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THE CANADA-US ICT INVESTMENT GAP: AN UPDATE

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The Canada-US ICT Investment Gap: An Update

Abstract

In 2005, the CSLS published a report that examined spending on information and communication technology (ICT) in Canada and the United States between 1987 and 2004. It found that Canadian firms lagged considerably behind US firms in ICT spending and that this situation accounted to some extent for the lower labour productivity growth experienced in Canada. This report provides an overview of the latest developments using the most recent update of the CSLS ICT database. It finds that ICT investment spending in the United States in 2005 and 2006 continued to outpace that in Canada, increasing an average of 5.6 per cent annually in the United States compared to 3.3 per cent in Canada when expressed in current dollars. Following this trend, nominal ICT investment per worker in domestic currencies also grew faster in the United States than in Canada in 2005 and 2006, 3.7 per cent versus 1.6 per cent. The recent increase in the Canadian dollar, however, led to a sharper decrease in ICT prices in Canada than in the United States over the 2004-2006 period. This in turn led to an increase in the level of PPP-adjusted ICT investment per worker in Canada relative to the United States from 56.5 per cent in 2004 to 58.0 per cent in 2006, continuing the positive trend started in 2000 when it stood at 49.0 per cent. While Canada's steady relative improvement since 2000 in terms of ICT investment per worker is encouraging, the low relative level of ICT investment per worker remains problematic and should be of concern to policy-makers as ICT investment is a key driver of productivity growth.

Résumé

En 2005, le Centre d'étude des niveaux de vie (CENV) a publié un rapport analysant les dépenses en TIC au Canada et aux États-Unis entre les années 1987 et 2004. Ce rapport remarque que les firmes canadiennes sont loin derrière les firmes américaines quant au niveau de leurs dépenses en TIC et que cette réalité contribue à expliquer la piètre performance du Canada en termes de croissance de la productivité du travail. Ce rapport fait usage de la récente mise à jour de la base de données sur les TIC du CENV pour donner une vue d'ensemble des derniers développements. Il apparaît que le niveau des dépenses d'investissement dans les TIC aux États-Unis en 2005 et 2006 continue de surpasser largement celui observé au Canada avec une croissance moyenne annuelle en devises domestiques de 5,6 pour cent aux États-Unis par rapport à 3,3 pour cent au Canada en dollars courants. Par contre, l'augmentation récente du dollar canadien a mené à une baisse plus substantielle des prix des TIC au Canada entre 2004 et 2006. Cette baisse plus rapide des prix entraîna à son tour une augmentation dans le niveau d'investissement en TIC par travailleur en PPA par rapport aux États-Unis, de 56.5 pour cent en 2004 à 58.0 pour cent en 2006, continuant ainsi la tendance débutée en 2000 alors que le niveau relatif se situait à 49.0 pour cent. Bien que l'amélioration constante du niveau relatif d'investissement en TIC par travailleur au Canada soit encourageante, le niveau relatif peu élevé de l'investissement en TIC par travailleur demeure problématique et devrait soulever l'inquiétude des analystes de politiques puisque l'investissement en TIC est l'un des déterminants clés de la croissance de la productivité.

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The Canada-US ICT Investment Gap: An Update

Executive Summary

In 2005, the Centre for the Study of Living Standards (CSLS) published a report that examined spending on information and communication technology (ICT) in Canada and the United States between 1987 and 2004. It found that Canadian firms lagged considerably behind US firms in ICT spending and that this situation accounted to some extent for the lower labour productivity growth experienced in Canada. This report provides an updated picture of Canada's competitive position in terms of ICT investment based on the database developed for the 2005 report recently updated to 2006.

The report first provides an overview of business sector ICT investment in Canada relative to the United States, focusing on developments in 2005 and 2006. The key findings are:

- Business sector ICT investment in the United States expressed in current dollars and domestic currency continued to outpace that in Canada in 2005 and 2006, increasing an average of 5.6 per cent annually compared to 3.3 per cent.
- The share of ICT investment in nominal GDP and total fixed non-residential investment in both Canada and the United States declined slightly between 2004 and 2006. The decline was, however, larger in Canada and the gap between Canada and the United States in terms of ICT investment as a share of both GDP and total investment increased during the 2004-2006 period.
- Nominal ICT investment per worker in domestic currencies also grew faster in the United States than in Canada in 2005 and 2006, averaging 3.7 per cent per year versus 1.6 per cent per year.
- ICT prices declined significantly in both Canada and the United States between 2004 and 2006. However, prices declined faster in Canada than in the United States. The greater decline in prices in Canada was largely due to the sharp appreciation in the Canadian dollar over the period (15.5 per cent).
- The greater fall in ICT prices in Canada relative to the United States lead Canadian firms to invest more in terms of ICT per worker than their American counterparts when expressed in a common currency. In 2006, Canada's PPP-adjusted ICT investment per worker stood at 58.0 per cent the level in the United States, up from 56.5 per cent in 2004 and 49.0 per cent in 2000.

The steady relative improvement of Canada since 2000 in terms of PPP-adjusted ICT investment per worker is encouraging, but it may prove unsustainable as it appear to rely largely on a continuous appreciation of the Canadian dollar. More importantly, this positive trend should not obscure the fact that there remains a massive gap in ICT investment intensity between Canada and the United States, with the level of PPP-

adjusted ICT investment per worker in Canada still only 58.0 per cent that of the United States in 2006.

The second section of the report analyzes the latest developments in Canada in more detail. Key findings are:

- In 2006, current dollar total economy ICT investment was up 2.6 per cent in Canada, well above the 0.5 per cent annual average growth which occurred over the 2000-2005 period.
- Since 2004, the business sector has experienced much faster growth in total ICT investment in current dollars than the non-business sector. For example, business sector ICT investment grew 4.1 per cent in 2006 while the non-business sector declined 5.2 per cent.
- All three ICT components in Canada showed substantial decline in prices between 2000 and 2006, with computer prices dropping most dramatically (61.1 per cent), followed by communication equipment (28.9 per cent) and finally software prices (15.6 per cent).
- When measured in volume (1997 dollars), the three ICT components experienced considerable growth over the 2000-2005 period in Canada. Computer investment growth averaged 12.6 per cent per year, followed by 6.6 per cent for software, and 3.8 per cent for communication equipment. These positive trends intensified in 2006 with computer investment up 21.4 per cent, software 23.4 per cent and communication equipment 5.9 per cent.

Assessments of ICT investment performance are very sensitive to whether one focuses on current dollar or constant dollar (volume or real) data on investment. In current dollar terms, ICT investment grew relatively weakly since 2000 in Canada. Yet, much of this situation reflects the fall in prices of ICT goods. When measured in constant dollars, ICT investment in Canada has been much stronger, with robust investment growth rate for every component.

From a productivity perspective, it is investment in real terms (volume) that drives productivity growth. In this context, the constant dollar estimates provide a more accurate view of the potential for ICT investment to increase productive capacity. In this respect, the strong growth in real ICT investment in Canada in 2005 and 2006 is encouraging. However, using the United States to benchmark Canada's performance suggests that ICT investment intensity in Canada still remains too low. Since ICT investment is a key driver of productivity growth, the massive and persistent Canada-United States ICT investment per worker gap should be of concern to policy-makers.

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The Canada-US ICT Investment Gap: An Update¹

Introduction

In 2005, the Centre for the Study of Living Standards (CSLS) published a report that examined spending on information and communication technology (ICT) in Canada and the United States between 1987 and 2004 (Sharpe, 2005).² It found that Canadian firms lagged considerably behind US firms in ICT spending and that this situation accounted to some extent for the lower labour productivity growth experienced in Canada.

The main objective of this report is to provide an updated picture of Canada's competitive position in terms of ICT investment based on the database developed for the 2005 report. The report first provides an overview of developments in ICT investment in Canada relative to the United States, focusing on developments in 2005 and 2006. The latest developments in Canada are then analyzed in more detail in the second section. This report is based on the ICT database developed for the earlier CSLS report (Sharpe, 2005) and that has been recently updated to 2006.³

¹ This report is based on the CSLS-ICT database which is updated bi-annually by the Centre for the Study of Living Standards for the Information Technology Association of Canada. The authors would like to thank Celeste Bradley and Martha Sevigny for their contributions to this report.

² An abridged version of the 2005 CSLS report on the Canada-US ICT investment gap was also published (Sharpe, 2005a).

³ Available online at <http://www.csls.ca/data/ict.asp>. The CSLS ICT database provides estimates of ICT investment and ICT capital stock in Canada and the United States by industry, broken down into 20 NAICS industrial subcategories, as well as on a per worker basis. The data are broken down by the three ICT components: computers, communications, and software and are expressed in both current and chained dollars. ICT estimates by industry are available for the period 1980 to 2006. Estimates of ICT per worker are only available from 1987 to 2006 due to the more limited availability of employment estimates.

I. ICT Investment Trends in Canada and the United States in 2005 and 2006

This section compares the recent developments in ICT investment in Canada to those observed in the United States. It is important to note that ICT investment estimates for the total economy in the United States are unavailable. We thus use estimates for the business sector for both the United States and Canada when comparing the two countries. For the more detailed analysis of Canada's ICT investment presented in section II, however, we use total economy estimates as they provide a more comprehensive picture of Canada's ICT investment.

The following section first examines growth rates in ICT investment in Canada and the United States in 2005 and 2006. It then looks at the evolution of the Canada-US ICT investment gap during these two years. Next, the section briefly looks at how ICT prices evolved in both countries and concludes with a summary of key findings.

A. Growth Rate of ICT Investment in Canada and the United States

ICT investment in Canada picked up in 2005 and 2006 when compared to the 2000-2004 period. Yet, despite a significant increase in ICT investment growth in recent years, Canada continued to perform much worse than the United States, both in terms of growth in and levels of ICT investment.

1. ICT Investment

Business sector ICT investment expressed in current dollars grew an average of 3.3 per cent annually in Canada in 2005 and 2006, well above the 2000-2004 average annual growth rate of -0.2 per cent (Summary Table 1). It increased by 4.1 per cent in 2006, an improvement over the 2005 growth rate of 2.5 per cent. Total business sector ICT investment in the United States increased by 5.3 per cent in 2006, which was 0.6 percentage points slower than in 2005 (5.9 per cent), but still well above the growth rate of the 2000-2004 period (-3.5 per cent). Relative to Canada, total ICT investment in the United States grew an average of 2.3 percentage points faster annually over 2004-2006.

In Canada, communication equipment investment experienced the fastest growth among the three components of ICT investment in 2005 and 2006, 5.7 per cent per year, while computer investment experienced the lowest growth rate, declining on average by 0.8 per cent each year. In the United States, positions were reversed with communication equipment ICT investment growing the slowest, 5.1 per cent per year, while computer ICT investment had the highest growth rate at 6.6 per cent per year.

2. ICT Investment Shares

In addition to higher growth rates of total ICT investment in the business sector in the United States compared to Canada, the share of ICT investment in the economy is much higher in the United States than in Canada. Total business sector ICT investment

accounted for 2.64 per cent of nominal Canadian business sector GDP in 2004 (Summary Table 1). This ratio declined in both 2005 and 2006, reaching 2.53 per cent in 2006. These levels were still a significant decline from the high of 3.18 per cent reached in 2000. By comparison, total ICT investment accounted for 3.81 per cent of nominal United States GDP in 2006, only a slight decline from its 2004 level (3.87 per cent).

Summary Table 1: Current Dollar ICT Investment in the Business Sector in Canada and the United States, domestic currencies, 2000 and 2004-2006

