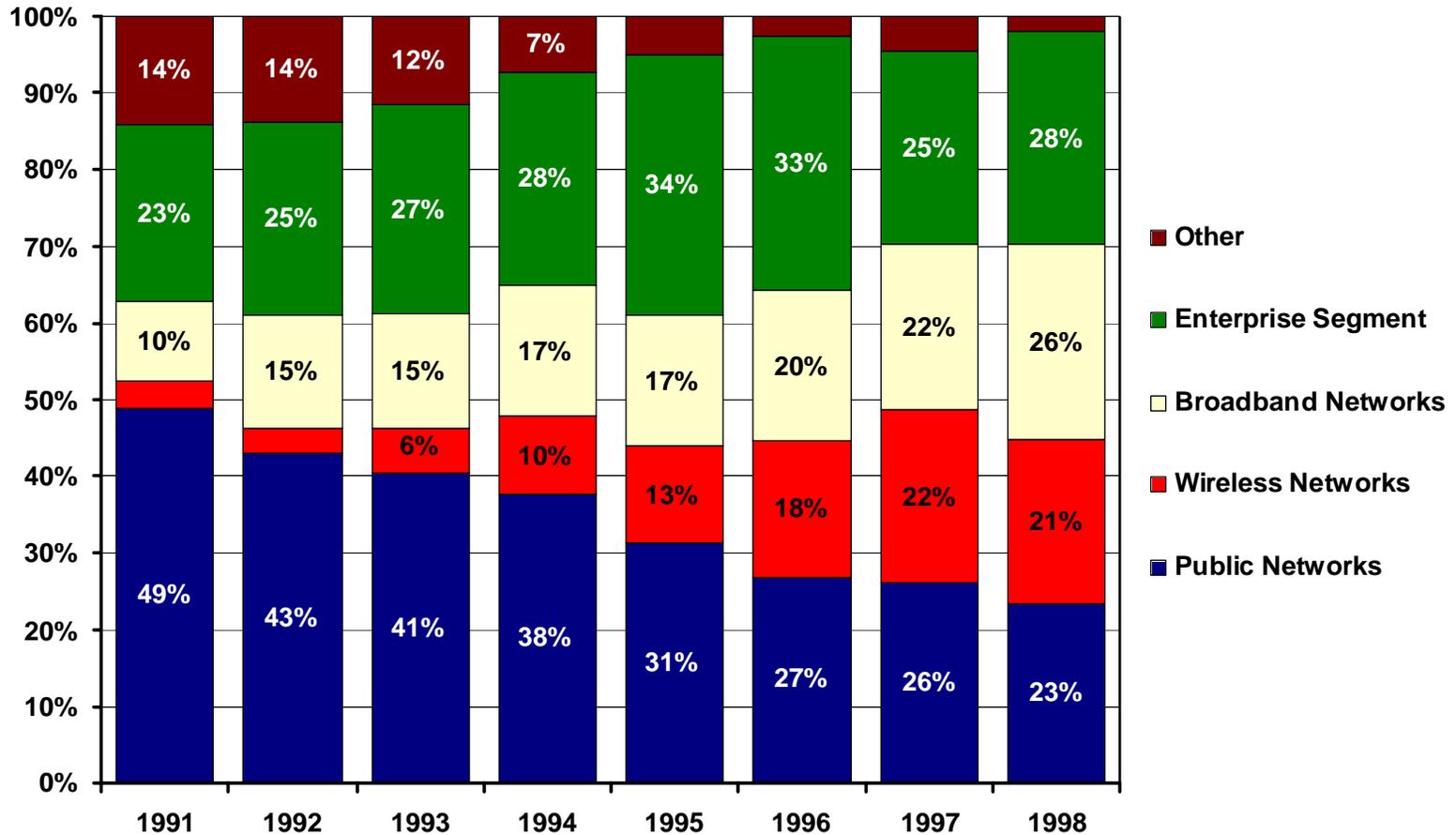
Share of Digital Local Lines Placed in Service, 1989



Source: BlueStone Capital Market Analysis, November 2000, Northern Business Information, 1990 Edition

Nortel Networks: A Radical Change in Business Mix

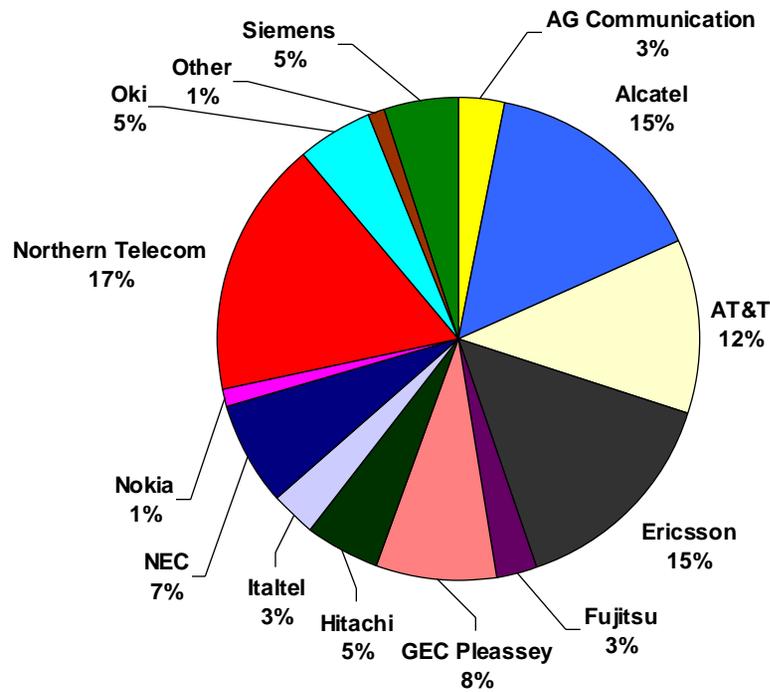
Distribution of Sales by Product Segment, 1991 to 1998



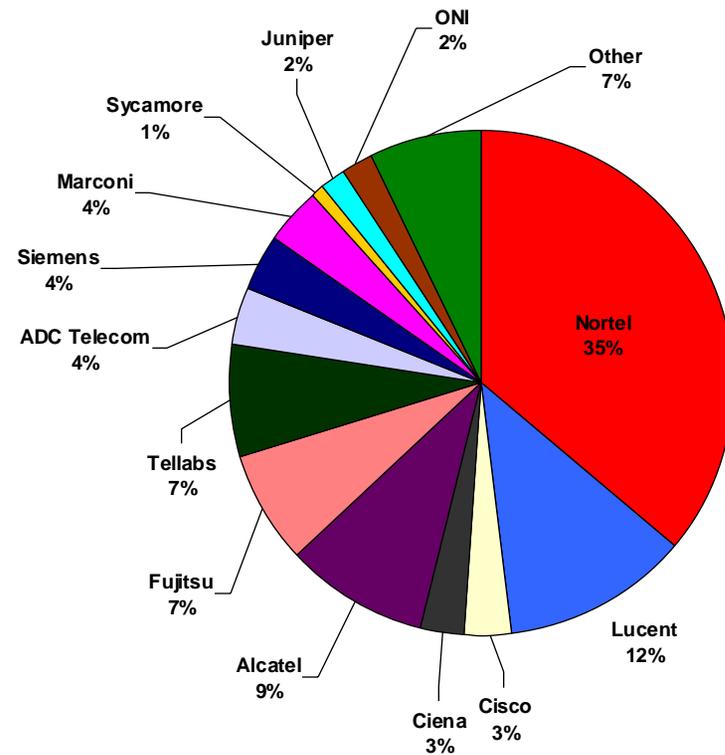
Source: Various Nortel Networks Annual Reports.

Greater Leadership in the New Business

Share of Digital Local Lines Placed in Service, 1989



Share of Optical Systems Market, 2000E



Source: BlueStone Capital Market Analysis, November 2000, Northern Business Information, 1990 Edition

Canadian Depth in Optical Networking

- **Dominant player in Optical Networking**
 - **Nortel Networks**
- **Dominant player in Optical Components**
 - **JDS-Uniphase**
- **Dominant player in Optical Outsourced Manufacturing**
 - **Celestica**
- **Strong Optical Cluster Taking Shape in Ottawa-Kanata**

