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INNOVATION AND BUSINESS STRATEGY

Why Canada Falls Short

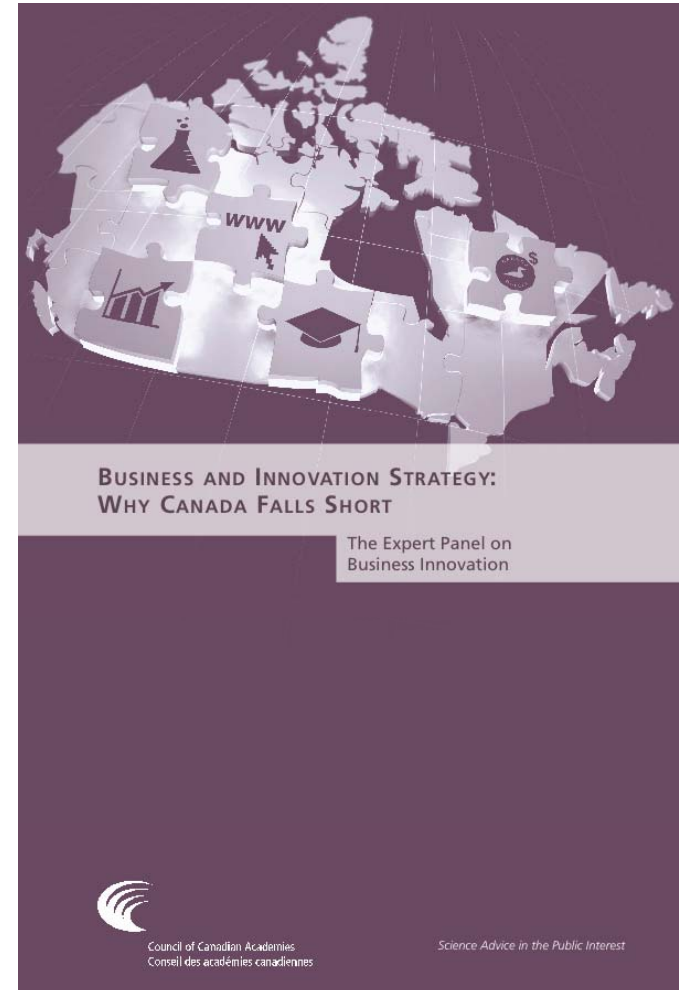
by

Peter J. Nicholson, President
The Council of Canadian Academies

Presentation to
Science Day in Canada
Ottawa, ON
27 May, 2009

OUTLINE

- **INTRODUCTION & SUMMARY**
- **MEASURING THE BUSINESS INNOVATION GAP**
- **INNOVATION AS BUSINESS STRATEGY**
- **FACTORS THAT INFLUENCE INNOVATION AS STRATEGY**
- **SOME BROAD PUBLIC POLICY IMPLICATIONS**



INTRODUCTION

QUESTION: “If innovation is good for business, why is Canadian business less committed to innovation than most policy-makers believe it should be?”

- Council appointed an 18-member panel (next slide) to address the question.
- Panel was asked for a diagnosis, not a policy prescription.
- Panel’s perspective was long-term, covering many decades, so conclusions remain relevant despite current crisis.
- Panel analyzed innovation as an economic process, not simply as an S&T activity.

INNOVATION IS NEW OR BETTER WAYS OF DOING VALUED THINGS

EXPERT PANEL ON BUSINESS INNOVATION

BUSINESS Services	Robert Brown (Chair)	Montreal	CAE; Bombardier*
	Guthrie Stewart	Montreal	Edgestone Capital*
	John Thompson	Toronto	TD Bank, IBM*
ICT	Savvas Chamberlain	Waterloo	DALSA
	Brian McFadden	Montreal	Prestige Telecom; Nortel*
	Jim Roche	Ottawa	CMC*; Tundra Semiconductor*
	Alexandre Taillefer	Montreal	Stingray Digital
Life Sciences	Nathalie Dakers	Vancouver	Centre for Drug R&D (UBC)
	André Marcheterre	Montreal	Merck-Frosst*
Resources	Walter Mylnaryk	Montreal	Kruger Inc.
	Charles Ruigrok	Calgary	Syncrude*
Consulting	Marcel Côté	Montreal	SECOR
	David Pecaut	Toronto	The Boston Consulting Group
LABOUR	Jim Stanford	Toronto	CAW
NGO	Andrew Sharpe	Ottawa	Centre for the Study of Living Standards
ACADEMIC	Meric Gertler	Toronto	University of Toronto
	Bronwyn Hall	US, The Netherlands	UC Berkeley; Maastricht University
	Arthur May	St. John's	Memorial University*; NSERC*

* Retired from organization

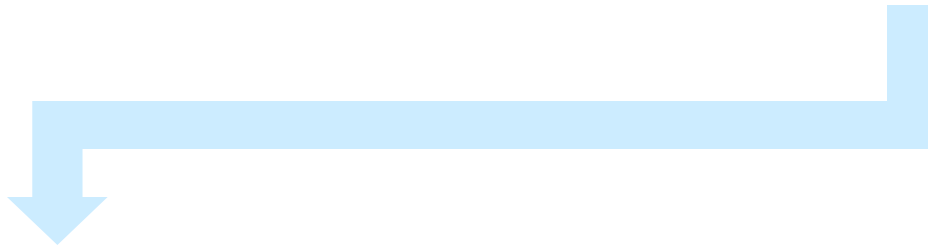
REPORT IN A NUTSHELL

1. Canada's long-standing productivity growth problem is due to weak business innovation.
2. Business innovation is driven by business strategy.
3. The productivity issue needs to be reframed to focus on the factors that influence businesses to choose – or not to choose – innovation as a key competitive strategy.
4. Public policy has an important role, but the primary challenge is for business to adopt innovation-oriented strategies.

OUTPUT, PRODUCTIVITY, INNOVATION

OUTPUT PER CAPITA

$\text{GDP/Population} = \text{GDP/Hours Worked} \times \text{Hours Worked/Population}$



LABOUR PRODUCTIVITY

Workforce Composition, **Capital Intensity, Multifactor Productivity**



INNOVATION

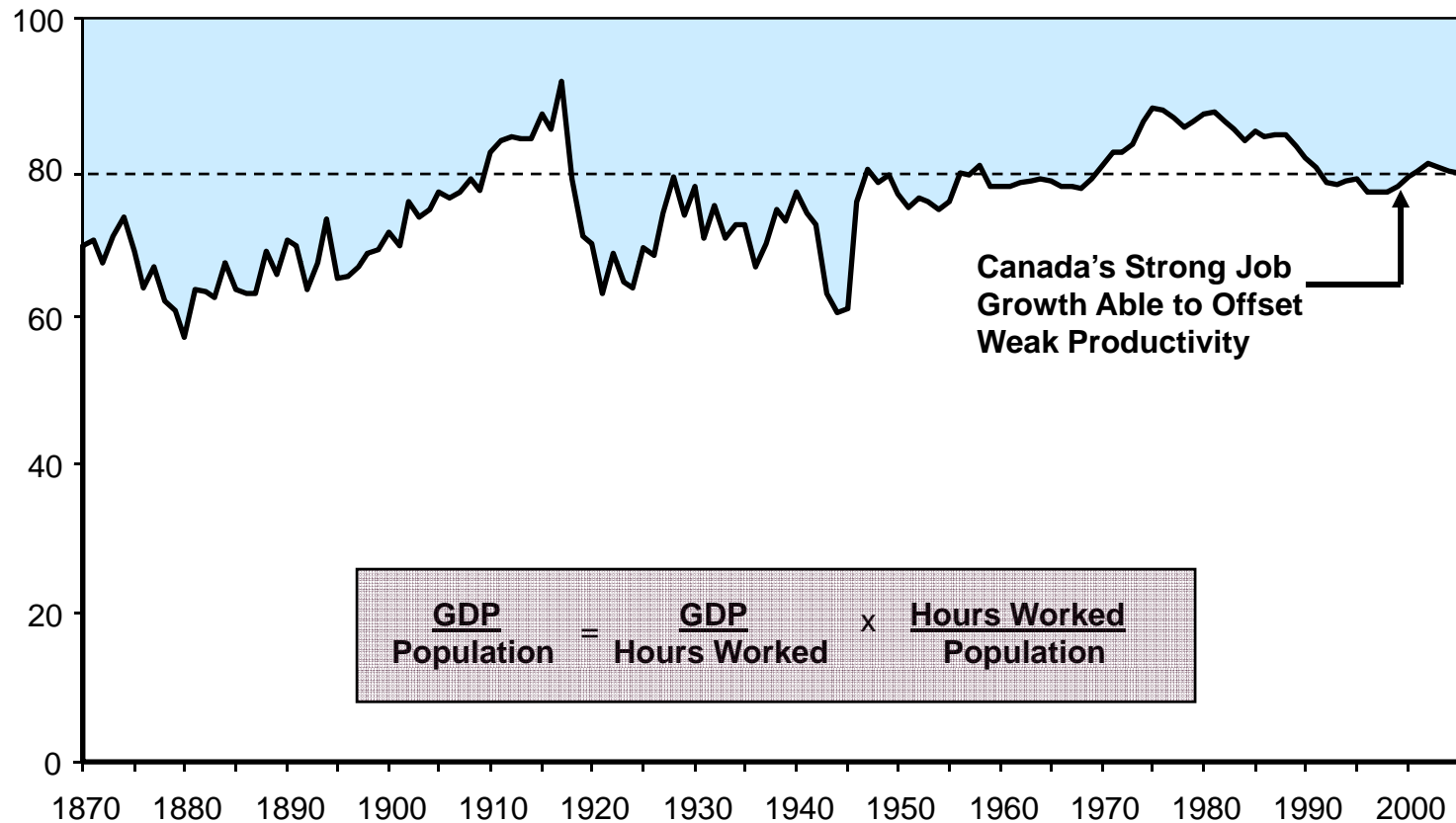


- **Insights of entrepreneurs**
- **Payoff from R&D**
- **Improved business models**
- **Efficient work practices**
- **Continuous improvement**
- **Application of leading-edge technology**

REPORT FOCUSES ON INNOVATION BY BUSINESS AND AS BROADLY INTERPRETED

THE U.S. – CANADA GAP IN PER CAPITA OUTPUT SINCE 1870

CANADA'S GDP PER CAPITA AS PERCENT OF U.S.