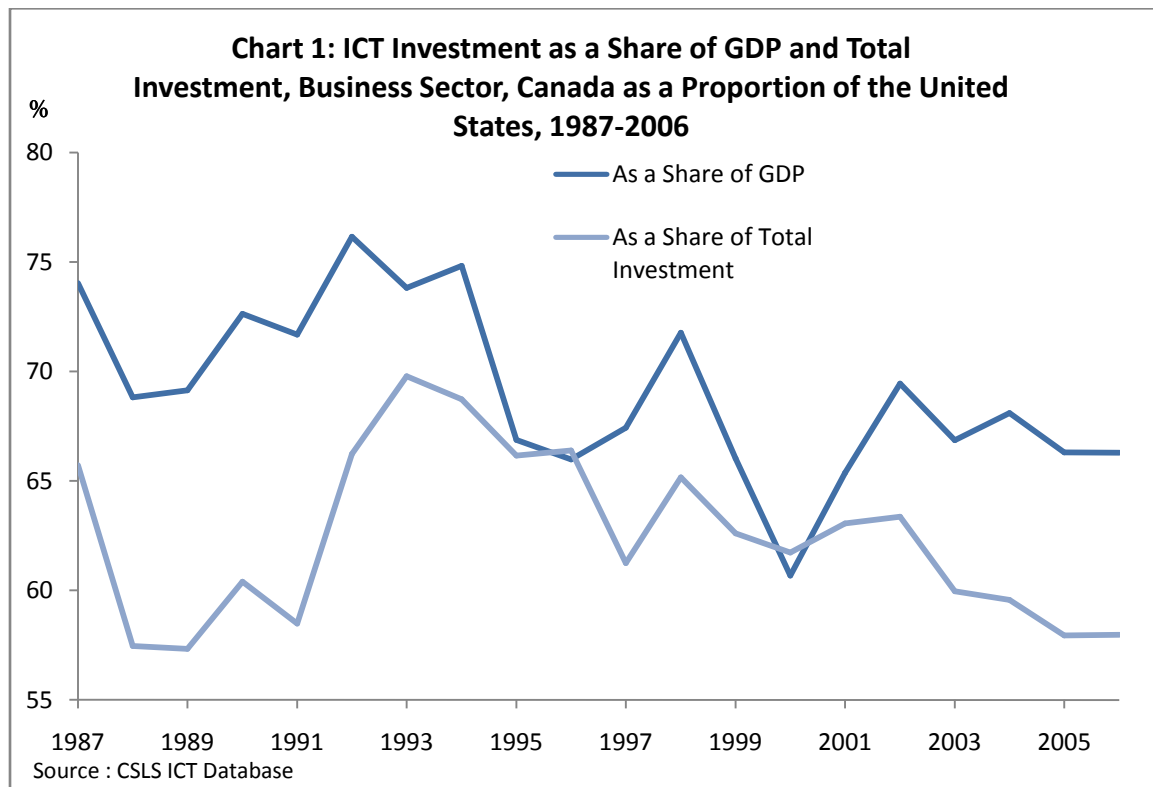
Year	Canada				United States			
	Total	Computers	Communication	Software	Total	Computers	Communication	Software
	ICT Investment (average annual growth rate, %)							
2000-2004	-0.2	-2.3	-1.2	2.3	-3.5	-5.7	-9.0	1.0
2004-2006	3.3	-0.8	5.7	4.8	5.6	6.6	5.1	5.4
2005	2.5	1.7	-1.7	6.0	5.9	10.7	1.4	5.9
2006	4.1	-3.3	13.6	3.7	5.3	2.7	8.9	4.9
	ICT Investment as a Share of GDP in the Business Sector (%)							
2000	3.18	1.08	0.90	1.19	5.24	1.32	1.62	2.30
2004	2.64	0.83	0.72	1.09	3.87	0.89	0.95	2.04
2005	2.55	0.79	0.67	1.09	3.84	0.92	0.90	2.02
2006	2.53	0.73	0.72	1.08	3.81	0.89	0.92	1.99
	ICT Investment as a Share of Total Fixed Non-Residential Investment in the Business Sector (%)							
2000	20.1	6.8	5.7	7.5	32.5	8.2	10.1	14.3
2004	18.1	5.7	4.9	7.5	30.4	7.0	7.4	16.0
2005	16.9	5.2	4.4	7.2	29.1	7.0	6.8	15.3
2006	16.2	4.7	4.6	6.9	27.9	6.5	6.7	14.6
	ICT Investment per Worker (average annual growth rate, %)							
2000-2004	-1.9	-4.0	-2.9	0.5	-3.0	-5.2	-8.5	1.5
2004-2006	1.6	-2.5	3.9	3.1	3.7	4.7	3.2	3.5
2005	0.7	-0.1	-3.4	4.1	4.0	8.7	-0.4	4.0
2006	2.4	-4.9	11.8	2.0	3.4	0.8	6.9	3.0
	ICT Prices (average annual growth rate, %)							
2000-2004	-6.2	-12.5	-4.7	-2.4	-6.5	-13.1	-3.8	-1.4
2004-2006	n.a	-18.6	-7.2	-3.4	-7.2	-12.4	-1.1	0.3
2005	-9.6	-16.6	-6.1	-2.9	-8.4	-12.3	-2.0	-0.5
2006	n.a	-20.6	-8.4	-3.8	-6.0	-12.6	-0.2	1.1

Source: CSLS ICT Database

Total business sector ICT investment in Canada accounted for 18.1 per cent of total fixed non-residential investment in 2004. The share of ICT in total investment experienced a sharp decline in 2005 when it fell to 16.9 per cent, followed by a smaller decline in 2006 (16.2 per cent). In 2006, this figure was almost twice as large in the United States (27.9 per cent). The United States also saw its share of ICT investment in total investment decrease significantly between 2004 and 2006, declining a total of 2.5 percentage points over the period.

3. ICT Investment per Worker

Canada experienced somewhat slower growth on average in business sector employment over the 2004-2006 period than the United States (1.7 per cent in Canada compared to 1.9 per cent in the United States). This small difference, however, can not explain much of the slower growth in ICT investment. Indeed, current dollar ICT investment per worker in the business sector in the United States still grew on average more than two full percentage points faster in the United States than in Canada over the 2004-2006 period, 3.7 per cent compared to 1.6 per cent (Summary Table 1). In both Canada and the United States, growth in 2005 and 2006 significantly outpaced the dismal performance in the 2000-2004 period (-1.9 per cent and -3.0 per cent respectively).



In Canada, the component with the highest current dollar ICT investment per worker growth rate over the 2004-2006 period was communication equipment with an average annual growth rate of 3.9 per cent, due in large part to very strong growth in 2006 (11.8 per cent). Current dollar computer ICT investment per worker had the lowest growth rate of the three components over the 2004-2006 period, declining by 2.5 per cent per year. In the United States, computers exhibited the highest growth rate of all three components, growing by 4.7 per cent per year, while communication equipment showed the slowest growth rate, still growing a healthy 3.2 per cent per year on average.

B. Canada-United States ICT Investment Gap

1. ICT Investment Shares

In 2006, the ratio business sector ICT investment to total business sector fixed non-residential investment in Canada was only 58.0 per cent that of the United States (Table 9). In 2005, this number declined by 1.7 percentage points (from 59.6 per cent to 57.9 per cent), and recovered only 0.1 percentage point in 2006 (Summary Table 2, Chart 1). The relative decline over the 2004-2006 period was entirely due to the computer component, which decreased from 81.0 per cent of the United States in 2004 to 71.2 per cent in 2006 (Table 10).⁴ The relative ratio for the software component increased only slightly over the period, from 46.9 per cent in 2004 to 47.1 per cent in 2006 (Table 12), while the relative ratio for computers increased 1.9 percentage points, from 66.7 per cent in 2004 to 68.6 per cent in 2006 (Table 11).

Summary Table 2: Business Sector Canada-United States ICT Investment Gap, current dollars, 2000 and 2004-2006

	Total	Computers	Communication	Software
	ICT investment per worker in Canada as a share of ICT investment per worker in the United States, PPP adjusted (%)			
2000	49.0	66.3	45.1	41.9
2004	56.5	76.8	63.2	44.4
2005	56.6	73.0	63.5	46.0
2006	58.0	71.2	68.6	47.1
	ICT investment per worker in Canada as a share of ICT investment per worker in the United States, Market Exchange Rate adjusted (%)			
2000	42.3	57.2	39.0	36.1
2004	50.4	68.6	56.5	39.7
2005	52.5	67.7	58.9	42.7
2006	55.4	68.1	65.6	45.1
	ICT Investment as a Share of Total Investment in Canada as a Proportion of that of the United States (%)			
2000	61.7	83.4	56.9	52.7
2004	59.6	81.0	66.7	46.9
2005	57.9	74.8	65.0	47.1
2006	58.0	71.2	68.6	47.1
	ICT investment as a Share of GDP in the Business Sector in Canada as a Proportion of that of the United States (%)			
2000	60.7	82.0	55.9	51.8
2004	68.1	92.7	76.3	53.6
2005	66.3	85.5	74.4	53.9
2006	66.3	81.5	78.4	53.9

Source: CSLS ICT Database

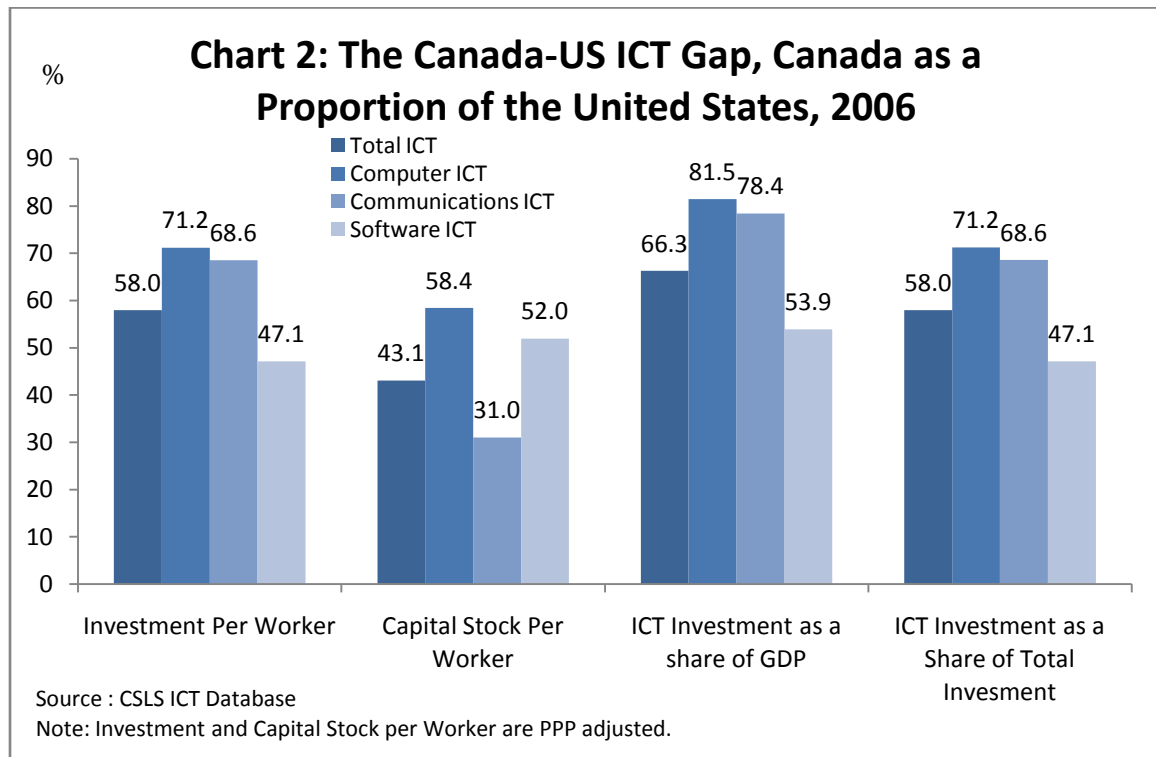
The ratio of ICT investment as a share of GDP in the business sector in Canada compared to that of the United States also decreased slightly between 2004 to 2006, from

⁴ All tables can be found at the end of the report.

68.1 per cent in 2004 to 66.3 per cent in 2006 (Chart 1 and Table 5). During the same period, the ratio improved for communication equipment ICT investment (2.1 percentage points, Table 7) and software ICT investment (0.3 percentage points, Table 8), and decreased for computer ICT investment (-11.2 percentage points, Table 6).

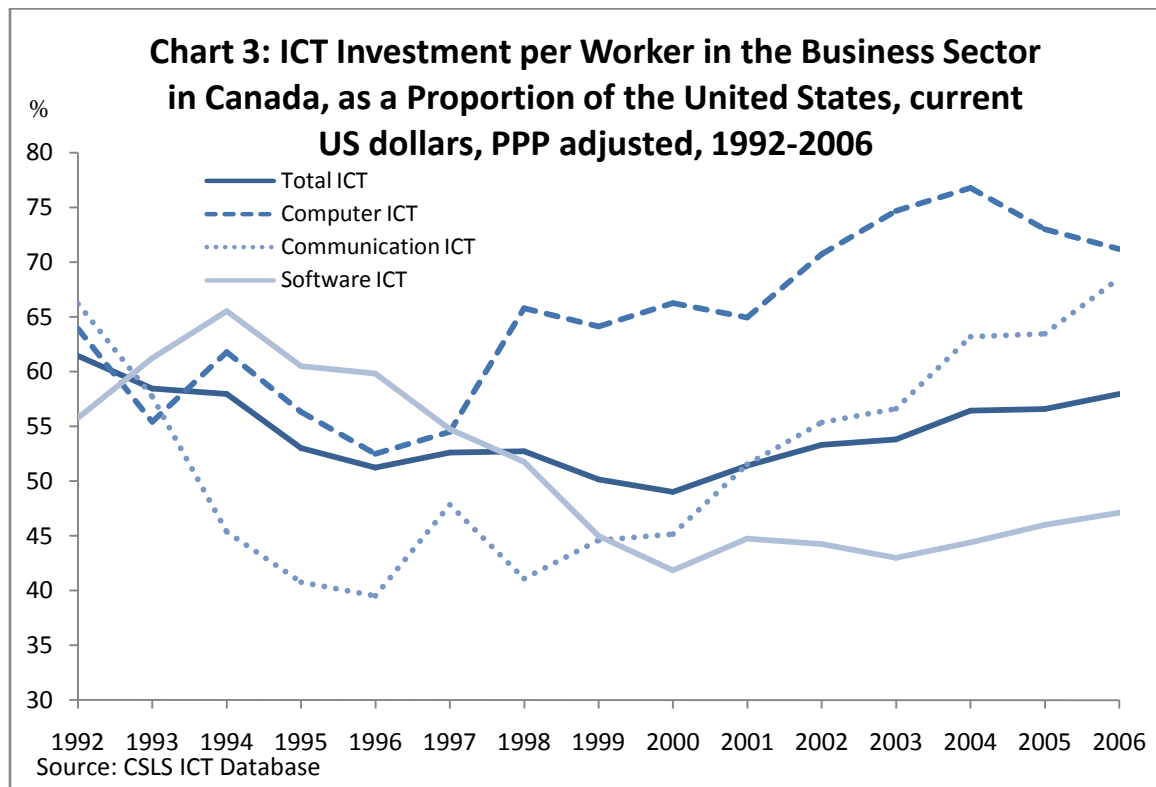
2. Investment per Worker Gap

The slower growth of ICT investment in 2005 and 2006 in Canada compared to the United States did not lead to a worsening in the level of ICT investment per worker in Canada relative to that of the United States if the differences in the evolution of prices in both countries are taken into account. In fact, it is estimated that current dollar PPP adjusted ICT investment per worker in the business sector in Canada was 58.0 per cent that of the United States in 2006 (Summary Table 2, Chart 2).⁵ This represented an increase of 1.4 percentage points from the 2005 estimate of 56.6 per cent, which itself was a 0.1 percentage point increase over the 2004 estimate.



