

Realizing Innovation Potential in the Global Knowledge Economy – Is Canada Really Lagging Behind?

APEC Study Centre Consortium Conference 2005

PECC Trade Forum 2005

Jeju, Korea

May 24, 2005

Surendra Gera

Industry Canada

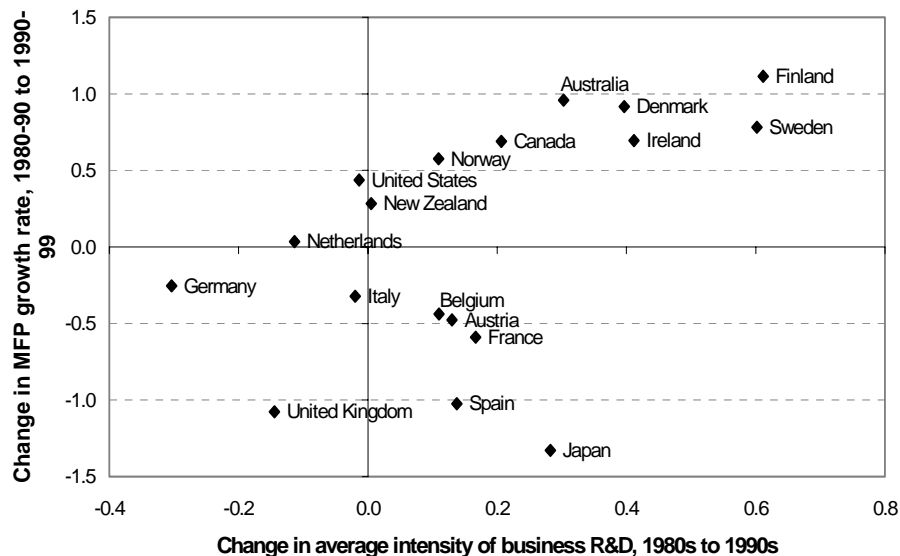
Objectives of the Paper

- **This paper is has a number of objectives:**
- **First, it discusses the changing role of innovation in the global knowledge economy;**
- **Second, it provides an overview of Canada's recent innovation performance and supporting policy framework;**
- **Third, it discusses Canada's innovation performance through benchmarking vis-à-vis our international competitors and trading partners;**
- **Fourth, it provides an overview of Canada's innovation policy focusing on targets and incentives, and assesses the adequacy of direct and fiscal measures for R&D support in achieving its target of moving to the top five countries in the world.**

The Changing Role of innovation in the Global Knowledge Economy

- The global knowledge economy offers many opportunities and challenges raised by:
 - the emergence of new economic entities in the world scene,
 - the fast growing trade in services and the globalization of supply chains; and
 - increasing globalization of scientific and technological capabilities and expanding technological opportunities in enabling technologies, especially in life sciences and ICT.
- Innovation, science and technology are receiving greater policy attention as their links to productivity and economic growth are well recognized.

Changes in average business R&D and multi-factor productivity growth rate, OCED countries



Source: Sheehan (2004)

The Changing Role of innovation in the Global Knowledge Economy (cont.)

- **Countries that are close to technology frontier (such as Canada, Korea) would benefit more (in terms of GDP per capita growth) from R&D and (world-first) innovations than adopting existing technologies (Acemoglu, Aghion and Zibilotti, 2002).**

- **MNEs contribute significantly to productivity growth in *home and host* countries (OECD, STI Outlook, 2004).**
 - **Estimated 14 percent of US productivity growth over 1986-97 resulted from technological spillovers from foreign affiliates.**

 - **Facilitating spillovers, such as through linkages to local suppliers would ensure benefiting from globalization.**

- **Recent years have seen increasing globalization of R&D causing concerns about moving high-productivity, high value-added jobs to foreign countries.**
 - **Firms establish R&D facilities abroad not just to be near local markets, but to be near centres of scientific and technological excellence.**

A Changing Environment for Business R&D

➤ In the global knowledge economy, firms face greater competition- makes it harder to appropriate returns; shorter time-to-market, shorter product life-cycles; uncertainty about future technology and markets; and increased cost and risk of innovation – cost of innovation is growing in many capital-intensive industries (OECD, STI Outlook, 2004)

➤ Competition is growing – many OECD countries aim to increase innovative capabilities by identifying R&D targets.

Examples of R&D spending targets in the OECD

| Country/Region | R&D intensity in 2002 (%) ¹ | R&D target | Target date |
|----------------------|--|-----------------------------------|-------------|
| Austria | 1.93 | 2.5% of GDP | 2006 |
| Canada | 1.91 | Top 5 in OECD | 2010 |
| EU - 25 | 1.83 | 3.0% of GDP | 2010 |
| Germany | 2.52 | 3.0% of GDP | 2010 |
| Hungary | 1.02 | OECD average | 2006 |
| Ireland ¹ | 1.40 | 2.5% of GNP | 2010 |
| Korea | 2.91 | Double national investment in R&D | 2007 |
| Mexico ² | 0.39 | 1.0% of GDP | 2006 |
| Norway | 1.67 | At least OECD average | 2005 |
| Poland | 0.66 | 1.5% of GDP | 2006 |
| Spain | 1.03 | 1.4% of GDP | 2007 |
| United Kingdom | 1.88 | 2.5% of GDP | 2014 |

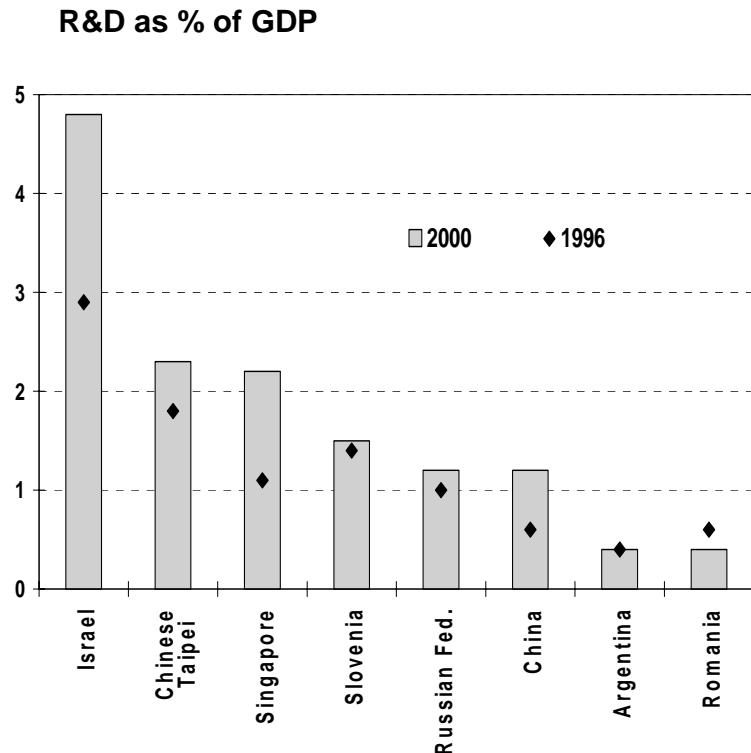
1. Figures for Ireland are expressed as in terms of gross national product, instead of gross domestic product, consistent with its national reporting scheme.

2. R&D intensity for 2001

Source: OECD Science, Technology and Industry Outlook, 2004, p.25.

A Changing Environment for Business R&D (cont.)