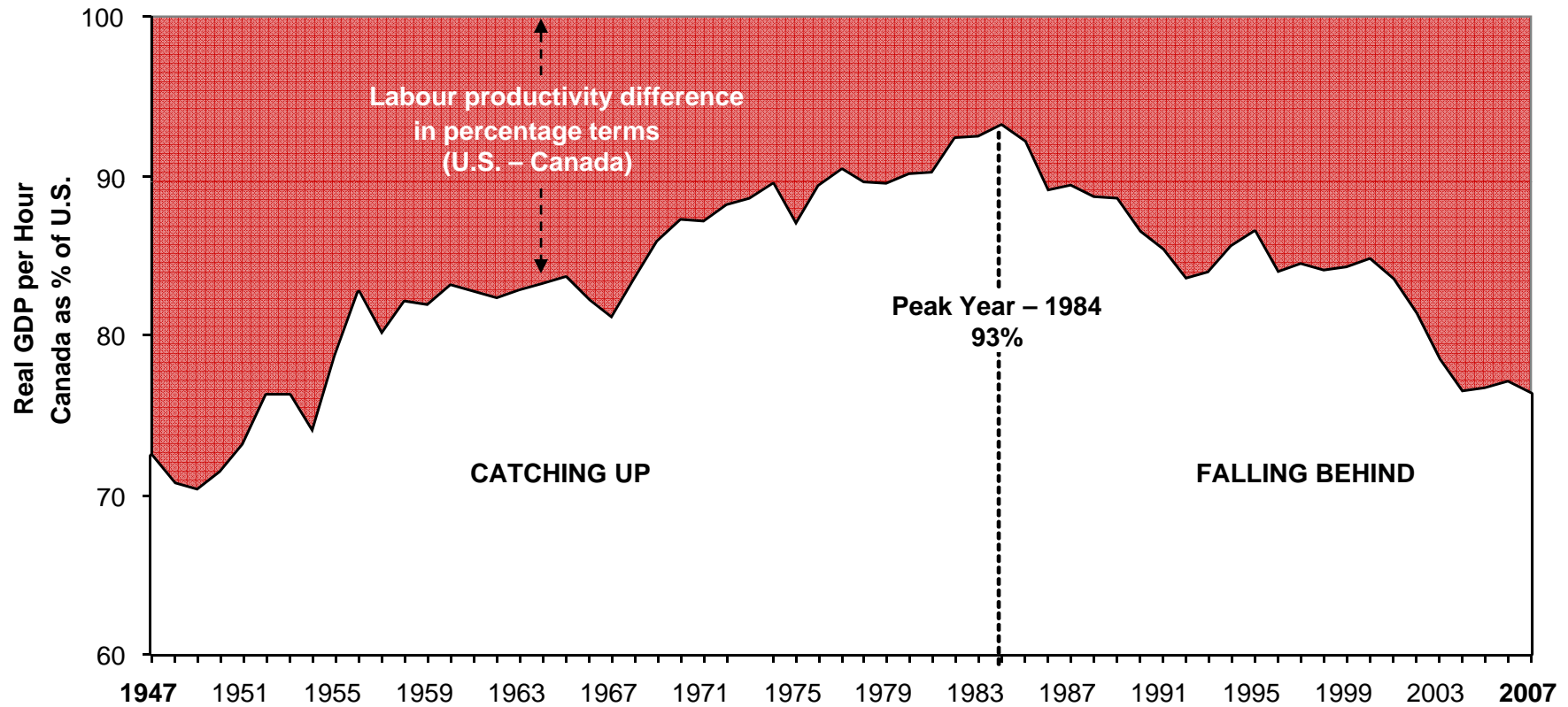


Data Source: (Conference Board & Groningen Growth and Development Centre, 2008; Maddison, 2008)

ECONOMIES IN CANADA AND THE U.S. HAVE EVOLVED IN TANDEM

CANADA'S RELATIVE PRODUCTIVITY SLIDE

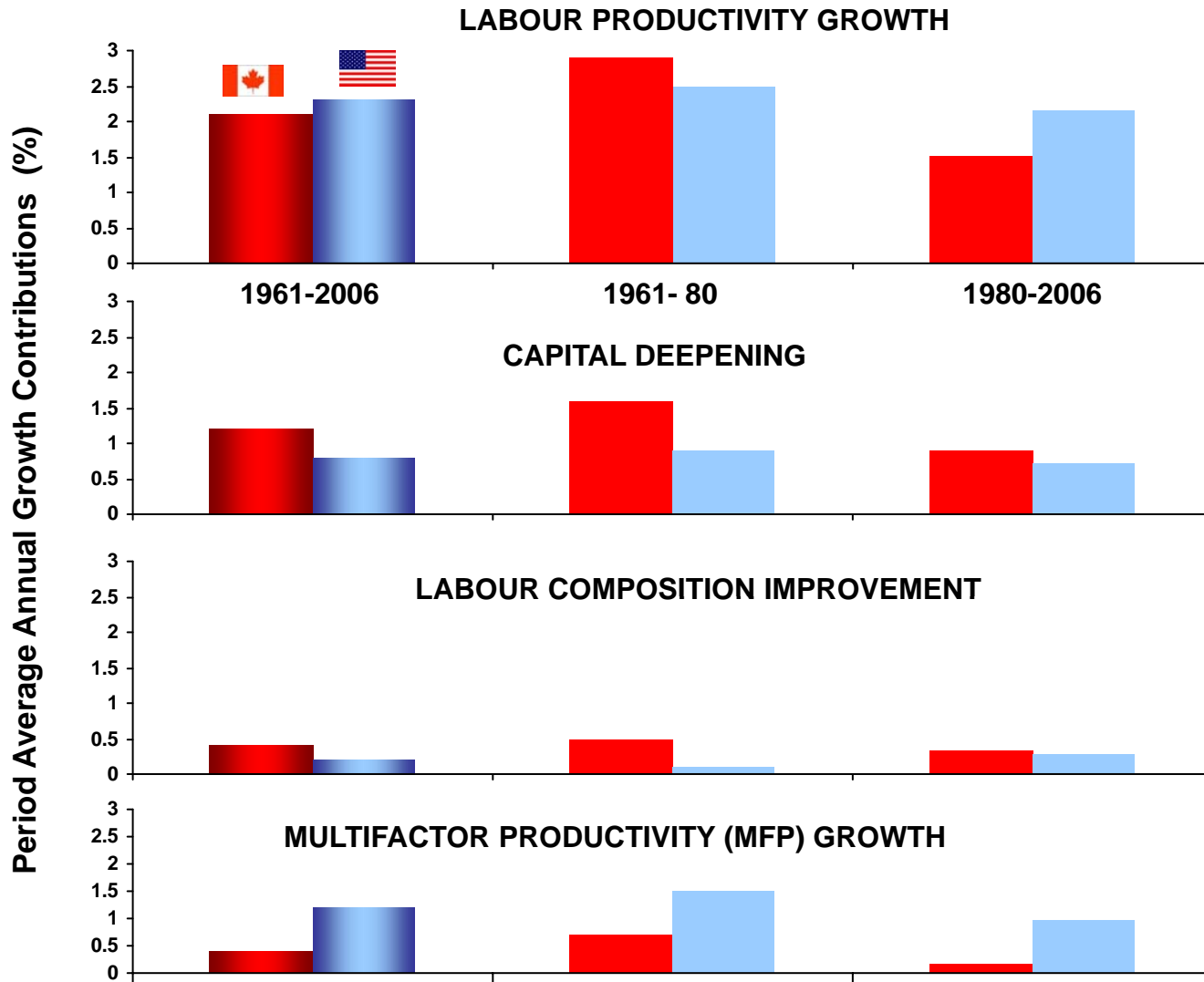
PRODUCTIVITY IN THE BUSINESS SECTOR - CANADA AS % OF U.S. SINCE 1947



Data Source: (CSLS, 2008a)

CANADA'S PRODUCTIVITY GROWTH HAS ALSO LAGGED MOST OECD PEERS

ACCOUNTING FOR PRODUCTIVITY GROWTH DIFFERENCES



Data Source: (Baldwin & Gu, 2007)

CANADA'S MFP GROWTH HAS LAGGED U.S. FOR AT LEAST 45 YEARS

WHAT IS “MULTIFACTOR PRODUCTIVITY”?