⁵ To make comparison across countries, one needs to convert monetary indicators into a common accounting unit. To do this, it is possible to use purchasing power parity (PPP) measures or market exchange rates. The former is generally preferred to the latter as market exchange rates are affected by commodity prices and capital movements and thus deviate from the underlying relative purchasing power of the country. As a result, market exchange rates vary much more than PPPs and can yield misleading results. Yet, in general, the discrepancy between market exchange rates and PPPs is smaller for tradables such as ICT goods than it is for non-tradables. In fact, it is interesting to note that recent trends in ICT investment per worker are not fundamentally altered if market exchange rates are used instead of PPPs (Table 2). In the following analysis, PPPs for machinery and equipment goods, which include ICT goods, are used to compare Canada and the United States. Statistics Canada does not publish a PPP estimate for ICT goods. The value for the 2006 M&E PPP is obtained by extrapolating the 2005 PPP estimate produced by Statistics Canada using national account data from Canada and the United States. This method is the similar to that used by Statistics Canada to extend the series beyond the 2002 base year. More details are given on Table 18.

More importantly, the sharp increase in 2006 was consistent with the trend during the 2000-2004 period when, after reaching a trough in 2000, the ratio of current dollar ICT investment per worker in the business sector in Canada compared to that of the United States increased by 7.5 percentage points (Table 1). The reversal of trend since 2000 suggests that while Canadian firms are, as before, investing less per worker in terms of ICT than US firms, their competitive position is improving rather than worsening.



Of the three components of ICT investment, the ratio of Canadian computer ICT investment per worker to that of the United States was the highest in 2006 at 71.2 per cent (Table 2). Yet, the computer component was the only one experiencing a decline over the 2004-2006 period, decreasing 5.6 percentage points (Chart 3). Communication equipment ICT investment per worker in Canada compared to the United States was 68.6 per cent in 2006, a sharp improvement over the 2005 estimate (63.5 per cent) and the 2004 estimate (63.2 per cent) (Table 3). Finally, the figure for software ICT investment increased more than 1 percentage point each year, from 44.4 per cent in 2004 to 46.0 per cent in 2005 and 47.1 per cent in 2006 (Table 4).

In 2006, Canada had the highest share of ICT investment per worker compared to that of the United States in the arts, entertainment, and recreation industry (251.7 per cent) and the lowest in the administration and support industry (18.8 per cent) (Table 13). The educational services industry had the highest ICT investment per worker in Canada as a share of that of the United States for both the computers and communication equipment components, 419.8 per cent and 223.9 per cent, respectively (Table 14 and

Table 15). Software ICT investment per worker in Canada as a share of that in the United States was highest in the arts, entertainment, and recreation industry at 520.2 per cent (Table 16). Given the economic similarities between Canada and the United States, these rather large differences in ICT investment per worker by industry between the two countries may be due to measurement issues.

3. Effect of the Rising Loonie

Canada's strong performance in PPP-adjusted ICT investment per worker since 2002 was almost entirely driven by the increase in the Canadian dollar. In 2002, the Canadian dollar averaged US\$0.64 – in 2006 it averaged US\$0.88.⁶ The thriving loonie have meant that prices of ICT in Canada have risen slower (or fallen faster) than they have in the United States. In other words, Canadian businesses can now obtain more ICT goods for a given level of spending relative to the United States than they used to in the late 1990s.

A strong Canadian dollar also explains why ICT investment in nominal terms has grown slower in Canada than in the United States between 2004 and 2006. Indeed, Canadian firms who planned to buy a given amount of ICT goods from foreign suppliers suddenly saw the total cost plummet. In other words, the strength of the loonie and the ensuing faster decline in ICT prices in Canada has had two effects – it allowed firms to increase their ICT budgets slower than their American counterparts, but it also incited them to buy more ICT goods. On a net basis, it appears that the strong Canadian dollar has been beneficial to Canadian firm in terms of ICT investment per worker as they have taken advantage of better prices to buy more ICT goods. Yet, even if PPP-adjusted ICT investment per worker gap between Canada and the United States continued to close at the rate observed between 200 and 2006, it would take approximately 28 years for Canada to eventually reach a level of investment per worker similar to that of the United States.

C. ICT Prices

In 2005 and 2006, Canadian ICT prices for all three components continued to fall. In 2006, computer prices decreased by 20.6 per cent, communication equipment prices decreased by 8.4 per cent, and software prices decreased by 3.8 per cent (Summary Table 1). In the United States business sector ICT prices fell by 6.0 per cent in 2006 and 8.4 per cent in 2005. In both countries, the sharpest decline in prices was in the computers component. In general, there has been a consistent decline in ICT prices across all industries between 1987 and 2006 for both Canada and the United States (Table 17). The trend of falling ICT prices indicates that the volume of ICT stock has been increasing more rapidly than the growth rates of ICT investment, measured in current dollars, indicate.

⁶ In 2007, the Canadian dollar appreciated a further five cents to US\$0.93. It is thus likely that the trend of increasing ICT investment per worker in Canada relative to the United States continued in 2007.

As was mentioned in a previous section, the increasing value of the Canadian dollar relative to its American counterpart has contributed to a faster decline in the price of ICT goods in Canada relative to the United States. In 2005, ICT prices fell 1.2 percentage point faster in Canada while in 2006, the price of every component fell between 3.6 and 8.0 percentage point faster in Canada than in the United States.⁷

D. Summary Assessment of Canada's ICT performance relative to the United States

In domestic currency expressed in current dollars, ICT investment per worker grew more slowly in Canada than in the United States in 2005 and 2006. In addition, ICT investment in Canada grew slower than both GDP and total investment during the 2004-2006 period. In other words, the share of ICT investment in GDP and total investment in Canada declined over the period. In the United States, the share of ICT investment in GDP and total investment also declined. The decline was, however, larger in Canada and the gap between Canada and the United States in terms of ICT investment as a share of both GDP and total investment increased during the 2004-2006 period.

Yet, from a productivity perspective, it is investment in real terms that drives productivity growth. The significant decline in ICT prices occurring in both Canada and the United States indicates that real ICT investment and capital stock are increasing more rapidly than the current dollar data indicate. Moreover, the faster decline in ICT prices in Canada compared to the United States in 2005 and 2006 can explain the slower growth in nominal ICT investment experienced in Canada previously mentioned.

To take into account the differences in the evolution of ICT prices on both sides of the border, it is preferable to adjust ICT investment estimates using PPP estimates. We find that after leveling off in 2005, the PPP-adjusted Canada-United States ICT investment per worker gap decreased in 2006. This continued the trend observed since 2000 when Canadian firms hit rock-bottom and were investing in ICT less than half as much per worker as their American counterparts. The steady relative improvement of Canada since 2000 in terms of PPP-adjusted ICT investment per worker is encouraging, but it may prove unsustainable as it appears to rely largely on a continuous appreciation of the Canadian dollar. More importantly, this positive trend should not obscure the fact that there remains a massive gap in ICT investment intensity between Canada and the United States, with the level of PPP-adjusted ICT investment per worker in Canada only 58.0 per cent that of the United States.

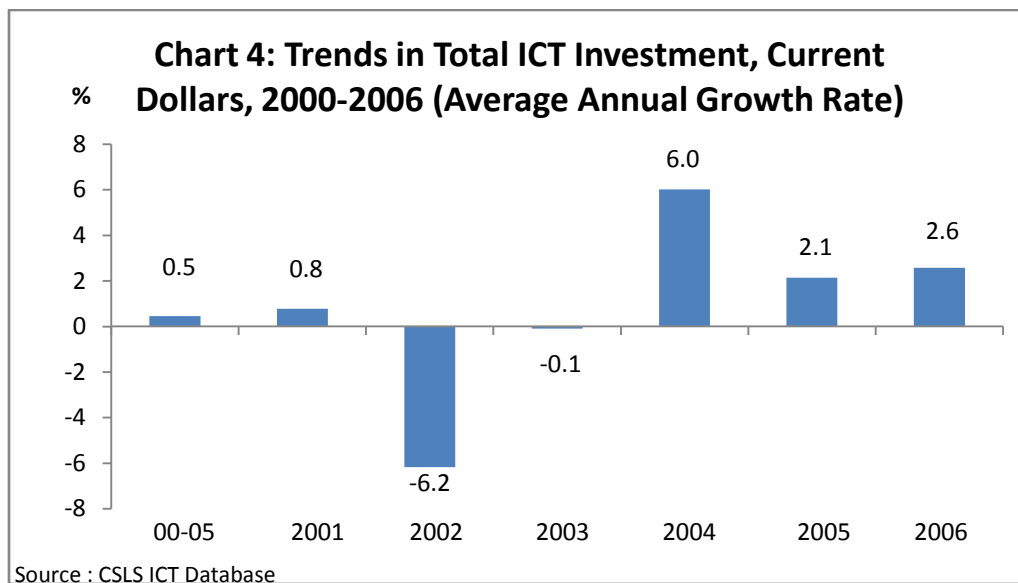
⁷ Total ICT prices for Canada for 2006 are not available.

II. Detailed Overview of Developments in ICT Investment in Canada, 2000-2006

This section provides a more detailed review of developments in ICT investment in Canada over the 2000-2006 period, with a particular focus on the performance in 2006. It first reviews developments in current dollar ICT investment. It looks at ICT investment by component, ICT investment as a share of GDP, ICT investment in both the business and non-business sector and ICT investment per worker. It then reviews the major developments in the price of ICT investment by component. Finally, it reviews developments in constant dollar (volume) ICT investment, again focusing on ICT investment by component, ICT investment as a share of GDP and ICT investment per worker. In contrast to the previous section which focused on the business sector and on Canada/US comparisons, this section focuses on total economy estimates of ICT investment at a detailed level in Canada.

A. Current Dollar ICT Investment

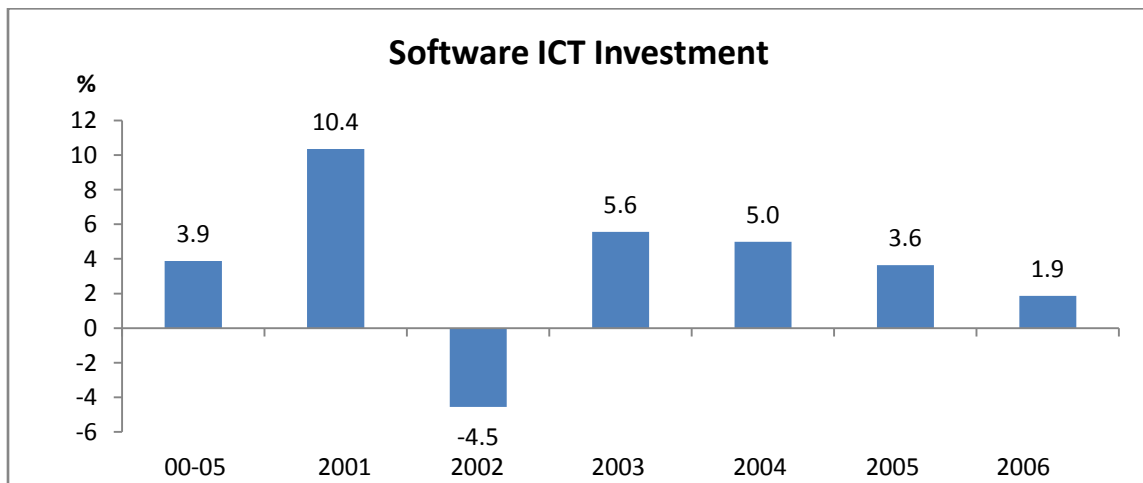
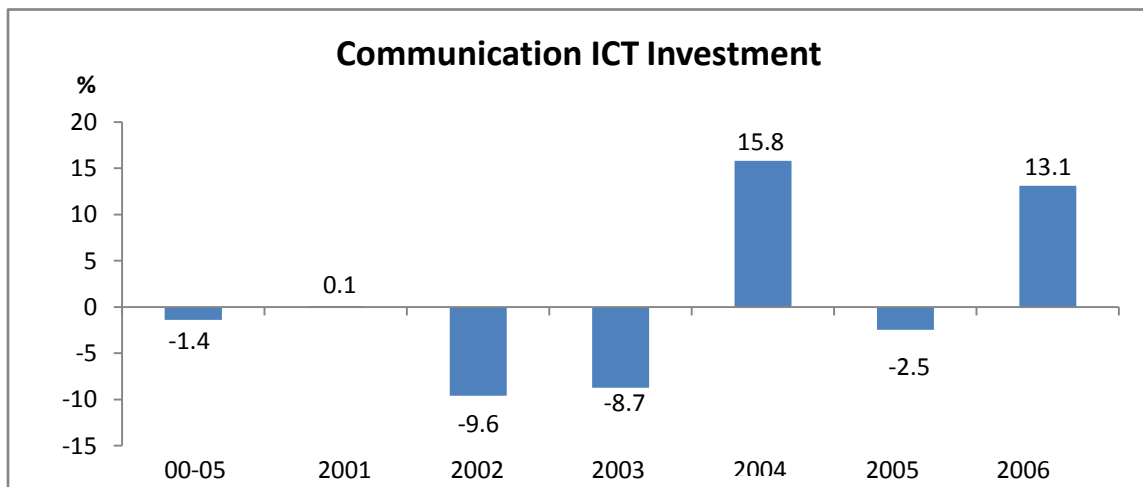
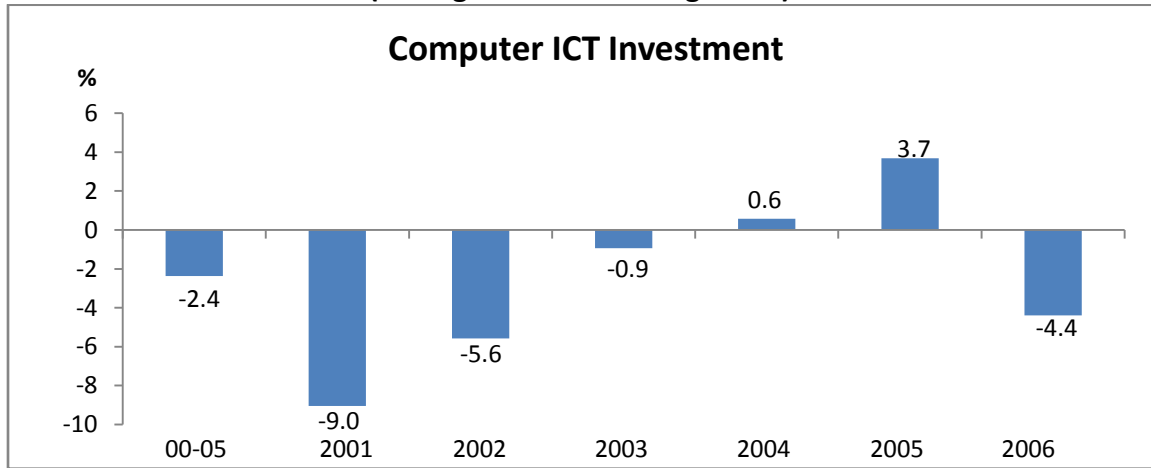
The overall trend in total current dollar ICT investment growth for the first part of the decade was relatively weak at 0.5 per cent per year and was negative in 2002 and 2003 (Chart 4). ICT investment did recover after 2003. It advanced a strong 6.0 per cent in 2004, but growth fell off to 2.1 per cent in 2005 and 2.6 per cent in 2006.