- A number of non-OECD economies are increasing investments in R&D.
 - China's R&D intensity doubled from 0.6 percent to 1.2 percent of GDP between 1995 and 2002, and its total R&D investment rose to US\$ 72 billion, third only to the US and Japan.
 - Israel's R&D intensity reached 4.7 percent – higher than that of any OECD country.
 - Combined R&D of China, Israel and Russia equalled 14.7 percent of OECD's in 2001, versus 6.4 percent in 1995.

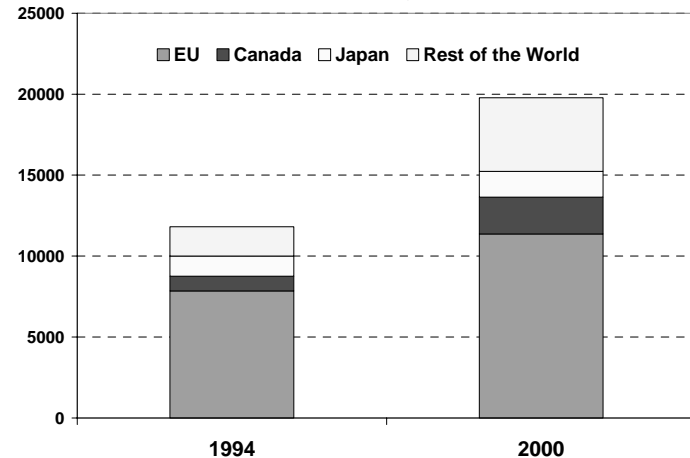


Source: OECD, STI Outlook (2004)

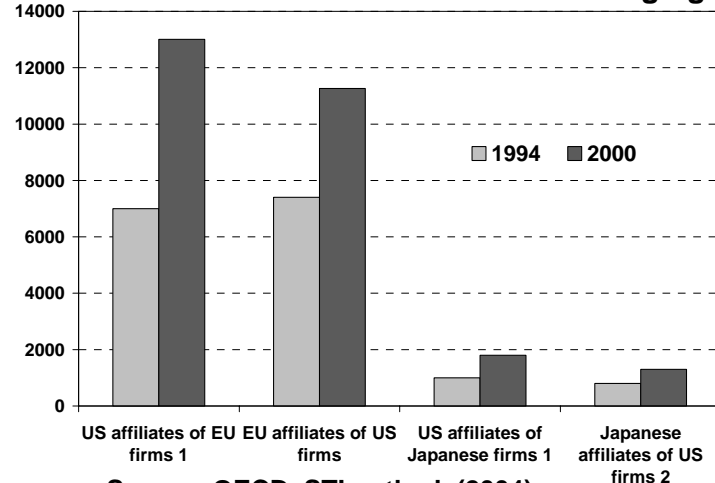
Changes in R&D Spending by Foreign Affiliates

- A considerable portion of the R&D performed by foreign affiliates remains in the OECD area. For example,
 - In 2000, 65 percent of manufacturing R&D performed by foreign affiliates in the US came from firms headquartered in the EU15 of Japan – a gain of its share of OECD foreign affiliate R&D funding, from 45 percent to 55 percent.
 - Similarly, US\$ 13 billion of the spending by foreign affiliates in the EU15 came from the US or Japan.
- US outward R&D investments growing in all major regions
 - Growth fastest in “rest of the world”. China received US\$ 506 million in 2000 compared to 5 million in 1994;
 - Singapore received US\$ 548 million in 2000, compared to less than 50 million in 1994.

Outward R&D investment, US\$ millions



Intra-OECD flows of R&D investment changing

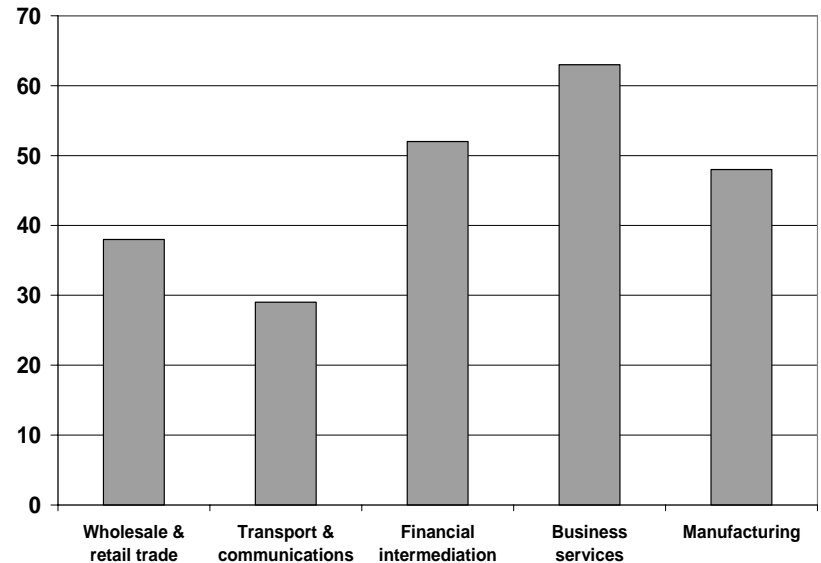


Source: OECD, STI outlook (2004)

A Changing Environment for Business R&D (cont.)

- **Service sector industries are innovative (Sheehan, 2005).**
- **Services innovation mainly driven by:**
 - **Intramural and external R&D primarily in business services: computing, software, and telecommunications.**
 - **Patterns differ by industry sector e.g., finance versus business services.**
 - **Acquisition of equipment and knowledge, especially information technology.**

Share of innovative firms, CIS3 Survey 1998-2000



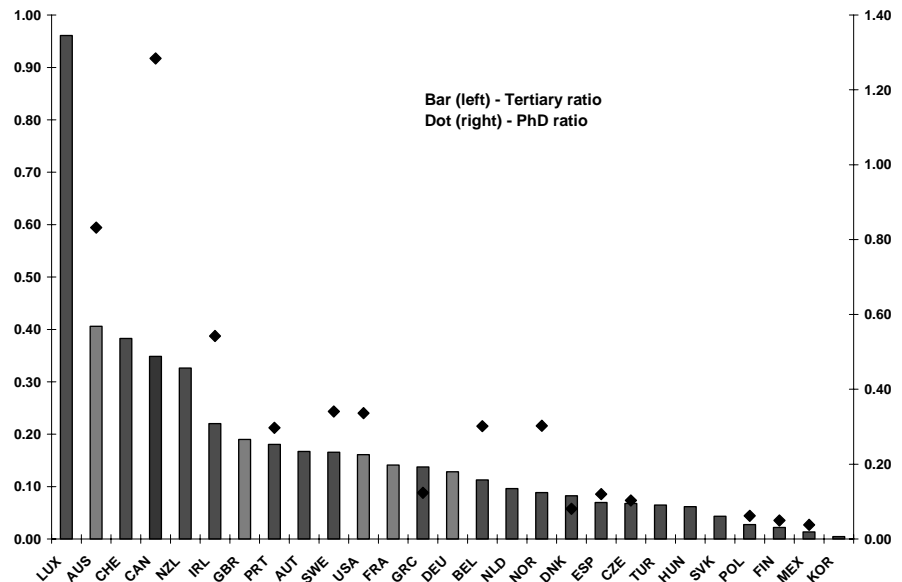
Source: Sheehan (2005)

Increased mobility of the highly skilled increases rate of diffusion of knowledge.