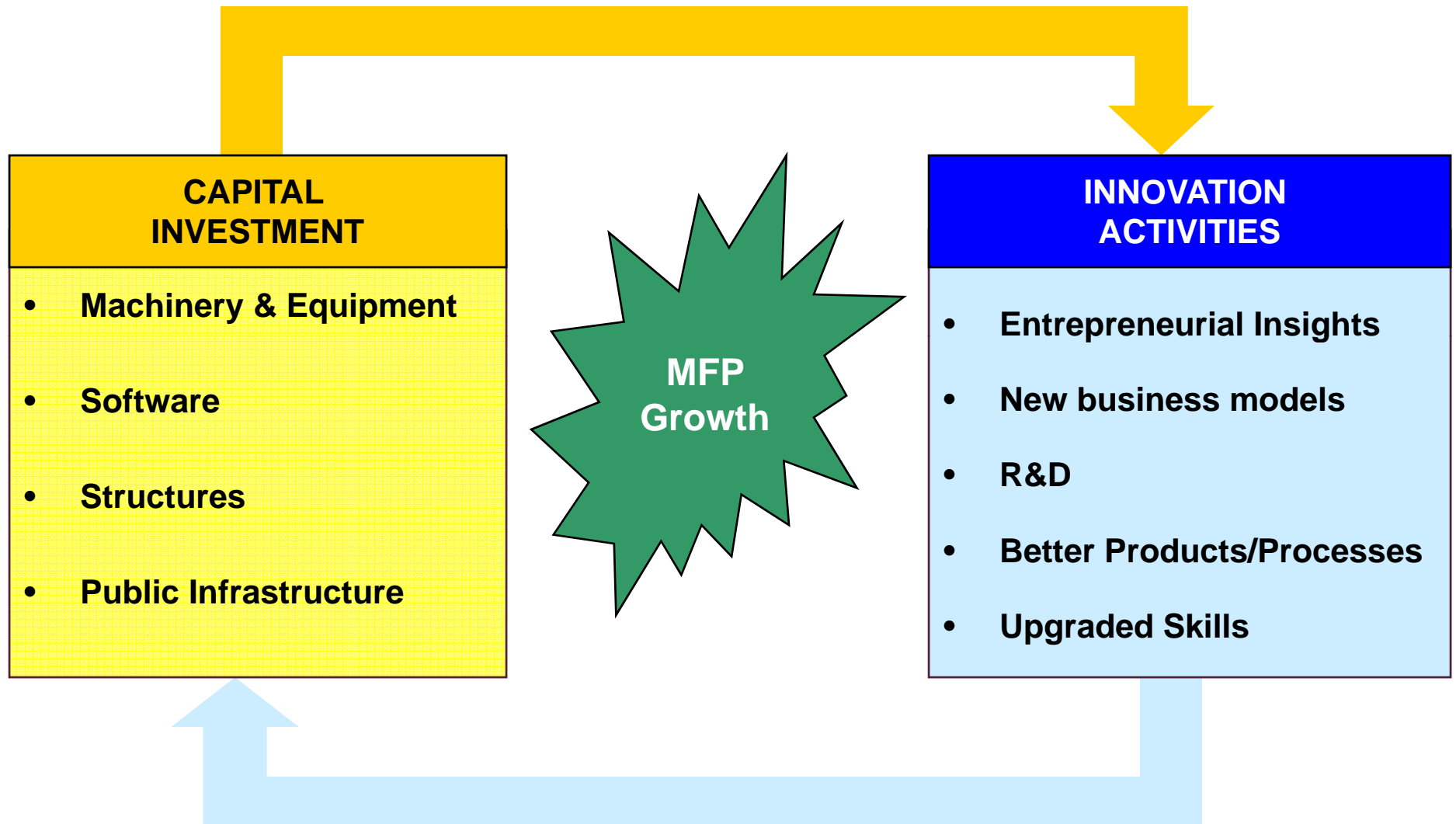
MFP = The part of GDP per Hour that is NOT explained by Capital Intensity and Workforce “Quality”

EXAMPLES OF INNOVATION-BASED MFP GROWTH:

- Double stacking rail containers
- Installing a Drive-thru window in a fast food outlet
- Equipping a sales force with BlackBerries

THOUSANDS OF INNOVATIONS, LARGE & SMALL, DRIVE PRODUCTIVITY GROWTH

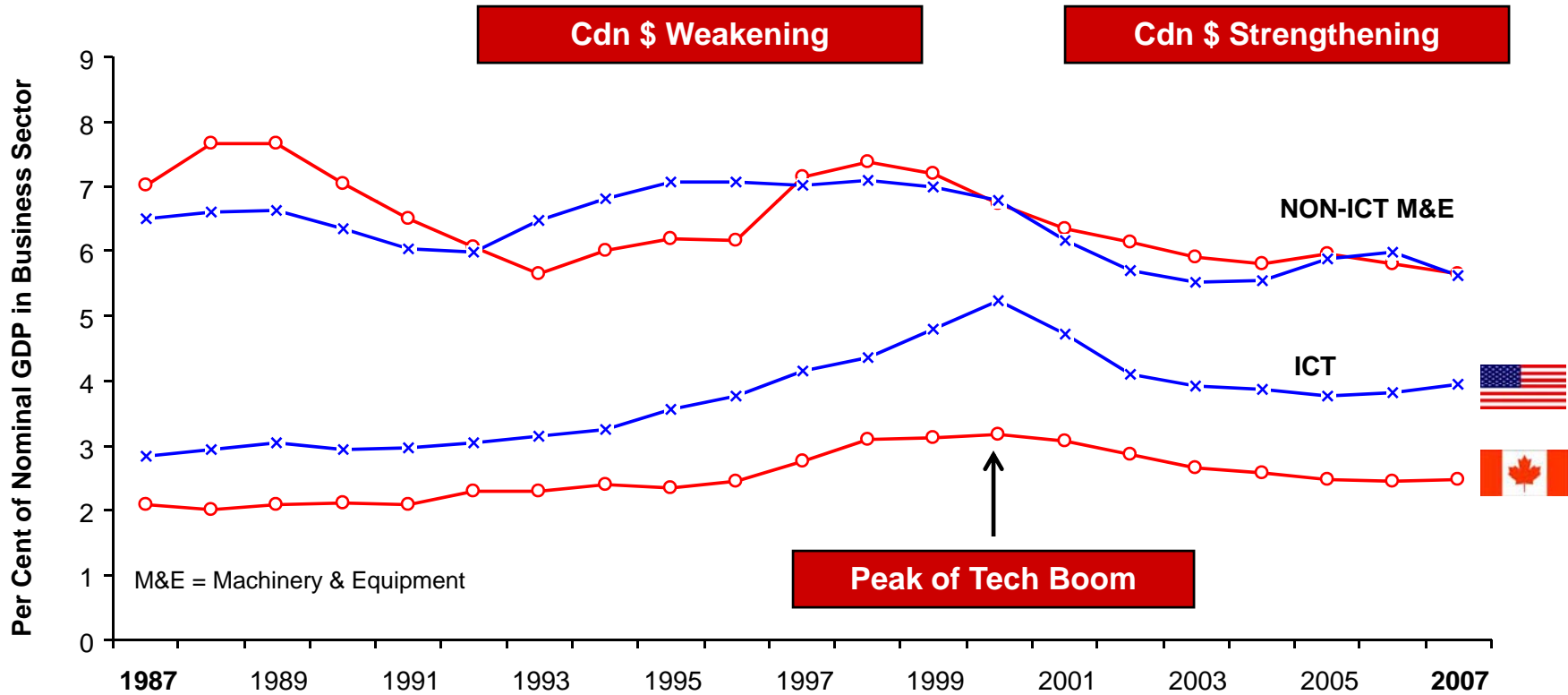
INTERACTION OF MFP AND CAPITAL INVESTMENT