1. Current Dollar ICT Investment by Component

Total ICT investment consists of three components: computer investment, communication equipment investment and software investment. There appears to be little correlation in the growth pattern of the three ICT investment components (Chart 5). Investment in software experienced a 3.9 per cent average annual increase over the

Chart 5: Trends in ICT Investment by Component, Current Dollars, 2000-2006
(average annual rate of growth)

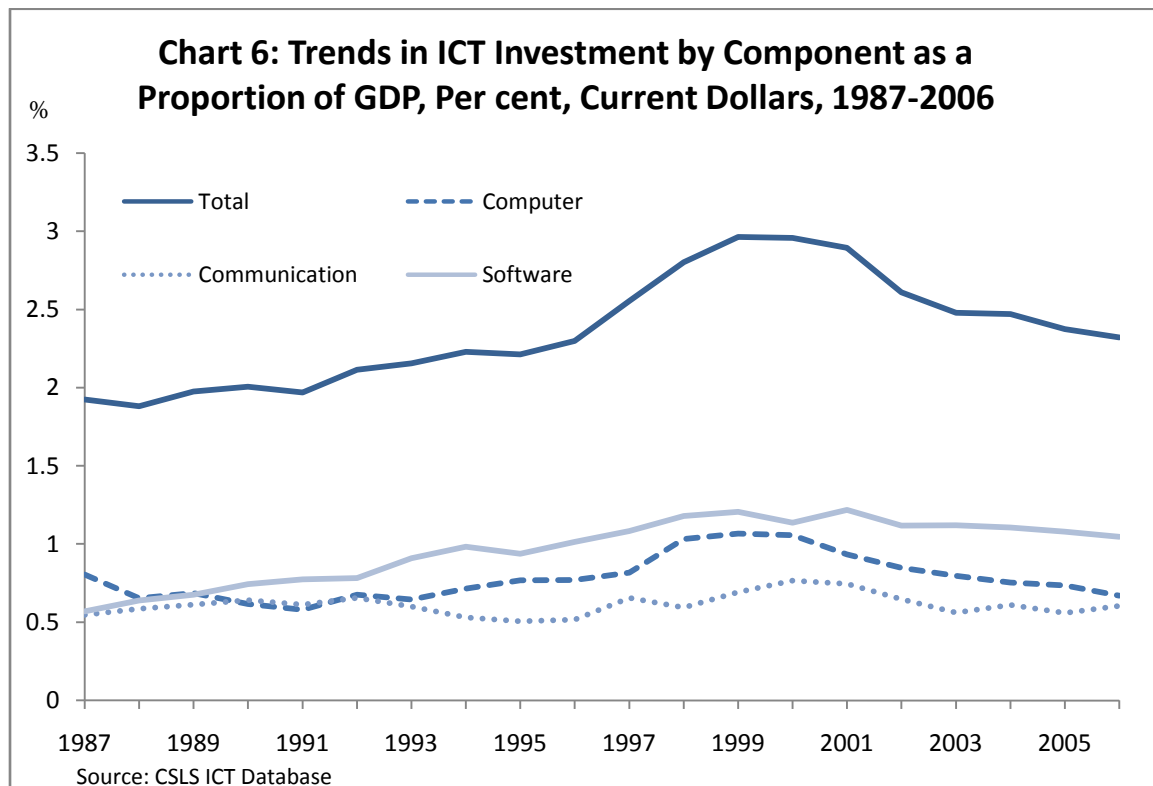


Source: CSLS ICT Database

2000-2005 period, while communication equipment investment fell 1.4 per cent per year, and computer investment fell more (2.4 per cent per year).

The downward trend in computer investment since 2000 is particularly striking. Over the 2000-2006 period, computer investment increased only in 2004 (0.6 per cent) and 2005 (3.7 per cent). In 2006, computer investment fell 4.4 per cent, leaving the investment level in computers 15.2 per cent lower than the 2000 level.

Communication equipment investment has also exhibited a poor performance in current dollar terms, with an average annual decline from 2000 to 2005 of 1.4 per cent. Although investment in communication equipment has declined between 2000 and 2005, there was positive growth in 2006 and 2004 as investment grew 13.1 and 15.8 per cent respectively. Therefore, although the 2000-2005 period displayed an average annual decline in investment levels, strong growth last year increased the level of investment in 2006 above that of 2000.



Unlike the other two components of ICT, software investment growth has been positive since 2002. Software investment in 2006 experienced an increase of 1.9 per cent, the second lowest year of investment growth since 2002. Even though this type of investment has been relatively strong when compared to the other components, as software experienced an average growth of 3.9 per cent for the 2000-2005 period, the higher levels of growth occurred at the beginning of the period in question and investment growth has been steadily declining in more recent years.

2. ICT Investment as a share of GDP

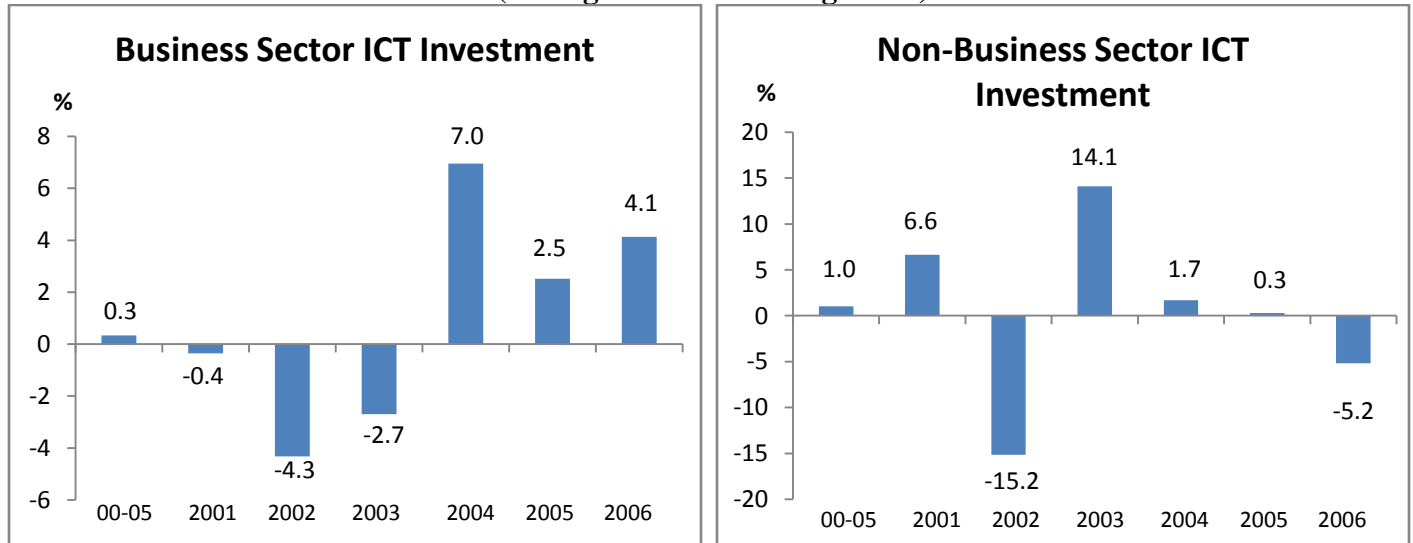
The overall trend in total ICT investment in current dollars as a proportion of GDP was relatively stable before 1997, at approximately 2.0 per cent of total GDP spending (Chart 6). Total ICT spending was at a historic high as a proportion of GDP at 3.0 per cent in 1999 and has been on the decline ever since.

Chart 6 provides an illustration of the trends in ICT investment by component as a share of nominal GDP. It can be seen that since 1989 software investment has accounted for the largest share of GDP, hovering around one per cent of GDP since 1994. In 2006, software investment as a proportion of GDP was 1.05 per cent, approximately double that of each of the other two components. Computer investment as a proportion of GDP steadily declined from approximately 1.00 to 0.67 per cent, while communication equipment investment remained fairly stagnant around 0.60 per cent. After peaking at the beginning of the 2000s, investment as a proportion of GDP for all three components declined, with computer investment experiencing the greatest fall.

3. Business vs. Non-business Sector

Total ICT investment can also be divided into the business and non-business sectors. The business sector represents approximately 80 per cent of the total economy and is comprised of industries whose output is marketed. The non-business sector is made up of the industries of public administration, healthcare and social assistance and educational services whose output is not marketed.

**Chart 7: Trends in ICT Investment by Sector, Current Dollars, 2000-2006
(average annual rate of growth)**

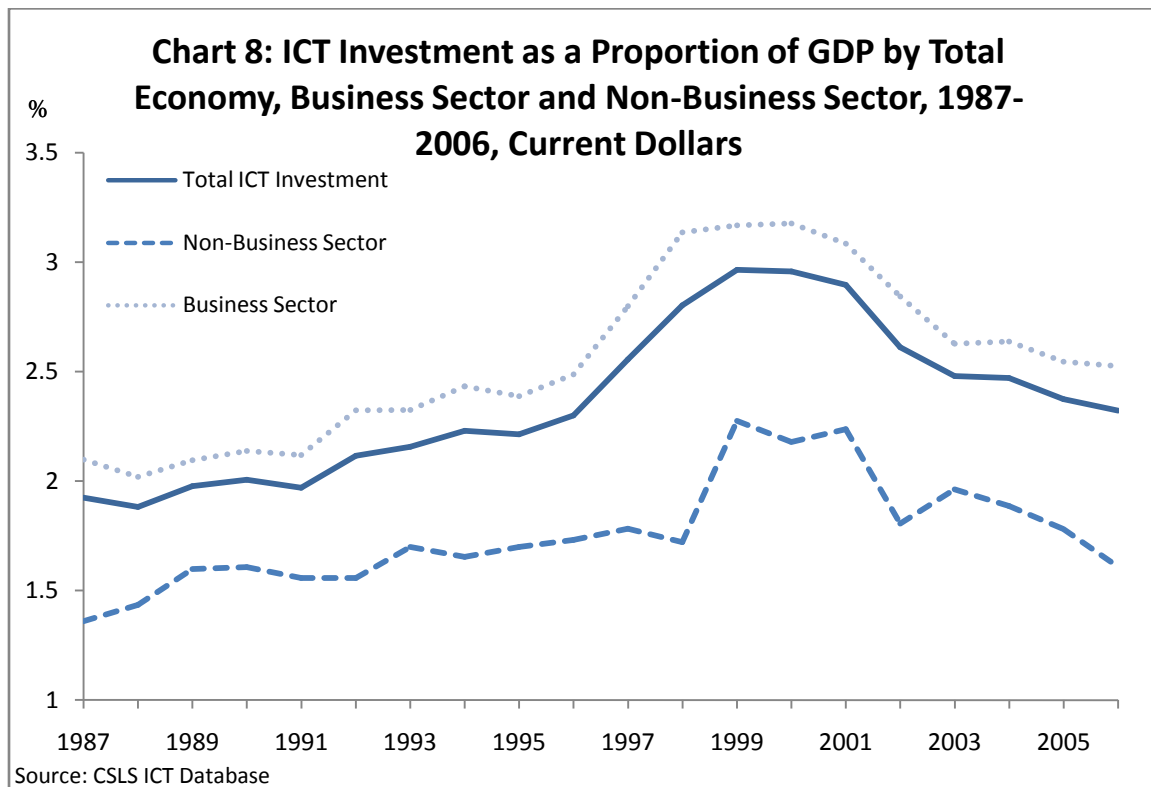


Source: CSLS ICT Database

In 2006, the business sector increased its ICT investment by 4.1 per cent, up from the 2005 rate of 2.5 per cent, but down from the 2004 increase of 7.0 per cent (Chart 7). Although there was positive growth in recent years, this was offset by the negative

performance experienced at the beginning of the decade, leading to an average annual growth rate of a mere 0.3 per cent over the 2000-2005.