➤ The international market for some segments of the highly skilled population is becoming more competitive as industrialized countries compete strategically for these talents (Gera and Songsakul, 2004)

- In absolute terms, the US, Australia, Canada, Germany, the UK and France are the major beneficiaries of high-skilled immigrants.
- Canada ranks fourth with 35 percent of foreign-born to native population with tertiary education. Canada has highest ratio of foreign-born Ph.Ds to native Ph.Ds.
- Australia has higher ratio of foreign-born with tertiary education than Canada (rank 2nd at 0.41) but it lags Canada in terms of foreign-born Ph.Ds (0.83).

Ratio of foreign-born to native population aged 15+ with tertiary education, OECD countries, 2000-2001



Source: Gera and Songsakul (2005)

Business R&D strategies have changed

➤ *Old model: closed innovation*

- **Virtuous circle**
- **Firms identify needed technological advances**
- **Firms conduct needed R&D internally**
- **Firms incorporate advances into new products & services**
- **Product revenues finance additional R&D**
- **Globalisation to tailor products to local markets**

➤ *New model: open innovation*

- **R&D linked to business strategy (new funding models, incentives for workers)**
- **Acquisition of external technology (licensing, corporate VC, M&A, collaborative research)**
- **Externalisation of R&D results (licensing, spin-offs)**
- **Globalisation to tap into world-wide talent pools**

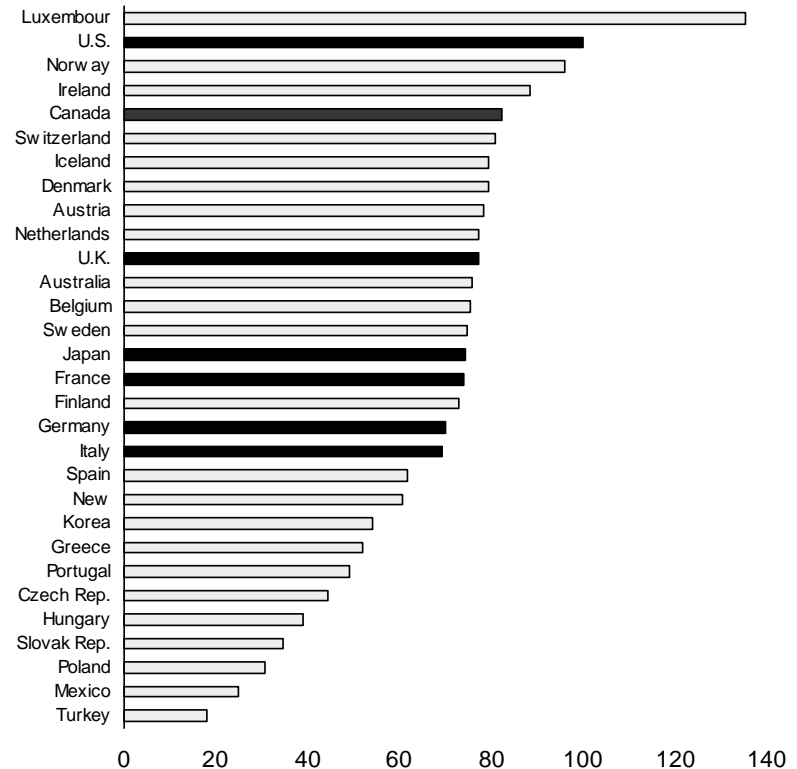
Source: Adapted from Sheehan (2004)

***CANADA'S INNOVATION PERFORMANCE:
STRENGTHS AND WEAKNESSES***

Canada's standard of living is high among OECD Countries

- A significant component of our quality of life is represented by our standard of living, our GDP per head.
- Canada's GDP per capita is 2nd highest in the G-7, and 5th among the wealthy OECD nations.
- Canada's living standard was 20 percent below the U.S. in 2003.

Global Perspective on "Living Standards"
(Relative GDP per capita, 2003, U.S.=100)

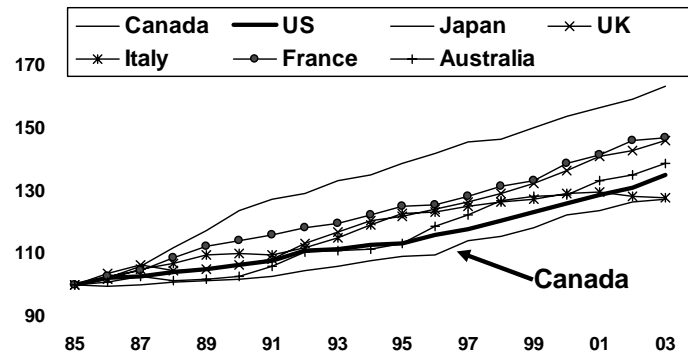


Source: OECD in Figures, 2004

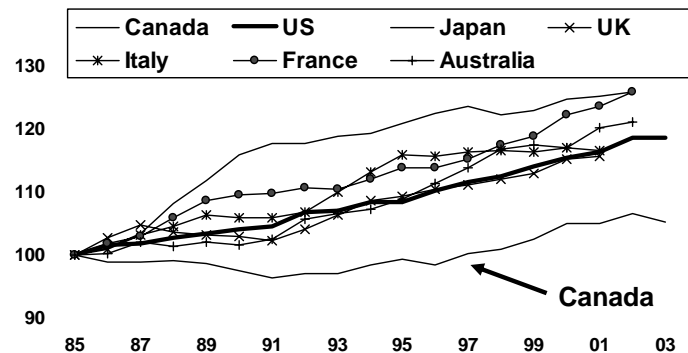
Labour productivity and MFP growth have been lower

- Labour productivity and MFP growth have been lower in Canada than in many other advanced economies.
- MFP performance has been worse than the productivity of labour suggesting overall poor efficiency gains in production, lagging technology adoption and sub-optimal production practices.
- During 1981-2001, MFP in Canada grew at an annual average rate of 0.3 percent, compared to an average of 1.1 percent per year for Australia, France, Japan, Italy, UK, and U.S.

Labour Productivity in Selected OECD Countries, 2003
(1985=100)



Multifactor Productivity in Selected OECD Countries
(1985-2003, 1985=100)



Note: MFP is based on harmonized price indexes for ICT capital goods.
Source: OECD, Productivity Programme.

Canada's Innovation Performance: Benchmarking

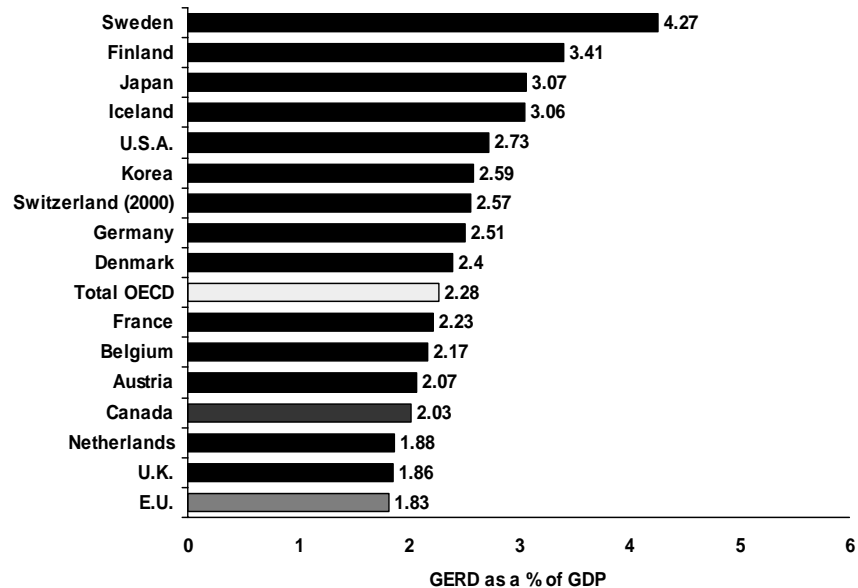
Summary of Benchmarks and Performance by Canada

