Information and Communications Technologies Investment in Canada

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M.C. McCracken

Informetrica Limited

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Information and Communication Technologies Investment in Canada

Investment by business and governments determines the longer-term prospects of the economy. It embodies new technologies from around the world. When combined with past investments and people it can produce a wide variety of goods and services in a cost-effective manner.

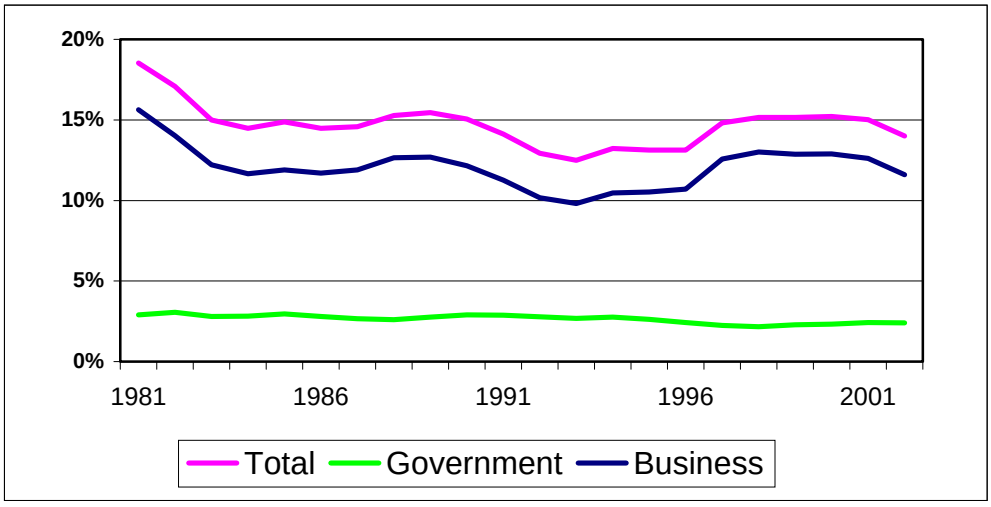
The important concepts of **productivity, competitiveness, potential growth, and prosperity** are all linked to the **choices** made by businesses and governments to buy new equipment and structures.

1 Big Picture on Investment and GDP shares

One of the "key economic ratios" is the share of investment relative to the size of the economy as measured by Gross Domestic Product (GDP). This is sometimes referred to as "**investment effort**".

Persistently low levels of this ratio usually lead to lower productivity growth. Reversal of such a situation requires more "effort", with an eventual payoff in higher productivity growth.

Figure 1 Total Investment (% of GDP)



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2 Government Investment

Investment by governments is important in two respects. It affects the capital that government employees have to work with in producing goods and services. It also represents (at least in part) the **infrastructure** supporting the activities of the business sector and households.

Infrastructure includes the roads and highways, airports, and canals and seaports that enable the transportation systems to function. It includes water and sewage treatment systems providing clean water to manufacturers, the service sector, and residents. It also includes the information infrastructure (e.g., statistics), standards, and trade agreements.

Government infrastructure has been shown to have an important role in **private productivity** performance. Unfortunately, government investment has been a **declining share** of the economy and total investment, reflecting the government's priority on reducing its role in the economy and improving its fiscal position.