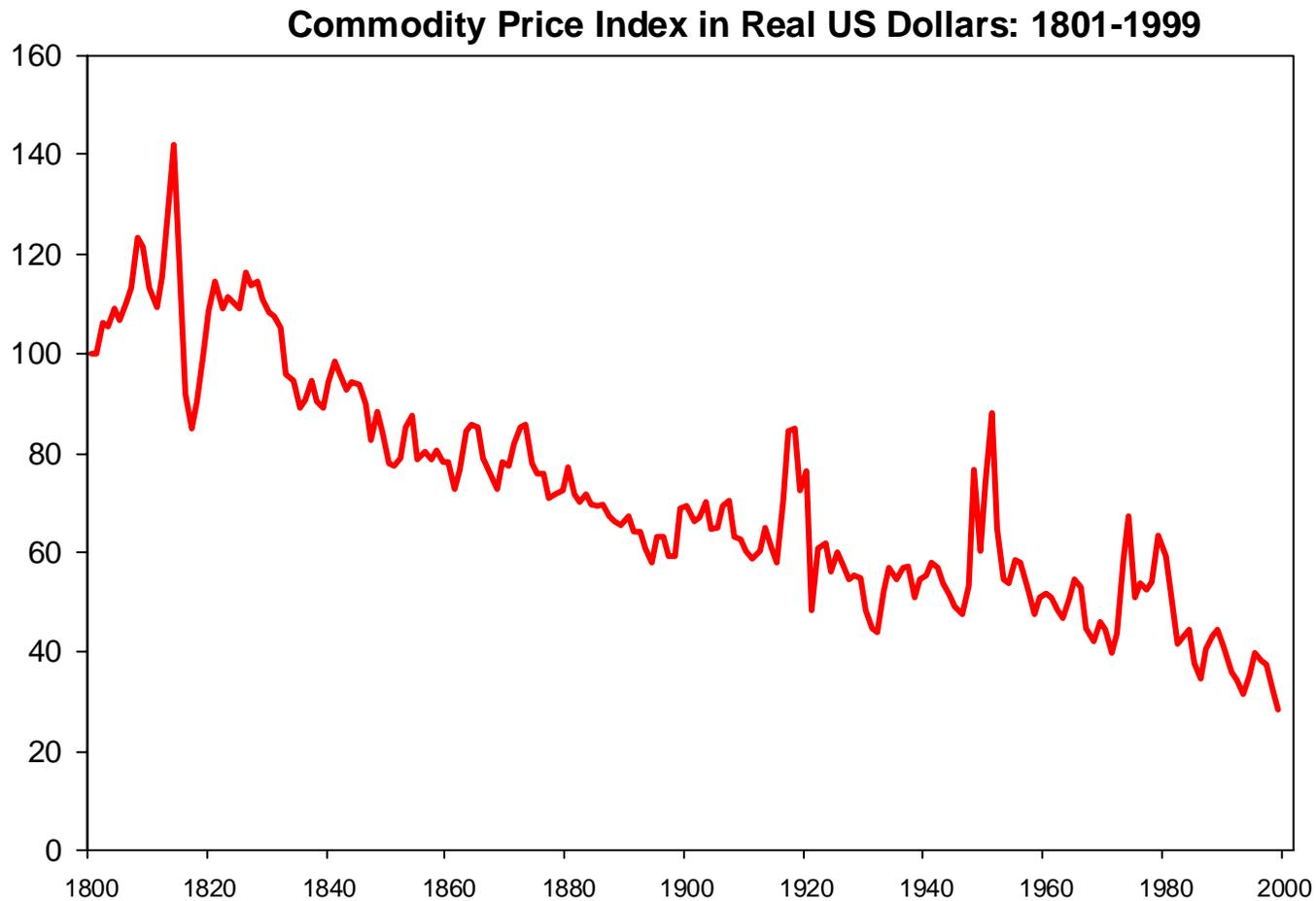
The Crux of the Issue

Replication

Versus

Innovation

Relentless Downward Pressure on Commodity Prices

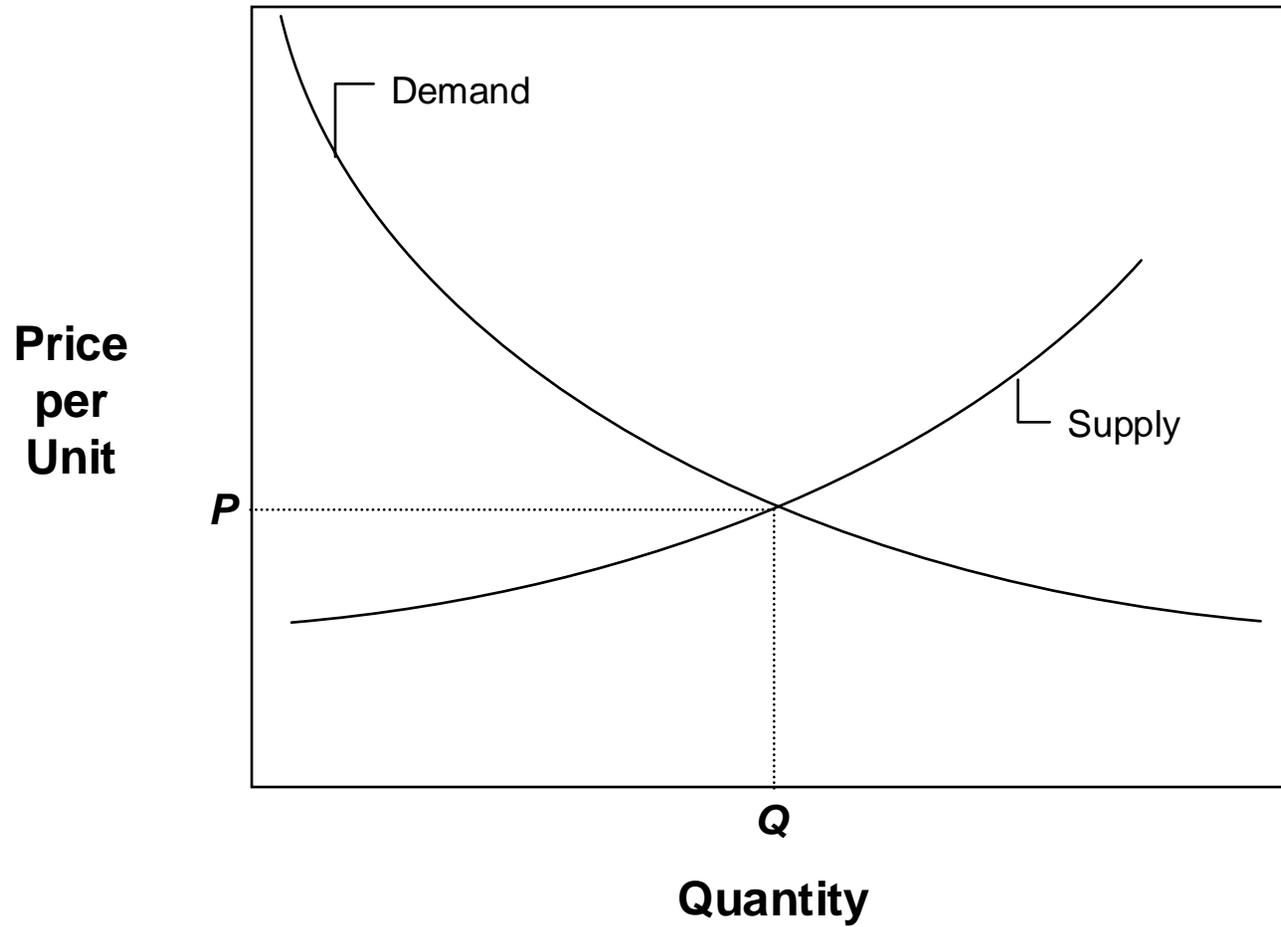


Note: Index of 1801 = 100

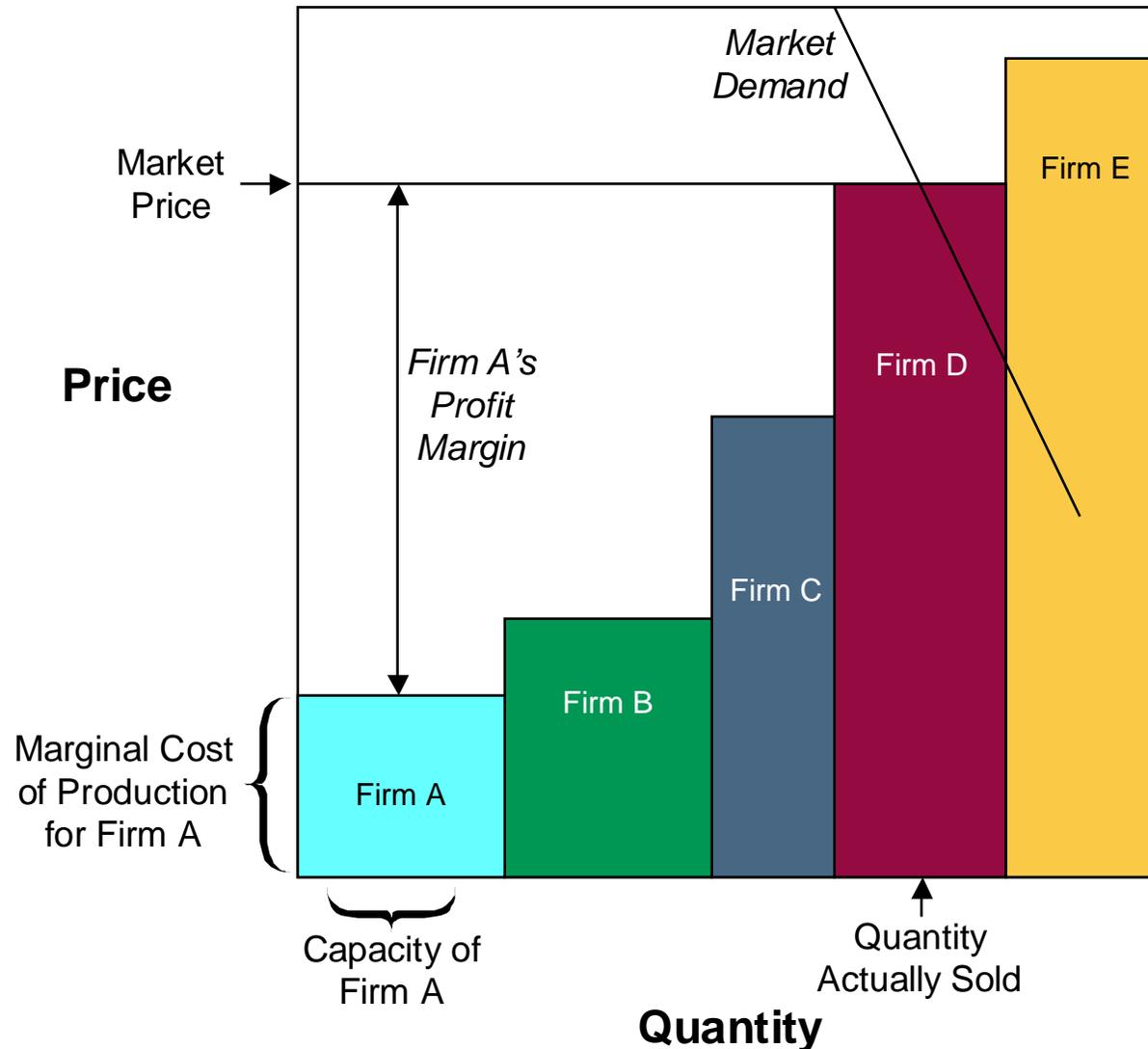
Source: Nesbitt Burns Economic Research

RLM-RSM-CITR-8-27-01

Market Forces

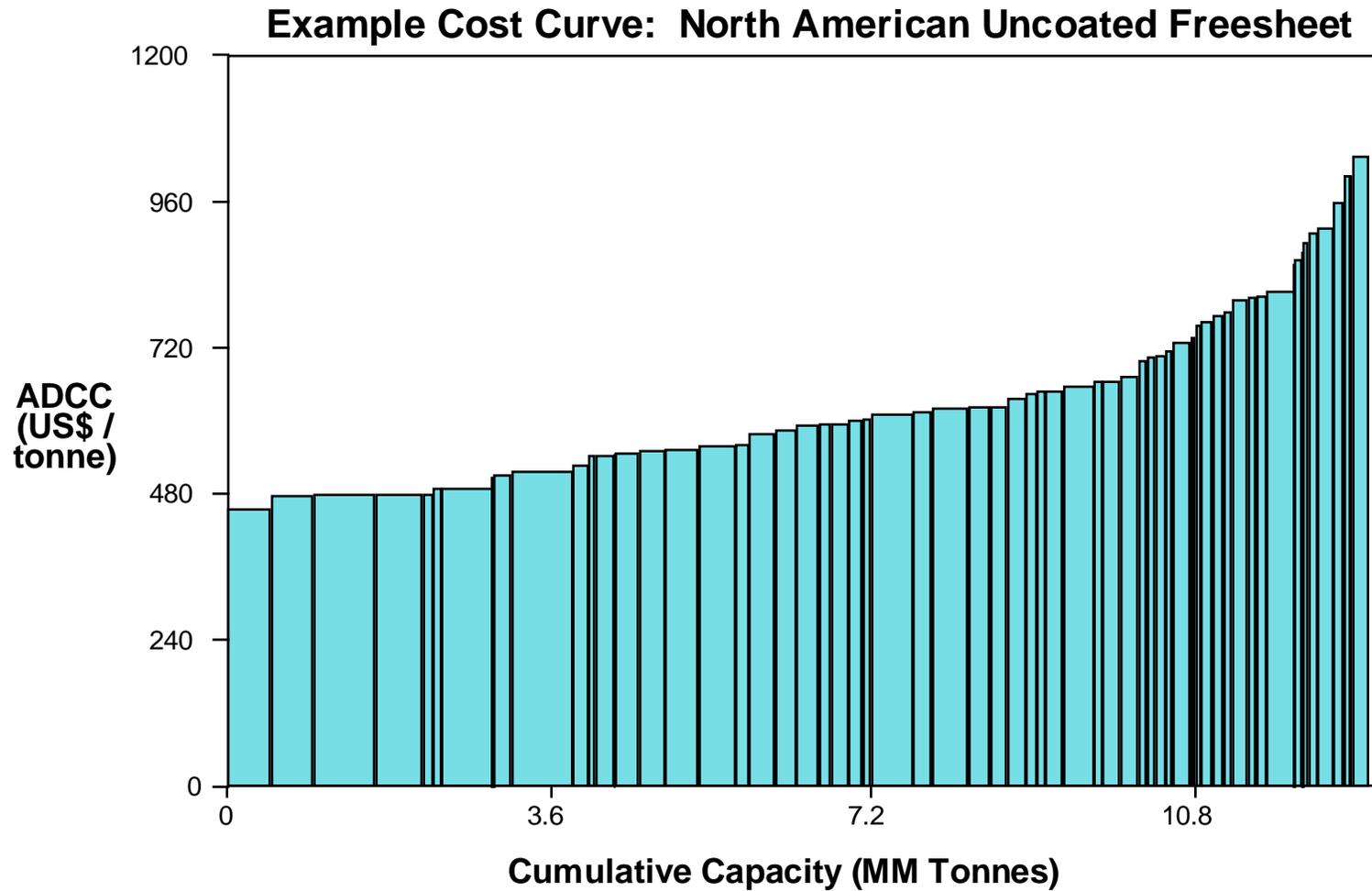


Position on Cost Curve Determines Competitiveness



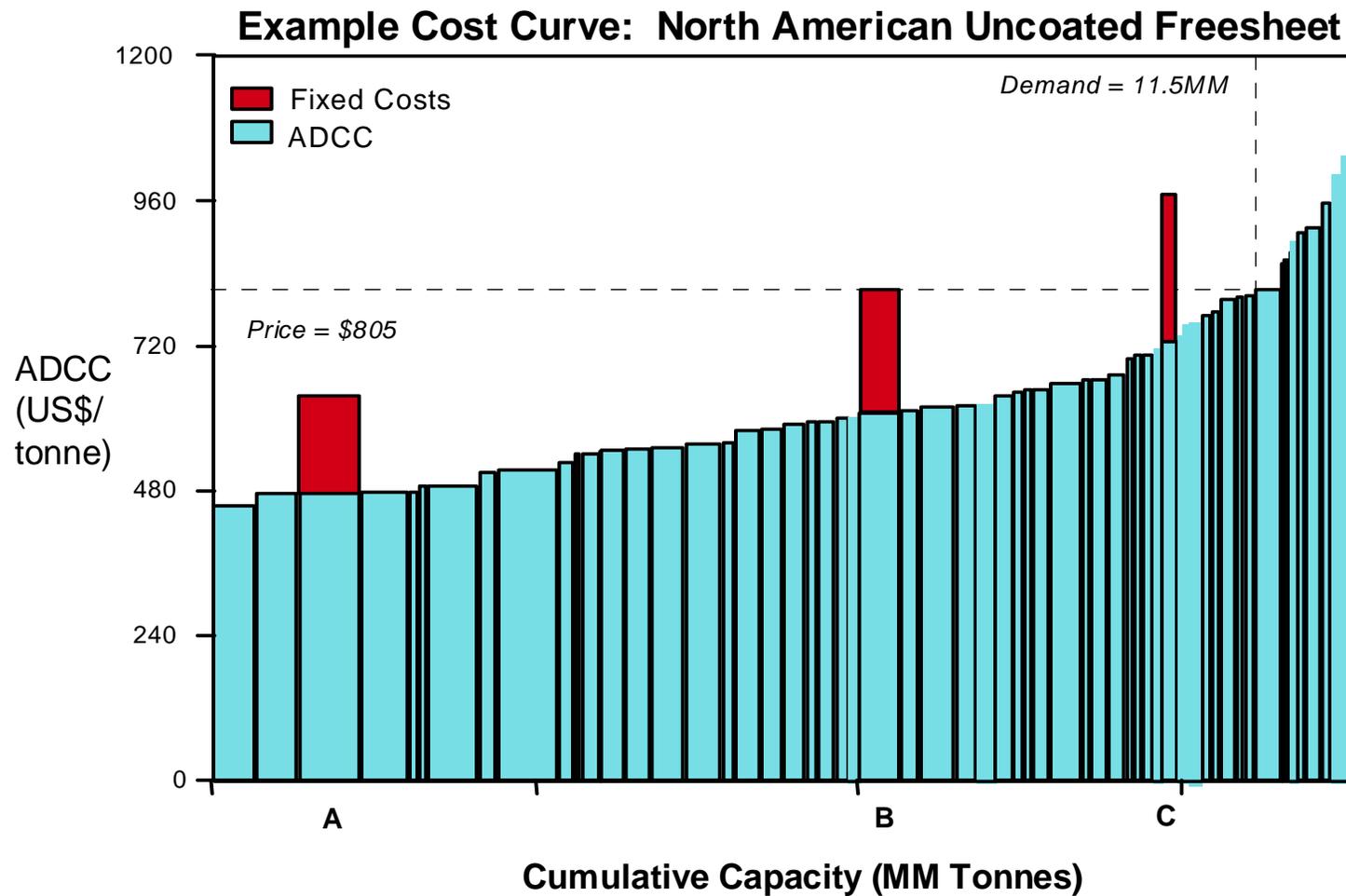
- Firms survive in this market as long as the market price exceeds their marginal cost of production
 - Firms A, B, C, and D remain in market
 - Firm E must reduce its cost or exit
- Efficient firms earn healthy profits despite the intense competition
 - E.g., Firm A