| Benchmarks | Canada's rank (out of 11 comparator countries, unless otherwise noted) | Leading country |
|--|---|------------------------|
| <u>Knowledge Performance</u> | | |
| Gross domestic expenditure on R&D as percent of GDP | 7 | Sweden |
| Business enterprise expenditure on R&D as percent of GDP | 8 | Sweden |
| Publication of scientific papers per one million population | 5 | Sweden |
| Triadic patent families | 8 | Sweden |
| University-Industry collaboration in R&D | 2 (of 10) | Germany |
| Technology balance of payments (payments plus receipts) | 5 (of 10) | Germany |
| <u>Skills Performance</u> | | |
| Educational attainment in the labour force | 1 | Canada |
| Human resources in science and technology occupations | 7 | Sweden |
| Adult participation in continuing education | 6 (of 6) | Finland |
| <u>Innovation Environment</u> | | |
| Economy-wide regulatory environment | 6 | U.K. |
| Total corporate tax as a per cent of GDP | 3 | Australia |
| Attractiveness of R&D tax treatment | 3 | Spain |
| Investment in venture capital | 2 | U.S. |
| World competitiveness ranking | 4 | U.S. |
| Relocation of R&D facilities as a threat to the economy's future | 7 | Finland |
| Foreign direct investment (FDI) Confidence Index | 7 (of 9) | U.S. |
| <u>Community-Based Innovation</u> | | |
| Broadband subscribers per 100 population | 1 | Canada |

R&D Performance in Canada

- Canada spends less on R&D investment than other industrialized countries, despite a generous fiscal incentive -- the Scientific Research & Experimental Development (SR&ED) Tax Credit Program.
 - Canada ranked 13th in the OECD in terms of gross expenditures on R&D (GERD) as a percent of GDP.
- In particular, Canada trails the leader by more than 2 percentage points and lags the U.S by about $\frac{3}{4}$ of a percentage point.

GERD as a Percentage of GDP, Top OECD Countries, 2001 or nearest year.

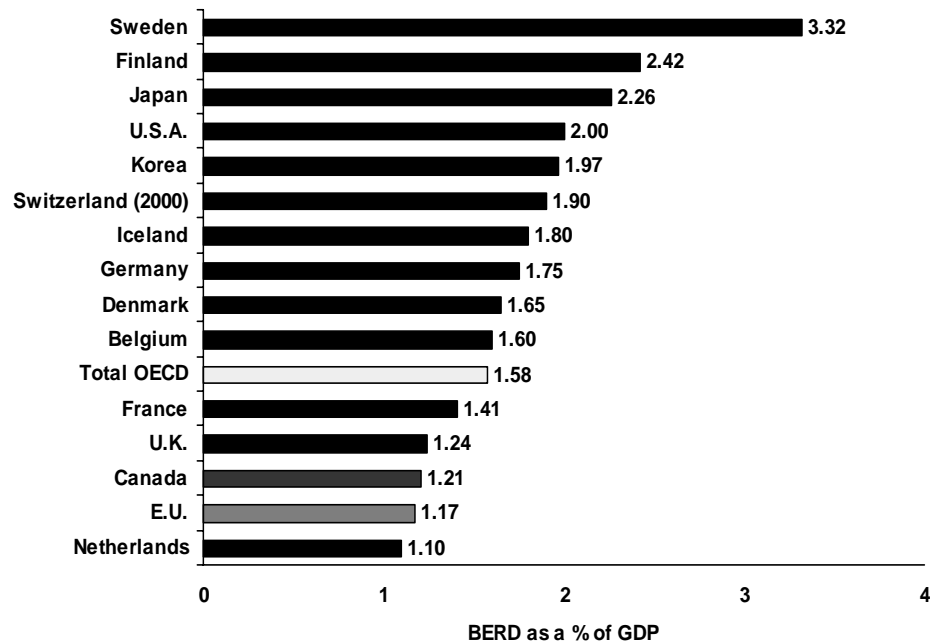


Source : OECD, Main Science and Technology Indicators, 2004/2, December 2004

Business sector R&D performance

- Canada ranks 13th in the OECD in terms of Business Expenditure on R&D.
- Several reasons have been advanced to explain Canada's lagging performance, including the high degree of foreign ownership and relatively small size of Canadian firms.

BERD as a percentage of GDP, 2001 or nearest year

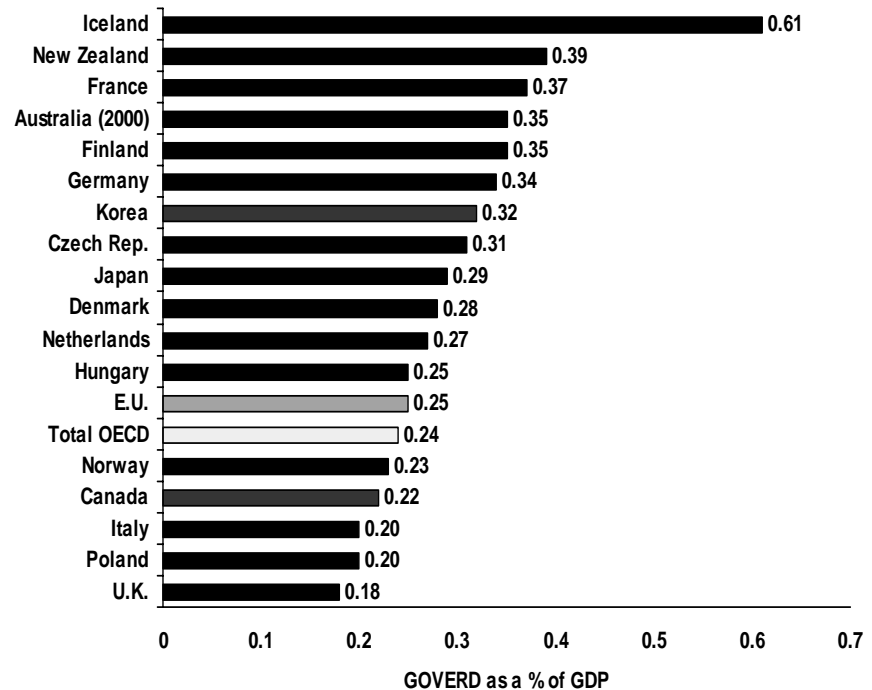


Source : OECD, Main Science and Technology Indicators, 2004//2, December, 2004.