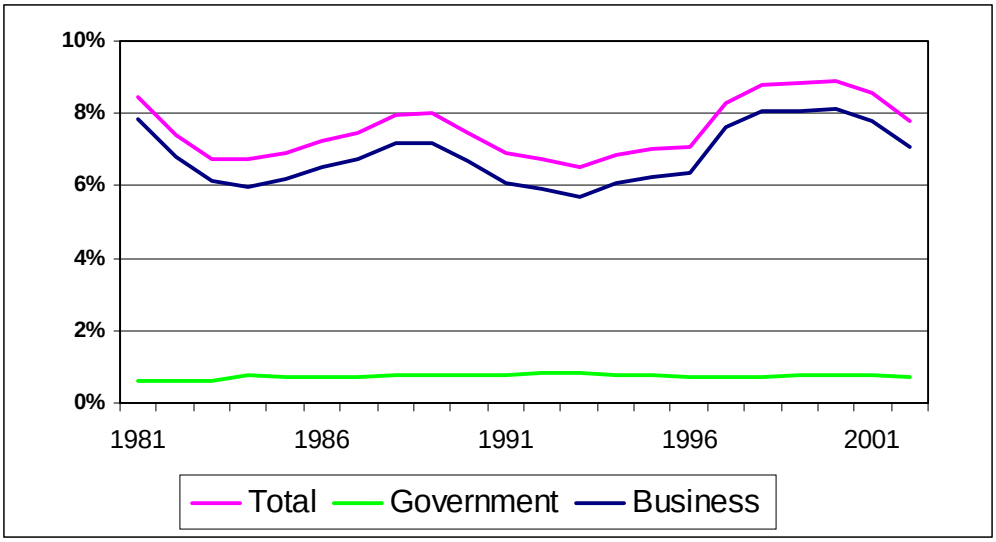
3 M&E – Special Properties

Machinery and Equipment (M&E) receives greater attention by some economists. There is greater detail provided by Statistics Canada for machinery and equipment (10 types) compared to the two types of non-residential construction (buildings and engineering). There are several reasons:

M&E embodies new technology – The hardware and software carry the technology – not the physical structures (e.g., buildings) or the holes in the ground (e.g., oil wells). A "smart" building is that way because of the installed control equipment.

Machinery and equipment has a much shorter life than buildings or engineering structures as a general rule. This **short life** may not be a short physical life, but rather **economic obsolescence** as a result of technological changes making it uneconomic to even operate the old equipment. This obsolescence is particularly evident in the case of computers and software. At the same time, the experience associated with the use of computers can be readily applied to new systems.

Figure 2 M&E Investment (% of GDP)

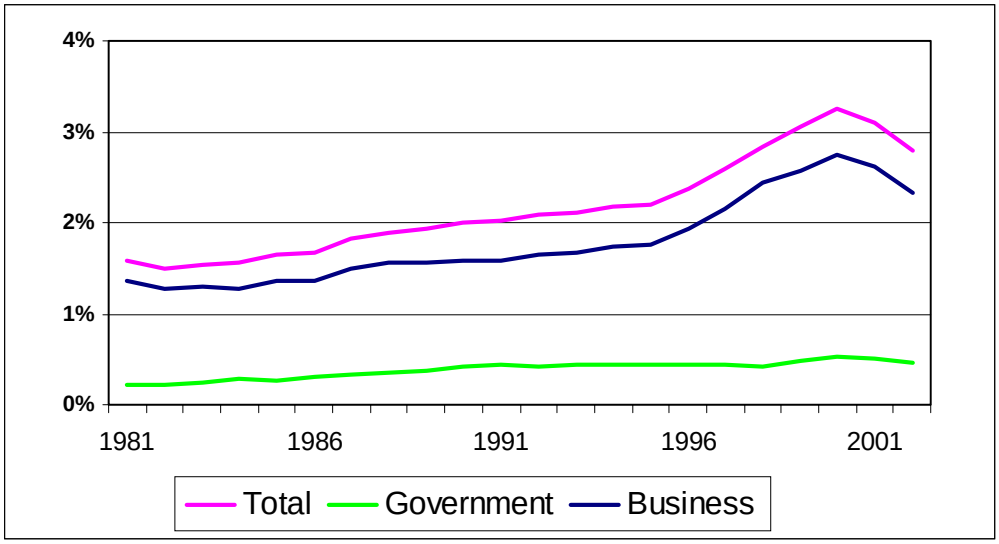


4 ICT Investment

Although specific types of equipment have been separately identified, grouping the types into a "high-tech" category is not easily done. Agricultural equipment embodies an increasing array of microprocessors, including Global Positioning Systems (GPS) and optimizing software for seeding and fertilizing. Even automobiles and trucks have become more sophisticated with chips controlling the micro-functions in engines, etc. (and their repair and maintenance).

However, the focus here is on three major types of equipment – **computers, software, and telecommunications equipment** – representing the end-use purchases or **investment** by businesses and governments. We have labelled this total as "information and communications technologies" or **ICT investment**. Hardware embodied in other equipment is not captured by this measure. It will be part of the other product embodying the chips or software, either as investment goods, consumer products, or exported goods. This is not the investment by the ICT Industry in Canada, although they may purchase part of it. Rather this is the investment made up of ICT equipment, bought by any industry or government in Canada.