DISTINCTION BETWEEN MFP GROWTH AND CAPITAL DEEPENING IS SOMEWHAT ARTIFICIAL

ICT DRIVES U.S.-CANADA INVESTMENT GAP

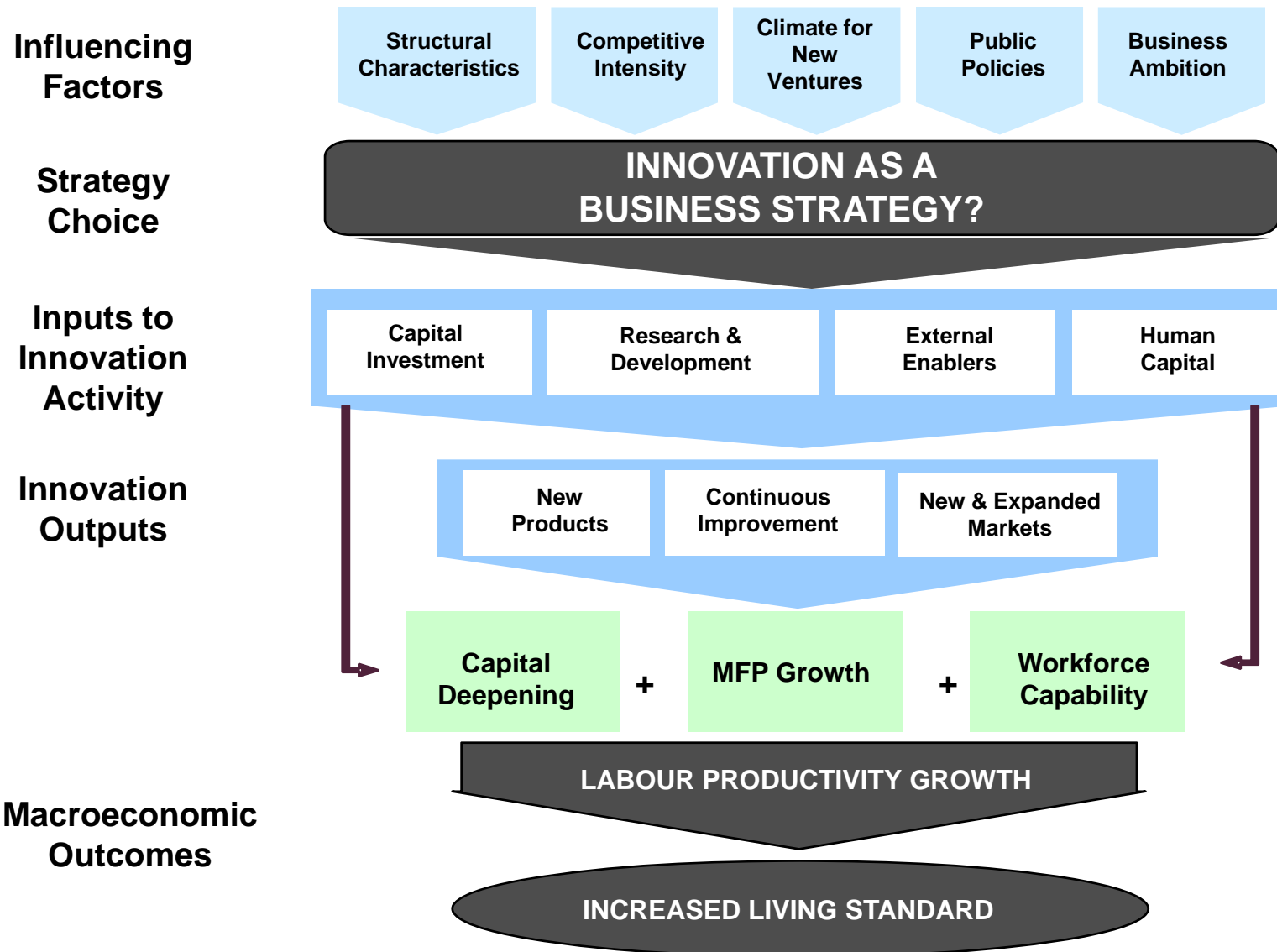
M&E ANNUAL INVESTMENT INTENSITY SINCE 1987



Data Source: (CSLS, 2008b)

ICT HAS BEEN A KEY DRIVER OF MFP & PRODUCTIVITY GROWTH IN U.S.

INNOVATION THROUGH THE LENS OF BUSINESS STRATEGY



REFRAMING THE ANALYSIS OF CANADA'S WEAK PRODUCTIVITY GROWTH

ROOTS OF CANADA'S INNOVATION WEAKNESS

"UPSTREAM" ROLE IN NORTH AMERICAN VALUE CHAINS

Comparative advantage and history imply:

- Commodity supplier
- Little contact with "end customer"
- Foreign control in many tech-intensive sectors
- Comfortable and profitable niche in North America

SMALL AND FRAGMENTED DOMESTIC MARKET

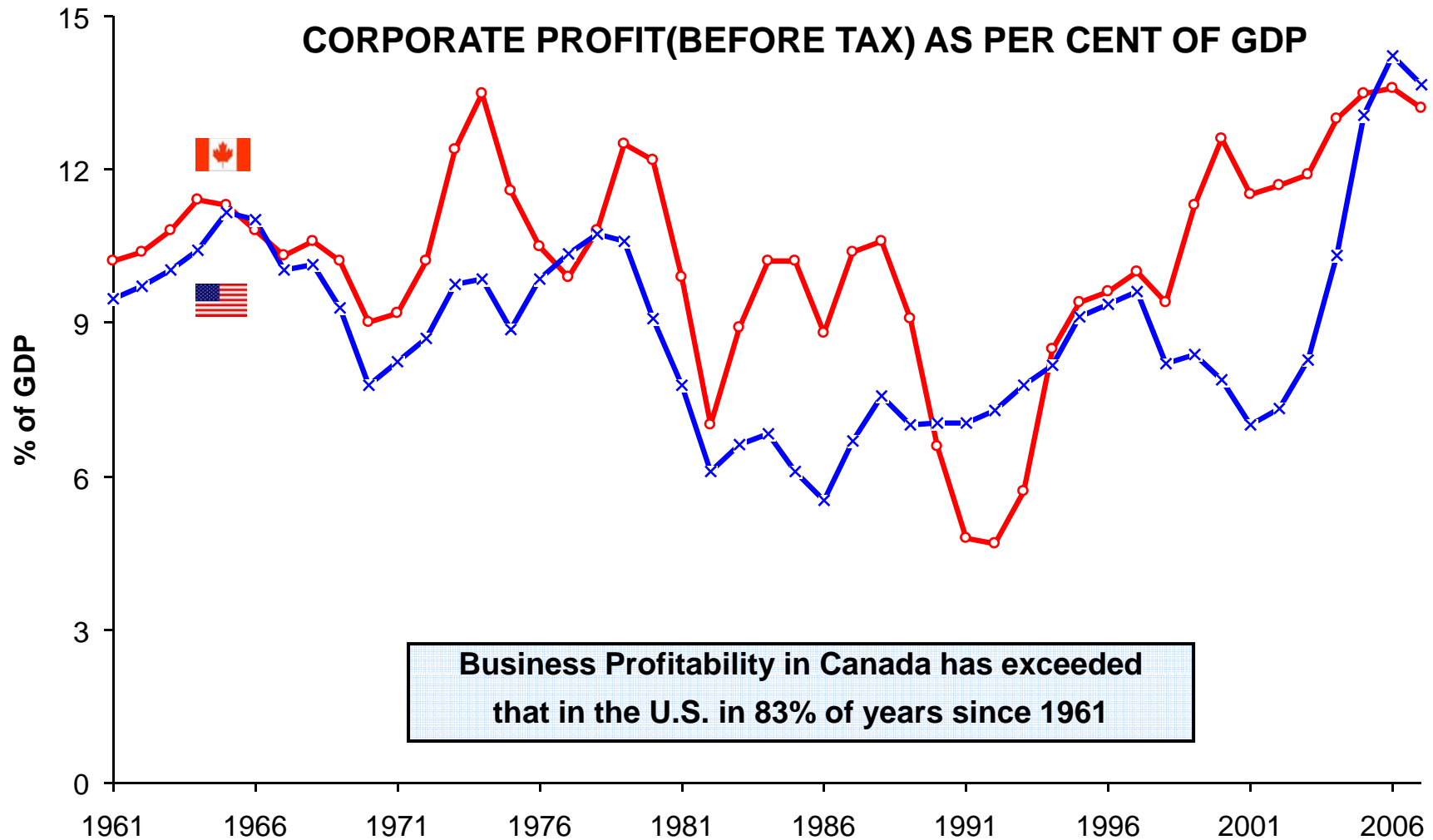
Smaller markets tend to provide:

- Less reward for innovation risk
- Less attraction for competitors from the outside, and thus . . .
- Less pressure to innovate

But success of Finland and Sweden shows importance of innovation-driven export focus

CANADIAN BUSINESS HAS ADAPTED PROFITABLY TO THESE CONDITIONS

BUSINESS PROFIT HEALTHY DESPITE WEAK INNOVATION



Data Source: (Statistics Canada, 2007)