Industry Cash Cost Supply Curve

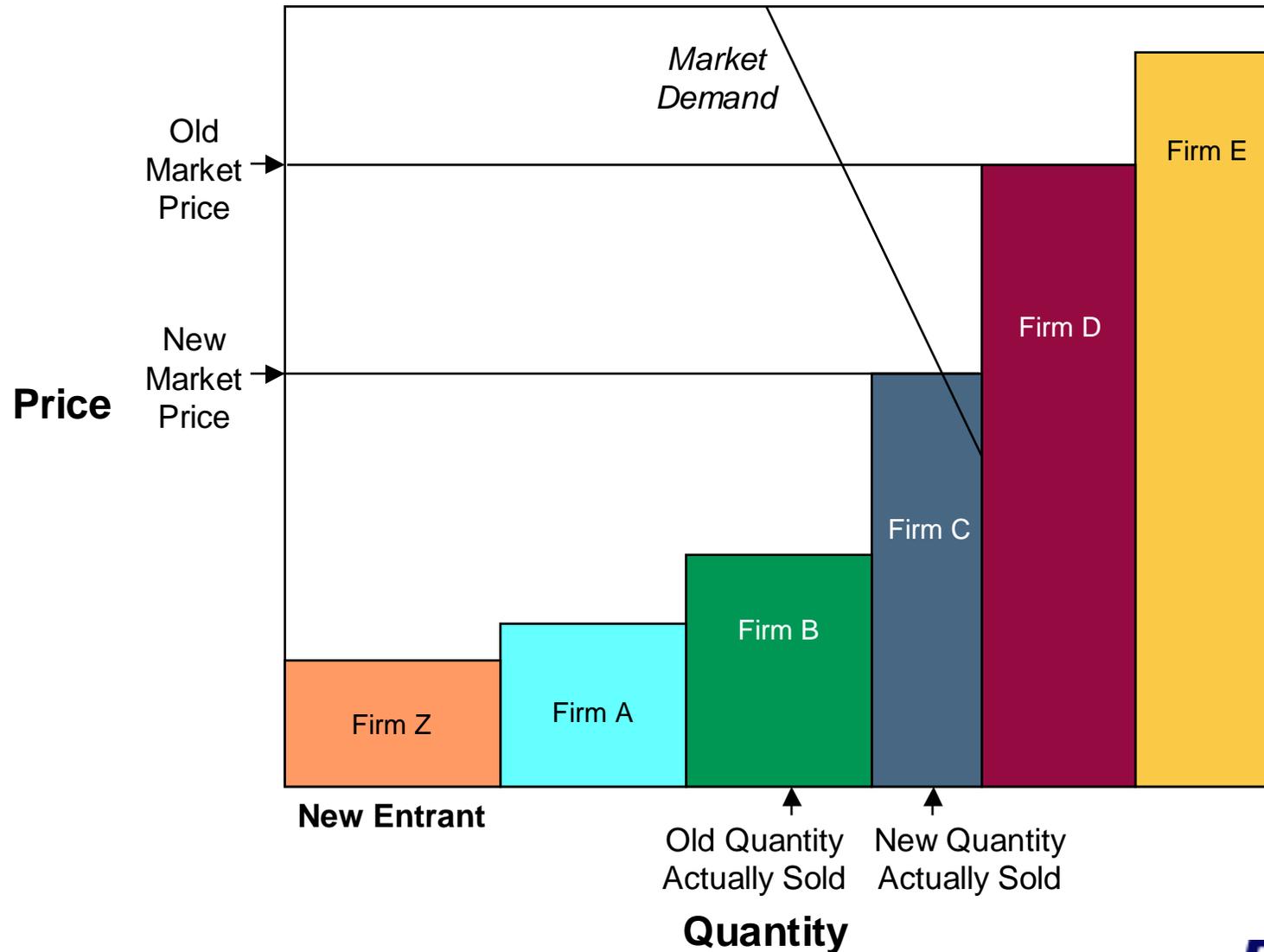


Source: Monitor Company Analysis

Cash Costs versus Total Costs



Evolution of Commodity Markets



The Increased Importance of Innovation

The Largest Market Capitalization Firms

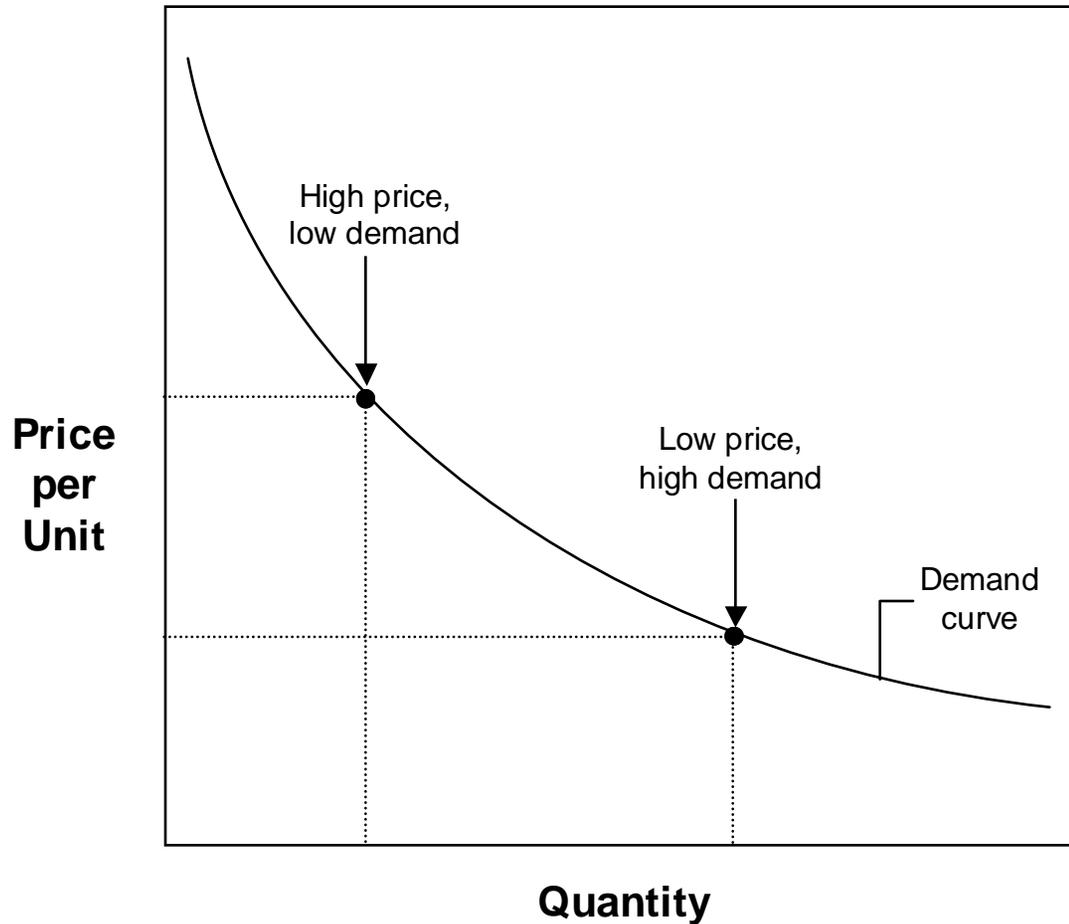
1928		
Rank	Company	Market Value (Billions*)
1	General Motors	\$22
2	AT&T	18
3	U.S. Steel	9
4	Standard Oil (New Jersey)	9
5	General Electric	9
6	DuPont	8
7	F.W. Woolworth	7
8	S.H. Kress	7
9	Standard Oil Co. of California	6
10	New York Central Railroad	6
11	Pennsylvania Railroad	6
12	Canadian Pacific Railway	6
13	Consolidated Gas of New York	5
14	Standard Oil Co. of New York	5
15	R.J. Reynolds Tobacco	5

1969		
Rank	Company	Market Value (Billions*)
1	IBM	\$159
2	AT&T	102
3	General Motors	76
4	Eastman Kodak	51
5	Exxon	51
6	Sears, Roebuck	40
7	Texaco	32
8	Xerox	31
9	GE	27
10	Gulf Oil	24
11	3M	23
12	DuPont	19
13	Avon Products	19
14	Coca-Cola	18
15	Mobil Oil	18

2001		
Rank	Company	Market Value (Billions)
1	GE	\$459
2	Microsoft	335
3	Citigroup	314
4	Cisco	306
5	Exxon Mobil	284
6	Pfizer	271
7	Intel	244
8	AOL	241
9	WalMart	239
10	Vodafone	226
11	AIG	205
12	IBM	194
13	Nokia	187
14	Merck	182
15	BP Amoco	175

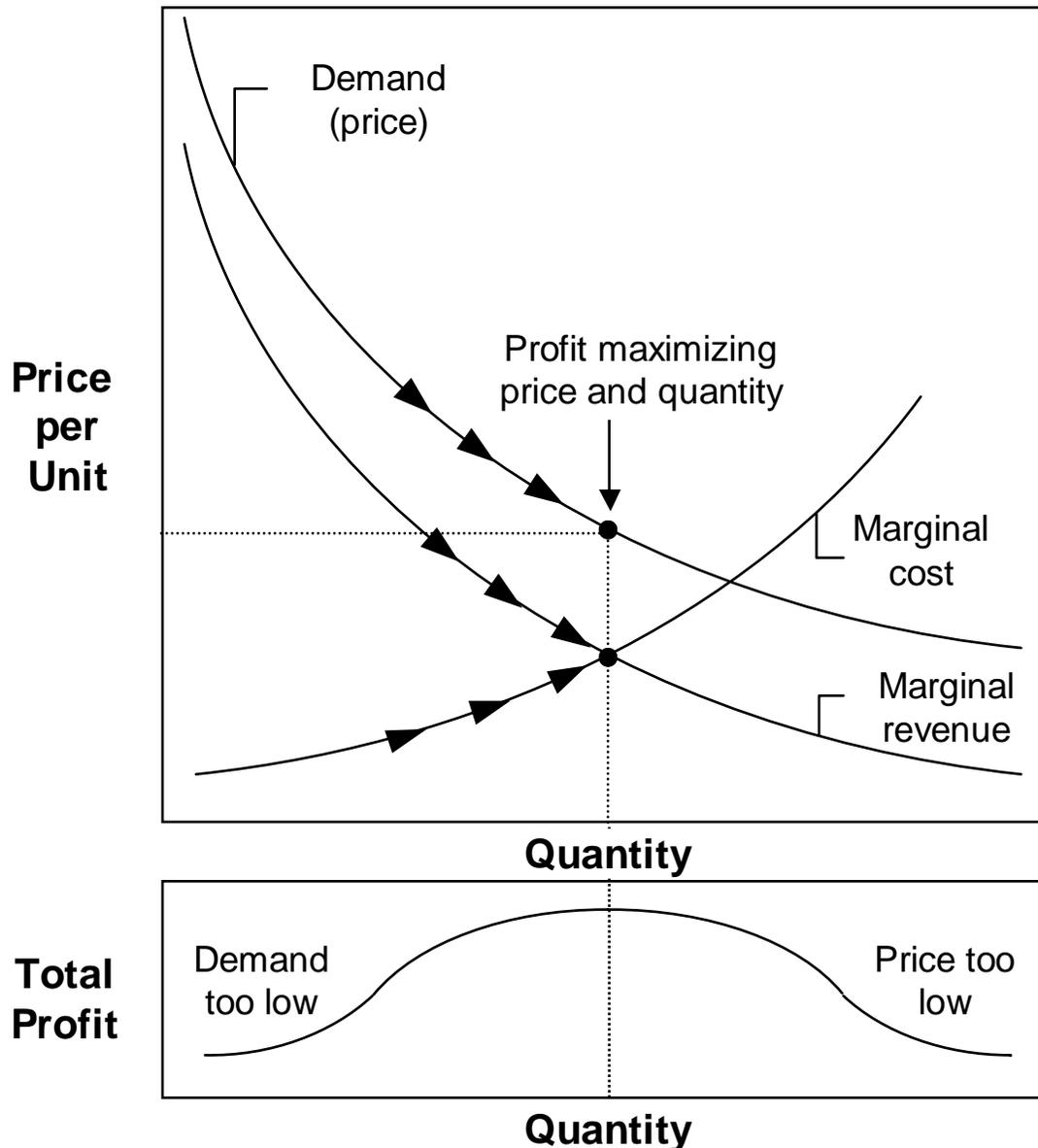
Note: *1928 and 1969 market value inflated to 1999 \$ using US GDP inflator
 Source: Center for Research in Security Prices, University of Chicago