Government performed R&D

- **Canada ranks 14th in the OECD in government expenditure on R&D as a proportion of GDP, despite federal investment in R&D increasing 29% from 1997 to 2002.**

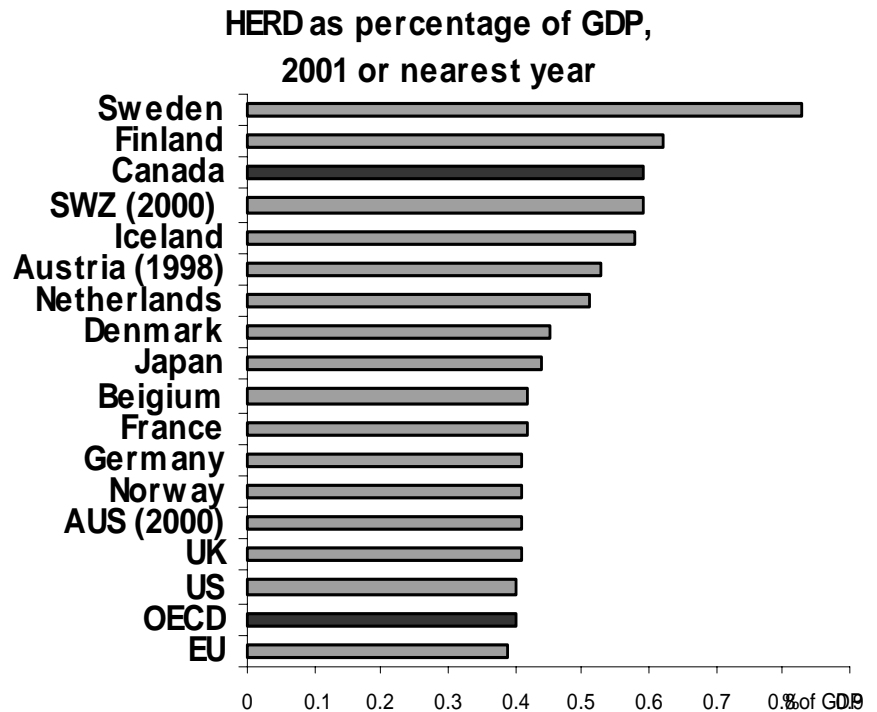
Government-performed R&D as a percentage of GDP, selected countries



Source : OECD, Main Science and Technology Indicators 2004/2, December 2004.

Higher education R&D

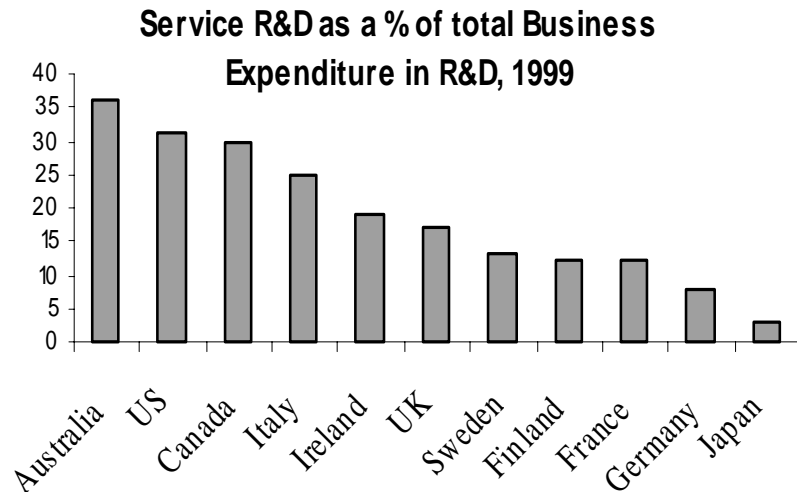
- Canada ranks 3rd in the OECD in R&D conducted by higher education. It is ahead of both the US and the UK, and ahead of the OECD average.
- This is clearly an area of strength for R&D in Canada. However, it still trails the innovation leaders, i.e. of Sweden and Finland.



Source: OECD Main STI (2004)

Service R&D

- Service sector R&D as a percent of total business expenditure in R&D is relatively high in Canada compared with other major OECD economies – Canada ranks third behind Australia and the US.
 - However, it has remained virtually flat in Canada from 1994 onwards.
- Much work is needed to understand the nature of the innovation process in services. “Work on service innovation still remains weak in capturing what service innovation is all about” (*Knowledge and Innovation in the New Service Economy*, Birgitte et.al., ed. 2000)



Source : OECD, Main Science and Technology Indicators, 2004/2, December 2004

Commercialization – proportion of enterprises that bring new products/processes

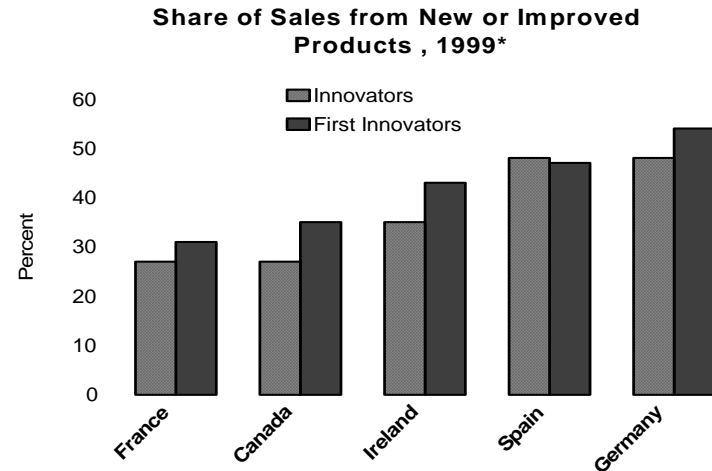
➤ There is a growing concern among policy makers that Canada suffers from a “commercialization gap”

➤ In Canada, 80 per cent of manufacturing firms innovate, with 26 per cent introducing products and processes that are new to Canada or the world.

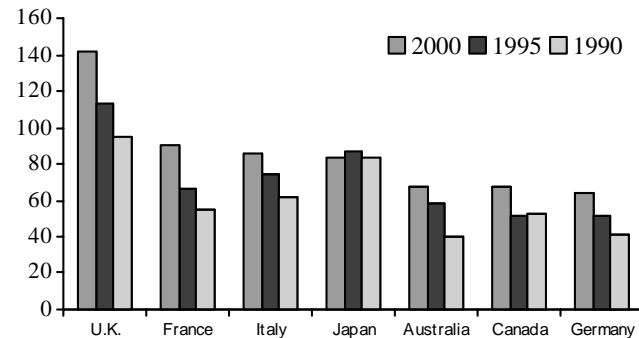
➤ However, Canadian firms trail in their ability to capture economic benefits. Some European countries (France, Germany, Ireland and Spain) report substantially more sales from their innovations.

➤ The export of high-tech products is an important indicator of a country’s ability to commercialize the results of research and technological innovation in international markets.

➤ Again, Canada underperforms relative to all G-7, and Australia except Germany.



Source: Government of Canada, Achieving Excellence, 2001
High-tech export as a percent of GERD in G-7 countries and Australia relative to U.S., US=100



Source: National Science Board: Science Engineering Indicators, 2004

Canada's Innovation Policy: Government Support for Business R&D

- **Market failures: Two major sources of “market failures” provide the necessary rationale for government support to R&D**
 - Externality-induced under investment in R&D (imperfect appropriability).
 - Empirical evidence supports that the social returns to R&D are at least double private returns (Griliches, 1998; Hall, 1993; Globerman, 2000).
 - financial constraints-related under investment – existence of “incomplete” financial markets (e.g., asymmetric information, moral hazard) lead to financial constraints for R&D.
 - Empirical evidence supports the role of financial constraints in R&D, especially for small and newly created young firms (Hall, 2002)

- **Institutional or systematic failures: rationale for government support for facilitating the operation of the national innovation systems**

Summary of studies on social rates of return on R&D

| Studies | Estimated Rates of Return (%) | |
|---------------------------|-------------------------------|--------|
| | Private | Social |
| Nadiri (1993) | 20-30 | 50 |
| Mansfield (1977) | 25 | 56 |
| Terleckyj (1974) | 29 | 48-78 |
| Sveikauskas (1981) | 10-25 | 50 |
| Goto-Suzuki (1989) | 26 | 80 |
| Bernstein & Nadiri (1998) | 9-27 | 10-160 |
| Scherer (1984) | 29-43 | 64-147 |
| Bernstein & Nadiri (1991) | 14-28 | 20-110 |