The non-business sector investment in ICT has fluctuated much more substantially from year to year since 2000. The average growth rate of ICT investment in the non-business sector for the 2000-2005 period was 1.0 per cent, with 2002 experiencing the greatest fall (15.2 per cent) and 2003 the greatest increase (14.1 per cent). After the 2002 decline, investment recovered and slowly increased each year until 2006, when it fell by 5.2 per cent. Although investment recovered from its significant decline in 2002, there was only one strong year of growth since then, which occurred in 2003 (14.1 per cent). After 2003 growth was so weak that with the 5.2 per cent decline that occurred in 2006, the level of investment for 2006 was below that of 2000.

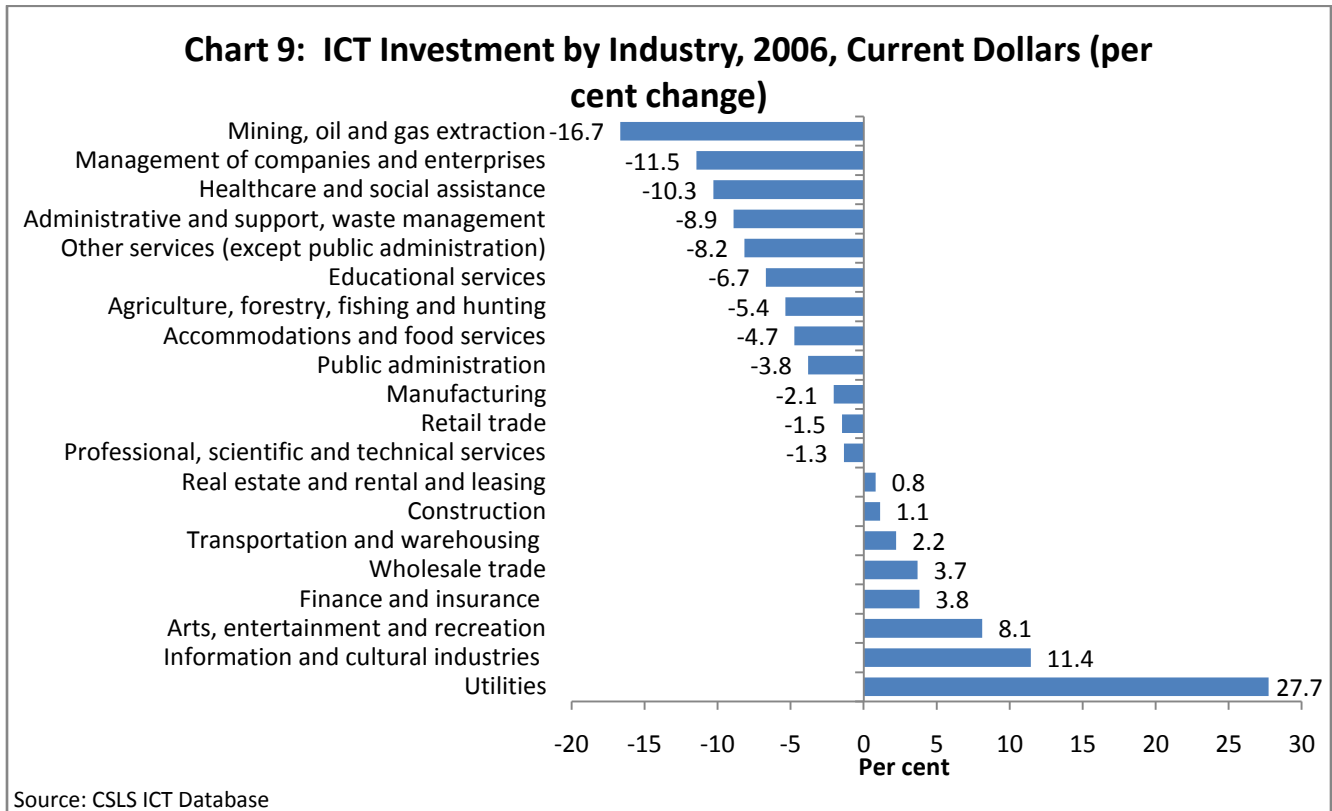


The non-business sector is investing markedly less in ICT than the business sector as a share of GDP. The gap between the two sectors increased in 2006 as business sector ICT investment grew by 4.1 per cent while non-business sector investment declined 5.2 per cent.

ICT investment in the business sector as a proportion of business sector GDP followed a similar growth path of that of total ICT investment, reaching its peak proportion of GDP in 2000 (3.2 per cent – Chart 8). The non-business sector also experienced its peak during the same period, at 2.3 per cent of non-business sector GDP in 1999, but then declined at a much faster rate. Even at its peak, ICT investment as a proportion of GDP in the non-business sector was only approximately 70 per cent of that

in the business sector, which once again demonstrates the extent of the gap in investment between the two sectors.

Although the business sector experienced an overall increase in ICT investment growth in 2006, there was a large variance in the levels of growth experienced by individual industries within the sector (Chart 9⁸). The industries with the largest increases in 2006 were utilities, which experienced an increase of 27.7 per cent, followed by information and cultural industries (11.4 per cent), and arts, entertainment and recreation (8.1 per cent). The industry with the greatest decline in growth was mining, oil and gas extraction which experienced -16.7 per cent growth.



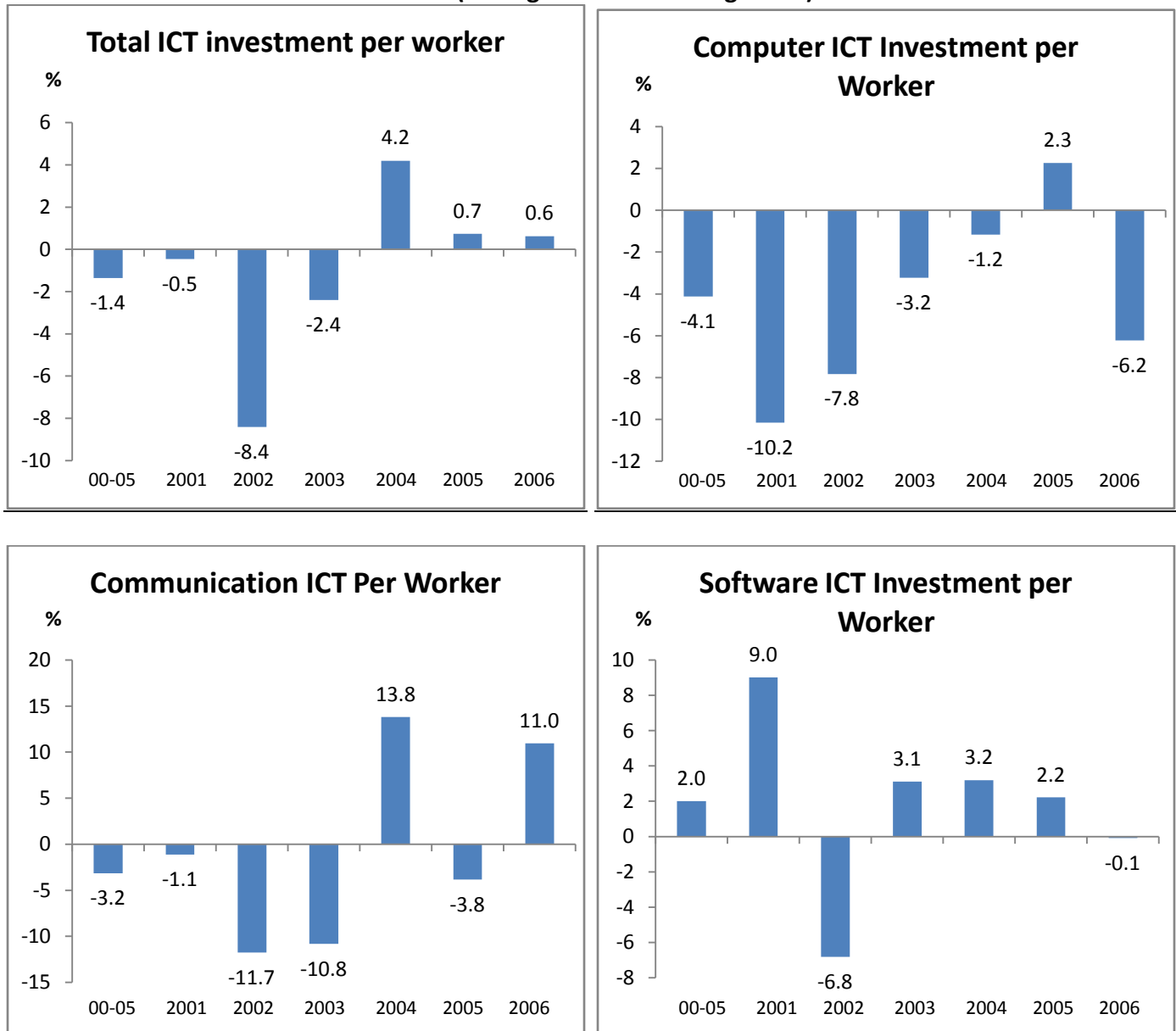
4. ICT Investment per Worker

The change in ICT capital intensity is determined by nominal ICT investment and the growth rate of employment. Overall, annual growth in total ICT investment per worker has been either negative or very weak since 2000 (Chart 10). Total ICT

⁸ For some industries, Statistics Canada provided data for only two of the three components. Moreover, Statistics Canada did not release data on total current dollar ICT at the industry level for 2006 in order to prevent the residual calculating of ICT investment and capital stock levels for the communication equipment component for the industries in which it was deemed confidential. The figures in Chart 9 were calculated through summing up the data released for each of the three components. As a result, the figures for the following industries excluded data on communication ICT: utilities, construction, administrative and support waste management, healthcare, accommodation and food service, and other (except public administration). In 2006, these six industries made up approximately 7.2 per cent of the communication equipment ICT spending.

investment in current dollar per worker increased a mere 0.6 per cent in 2006. Yet this was an improvement from the general trend as the average annual rate of change for 2000-2005 was a decline of 1.4 per cent. The largest fall in ICT investment occurred in 2002 when there was a decline of 8.4 per cent. Since then, 2004 has been the only year to see substantial growth (4.2 per cent). Due to this fall in investment over the 2000-2006 period, investment per worker in 2006 was 6.0 per cent below that of the 2000 level.

Chart 10: Trends in ICT Investment per Worker by Component, Current Dollars, 2000-2006 (average annual rate of growth)



Source: CSLS ICT Database

B. ICT Prices

By comparing the current dollar estimates of ICT investment with the 1997 chained dollar figures, it is possible to obtain implicit deflators for computer, communication equipment and software. Prices declined for all three components of ICT investment (Chart 11). Using 1997 as the base year (1997 price equals 100), it is clear that the average price of computers has been steadily falling. In 2006, the price of a computer was 38.9 per cent, or approximately two-fifths, what it would have been in 2000. Computer equipment prices dropped on average 13.3 per cent annually from 2000-2005, with 2006 continuing this negative trend with a decline of 20.6 per cent over the previous year, the largest decline since 2000.