Demand for a Unique Product



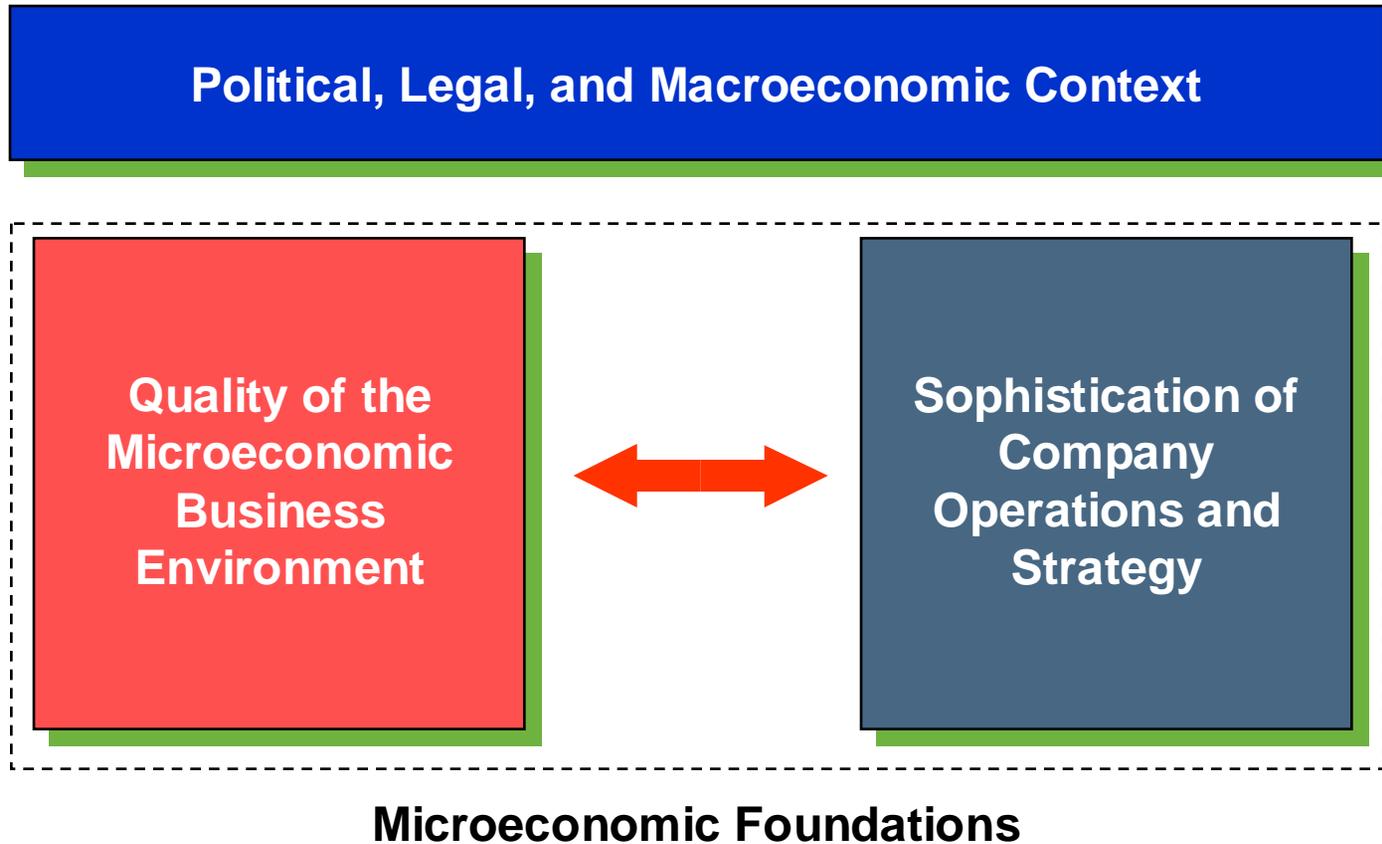
- In contrast, a firm providing a unique product is a price-setter, not a price-taker
- The demand for the unique product depends upon the price the firm sets
 - The higher the price, the lower the demand

Maximizing Profit from a Unique Product

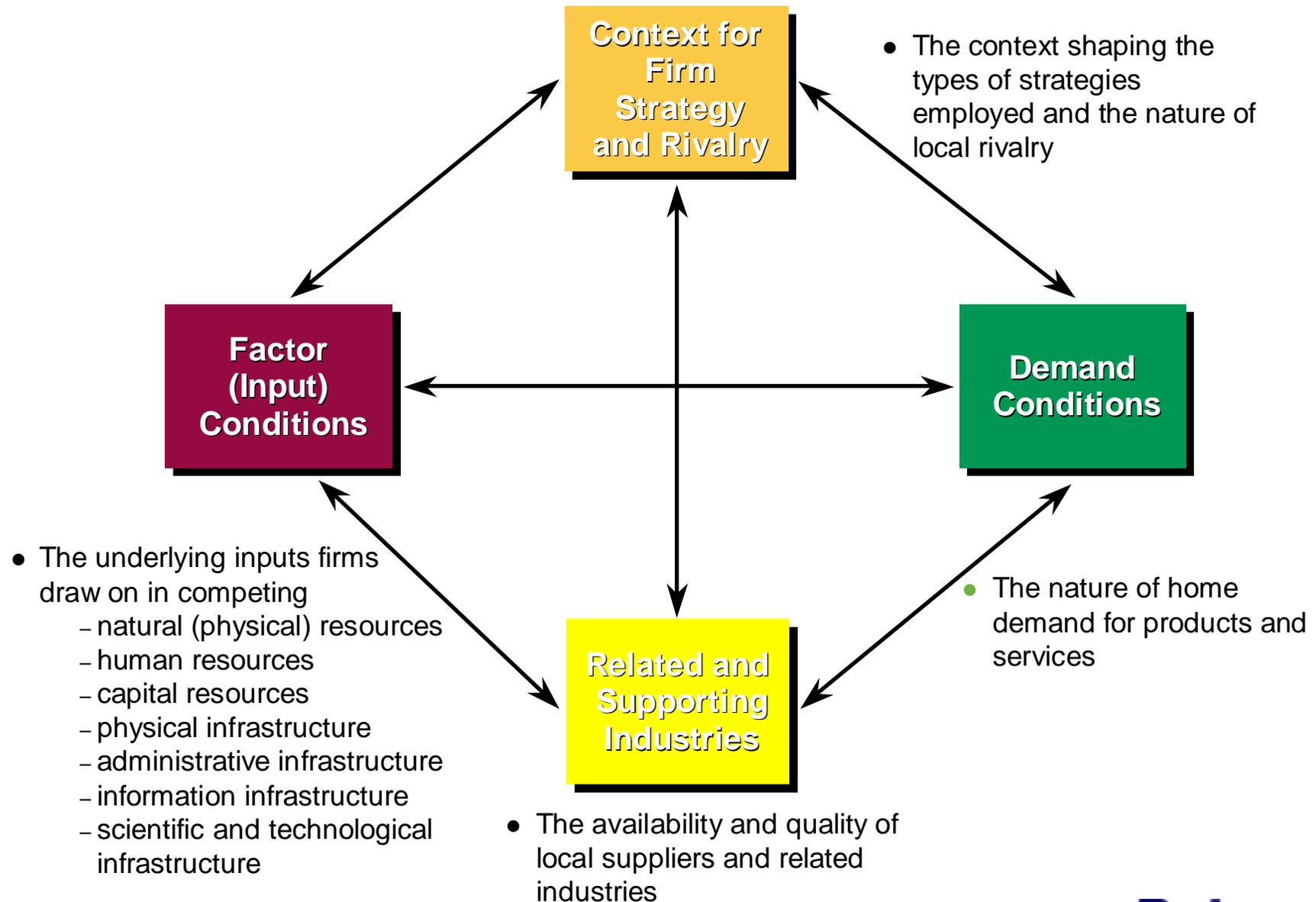


- A firm with a unique product can set price for maximum profit
 - It lowers price and stimulates demand so long as the revenue from an incremental unit exceeds its marginal cost
- At the optimum, marginal cost matches marginal value
 - This maximizes profit, cash flow, shareholder value
- At any price above this, demand is too low
- Any further lowering of price stimulates too little new demand to justify the price decrease

Assessing Canada's Competitiveness



Quality of the Microeconomic Business Environment



Sophistication of Company Operations and Strategy

Choices Compatible with Global Competitiveness

Aspirations and Goals

- Global competitiveness
- Sustainable advantage over global competition

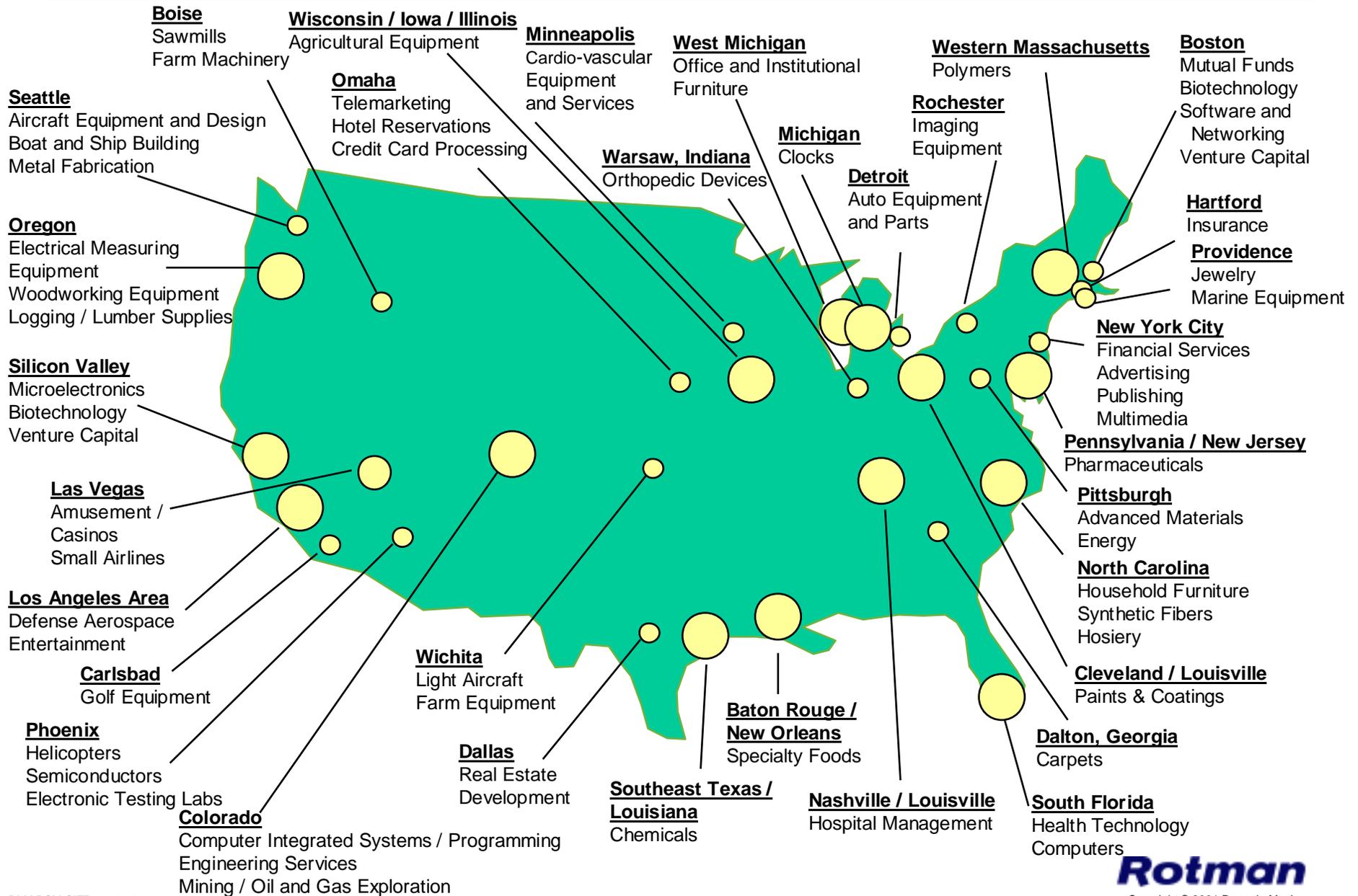
Where to Play

- Globally in focused product niche
- Serving demanding customers at home and abroad