STRONG AVERAGE PROFITABILITY TENDS TO CONFIRM STATUS QUO STRATEGY

KEY FACTORS THAT INFLUENCE INNOVATION STRATEGY CHOICE

- **STRUCTURAL CHARACTERISTICS**

- COMPETITIVE INTENSITY

- CLIMATE FOR NEW VENTURES

- PUBLIC POLICIES

- BUSINESS AMBITION

Analyzed in Context of R&D

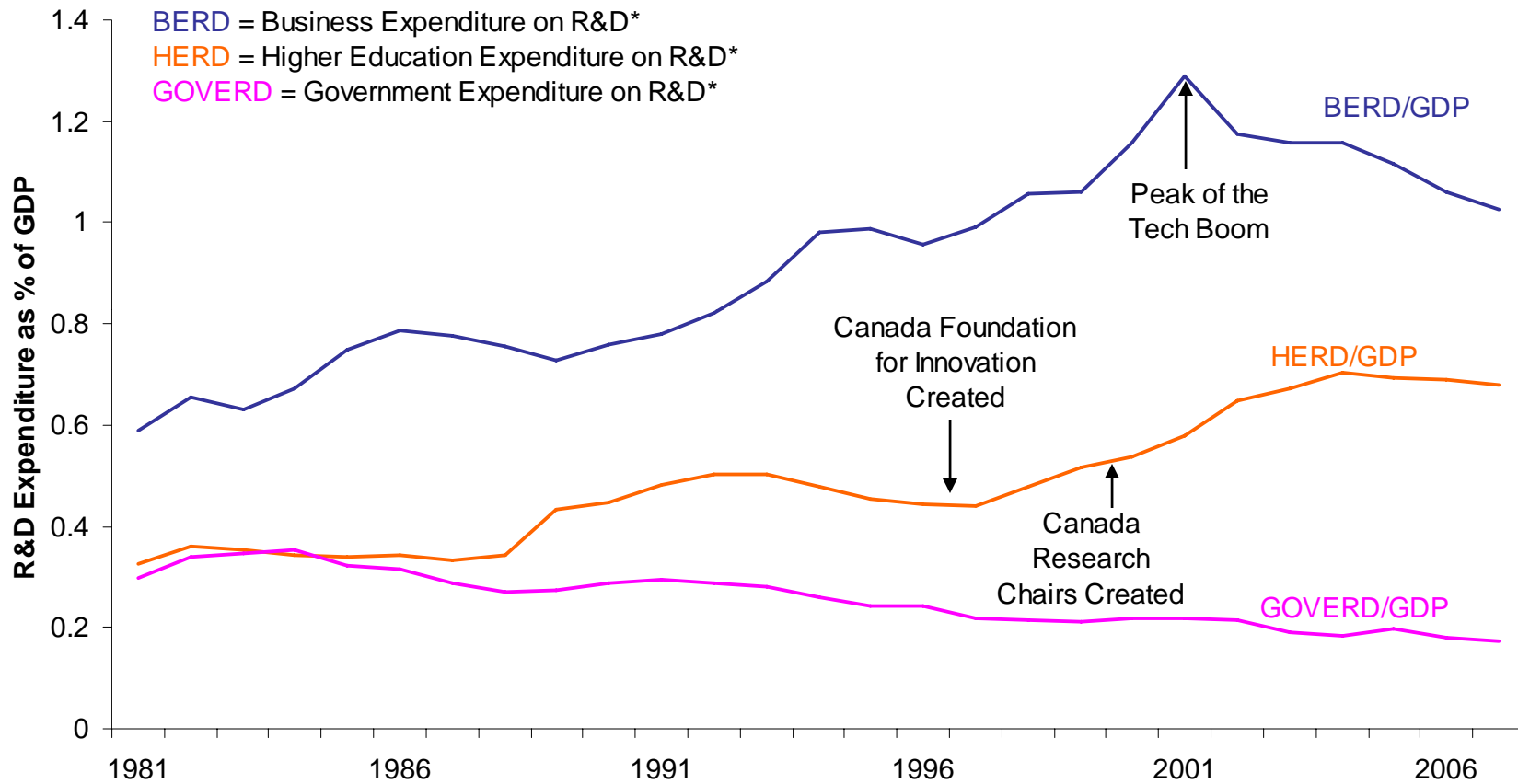
- **Sector Mix**

- **Foreign Ownership**

- **Firm Size Distribution**

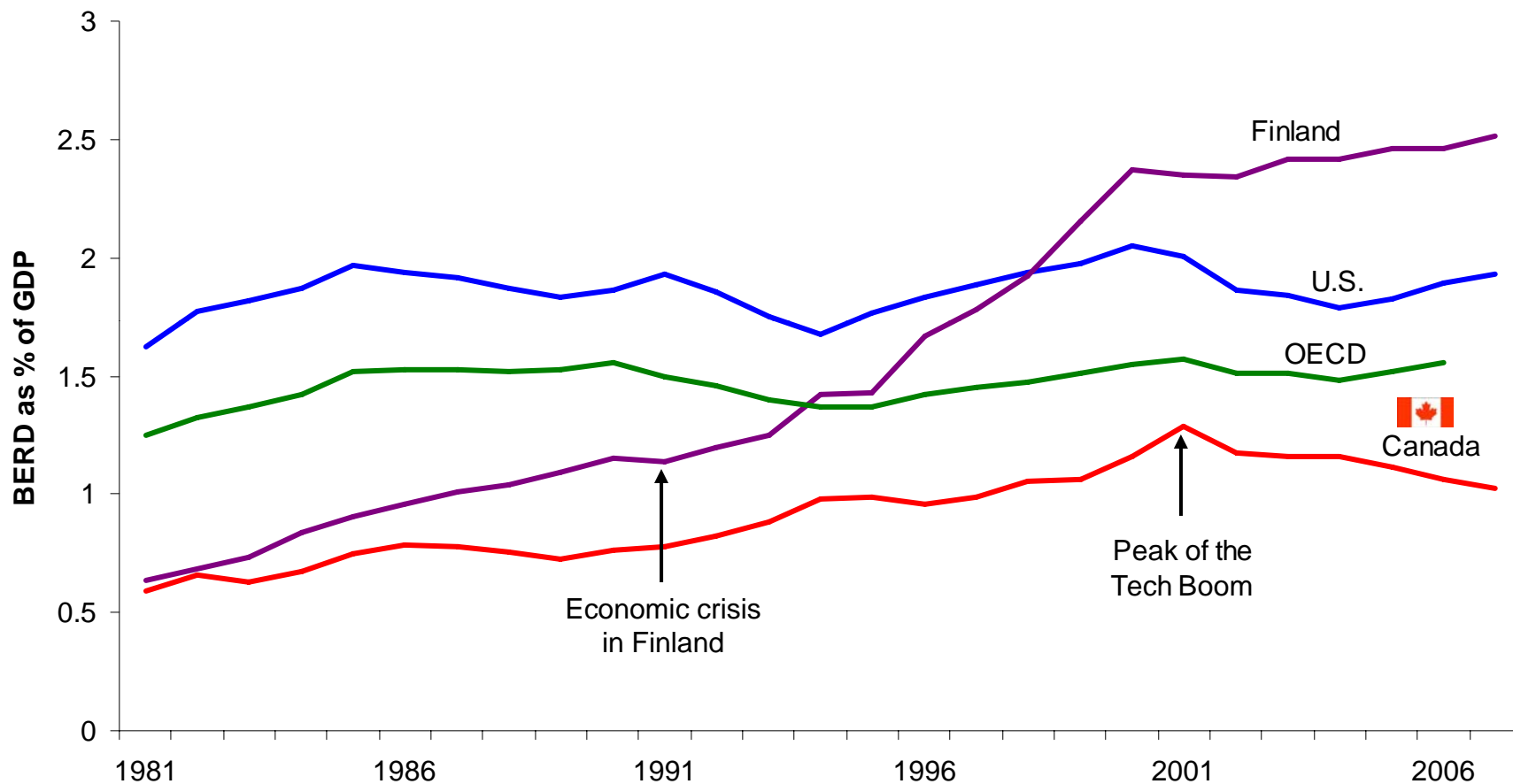
INNOVATION ANALYSIS CONVENTIONALLY FOCUSES ON STRUCTURE AND R&D GAPS

COMPONENTS OF R&D INTENSITY IN CANADA: 1981 - 2007



ALL R&D INTENSITY COMPONENTS FLAT TO DECLINING SINCE 2004