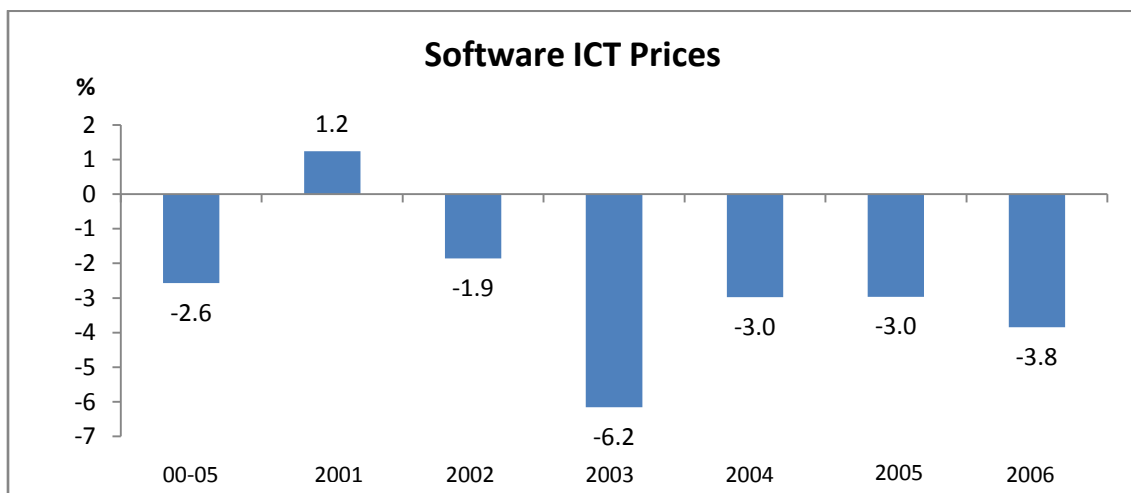
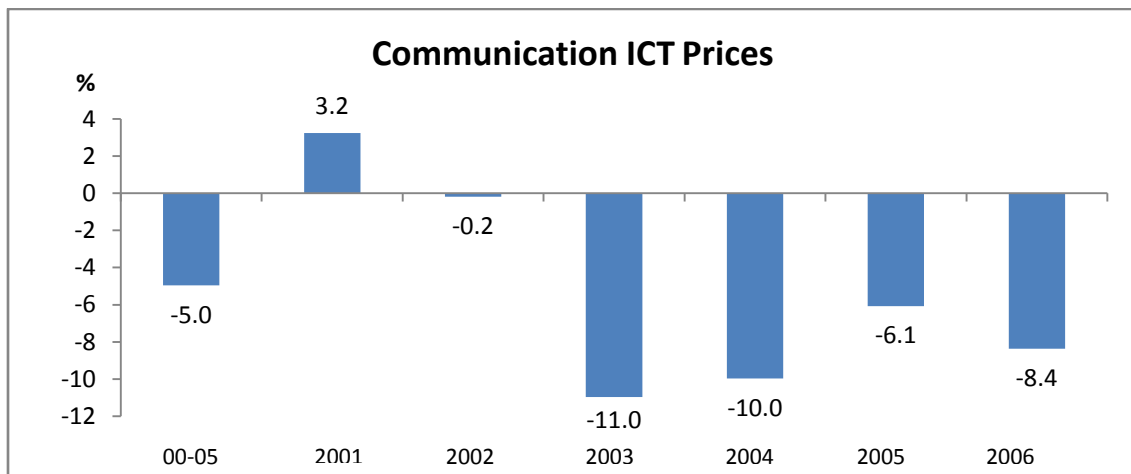
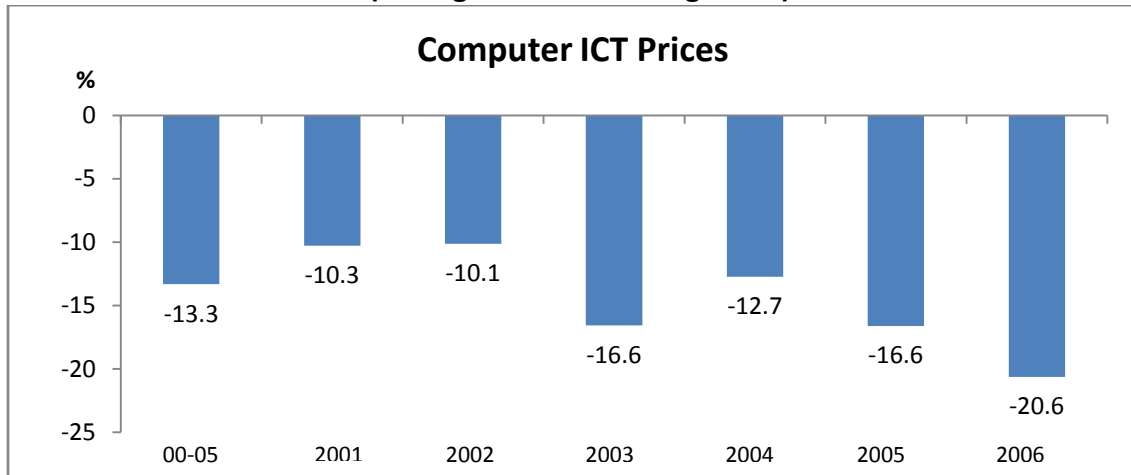
Communication equipment prices have also fallen since 2000. After a slight increase in prices in 2001, communication equipment prices dropped dramatically in 2003 and continued to fall into 2006, with prices in 2006 being 71.1 per cent of the 2000 level. The average annual price change from 2000-2005 was -5.0 per cent, with the decline in price well above this rate in 2006 (-8.4 per cent).

Software prices have also fallen since 2000, with 2006 prices being 84.4 per cent of the 2000 level. Between 2002 and 2006, software prices have been falling annually, with the greatest annual price decline occurring in 2003 when prices fell by 6.2 per cent. Although the 2006 decline in price of 3.4 was not as substantial as that of 2003, it was still greater than the 2000-2005 average of -2.8 per cent.

Thus, prices of all ICT components have declined substantially since 2000, with computer prices falling the most on average, followed by communication equipment and finally software. These price declines are important to note when looking at ICT investment in current dollars because although investment may be growing at a relatively low rate, 0.5 per cent annually for the 2000-2005 period, this measure captures both a price and a volume effect. Thus, the fact that prices are continually dropping implies that the volume of capital is increasing much faster than the current dollar investment figures implies when taken at face value.

The decline in the price of ICT goods embodies both the decline in the absolute price of the components and the increase in their quality. Prices are adjusted for changes in the quality of ICT goods to reflect the fact that firms can now purchase much more powerful products for lower levels of investment. Hence, increases in the level of real ICT investment can be the result of either (i) an increase in the quantity, (ii) an increase in the quality of ICT goods purchased or (iii) an increase in both quantity and quality. In general, an increase in real ICT investment is the result of both an increase in the quantity purchased and an increase in the quality of goods purchased.

**Chart 11: Trends in Price of ICT Goods by Component, 1997 base year, 2000-2006
(average annual rate of growth)**



Source: CSLS ICT Database

C. ICT Investment in volume (real, 1997 chained dollars)

This section examines trends in real ICT investment by looking at data measured in 1997 chained dollar. Total ICT investment figures in 1997 chained dollar are no longer available through Statistics Canada effective as of the 2006 production year. Therefore, growth in ICT investment is only analyzed at the component level.⁹

1. Real ICT Investment by Component

Overall there was a very positive performance in terms of chained dollars when looking at ICT investment growth (Chart 12). Since 2000, investment in computers has been growing steadily real terms. After relatively low rates of growth in 2001 and 2002, computer investment increased dramatically over the 2003-2006 period. The 2006 investment growth of 20.4 per cent was above the 2004 rate of 15.2 per cent, but below that of the 2005 rate of 24.4 per cent. Investment in computers has been increasing on average 12.6 per cent annually over the 2000-2005 period, a dramatic increase in investment in real terms.

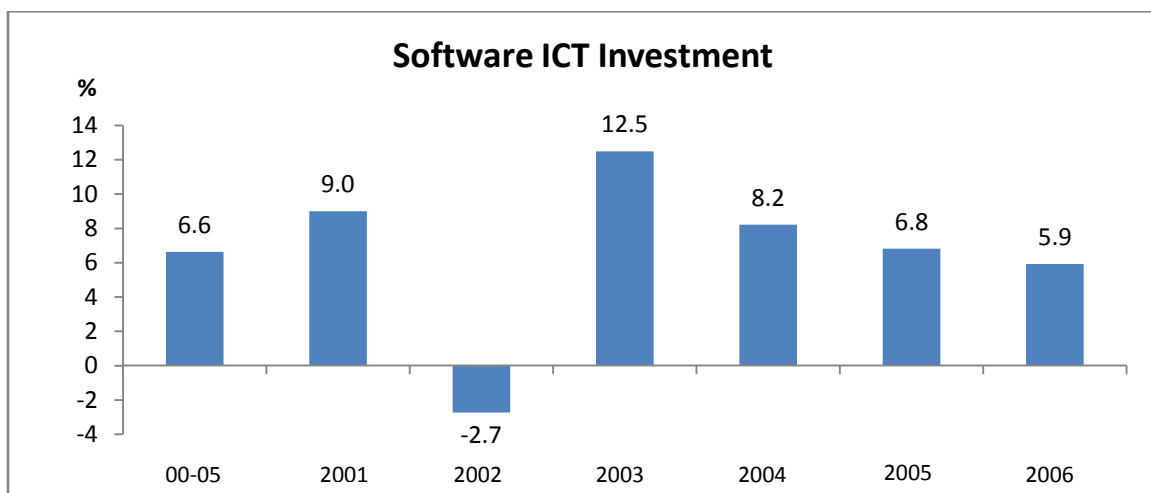
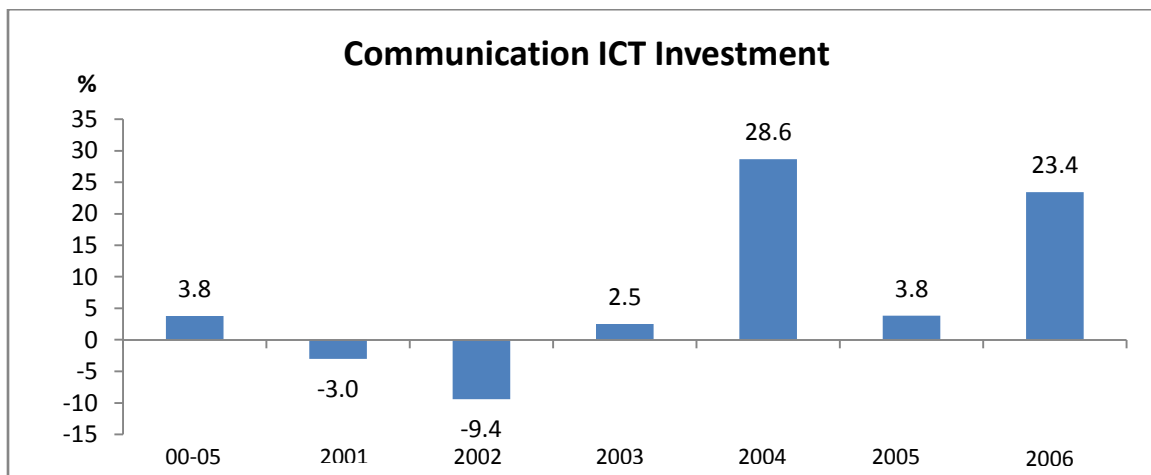
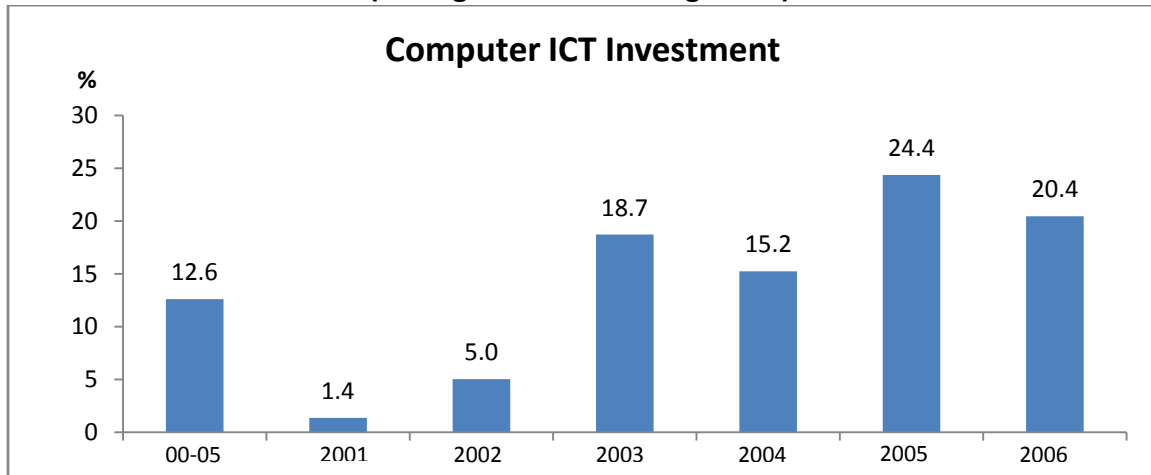
Communication equipment ICT investment has also seen an increase over the 2000-2005 period, of 3.8 per cent annually. After a decline in investment in 2001 and 2002, investment began to increase in 2003. In 2006, investment grew 23.5 per cent, which was well above the rate of both 2003 (2.5 per cent) and 2005 (3.8 per cent) and only slightly below that of 2004 (28.6 per cent).

Other than a fall in 2002, software investment has also been growing since 2000 in real terms. In 2006, investment increased 5.9 per cent, which was below the growth experienced in each of the previous three years as well as the overall average annual growth over the 2000-2005 period (6.6 per cent).

Overall, computer investment experienced the greatest increase over the 2000-2005 period, followed by software and finally communication equipment. The weakest performance was in 2002, for both current and chained dollar estimates, with both communication equipment and software experiencing their lowest rate of growth and computer investment its second lowest rate of growth since the beginning of the decade. On the whole, the healthy average annual growth experienced by the three components in real terms over the 2000-2006 period are encouraging. Moreover, the fact that the positive performance of all three components over the 2000-2005 period continued into 2006 illustrates once again the current vigor of ICT investment in real terms in Canada.

⁹ As noted earlier, Statistics Canada did not release data on total ICT in either current or constant dollars in 2006. As current dollars estimates are additive and because all three components were provided for most industries, total economy estimates could easily be created. Chained Fisher dollar estimates, however, are not additive. We were thus unable to create chained dollars total economy estimates. We therefore focus solely on ICT investment by component.