How to Win

- Unique product/process
- High R&D
- Global distribution
- Branding

Clusters of Competitive US Industries



Canada's Microeconomic Competitiveness Index is Falling

Microeconomic Competitiveness Index	Microeconomic Business Environment	Company Operations and Strategy
1. Finland	1. Finland	1. Germany
2. United States	2. United States	2. United States
3. Germany	3. Netherlands	3. Finland
4. Netherlands	4. Denmark	4. Japan
5. Switzerland	5. Singapore	5. Switzerland
6. Denmark	6. Germany	6. Sweden
7. Sweden	7. Australia	7. Netherlands
8. United Kingdom	8. Canada	8. Denmark
9. Singapore	9. United Kingdom	9. France
10. Australia	10. Switzerland	10. Belgium
11. Canada	11. Sweden	11. United Kingdom
12. Belgium	12. Austria	12. Austria
13. Austria	13. Belgium	13. Israel
14. Japan	14. Hong Kong	14. Iceland
15. France	15. France	15. Singapore
16. Hong Kong	16. Iceland	16. Canada

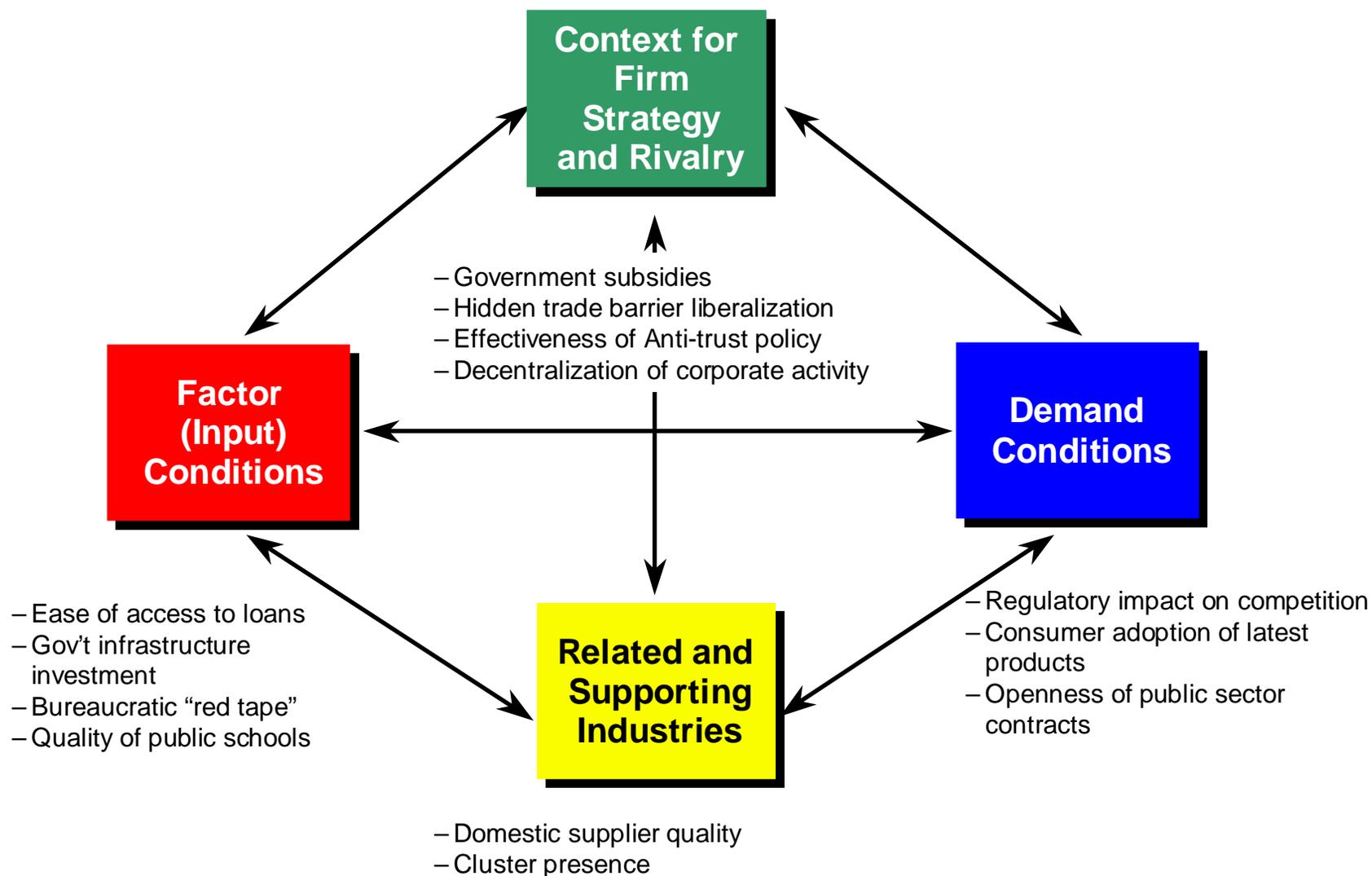
Source: MICHAEL PORTER, MEASURING THE MICROECONOMIC FOUNDATIONS OF ECONOMIC DEVELOPMENT, IN GLOBAL COMPETITIVENESS REPORT, WORLD ECONOMIC FORUM, 2000.

Canada's Microeconomic Competitiveness Index is Falling

Microeconomic Competitiveness Index	Microeconomic Business Environment	Company Operations and Strategy
1.	1.	1.
2.	2.	2.
3.	3. Canada (1998)	3.
4.	4. Canada (1999)	4.
5.	5.	5.
6. Canada (1998)	6.	6.
7.	7.	7.
8. Canada (1999)	8. Canada (2000)	8.
9.	9.	9.
10.	10.	10.
11. Canada (2000)	11.	11.
12.	12.	12. Canada (1999)
13.	13.	13. Canada (1998)
14.	14.	14.
15.	15.	15.
16.	16.	16. Canada (2000)

Source: MICHAEL PORTER, MEASURING THE MICROECONOMIC FOUNDATIONS OF ECONOMIC DEVELOPMENT, IN GLOBAL COMPETITIVENESS REPORT, WORLD ECONOMIC FORUM, 1998, 1999, 2000
 RLM-RSM-CITR-8-27-01

Weaknesses in Canadian Microeconomic Environment



Source: Porter, Michael E. "The Current Competitiveness Index: Measuring the Microeconomic Foundations of Prosperity," *The Global Competitiveness Report 2000*. New York: Oxford University Press, 2000.

Weaknesses in Company Operations and Strategy

Nature of Competitive Advantage	Capacity for Innovation	Company Investment in R&D	Extent of Branding
1. Germany	1. Finland	1. Switzerland	1. Japan
2. Israel	2. United States	2. Japan	2. Germany
3. Switzerland	3. Israel	3. Finland	3. Switzerland
4. Japan	4. Germany	4. United States	4. Sweden
5. Denmark	5. Sweden	5. Germany	5. Finland
6. Sweden	6. Switzerland	6. Sweden	6. France
7. United States	7. Japan	7. Israel	7. United States
8. Finland	8. France	8. Netherlands	8. Netherlands
9. Belgium	9. Denmark	9. France	9. Denmark
10. France	10. Austria	10. Belgium	10. United Kingdom
11. Austria	11. Netherlands	11. Denmark	11. Italy
12. Netherlands	12. United Kingdom	12. Singapore	12. Belgium
13. Italy	13. Iceland	13. Korea	13. Iceland
14. Taiwan	14. Belgium	14. United Kingdom	14. Austria
15. United Kingdom	15. Norway	15. Taiwan	15. Israel
16. Singapore	16. New Zealand	16. Austria	16. Spain
17. Hong Kong	17. Italy	17. Canada	17. New Zealand
18. Iceland	18. Russia	18. Iceland	18. Ireland
19. Norway	19. Korea	19. Ireland	19. Korea
20. Ireland	20. Canada	20. Norway	20. Canada
21. Korea	21. Australia	21. Russia	21. Singapore
22. Spain	22. Ireland	22. Slovakia	22. Taiwan
23. Canada	23. Spain	23. Australia	23. Norway
24. Costa Rica	24. Taiwan	24. South Africa	24. Russia
25. New Zealand	25. Singapore	25. Spain	25. Egypt

SOURCE: MICHAEL PORTER, MEASURING THE MICROECONOMIC FOUNDATIONS OF ECONOMIC DEVELOPMENT, IN GLOBAL COMPETITIVENESS REPORT, WORLD ECONOMIC FORUM, 2000

Sophistication of Company Operations and Strategy

Choices Incompatible with Global Competitiveness

Aspirations and Goals

- National competitiveness
- Sustainable advantage over local competition

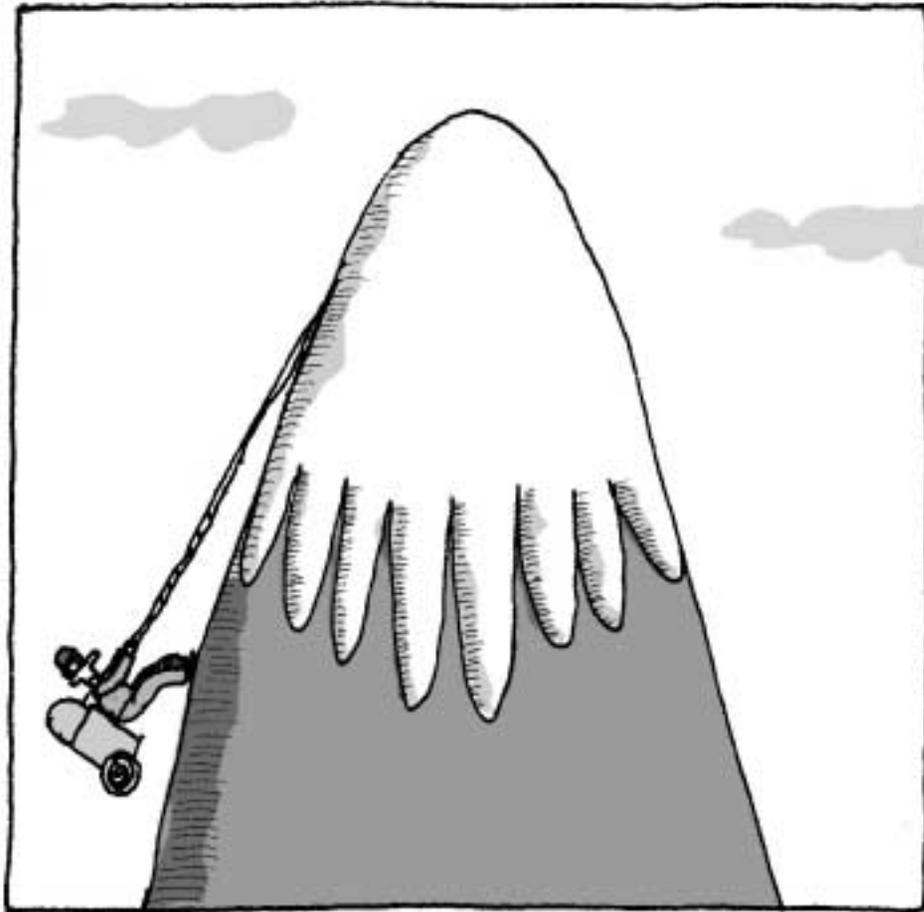
Where to Play

- Primarily in home country
- Broad participation
- Serving most easily satisfied customers