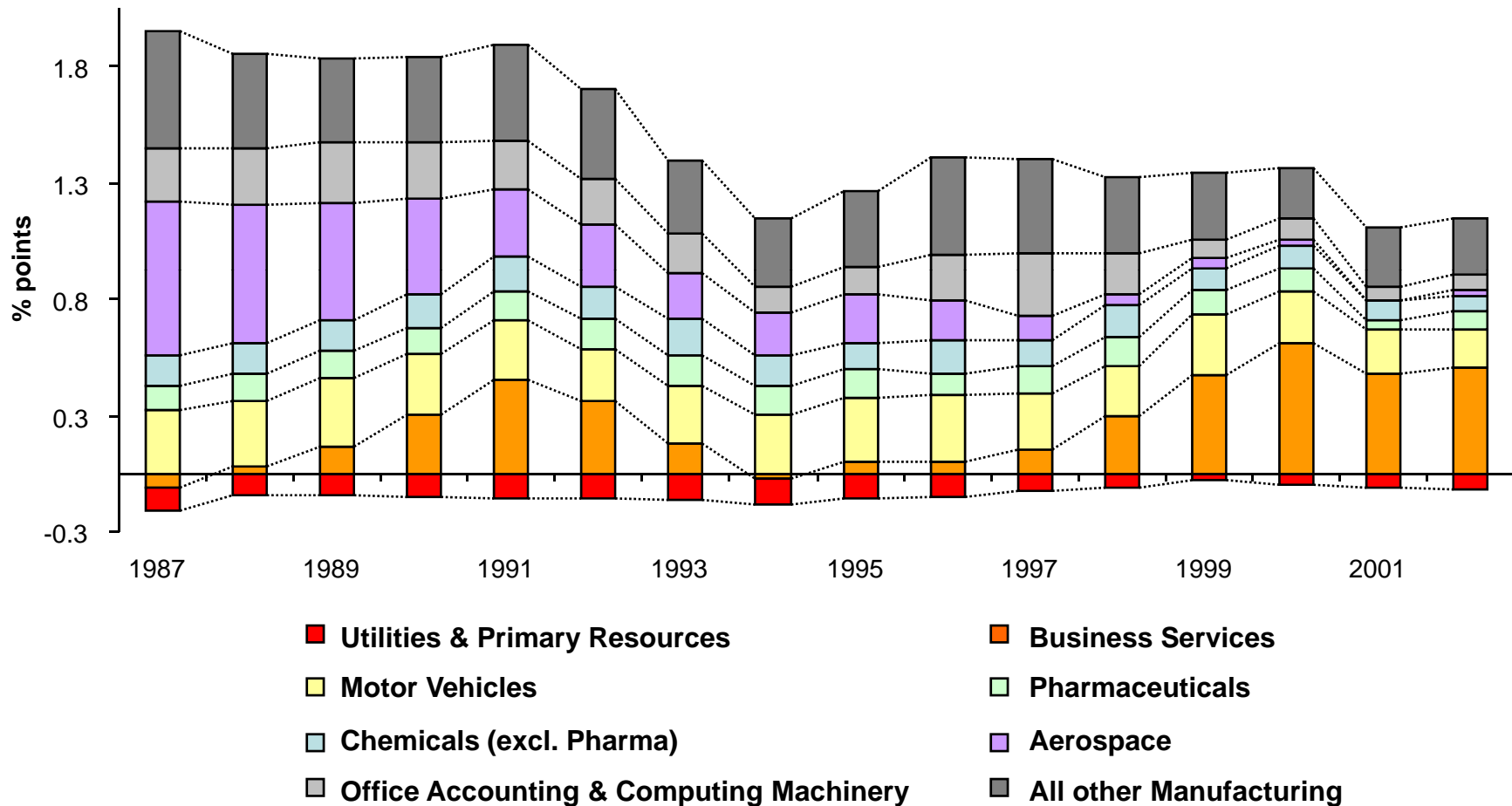
INTERNATIONAL TRENDS IN BUSINESS R&D INTENSITY: 1981 - 2007



END OF TECH BOOM REVERSED CANADA'S POSITIVE TREND

SECTORAL EVOLUTION OF THE U.S.-CANADA R&D GAP

THE U.S. - CANADA BERD INTENSITY GAP: 1987-2002

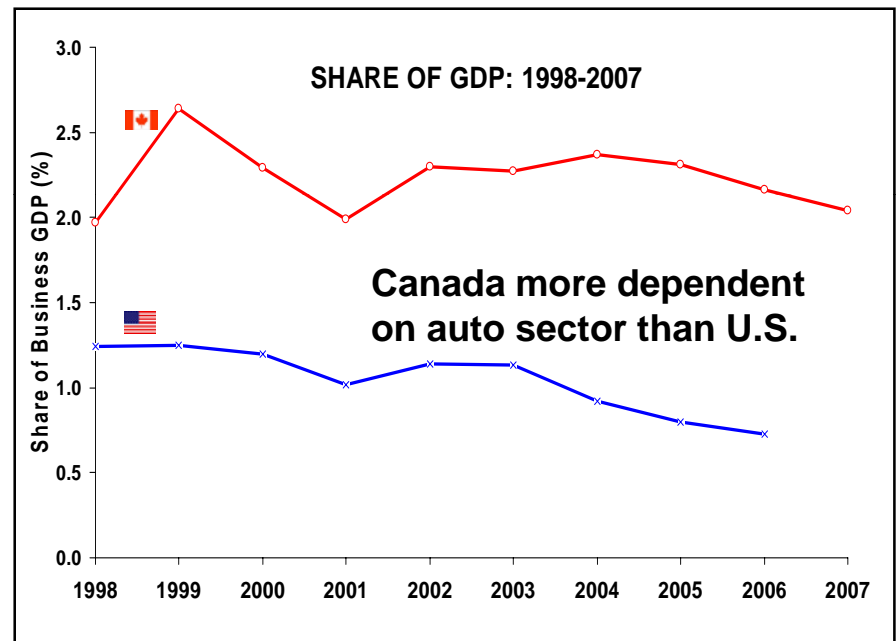
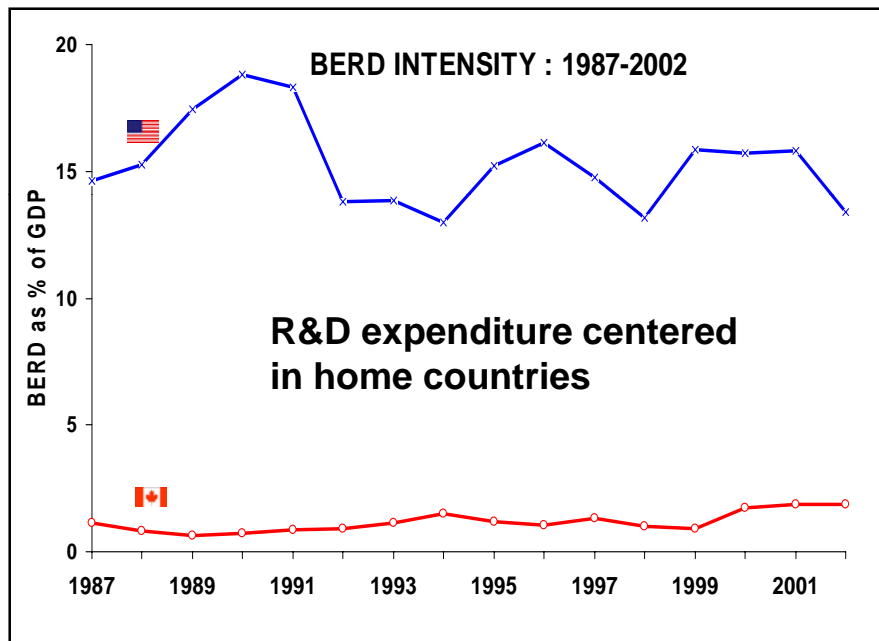


Data Source: Panel calculations based on OECD's STAN database.

GAP HAS NARROWED FOR MANUFACTURING BUT GROWN FOR SERVICES

AUTOMOTIVE – TRUNCATED INNOVATION STRATEGIES

R&D AND OUTPUT SHARES IN THE AUTO INDUSTRY

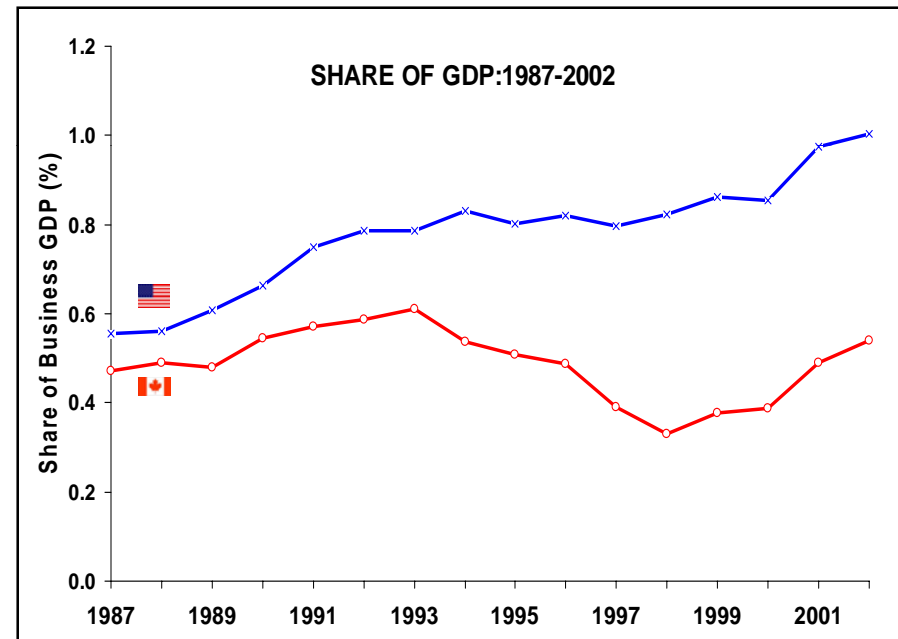
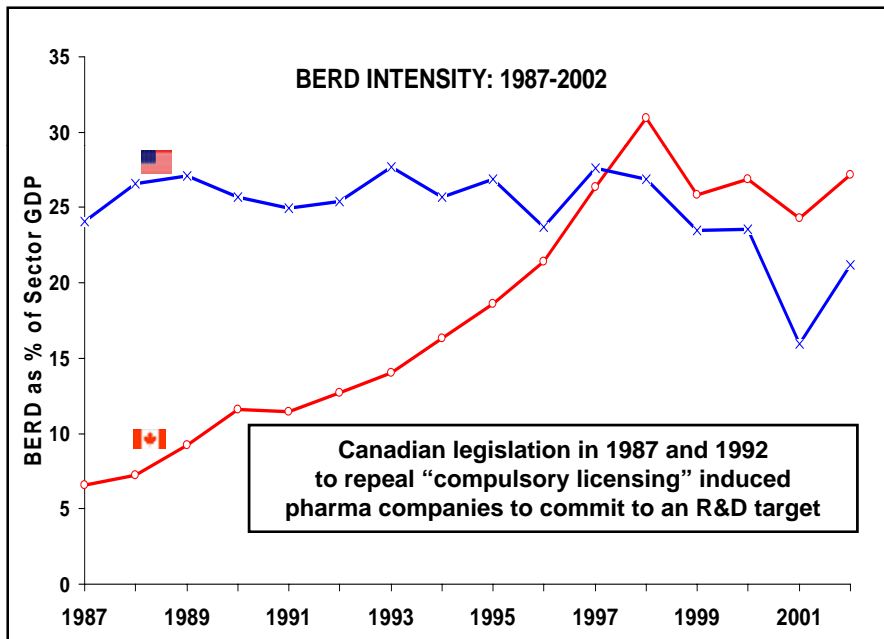