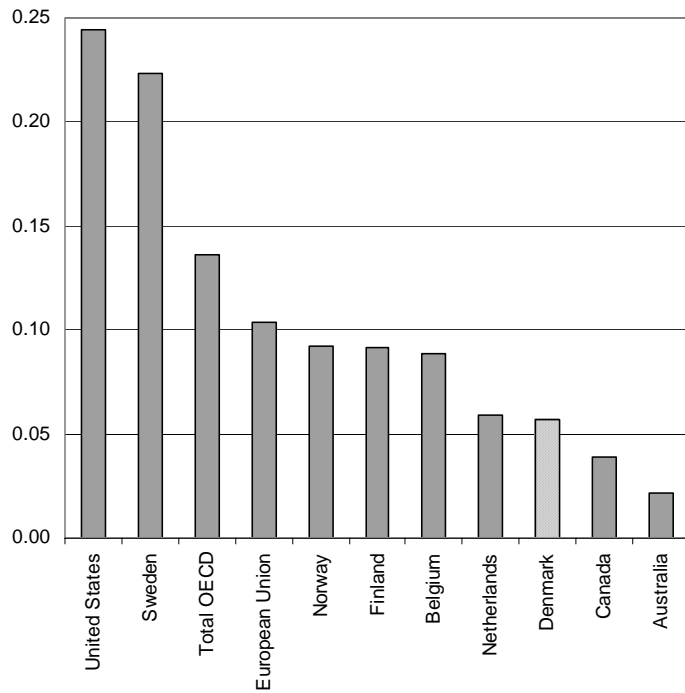
Source: Table adapted from Griliches (1992) and Nadiri (1993)

Canada's Innovation Policy: Direct Government Support for Business R&D

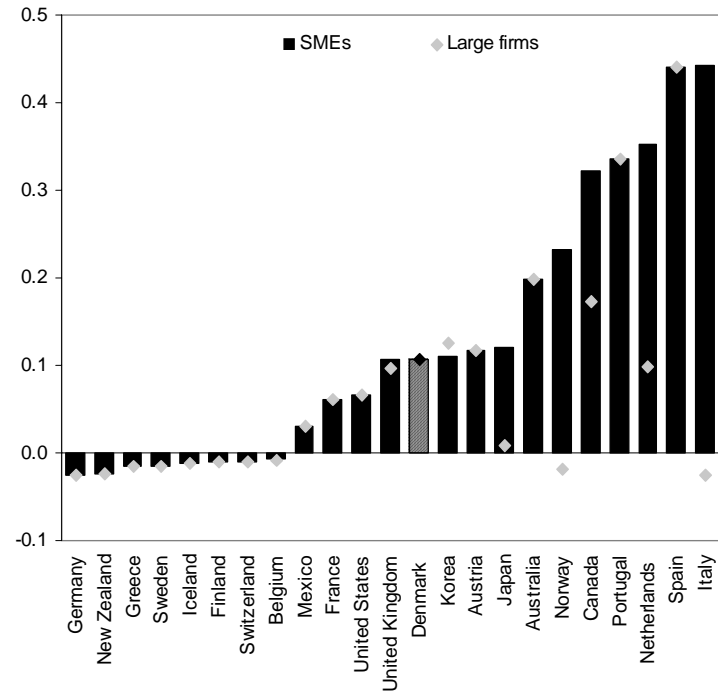
- **Direct Federal Support for Business Innovation: Examples include**
 - research grants and non-repayable contributions (e.g., Canada's Granting Councils);
 - conditionally repayable contributions (e.g., Technology Partnerships Canada);
 - contract work awarded competitively (e.g., Canada Space Agency, and the Department of National Defence);
 - technical advice (Industrial Research Assistance program); and funds for research consortia (PRECARN);
 - The Networks of Centres of Excellence (NCE)
 - The Canada Foundation for Innovation
 - CANARIE Inc.
 - STRATEGIS website
 - Granting Councils –Natural Sciences and Engineering Research Council of Canada (NSERC), and Social Sciences and Humanities Research Council of Canada (SSHRC).

Government Financing of Business R&D

Government-financed BERD as a % of GDP, 1999



Generosity of tax regimes for R&D (B-index)



Source: OECD, STI Outlook, 2004

***TAKING STOCK OF WHERE WE ARE TODAY:
CANADA'S INNOVATION PUZZLE***

Taking Stock of Where We Are Today: Canada's Innovation Puzzle

- **Canada's innovation puzzle 1: Why business R&D is relatively low in Canada despite generous fiscal incentives (SR&ED) relative to other OECD countries?**
 - **Traditionally three explanations have been offered to account for Canada's low level of R&D expenditures by business: industrial structure of the Canadian economy, in particular the relatively large natural resource sector (Nicholson, 2003); the high degree of foreign ownership; and relatively small size of Canadian firms.**
 - **A recent Canadian study, however, does not support Nicholson's argument: "the broad structure of the economy – the proportion that is either services, manufacturing or resources – is not an important explanatory factor to account for the low aggregate R&D" (ab Iorwerth, 2004).**

Taking Stock of Where We Are Today: Canada's Innovation Puzzle (cont.)

- The study concludes that low aggregate R&D intensity in Canada relative to the U.S. is mainly due to low R&D intensities in the service sector (the wholesale and retail trade industry in particular), the motor vehicles sector; and the relatively small share of research-intensive industries such as office and computer machinery, pharmaceuticals, and radio, television and communication equipment in the economy.
- For example, the motor vehicle industry, in particular, is quite research intensive in the U.S. with R&D expenditures representing 15.3 percent of output, but not so in Canada, where the industry spends less than one percent of output on R&D.

Structure and Intensity Effects (percent)

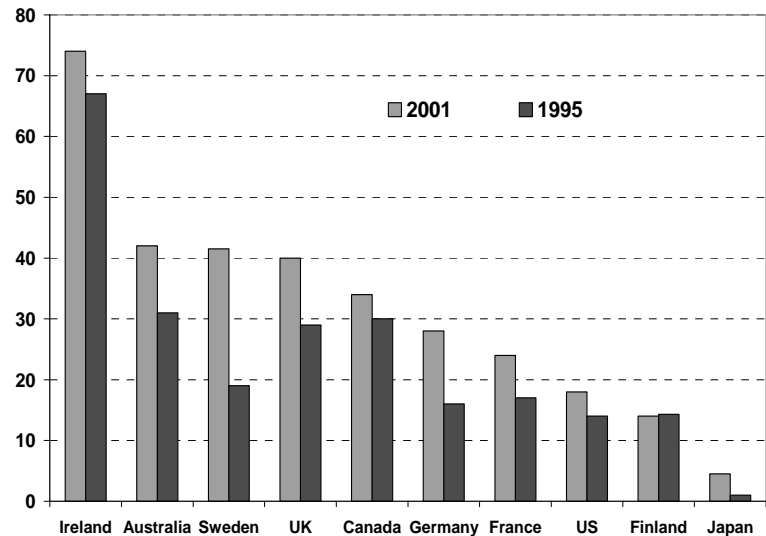
| | Canada | | U.S. | | Intensity effect | Structure effect |
|--|--------------------|--------------|--------------------|--------------|------------------|------------------|
| | Research intensity | Share of GDP | Research intensity | Share of GDP | | |
| Total service | 0.48 | 65.97 | 0.82 | 74.77 | -0.24 | -0.06 |
| Motor vehicles | 0.75 | 2.86 | 15.30 | 1.28 | -0.30 | 0.13 |
| Refined petroleum, plastics and chemicals | 1.63 | 2.21 | 5.33 | 2.12 | -0.08 | 0.00 |
| M&E n.e.c. | 2.09 | 1.26 | 5.50 | 1.24 | -0.04 | 0.00 |
| Electric machinery and apparatus, n.e.c. | 3.63 | 0.33 | 10.86 | 0.42 | -0.03 | -0.01 |
| Other transport equipment | 14.48 | 0.88 | 24.25 | 0.70 | -0.08 | 0.03 |
| Pharmaceuticals | 27.51 | 0.25 | 20.92 | 0.63 | 0.03 | -0.09 |
| Radio, tel. and com. eq. | 27.87 | 1.10 | 20.54 | 1.95 | 0.11 | -0.20 |
| Office, accounting and computing machinery | 53.63 | 0.10 | 25.80 | 0.39 | 0.07 | -0.12 |
| | | | | | -0.60 | -0.28 |
| Total R&D intensity gap | | | | | | -0.88 |