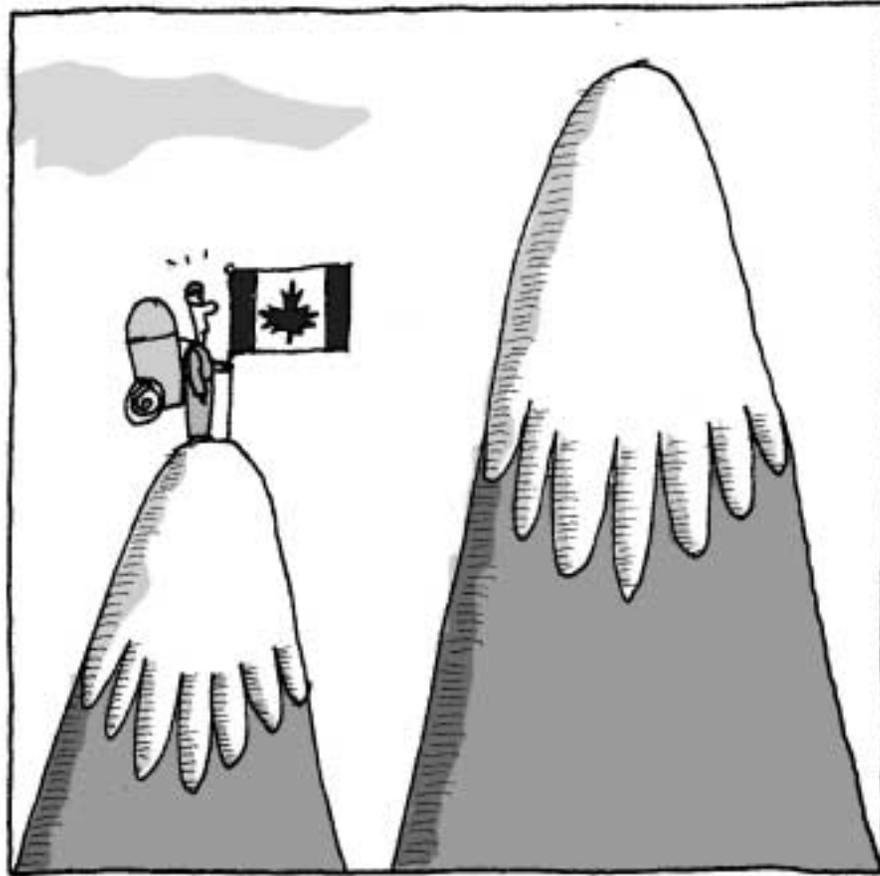
How to Win

- Replication with low cost labour /raw materials
- Minimal R&D
- Weak branding

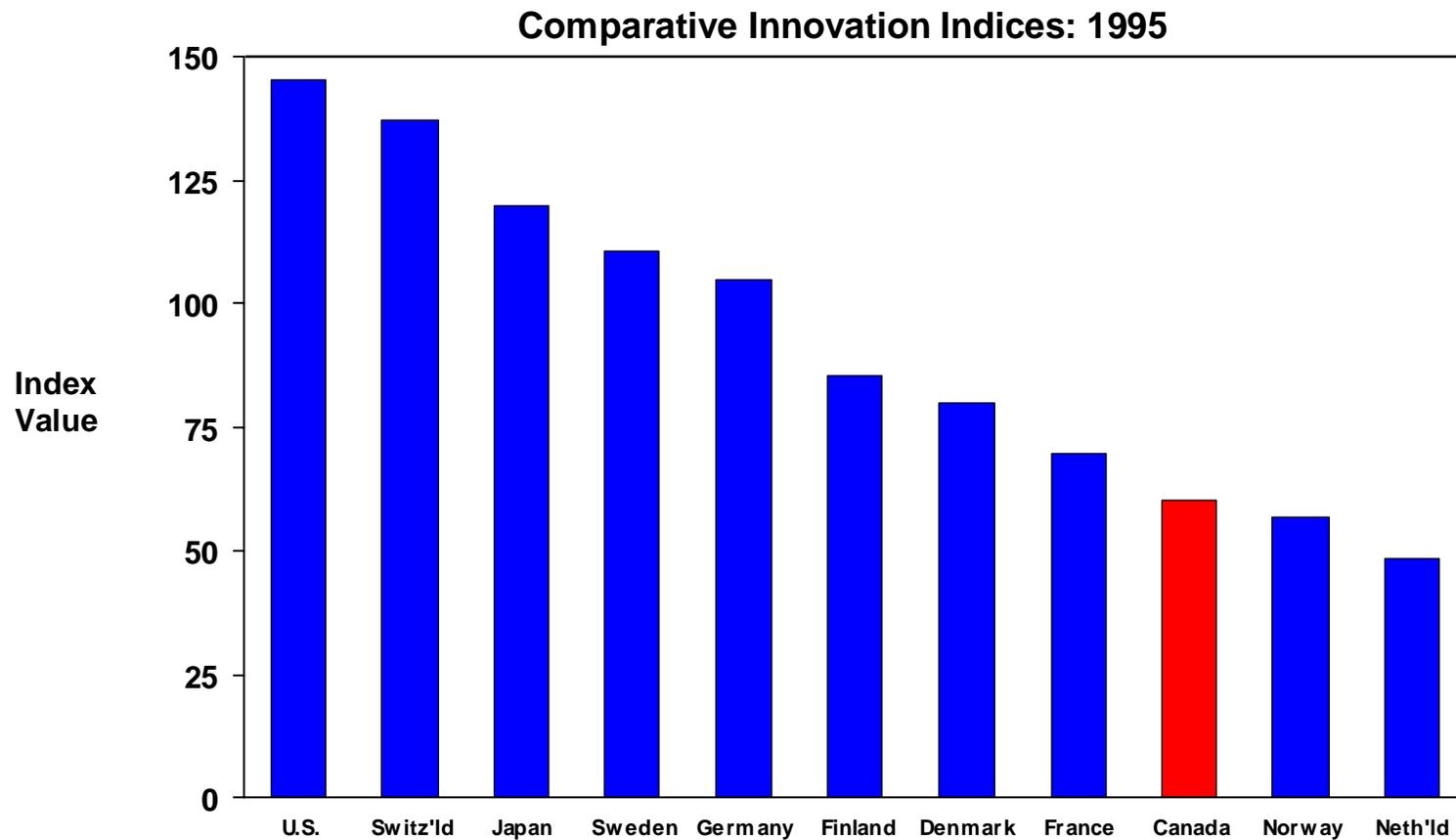
The Local Peak Problem



The Local Peak Problem



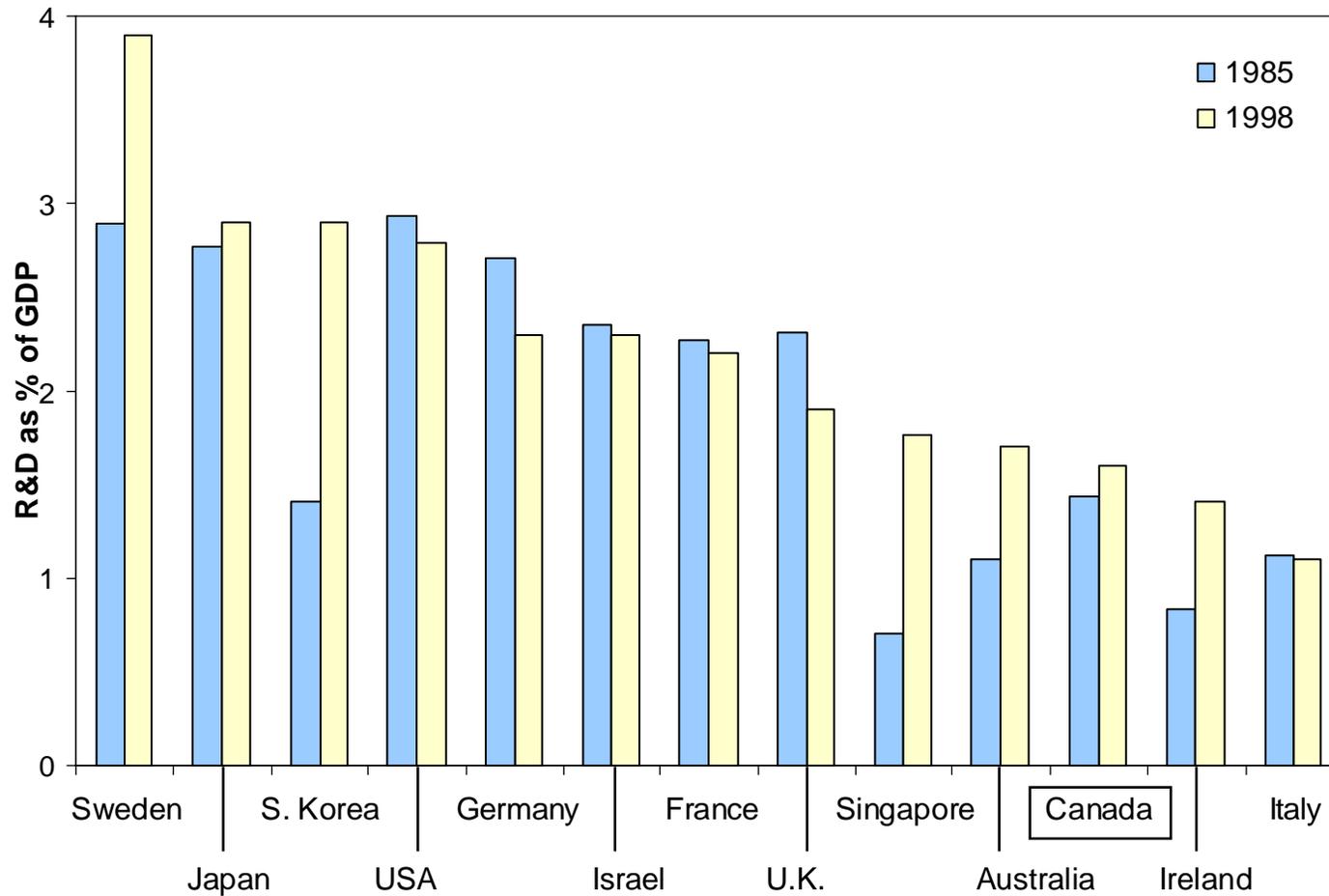
Weakening Relative Environment for Innovation



Source: Michael E. Porter, Scott Stern, "The New Challenge to America's Prosperity: Findings from the Innovation Index", Council on Competitiveness, Washington, DC, 1999

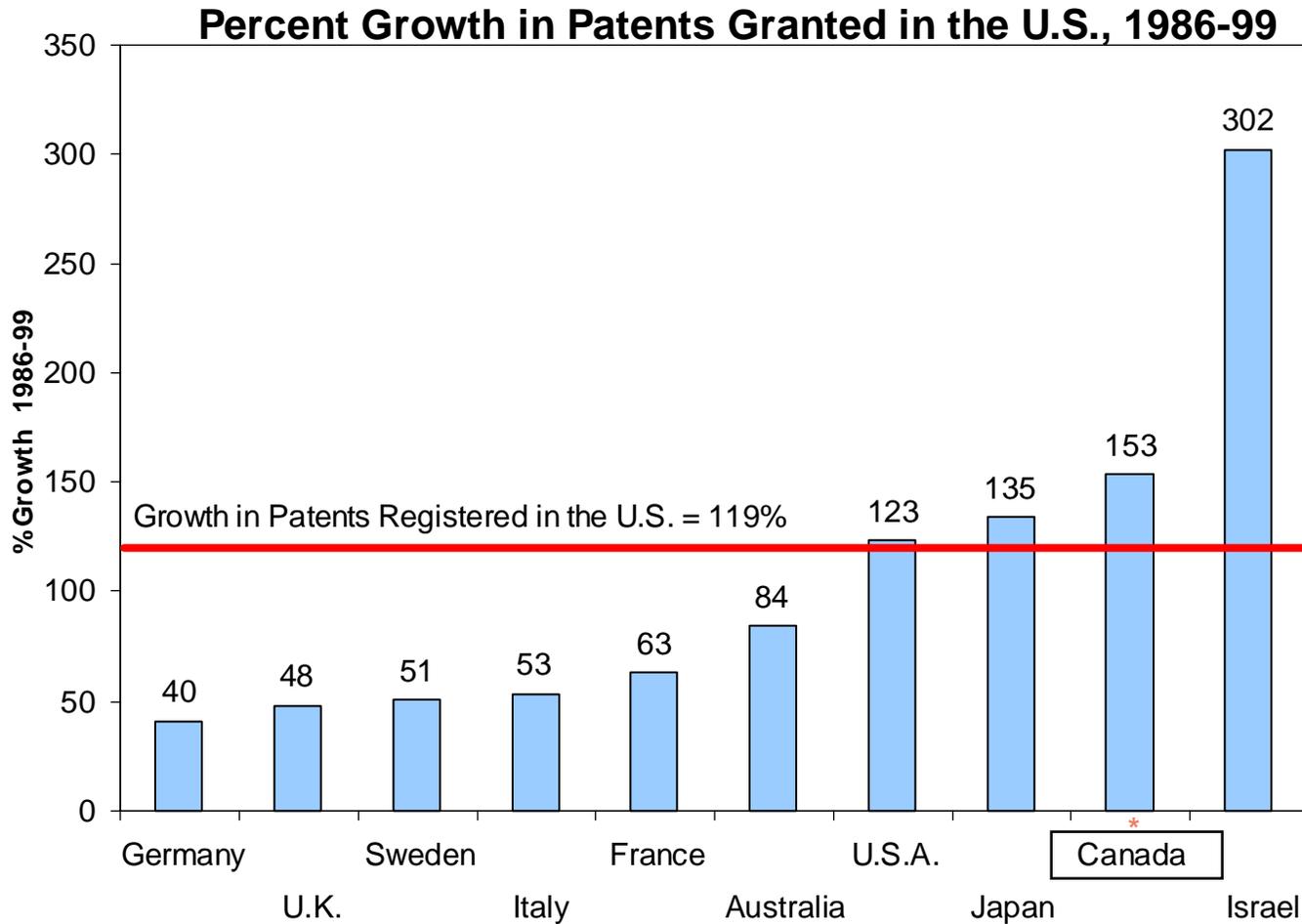
Low Canadian National Investment In R&D

Total R&D Investment as Percent of GDP: 1985 versus 1998



Source: US Competitiveness 2001: Strengths, Vulnerabilities, and Long-Term Priorities Report.