Data Source: (OECD, 2008b)

AUTOMOTIVE PRODUCTIVITY IS VERY HIGH IN CANADA DESPITE LOW R&D

PHARMA – POLICY CHANGES AND R&D COMMITMENTS

R&D AND OUTPUT SHARES IN PHARMACEUTICALS



Data Source: (OECD, 2008b)

HIGH R&D IN CANADA HAS NOT PRODUCED STRONG OUTPUT GROWTH

KEY FACTORS THAT INFLUENCE INNOVATION STRATEGY CHOICE

o STRUCTURAL CHARACTERISTICS

o **COMPETITIVE INTENSITY**

o CLIMATE FOR NEW VENTURES

o PUBLIC POLICIES

o BUSINESS AMBITION

- 
- o **Competition spurs innovation**
 - o **Small markets less attractive to competitors**
 - o **Export vs domestic markets**
 - o **Regulation**

KEY FACTORS THAT INFLUENCE INNOVATION STRATEGY CHOICE

o STRUCTURAL CHARACTERISTICS

o COMPETITIVE INTENSITY

o **CLIMATE FOR NEW VENTURES**

o **Early-stage financing**

o **Innovation from
university research**

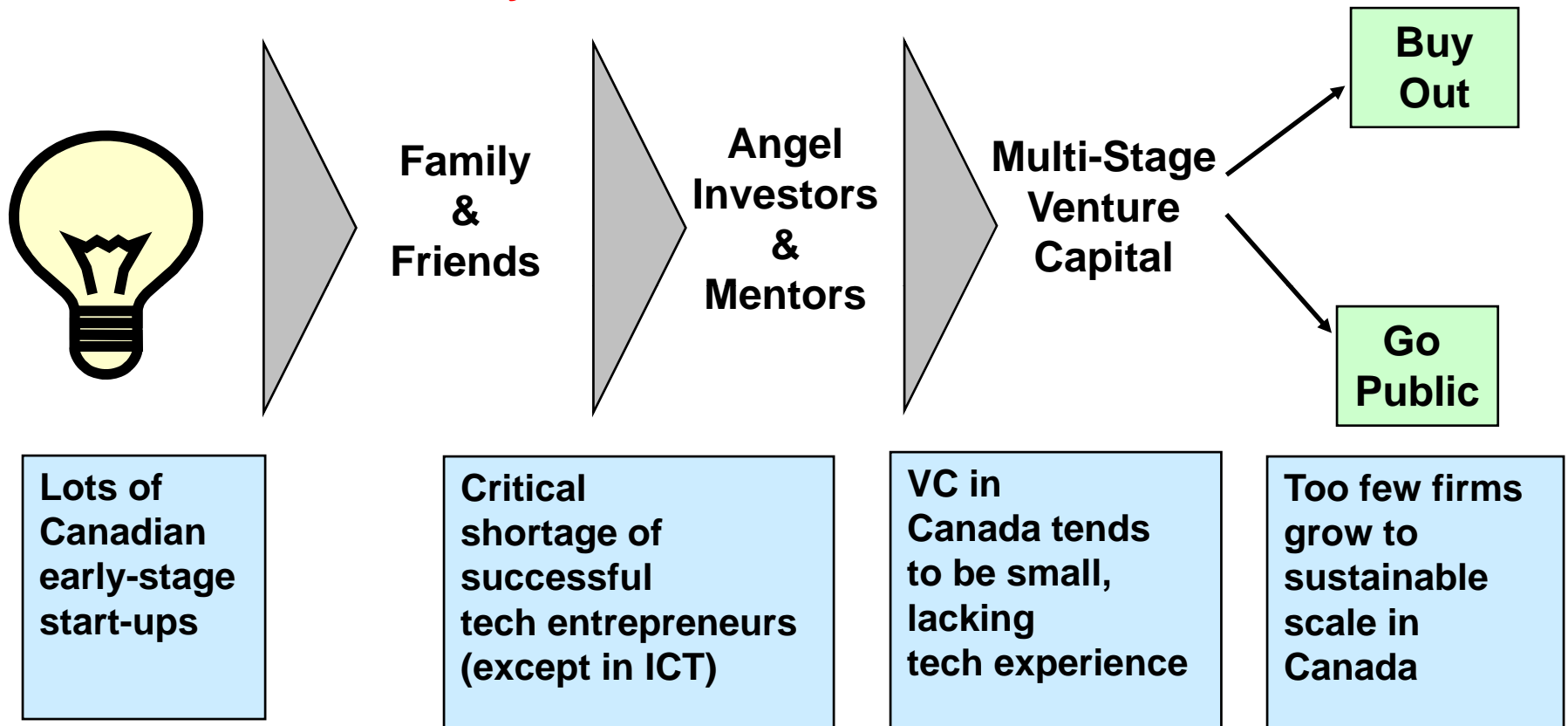
o **Geographic clusters**

o PUBLIC POLICIES

o BUSINESS AMBITION

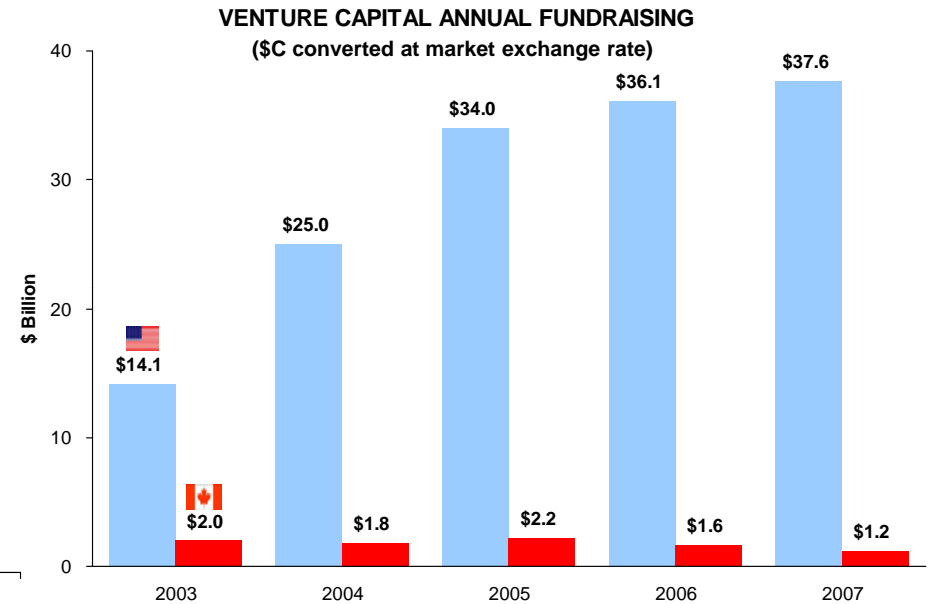
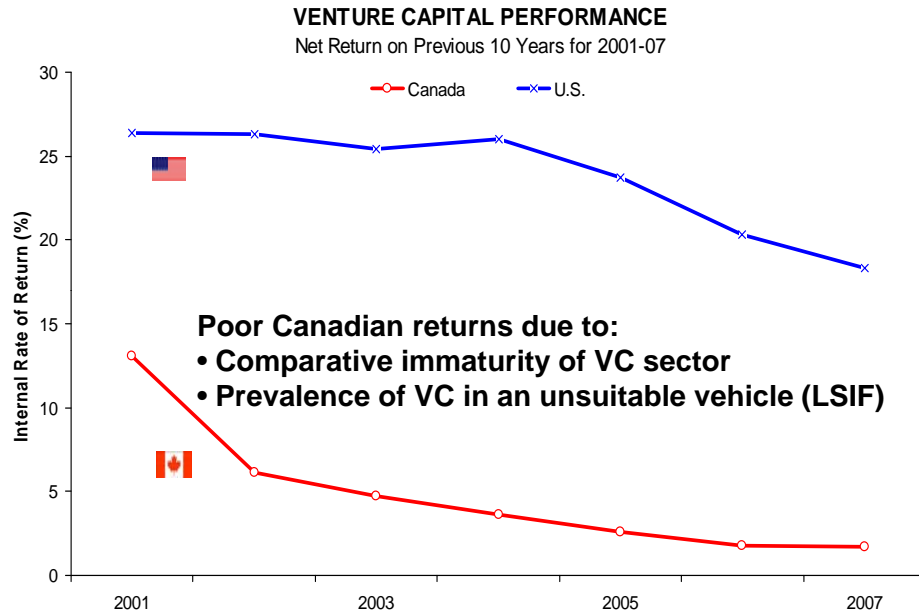
MULTI-STAGE FINANCING OF NEW VENTURES

“Valley of Death”



SUCCESS CREATES ‘ANGELS’ WHO THEN HELP GENERATE MORE SUCCESS

VC – POOR RESULTS HAVE CHOKED OFF INVESTMENT



NO QUICK FIX, BUT MARKET PERFORMANCE WILL BE THE SUCCESS CRITERION

“TECHNOLOGY TRANSFER” FROM UNIVERSITIES

Most important tech transfer is in the heads of trained graduates

OPPORTUNITIES

- **Withdrawal of (large) companies from the ‘research’ end of R&D**
- **Large public investment in university research**
- **Policy emphasis on commercial payoff from university research**