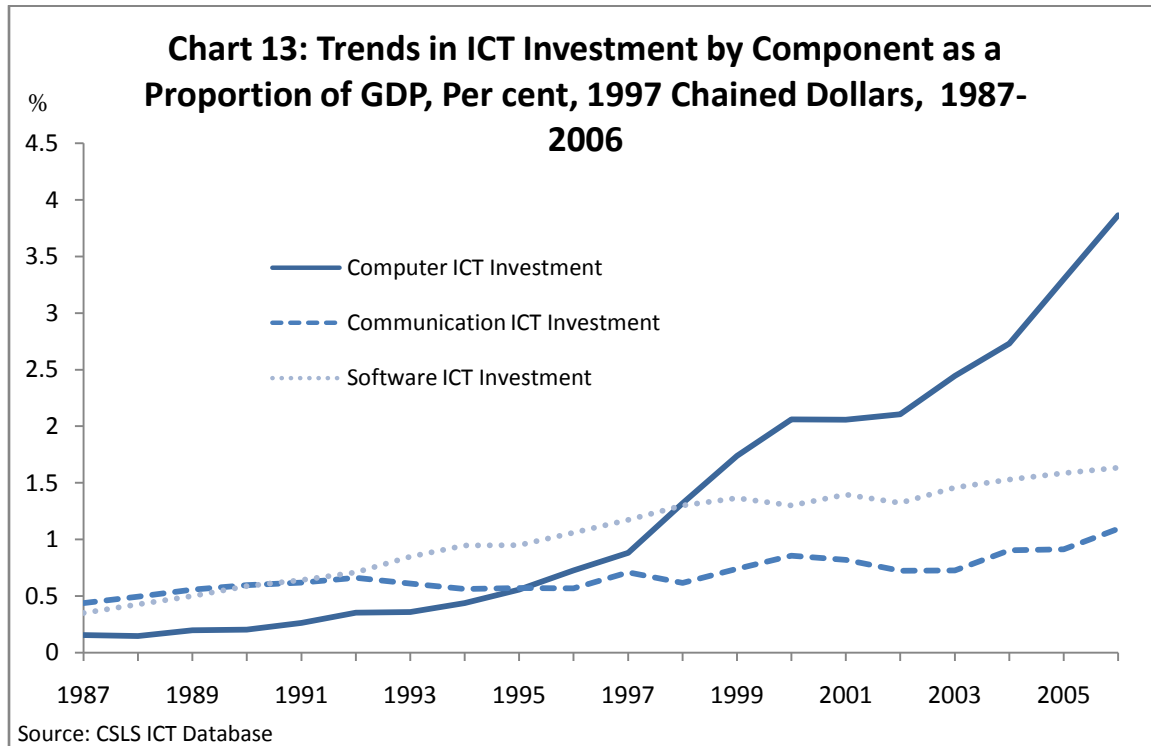
**Chart 12: Trends in ICT Investment by Component, 1997 Chained Dollars, 2000-2006
(average annual rate of growth)**



Source: CSLS ICT Database

2. Real ICT Investment as a Share of GDP

By examining trends in real investment for computers, communication equipment and software as a proportion of total GDP, we can see that overall levels of investment as a proportion of GDP have been increasing over the years for all components (Chart 13). Real computer investment as a proportion of GDP increased most rapidly, as computers and their technology have become a much more important element of both business and non-business life. The proportion of real computer investment in total GDP has increased from 0.15 in 1987 to 3.86 per cent in 2006. Real software investment as a proportion of GDP has also increased over 1987-2006, but at a much steadier rate, with investment as a proportion of GDP increasing from 0.35 per cent in 1987 to 1.63 per cent in 2006. Finally, real communications investment as a proportion of GDP has experienced the least overall change between 1987 and 2006, as it was 0.44 per cent in 1987 and reached 1.09 per cent in 2006.

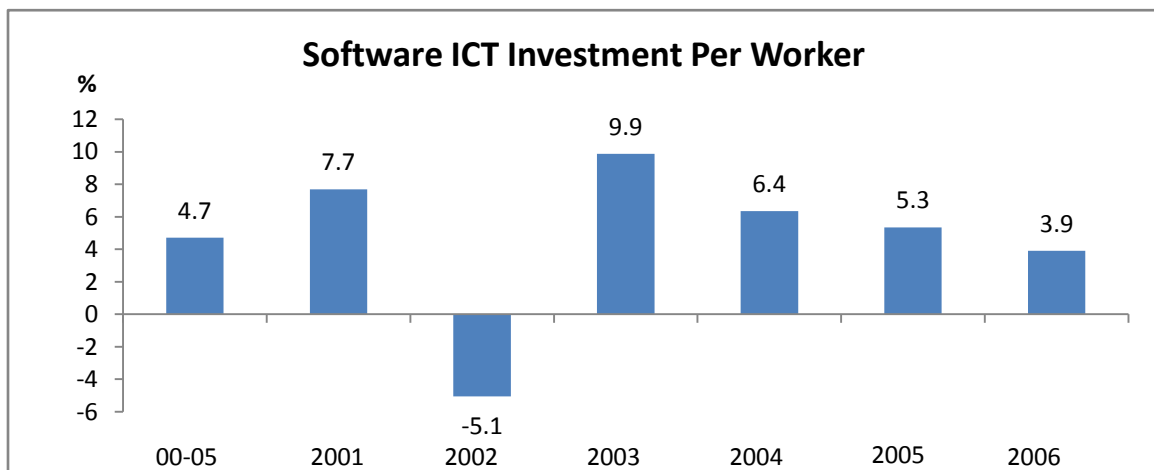
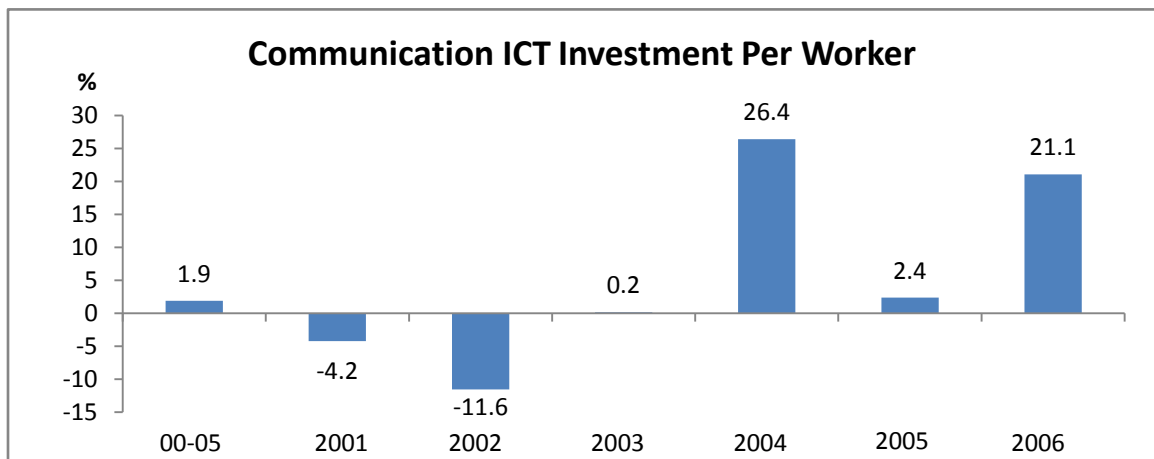
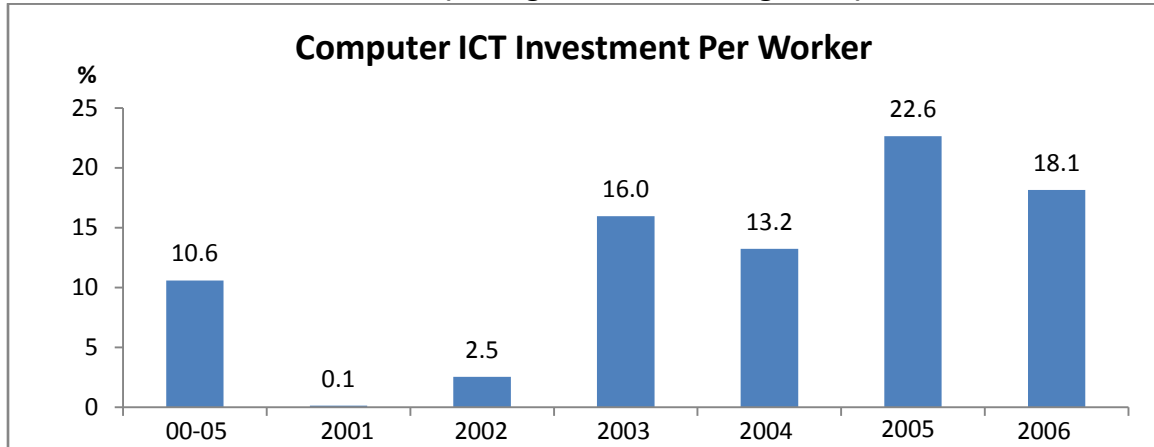


3. Real ICT Investment per Worker by Component

Real ICT investment per worker grew significantly since 2000 (Chart 14). It is interesting to note, once again, that investment patterns in chained dollar and in current dollar do not at all correspond. Total ICT investment per worker in current dollar fell on average during the 2000-2005 period. Current dollar investment per worker by component fell for computer and communication equipment and only increased slightly for software. In contrast, the chained dollar estimates exhibited much higher average annual growth in investment per worker over the 2000-2005 period, with an average annual real computer investment per worker growth of 10.6 per cent, real

communications equipment per worker investment growth of 1.9 per cent and real software investment per worker growth of 4.7 per cent. These trends of real investment per worker growth continued into 2006 for all components with growth rates of 18.1, 21.1 and 3.9 per cent respectively.

Chart 14: Trends in ICT Investment per Worker by Component, 1997 Chained Dollars, 2000-2006 (average annual rate of growth)



Source: CSLS ICT Database

Conclusion

This report examined recent developments in terms of ICT investment based on a recent update of the CSLS ICT database to 2006. The first section provided an overview of developments in business sector ICT investment in Canada relative to the United States, focusing on developments in 2005 and 2006.

From a productivity perspective, it is investment in real terms that drives productivity growth. In this context, the constant dollar estimates provide a more accurate view of the potential for ICT investment to increase productive capacity. In this respect, the strong growth in real ICT investment in Canada in 2005 and 2006 is encouraging.

The steady relative improvement of Canada since 2000 in terms of PPP-adjusted ICT investment per worker is also encouraging, but it may prove unsustainable as it appear to rely largely on a constant appreciation of the Canadian dollar. More importantly, this positive trend should not obscure the fact that there remains a massive gap in ICT investment intensity between Canada and the United States, with the level of PPP-adjusted ICT investment per worker in Canada still only 58.0 per cent that of the United States in 2006. Since ICT investment is a key driver of productivity growth, the massive and persistent Canada-United States ICT investment per worker gap should be of concern to policy-makers.

References

Sharpe, Andrew (2005) “What Explains the Canada-US ICT Investment Intensity Gap?”
CSLS Research Report 2005-06, December.

Sharpe, Andrew (2005a) “What Explains the Canada-US ICT Investment Gap?”,
International Productivity Monitor, Number 11, Fall, pp. 21-38.

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Table 1: Total ICT Investment per Worker in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada					U.S.	Canada vs. U.S.	
	ICT Investment per Worker in Canadian current dollars	PPP for Machinery and Equipment, US dollar per Canadian dollar	ICT Investment per Worker in current U.S.dollars, PPP Adjusted	Exchange Rate, U.S dollar per Canadian dollar	ICT Investment per Worker in current U.S.dollars, Exchange Rate Adjusted	ICT Investment per Worker in current U.S.dollars	ICT Investment per Worker in Canada as a share of ICT Investment per Worker in U.S, in per cent	
							PPP Adjusted	Exchange Rate Adjusted
	A	B	C=A*B	D	E=A*D	F	G=C/F*100	H=E/F*100
1987	\$890	n.a	n.a	0.75	\$671	\$1,124	n.a	59.7
1988	910	n.a	n.a	0.81	740	1,215	n.a	60.9
1989	989	n.a	n.a	0.84	835	1,320	n.a	63.3
1990	1,020	n.a	n.a	0.86	874	1,340	n.a	65.2
1991	1,016	n.a	n.a	0.87	886	1,399	n.a	63.4
1992	1,139	0.83	\$946	0.83	942	1,539	61.5	61.3
1993	1,182	0.81	957	0.78	916	1,637	58.5	55.9
1994	1,298	0.78	1,012	0.73	950	1,747	58.0	54.4
1995	1,328	0.78	1,036	0.73	968	1,955	53.0	49.5
1996	1,428	0.77	1,099	0.73	1,047	2,146	51.2	48.8
1997	1,679	0.77	1,293	0.72	1,213	2,457	52.6	49.4
1998	1,906	0.74	1,410	0.67	1,285	2,674	52.7	48.0
1999	2,024	0.76	1,538	0.67	1,362	3,067	50.2	44.4
2000	2,189	0.78	1,708	0.67	1,474	3,483	49.0	42.3
2001	2,162	0.77	1,665	0.65	1,396	3,238	51.4	43.1
2002	2,015	0.78	1,572	0.64	1,286	2,949	53.3	43.6
2003	1,925	0.83	1,597	0.71	1,374	2,969	53.8	46.3
2004	2,025	0.86	1,741	0.77	1,556	3,085	56.5	50.4
2005	2,040	0.89	1,816	0.83	1,684	3,208	56.6	52.5
2006	2,090	0.92	1,923	0.88	1,839	3,317	58.0	55.4
		Average Annual Growth Rate		1.15				
87-95	5.14	n.a	n.a	-0.43	4.69	7.16	n.a	-2.32
95-00	10.51	0.00	10.51	-1.57	8.78	12.25	-2.55	-3.53
00-06	-0.77	n.a	n.a	4.57	3.76	-0.81	n.a	4.60
87-06	4.60	n.a	n.a	0.82	5.45	5.86	n.a	-0.39

Source: PPP from Statistics Canada, Purchasing Power Parities and Real Expenditures, United States and Canada, Item Catalogue no. 13-604-MIB no.53, 2007.