Canadian Inventors Faring Well in US Patent Growth



Note; Canada's relatively high position in U.S. Patenting may be due in part to close proximity to the United States

Source US Competitiveness 2001: Strengths, Vulnerabilities, and Long-Term Priorities Report

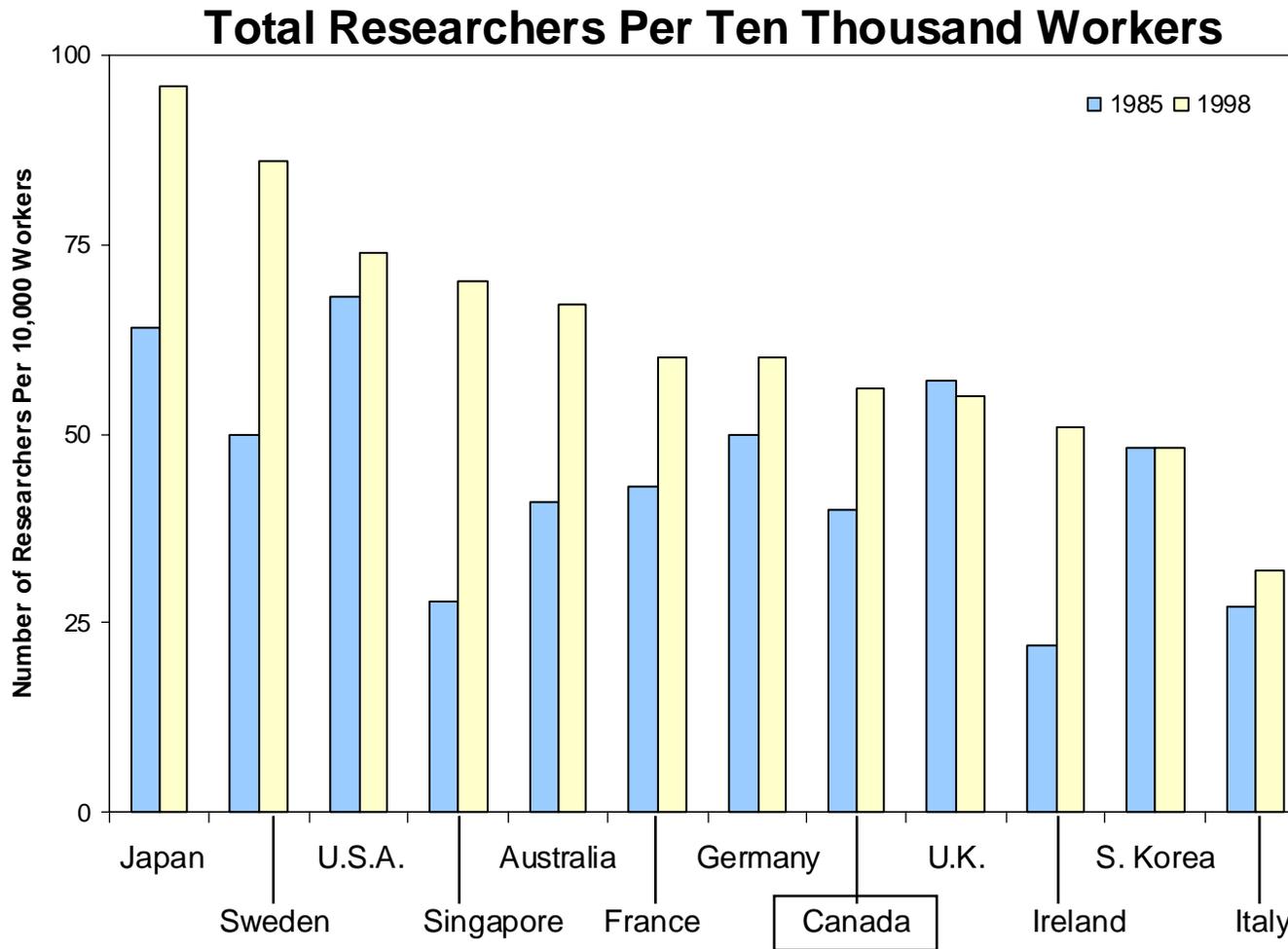
RLM-RSM-CITR-8-27-01

38

Rotman

Copyright © 2001 Roger L. Martin

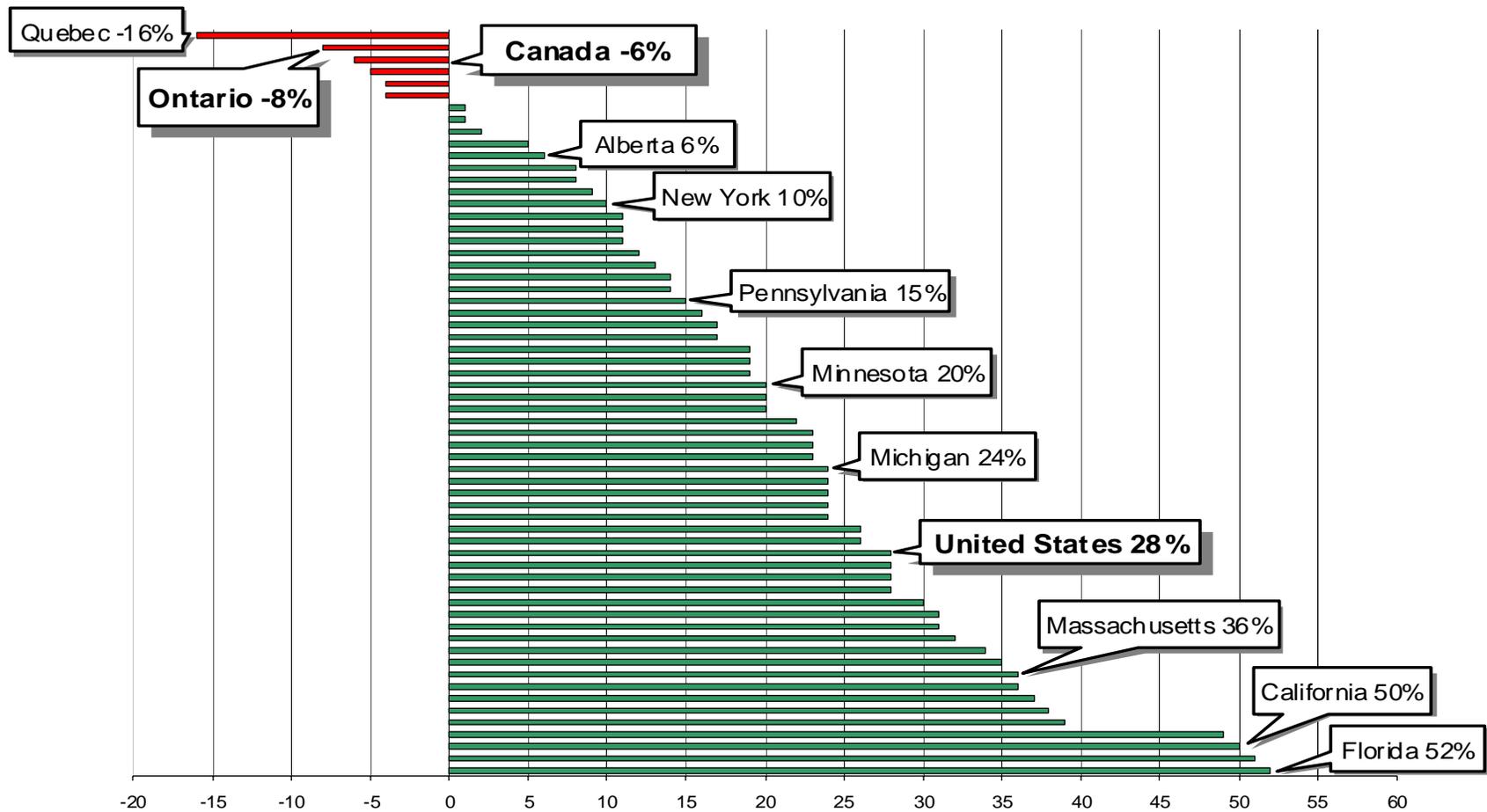
Proportion of Research Personnel is Growing



Source: US Competitiveness 2001: Strengths, Vulnerabilities, and Long-Term Priorities Report.

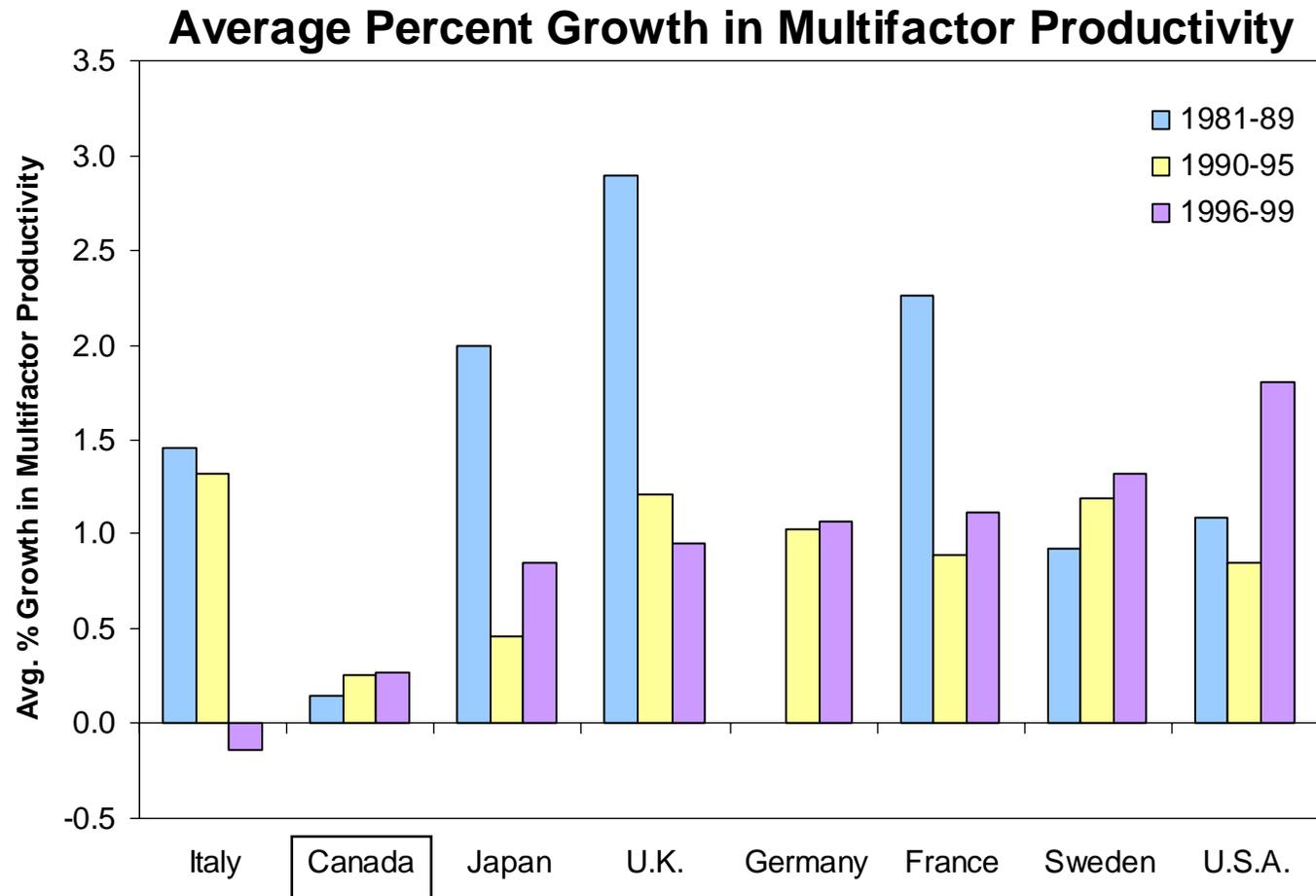
Dramatically Lower Priority for Higher Education

Four-Year Changes in Support for Higher Education 1995-96 to 1999-2000



Source: Statistics Canada; Association of Universities and Colleges of Canada; State Higher Education Executive Officers; Chronicle for Higher Education