Figure 3 ICT Investment (% of GDP)



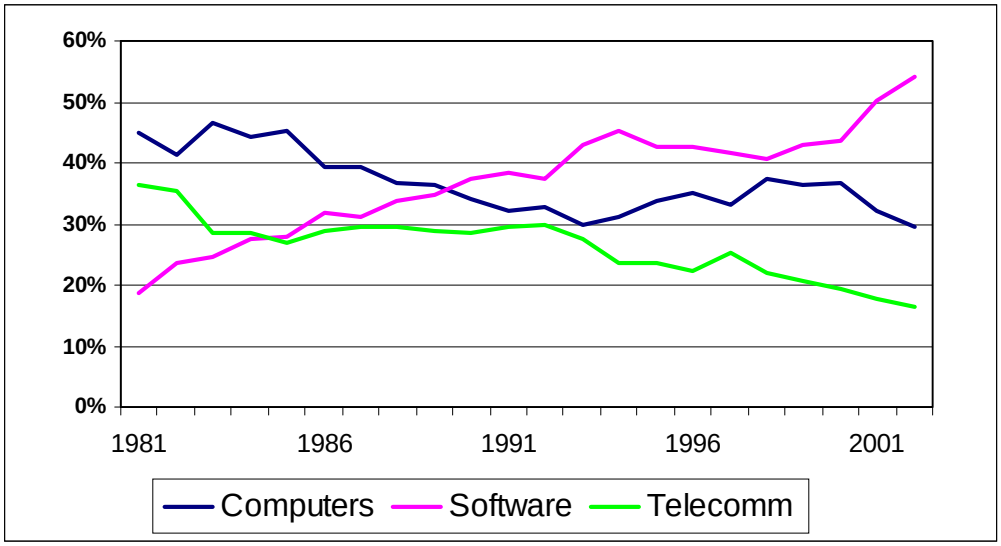
Government's share of ICT investment is small – about 0.5% of GDP and 16% of total ICT investment. Most of the rise in ICT investment effort has originated in the business community, doubling since the early 1980s. The share of ICT investment in total investment has risen from less than 10% in 1981 to more than 20% since 1999. Nevertheless, the different scales on the charts should be noted. ICT investment is **not** the dominant part of investment by any nominal measure.

5 Recent Changes

The year 2001 is noteworthy. The upward march of ICT investment **stopped** in 2001, with a decline of over $800 million to $33.6 billion and a decline in its share of total investment from 21.4% to 20.6%. Both governments and the business sector participated in the pause.

The decline was most dramatic for computers, with a decline of almost $2 billion. Telecommunications investment retreated by about $800 million. Software offset this weakness, expanding by $1.9 billion.

Figure 4 Distribution of ICT Investment by Type



Software has been recently added to the investment measure in the System of National Accounts. Previously, it was treated as an intermediate purchase, like raw materials and pencils, with the implicit assumption that its costs were covered out of current revenues. Now it is a type of Machinery & Equipment, and a rapidly growing component.

In 1981 it was less than 20% of total ICT Investment. Now it is over 50% of the total. The shares of computers and telecomm equipment have both declined at the same time.

6 Prospects

Is the love affair with technology over? Will further declines in business investment continue through 2002 and beyond? Will governments continue to withdraw from a role in providing infrastructure, requiring businesses and people to provide their own frameworks?

The forecast for 2002 is for weak investment to continue. Even if there is an economic recovery, business and government investment are slow to move. The real risk is that there is much more weakness in the near term than indicated in this forecast.

There is widespread agreement that there will be a recovery. Some think it will start in the next few quarters. Others are optimistic for 2003 or beyond. Once the recovery begins it is expected to be sustained, barring adverse shocks. ICT investment should expand again, with an added fillip from the desire to substitute capital for labour in increasingly tight labour markets.

There will be a moderation in the growth of potential in North America, reflecting slower labour force growth. The share of ICT investment will continue to rise, although perhaps somewhat less rapidly. Software will remain the more robust component, with declining prices and improved technologies pushing downward on the shares of computers and telecommunications equipment.