Source: ab Iorwerth (2005)

A growing share of R&D is in foreign affiliates

- Rising levels of R&D spending by foreign affiliates of MNEs are contributing to R&D expenditures in many OECD and other economies.
 - R&D performed by foreign affiliates represent over 12 percent of total expenditures on industrial R&D in the OECD area.
 - Total R&D performed by foreign affiliates in selected countries increased by more than 50 percent (in nominal terms) between 1995 and 2000.
- Foreign affiliates accounted for between 30 to 40 percent of R&D in Canada, the U.K., Sweden and Spain, and more than 70 percent in Ireland.
 - However, there is mixed evidence whether foreign ownership lowers aggregate R&D intensity in Canada. We need more research on this issue.

Share of business R&D controlled by foreign affiliates

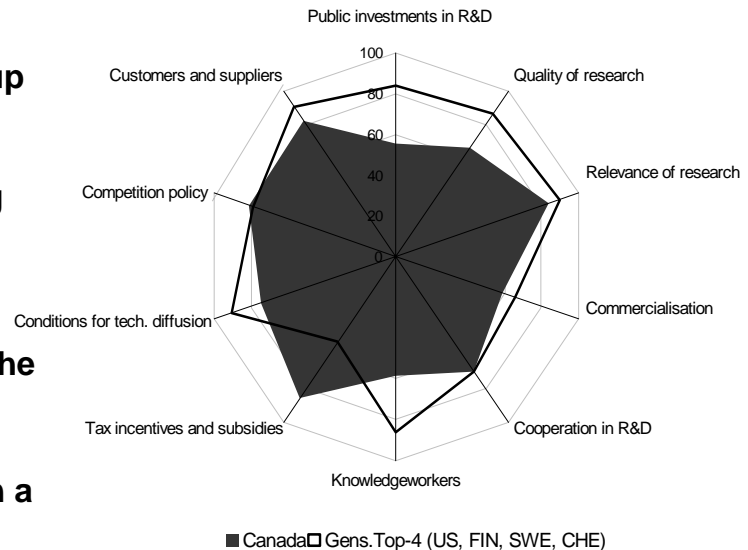


Source: OECD, STI Outlook, 2004

Taking Stock of Where We Are Today: Canada's Innovation Puzzle (cont.)

- **Canada's innovation puzzle 2: Why Canada suffers from a "commercialization gap"?**
 - Recent evidence shows that innovation performance of Canada (innovation activity and technology diffusion – with random weighting) ranked 10th in a group of 27 OECD countries (about average), whereas it ranked 3rd in terms of overall innovation framework conditions (along with Finland and the U.S.).
 - The SpiderWeb indicates where innovation framework conditions in Canada differ from the index values of the top 4 innovator countries (the U.S., Finland, Sweden, and Switzerland).
 - The Canadian innovation system lags in a number of policy areas: "the level of public investment in R&D", "commercialization of research", and "knowledge workers", while it displays a strong performance in terms of "tax incentives and subsidies" and "cooperation in R&D".

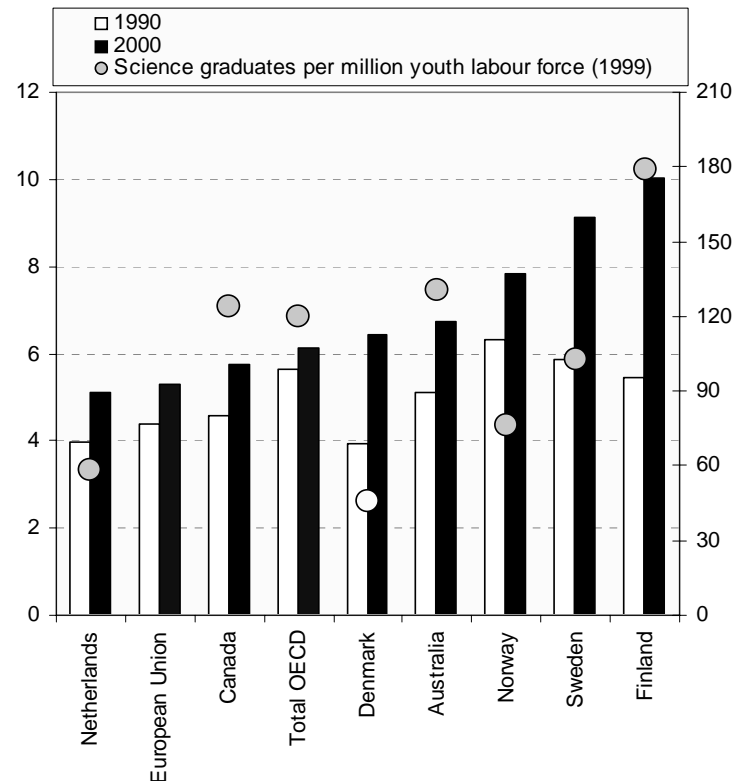
Canada vis-à-vis best-practice countries* on individual policy areas



* Best-practice countries (top-4) : FIN, USA, SWE, CHE.
Source: OECD (2004b).

Other Challenges: Canada's performance in producing science graduates is weak

- Canada has one of the highest capacities for supplying skilled workers. Among the major OECD economies, Canada ranks first in the proportion of population with tertiary credentials.
- However, Canada has fewer science graduates than most highly innovative economies and Australia.
 - Canada has also fewer Ph.D. graduates than most other G-7 countries and Australia.
- Canada loses far more highly skilled emigrants to the US than are gained from the US, due to better opportunities in the US.