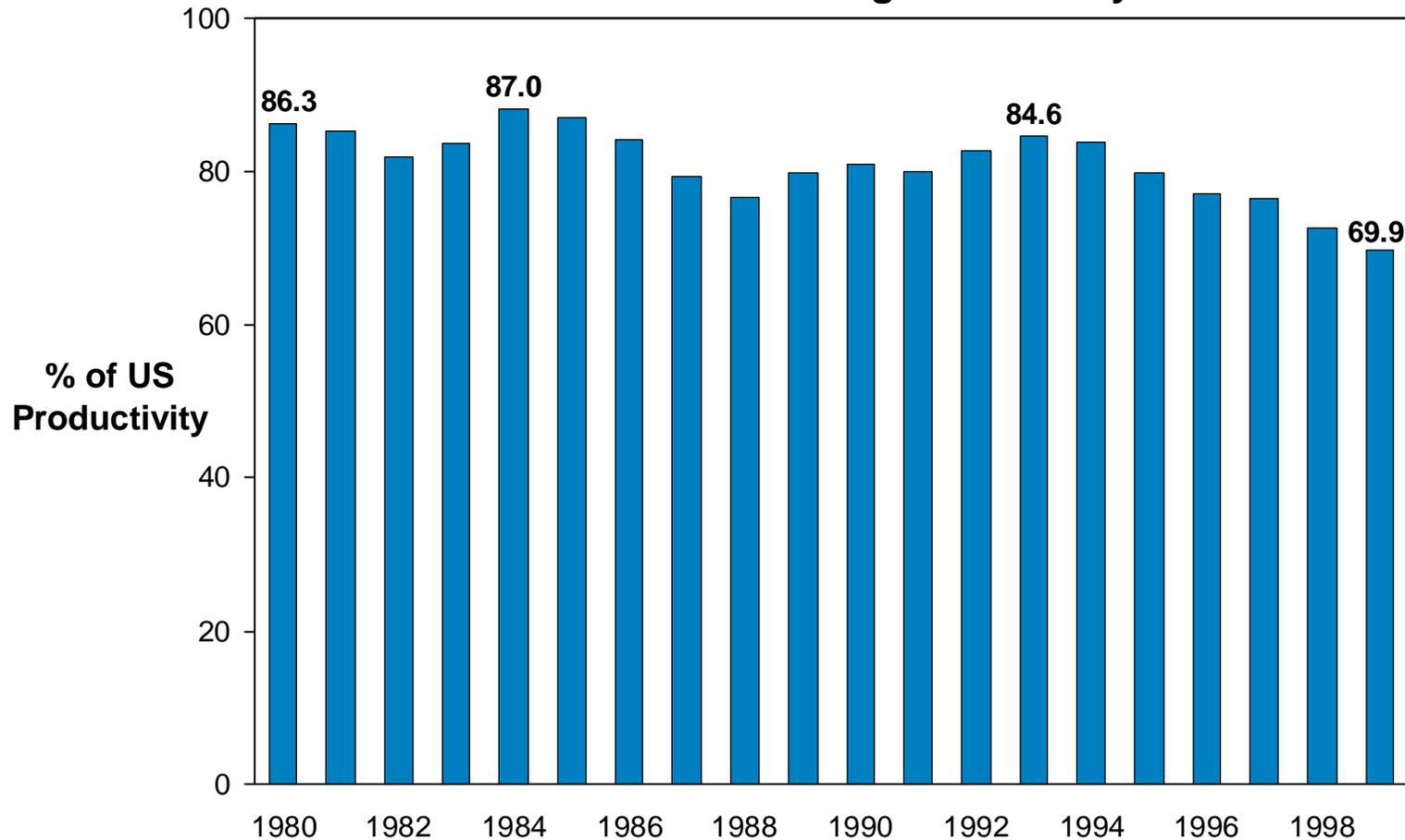
Net Result: Strikingly Low Productivity Growth



Source: US Competitiveness 2001: Strengths, Vulnerabilities, and Long-Term Priorities Report. Drawn from Gust, Christopher and Jaime Marquez, "Productivity Developments Abroad," *Federal Reserve Bulletin*, October 2000

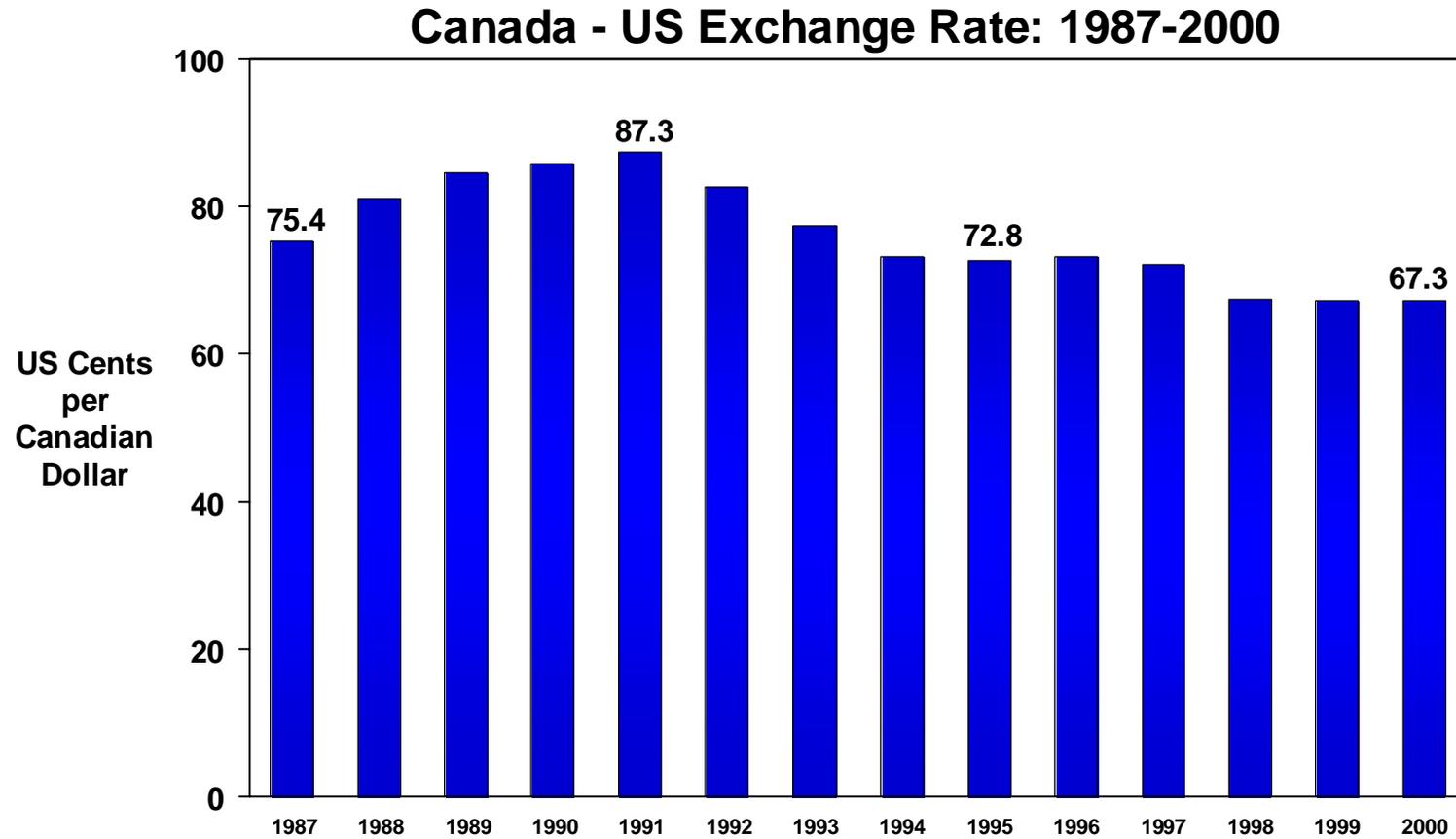
And a Widening Gap Relative to the US

Canadian Manufacturing Productivity as a Percentage of US Manufacturing Productivity

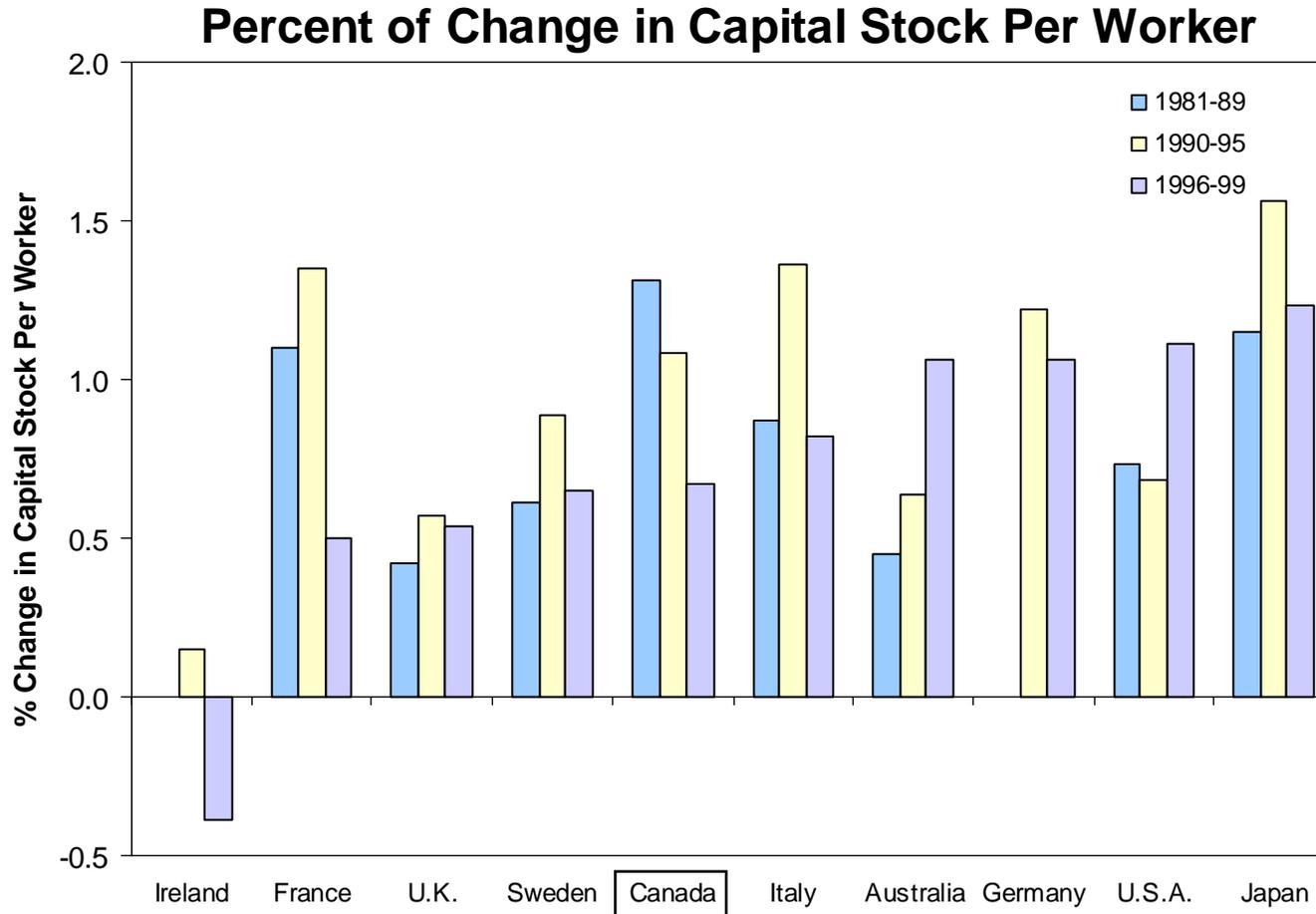


Source: Industry Canada, based on Statistics Canada and U.S. Bureau of Labor Statistics.
Labour productivity measured using \$1999 GDP per hour

And a Currency in Decline



Declining Growth in Canadian Capital Stock Per Worker



What Can Canadian Businesses Do?

- **Strategy**

- Focus on the global peak
- Set aspirations and goals accordingly
- Compete globally, serving the most sophisticated and demanding customers
- Compete on the basis of unique products and processes

- **Cluster Building**

- Be a demanding and sophisticated customer...
- But, encourage local suppliers to meet global standards and follow you globally
- Collaborate with competitors and governments to create specialized infrastructure and education...
- But, compete vigorously with the same competitors

What Can Canadian Governments Do?

- **Encourage an Environment of Pressure...**
 - Create an environment in which customer sophistication can flourish
 - Where possible, act as a sophisticated and demanding buyer
 - Maintain an environment that features intense rivalry
- **While Balancing it with Critical Elements of Support**
 - Invest heavily in the university research infrastructure
 - Scientific research
 - Business research
 - Invest in the key pieces of infrastructure
 - Encourage and celebrate innovation
 - Encourage and celebrate global competitiveness
 - Promote clustering rather than dispersion

What Can Canadian Universities Do?

- **Aspirations**

- Focus on the global peak and set goals accordingly
- Compete globally for faculty and students
- Seek unique and differentiated positioning

- **Connectedness**

- Seek to collaborate with proximate businesses
- Be guided in part by their needs
- And seek to guide them with your research-based insights