The successful search for new customers, new applications, and new markets will be a necessity for the sustained performance of the Canadian ICT sector.

Investment in Information and Communications Technologies (ICT)

(millions of current dollars)

Summary	**1981**	**1991**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Government ICT	762	2963	3690	3888	3730	4668	5469	5365	5368
Computers	316	1071	1464	1242	1352	1685	1953	1748	1564
Software	276	1193	1637	1722	1820	2322	2807	2973	3136
Telecomm	170	699	589	924	558	661	709	644	668
Business ICT	4953	10857	16176	19071	22298	25033	28962	28242	26516
Computers	2243	3365	5488	6360	8383	9093	10726	9058	7804
Software	797	4123	6849	7844	8736	10444	12249	13924	14144
Telecomm	1913	3369	3839	4867	5179	5496	5987	5260	4568
Total ICT	**5715**	**13820**	**19866**	**22959**	**26028**	**29701**	**34431**	**33607**	**31884**
Computers	2559	4436	6952	7602	9735	10778	12679	10806	9368
Software	1073	5316	8486	9566	10556	12766	15056	16897	17280
Telecomm	2083	4068	4428	5791	5737	6157	6696	5904	5236
ICT Share of Total Investment	**8.5%**	**14.2%**	**18.0%**	**17.5%**	**18.7%**	**20.1%**	**21.4%**	**20.6%**	**20.0%**
ICT Investment Share of GDP	**1.6%**	**2.0%**	**2.4%**	**2.6%**	**2.8%**	**3.0%**	**3.3%**	**3.1%**	**2.8%**
Government ICT	**0.2%**	**0.4%**	**0.4%**	**0.4%**	**0.4%**	**0.5%**	**0.5%**	**0.5%**	**0.5%**
Business ICT	**1.4%**	**1.6%**	**1.9%**	**2.2%**	**2.4%**	**2.6%**	**2.7%**	**2.6%**	**2.3%**
Govt. ICT share of Total ICT Inv.	**13.3%**	**21.4%**	**18.6%**	**16.9%**	**14.3%**	**15.7%**	**15.9%**	**16.0%**	**16.8%**
Distribution of ICT									
Computers	44.78%	32.10%	34.99%	33.11%	37.40%	36.29%	36.82%	32.15%	29.38%
Software	18.78%	38.47%	42.72%	41.67%	40.56%	42.98%	43.73%	50.28%	54.20%
Telecomm	36.45%	29.44%	22.29%	25.22%	22.04%	20.73%	19.45%	17.57%	16.42%
Cumulant ICT Inv.	105715	203483	288070	311029	337057	366758	401189	434796	466680
Cumulant/share of GDP	29.26%	29.62%	34.33%	35.14%	36.80%	37.61%	37.99%	40.11%	41.00%
Software/Computers	0.419	1.198	1.221	1.258	1.084	1.184	1.187	1.564	1.845
Context									
Investment share of GDP	18.53%	14.13%	13.13%	14.81%	15.16%	15.15%	15.21%	15.02%	14.00%
Government	2.90%	2.87%	2.43%	2.24%	2.16%	2.28%	2.32%	2.41%	2.40%
Business	15.63%	11.26%	10.70%	12.57%	13.00%	12.87%	12.89%	12.61%	11.60%
M&E share of GDP	8.44%	6.90%	7.09%	8.30%	8.76%	8.83%	8.87%	8.56%	7.79%
Government	0.59%	0.80%	0.72%	0.69%	0.69%	0.76%	0.77%	0.75%	0.72%
Business	7.85%	6.10%	6.37%	7.61%	8.07%	8.07%	8.10%	7.82%	7.08%
M&E share of Investment	45.53%	48.87%	53.96%	56.07%	57.78%	58.27%	58.30%	57.00%	55.67%
Government	20.17%	27.86%	29.46%	30.93%	32.12%	33.25%	33.02%	30.94%	29.80%
Business	50.24%	54.23%	59.52%	60.55%	62.04%	62.69%	62.85%	61.99%	61.02%

Sources: Statistics Canada with calculations and forecasts by Informetrica Limited