ISSUES & CHALLENGES

- **Mismatch of “culture” and incentives between academia and business**
- **Creating effective infrastructure to identify and mobilize research with real commercial potential**
- **Early-stage financing and mentorship**
- **Dearth of business “receptors” focused on S&T-based innovation**

FOSTER A RICHER ‘ECOSYSTEM’ OF RESOURCES LINKING UNIVERSITIES AND BUSINESS

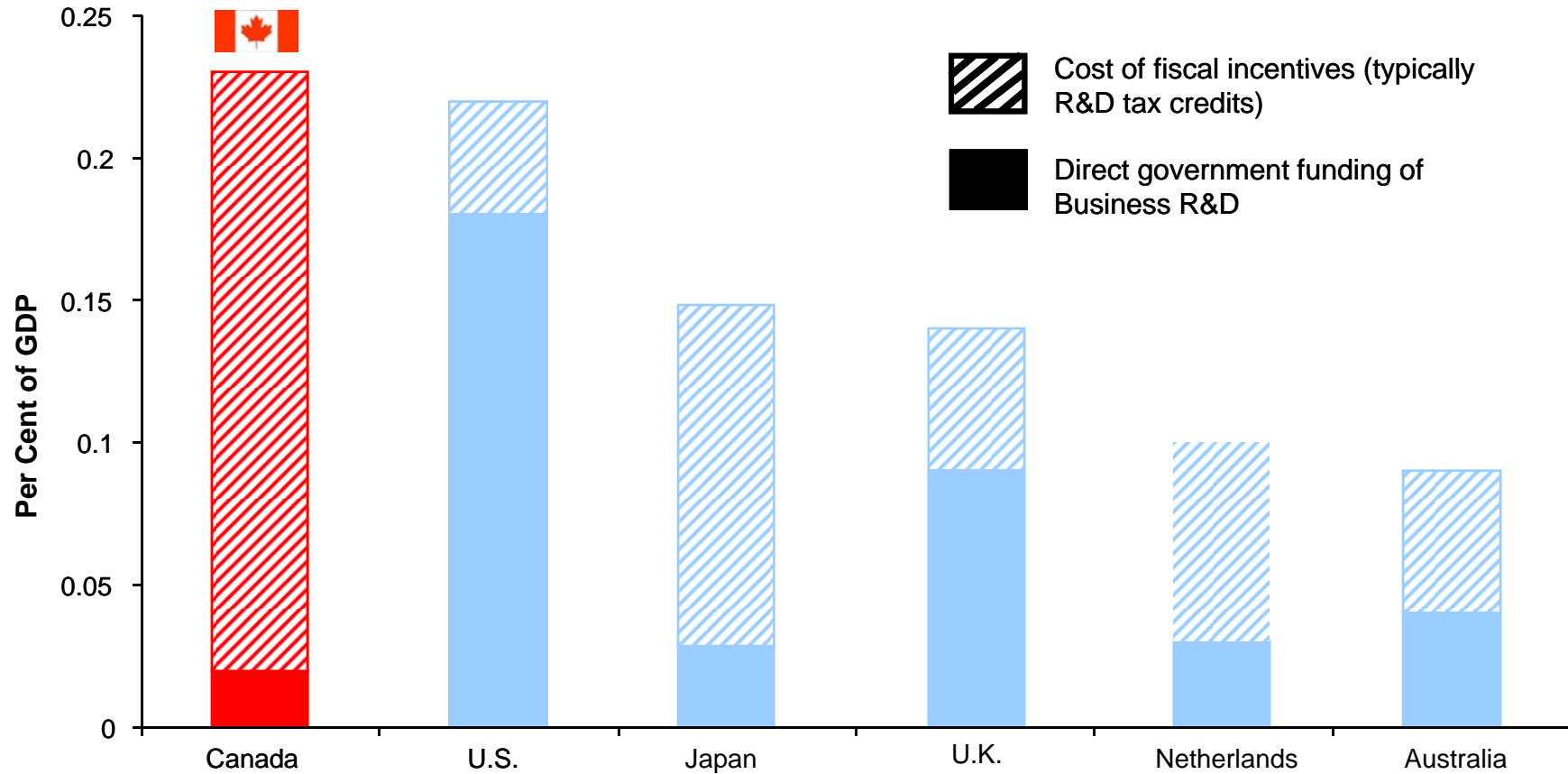
KEY FACTORS THAT INFLUENCE INNOVATION STRATEGY CHOICE

- STRUCTURAL CHARACTERISTICS
- COMPETITIVE INTENSITY
- CLIMATE FOR NEW VENTURES
- **PUBLIC POLICIES**
- BUSINESS AMBITION

- 
- **Macroeconomic Policies**
 - **Human Capital**
 - **Trade Liberalization**
 - **Regulation**
 - **Taxation (esp. SR&ED)**
 - **Sector Strategies**
 - **OECD “Menu”**

GOVERNMENT FUNDING OF BUSINESS R&D

(2005 OR LATEST YEAR)



Data Source: (OECD, 2008d)

CANADA IS AN 'OUTLIER' IN TERMS OF RELIANCE ON TAX-BASED INCENTIVES

KEY FACTORS THAT INFLUENCE INNOVATION STRATEGY CHOICE

- o STRUCTURAL CHARACTERISTICS
- o COMPETITIVE INTENSITY
- o CLIMATE FOR NEW VENTURES
- o PUBLIC POLICIES
- o **BUSINESS AMBITION**

INTANGIBLES OF “BUSINESS CULTURE” IS THE RESIDUAL FACTOR

DOES CANADIAN BUSINESS LACK “AMBITION”?

Why might Canadian businesses be less ambitious than the Americans?

- Arguments often advanced include:
 - Canada’s historical dependence on foreign initiative
 - Less competition in Canada’s domestic market
 - Canadian priorities / values are less commercially focused

- The issue is hotly debated:
 - Are Canadian and U.S. “attitudes” all that different?
 - Most panelists believed that business ambition was a key differentiator.

- Evidence is largely anecdotal based on experience of those who have worked in both U.S. and Canada.

MANY INTERNATIONAL SUCCESS DEMONSTRATE CANADA’S INNOVATIVE POTENTIAL

NEW FACTORS AT PLAY FOR CANADA

RESOURCE DEPENDENCE

- Volatile
- Unevenly-distributed
- Environmentally-challenged

US MARKET

- Increasing vulnerability of access
 - Protectionism
 - National security

EMERGING MARKETS

- Where the BIG growth will be
- Increasingly sophisticated competitors
- Broad spectrum of opportunities

NEW BUSINESS LEADERS

- Less captives of old mindset
- More at home in the world

CHALLENGES AND OPPORTUNITIES SHOULD MOTIVATE INNOVATIVE RESPONSES

SECTOR “CASE STUDIES” OF BUSINESS INNOVATION

There is no one-size-fits-all solution to the innovation puzzle.

- ❑ **AUTO SECTOR:** “Weak R&D But Strong Productivity”
- ❑ **LIFE SCIENCES:** “Great Promise – Mixed Results”
- ❑ **BANKING:** “Balancing Stability vs Radical Innovation”
- ❑ **ICT:** “A Catalytic Role for Government”

GOVERNMENT NEEDS TO (RE)DEVELOP DEEP SECTOR EXPERTISE

EXAMPLE - LIFE SCIENCES: GREAT PROMISE BUT MIXED RESULTS

INNOVATION CHALLENGES

- **Global competition for R&D mandates**
- **Difficulty of growing biotech startups**
- **Legacy of poor results**

SOME LESSONS FROM EXPERIENCE

- R&D support is necessary but not sufficient to generate significant economic benefits
- Governments in Canada have failed to **coherently** promote health sciences as a growth opportunity
- Startups need very patient and deep-pocketed investors and experienced business mentorship

\$3B PER YEAR OF PUBLIC R&D SUPPORT HAS YIELDED MEAGRE COMMERCIAL RETURN

CHALLENGES FACING HEALTH BIOTECH STARTUPS

- ❑ Heavily reliant on tech transfer from university research and on collaborative agreements with multinational pharma.
- ❑ Long and costly gestation to produce an approved product – e.g., 10 to 15 years and about \$1B. Canadian VCs tend to lack sufficient patience and deep pockets.
- ❑ Single product companies have trouble culling their “one and only” candidate.
- ❑ Too much “dumb” venture financing came into the sector in the boom years of the 1990s ... failures have made investors gun shy ... but the biotech venture community is now more savvy and disciplined.

OPPORTUNITY – BIG PHARMA’S INCREASING DEPENDENCE ON BIOTECH INNOVATORS

BROAD POLICY IMPLICATIONS OF THE ANALYSIS

- ❑ **DEEPER UNDERSTANDING** – Increase support for Statcan’s leading-edge work on innovation and productivity.
- ❑ **TECHNOLOGY INVESTMENT** – Encourage investment in advanced M&E and ICT in particular
- ❑ **COMPETITION & EXPORTS** – Increase exposure to competition and promote an export orientation, especially “downstream” in value chains.
- ❑ **NEW VENTURES** – Focus on early-stage financing and generation of potential “angels” to be investors and mentors.
- ❑ **BACKING OPPORTUNITIES** – Develop sector strategies to catalyze areas of opportunity.

BOTTOM LINE: NEED TO GET BUSINESS STRATEGY FOCUSED ON INNOVATION