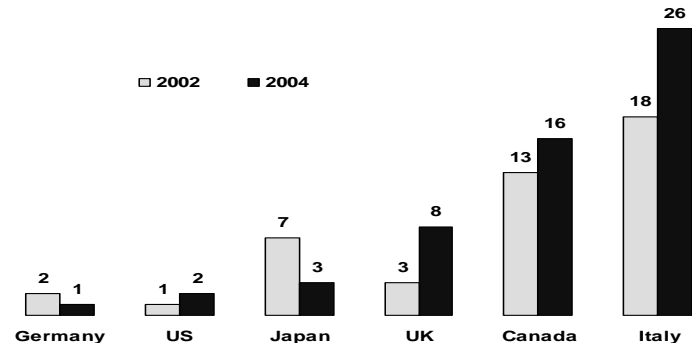


Source: Sheehan (2004)

Canadian companies are less effective in operations and corporate strategies

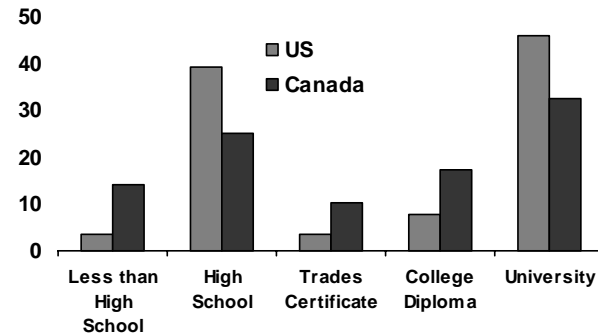
- The World Economic Forum ranks Canadian companies considerably lower in company operations and corporate strategies.
- This may be partly explained by the fact that managers in Canada are less educated.
 - In Canada, 33 percent of managers had university education in 1996, compared to 46 percent for their U.S. counterparts.
- "For Canada's relative prosperity to rise, we must shift away from competing on the basis of replication toward competing on the basis of innovation -- that is, on the basis of unique products or processes. This in turn will necessitate greater level of both business innovation and technological/scientific innovation in the Canadian business sector." (Roger Martin, 2001)
- Investment alone is not sufficient for increasing competitiveness. Managerial innovation is also required (Conference Board of Canada, 2004).

Company Operations and Strategies (world rank)



Source: Global Competitiveness Report 2002-03 and 2004-05, World Economic Forum

Managers by Educational Attainment in Canada and the U.S. 1996

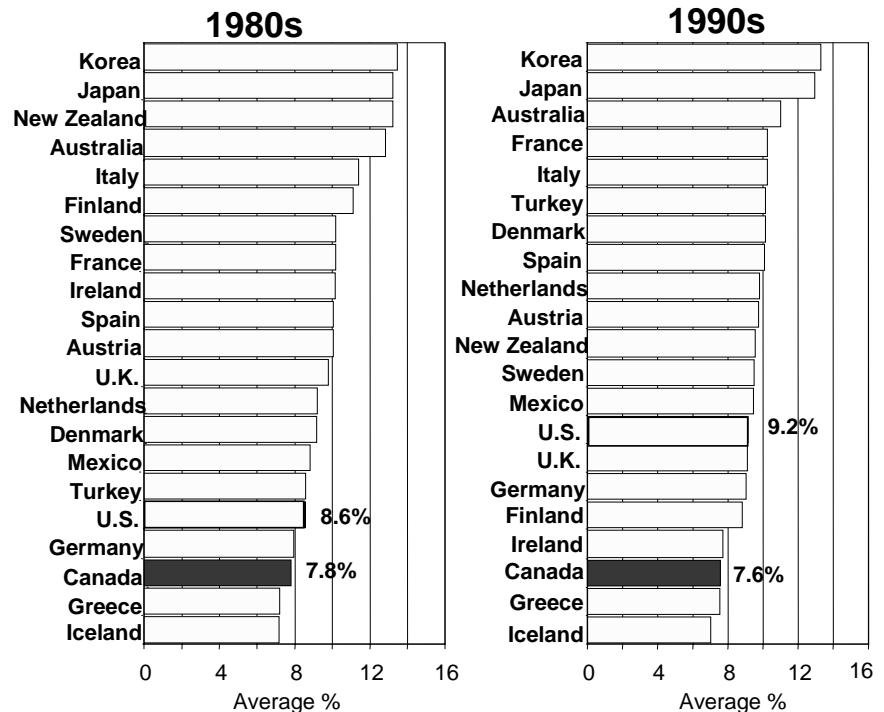


Source: Statistics Canada, 2001 Census, and "What's It Worth? Field of Training and Economic Status, 1996", US Census Bureau.

Canada lags many OECD countries in M&E investment

- Capital-embodied technical change is important to diffusion of technology.
- Canada's M&E investment, as a percentage of GDP, was the lowest in the 1980s and the 1990s among the G-7 countries, and most other OECD countries.
- The M&E investment gap between Canada and the U.S. increased in the 1990s.

Machinery and Equipment Investment as a Percentage of GDP (Percent)



Source: OECD National Accounts

***Canada's Innovation Policy:
The Role of Targets***

Canada's Innovation Policy: The Role of Targets

➤ The OECD average R&D intensity has increased from 1.95 per cent in 1981 to 2.23 in 1991, and to 2.33 in 2001.

➤ The R&D intensity of the top R&D performing OECD countries has ranged between 2.17 and 2.43 in 1981 and has increased to a striking range of 2.96 and 4.27 in 2001.

➤ The growth in R&D intensity across the OECD countries implies that countries must continue to invest more in R&D just to keep their existing ranking (Sheehan and Wyckoff, 2003)

Top OECD countries in R&D intensity (GERD as % of GDP)

| 1981 | | 1991 | | 2002 (or the nearest year) | |
|--------------|---------|--------------|---------|----------------------------|---------|
| Country | R&D/GDP | Country | R&D/GDP | Country | R&D/GDP |
| Germany | 2.43 | Japan | 2.75 | Sweden | 4.27 |
| UK | 2.38 | US | 2.72 | Finland | 3.40 |
| US | 2.34 | Sweden | 2.70 | Iceland | 3.09 |
| Switzerland | 2.18 | Switzerland | 2.62 | Japan | 3.06 |
| Sweden | 2.17 | Germany | 2.53 | Korea | 2.96 |
| OECD average | 1.95 | OECD average | 2.23 | OECD average | 2.33 |

Source: OECD Science, Technology and Industry Outlook (2004)

Formulating Innovation Policy: The Role of Targets

- **Studies argue that achieving the ordinal R&D target of the type Canada has set is harder to achieve because so many countries are trying to boost their R&D intensity – the target is moving upward (Sheehan and Wyckoff, 2003).**
- **The study suggests that the “jump from the position of 14th with a R&D intensity lower than that of the EU in 2000 (1.84 versus 1.88) to number five would require at a minimum that Canada raise its R&D intensity to the level enjoyed by the number 5 country, Korea, which had an R&D intensity of 2.96 in 2001”.**
- **It would also be important to ensure that governments have access to necessary policy instruments to provide a reasonable chance of achieving the desired outcomes.**

Main Conclusions

- **The Canadian economy is outward oriented, with high trade and FDI exposure. However, high barriers to trade and foreign investment, especially in industry-specific foreign direct investment restrictions remain higher than many other industrialized countries.**

- **Small markets, the lack of competitive pressure and of sophisticated rivalry can reduce incentive for firms to invest in R&D:**
 - **High concentration and vertical specialization of the Canadian industrial structure;**

 - **Large presence of small firms that tend to have lower capital intensity and tend to be less innovative, partly due to financial and market constraints they are facing; and**

 - **Less efficient company operations and corporate strategies, partly due to less educated managers.**

Main Conclusions (cont.)

- **Global demand is growing for scientists and engineers. Efforts to increase innovation performance will further increase demand for human resources in science and technology.**
- **Science, technology and industry are increasingly globalized - pose challenges and present opportunities. Further adaptation of policy is needed to realize benefits for the national economy.**
- **Innovation policy should focus more closely on the needs of the service sector, which accounts for growing share of output and employment in OECD economies.**
- **In our view, although posing a challenge to business and policy makers by setting an ambitious target was seen as necessary to focus attention on the importance of innovation, a reassessment of these targets in Canada is necessary. Trying to achieve the stated target may not be desirable at this stage even though not achieving it may undermine the credibility of government policy on innovation.**