Exchange rate from Statistics Canada, CANSIM II Table 16-0049 V37694.

ICT Investment for the U.S.business sector from BEA. National Economic Accounts: Table 2.7.

ICT Investment for the Canadian business sector from Statistics Canada unpublished data.

The number of workers for the Canadian business sector from the Productivity Program, Statistics Canada. CANSIM series v15857247 for 1997-2005, extended back to 1987 using growth rates of estimated employment for the total economy from Statistics Canada unpublished LFS data Feb 2006.

The number of workers for the U.S. business sector from an unpublished series of the U.S. Bureau of Labor Statistics, corresponding to BLS series PRS84006013.

Note: ICT Investment in Canada and U.S. includes investment in computers and peripheral equipment, software including own account software and communication equipment

Original table from the CSLS ICT Database - Summary Table 1

Table 2: Computer ICT Investment per Worker in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada					U.S.	Canada vs. U.S.	
	Computers Investment per Worker in Canadian current dollars	PPP for Machinery and Equipment, US dollar per Canadian dollar	Computers Investment per Worker in current U.S.dollars, PPP Adjusted	Exchange Rate, U.S dollar per Canadian dollar	Computers Investment per Worker in current U.S.dollars, Exchange Rate Adjusted	Computers Investment per Worker in current U.S.dollars	Computers Investment per Worker in Canada as a share of Computers Investment per Worker in U.S, in per cent	
							PPP Adjusted	Exchange Rate Adjusted
	A	B	C=A*B	D	E=A*D	F	G=C/F*100	H=E/F*100
1987	\$375	n.a	n.a	0.75	\$283	\$387	n.a	73.1
1988	305	n.a	n.a	0.81	248	398	n.a	62.2
1989	329	n.a	n.a	0.84	278	442	n.a	62.7
1990	294	n.a	n.a	0.86	252	394	n.a	64.0
1991	281	n.a	n.a	0.87	245	390	n.a	62.7
1992	350	0.83	\$290	0.83	289	454	63.9	63.7
1993	332	0.81	269	0.78	257	485	55.4	53.0
1994	406	0.78	316	0.73	297	512	61.8	58.0
1995	454	0.78	354	0.73	331	629	56.3	52.6
1996	462	0.77	356	0.73	339	677	52.5	50.0
1997	525	0.77	404	0.72	379	742	54.5	51.1
1998	693	0.74	513	0.67	467	779	65.8	60.0
1999	713	0.76	542	0.67	480	844	64.1	56.8
2000	746	0.78	582	0.67	502	878	66.3	57.2
2001	629	0.77	484	0.65	406	746	65.0	54.5
2002	626	0.78	\$488	0.64	399	690	70.7	57.8
2003	626	0.83	520	0.71	447	696	74.7	64.2
2004	634	0.86	545	0.77	487	710	76.8	68.6
2005	633	0.89	564	0.83	523	772	73.0	67.7
2006	602	0.92	554	0.88	530	778	71.2	68.1
Average Annual Growth Rate								
87-95	2.43	n.a	n.a	-0.43	1.99	6.26	n.a	-3.97
95-00	10.43	0.00	10.43	-1.57	8.70	6.90	2.45	1.42
00-06	-3.50	n.a	n.a	4.57	0.91	-1.99	n.a	2.95
87-06	2.53	n.a	n.a	0.82	3.37	3.75	n.a	-0.37

Source: PPP from Statistics Canada, Purchasing Power Parities and Real Expenditures, United States and Canada, Item Catalogue no. 13-604-MIB no.53, 2007.

Exchange rate from Statistics Canada, CANSIM II Table 16-0049 V37694.

Computers Investment for the U.S.business sector from BEA. National Economic Accounts: Table 2.7.

Computers Investment for the Canadian business sector from Statistics Canada unpublished data.

The number of workers for the Canadian business sector from the Productivity Program, Statistics Canada. CANSIM series v15857247 for 1997-2005, extended back to 1987 using growth rates of estimated employment for the total economy from Statistics Canada unpublished LFS data Feb 2006.

The number of workers for the U.S. business sector from an unpublished series of the U.S. Bureau of Labor Statistics, corresponding to BLS series PRS84006013.

Original table from the CSLS ICT Database - Summary Table 2

Table 3: Communications ICT Investment per Worker in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada					U.S.	Canada vs. U.S.	
	Communications Investment per Worker in Canadian current dollars	PPP for Machinery and Equipment, US dollar per Canadian dollar	Communications Investment per Worker in current U.S.dollars, PPP Adjusted	Exchange Rate, U.S dollar per Canadian dollar	Communications Investment per Worker in current U.S.dollars, Exchange Rate Adjusted	Communications Investment per Worker in current U.S.dollars	Communications Investment per Worker in Canada as a share of Communications Investment per Worker in U.S, in per cent	
							PPP Adjusted	Exchange Rate Adjusted
	A	B	C=A*B	D	E=A*D	F	G=C/F*100	H=E/F*100
1987	\$268	n.a	n.a	0.75	\$202	\$424	n.a	47.8
1988	307	n.a	n.a	0.81	249	458	n.a	54.4
1989	332	n.a	n.a	0.84	280	448	n.a	62.6
1990	356	n.a	n.a	0.86	305	461	n.a	66.1
1991	343	n.a	n.a	0.87	299	453	n.a	66.1
1992	384	0.83	\$319	0.83	318	481	66.2	66.0
1993	354	0.81	287	0.78	274	497	57.7	55.2
1994	326	0.78	254	0.73	239	561	45.4	42.6
1995	319	0.78	249	0.73	232	610	40.8	38.1
1996	341	0.77	263	0.73	250	665	39.5	37.7
1997	455	0.77	350	0.72	328	732	47.8	44.9
1998	435	0.74	322	0.67	293	784	41.1	37.4
1999	514	0.76	391	0.67	346	876	44.6	39.5
2000	623	0.78	486	0.67	420	1,077	45.1	39.0
2001	645	0.77	497	0.65	416	963	51.5	43.2
2002	537	0.78	\$419	0.64	343	757	55.4	45.3
2003	501	0.83	416	0.71	358	734	56.6	48.7
2004	554	0.86	476	0.77	425	753	63.2	56.5
2005	535	0.89	476	0.83	442	750	63.5	58.9
2006	598	0.92	550	0.88	526	802	68.6	65.6
Average Annual Growth Rate								
87-95	2.17	n.a	n.a	-0.43	1.73	4.66	n.a	-2.80
95-00	14.35	0.00	14.35	-1.57	12.56	12.05	1.12	0.10
00-06	-0.69	n.a	n.a	4.57	3.84	-4.79	n.a	9.06
87-06	4.30	n.a	n.a	0.82	5.15	3.42	n.a	1.68

Source: PPP from Statistics Canada, Purchasing Power Parities and Real Expenditures, United States and Canada, Item Catalogue no. 13-604-MIB no.53, 2007.

Exchange rate from Statistics Canada, CANSIM II Table 16-0049 V37694.

Communications Investment for the U.S.business sector from BEA. National Economic Accounts: Table 2.7.

Communications Investment for the Canadian business sector from Statistics Canada unpublished data.

The number of workers for the Canadian business sector from the Productivity Program, Statistics Canada. CANSIM series v15857247 for 1997-2005, extended back to 1987 using growth rates of estimated employment for the total economy from Statistics Canada unpublished LFS data Feb 2006.

The number of workers for the U.S. business sector from an unpublished series of the U.S. Bureau of Labor Statistics, corresponding to BLS series PRS84006013.

Original table from the CSLS ICT Database - Summary Table 3

Table 4: Software ICT Investment per Worker in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada					U.S.	Canada vs. U.S.	
	Software Investment per Worker in Canadian current dollars	PPP for Machinery and Equipment, US dollar per Canadian dollar	Software Investment per Worker in current U.S.dollars, PPP Adjusted	Exchange Rate, U.S dollar per Canadian dollar	Software Investment per Worker in current U.S.dollars, Exchange Rate Adjusted	Software Investment per Worker in current U.S.dollars	Software Investment per Worker in Canada as a share of Software Investment per Worker in U.S, in per cent	
							PPP Adjusted	Exchange Rate Adjusted
	A	B	C=A*B	D	E=A*D	F	G=C/F*100	H=E/F*100
1987	\$247	n.a	n.a	0.75	\$186	\$313	n.a	59.3
1988	298	n.a	n.a	0.81	242	359	n.a	67.6
1989	329	n.a	n.a	0.84	278	430	n.a	64.6
1990	370	n.a	n.a	0.86	317	485	n.a	65.4
1991	392	n.a	n.a	0.87	342	556	n.a	61.6
1992	405	0.83	\$336	0.83	335	603	55.8	55.6
1993	496	0.81	402	0.78	385	656	61.3	58.6
1994	566	0.78	442	0.73	415	674	65.5	61.5
1995	556	0.78	433	0.73	405	716	60.5	56.5
1996	624	0.77	481	0.73	458	803	59.8	57.0
1997	699	0.77	538	0.72	505	983	54.7	51.4
1998	778	0.74	576	0.67	524	1,112	51.8	47.2
1999	797	0.76	606	0.67	537	1,346	45.0	39.9
2000	820	0.78	640	0.67	552	1,529	41.9	36.1
2001	888	0.77	684	0.65	574	1,529	44.7	37.5
2002	852	0.78	\$665	0.64	544	1,502	44.3	36.2
2003	797	0.83	662	0.71	569	1,539	43.0	37.0
2004	837	0.86	720	0.77	644	1,622	44.4	39.7
2005	872	0.89	776	0.83	720	1,686	46.0	42.7
2006	890	0.92	818	0.88	783	1,737	47.1	45.1
	Average Annual Growth Rate							
87-95	10.69	n.a	n.a	-0.43	10.22	10.88	n.a	-0.60
95-00	8.10	0.00	8.10	-1.57	6.41	16.37	-8.05	-8.98
00-06	1.36	n.a	n.a	4.57	5.99	2.15	n.a	3.75
87-06	6.99	n.a	n.a	0.82	7.86	9.43	n.a	-1.44

Source: PPP from Statistics Canada, Purchasing Power Parities and Real Expenditures, United States and Canada, Item Catalogue no. 13-604-MIB no.53, 2007.

Exchange rate from Statistics Canada, CANSIM II Table 16-0049 V37694.

Software Investment for the U.S.business sector from BEA. National Economic Accounts: Table 2.7.

Software Investment for the Canadian business sector from Statistics Canada unpublished data.

The number of workers for the Canadian business sector from the Productivity Program, Statistics Canada. CANSIM series v15857247 for 1997-2005, extended back to 1987 using growth rates of estimated employment for the total economy from Statistics Canada unpublished LFS data Feb 2006.

The number of workers for the U.S. business sector from an unpublished series of the U.S. Bureau of Labor Statistics, corresponding to BLS series PRS84006013.

Original table from the CSLS ICT Database - Summary Table 3

Table 5: Total ICT Investment as a share of GDP in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	ICT Investment, billions of current Canadian dollars	GDP at market price, billions of current Canadian dollars	ICT Investment as a share of GDP, per cent	ICT Investment, billions of current U.S. dollars	GDP at market price, billions of current U.S. dollars	ICT Investment as a share of GDP, per cent	ICT Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$9.0	\$428	2.10	\$104	\$3,670	2.83	74.0
1988	9.5	468	2.02	116	3,949	2.94	68.8
1989	10.5	502	2.10	129	4,243	3.03	69.1
1990	10.9	510	2.14	131	4,463	2.94	72.6
1991	10.7	504	2.12	135	4,569	2.96	71.7
1992	11.9	510	2.32	148	4,840	3.05	76.2
1993	12.4	532	2.33	161	5,096	3.15	73.8
1994	13.9	570	2.43	177	5,444	3.25	74.8
1995	14.4	605	2.39	204	5,701	3.57	66.9
1996	15.7	630	2.49	228	6,057	3.77	66.0
1997	18.8	673	2.80	269	6,472	4.15	67.4
1998	22.0	700	3.14	298	6,827	4.37	71.8
1999	24.1	759	3.17	348	7,243	4.80	66.0
2000	26.7	840	3.18	402	7,667	5.24	60.7
2001	26.6	862	3.08	370	7,841	4.72	65.4
2002	25.4	895	2.84	329	8,041	4.10	69.5
2003	24.8	942	2.63	331	8,412	3.93	66.9
2004	26.5	1,004	2.64	348	8,988	3.87	68.1
2005	27.2	1,067	2.55	369	9,603	3.84	66.3
2006	28.3	1,119	2.53	388	10,193	3.81	66.3
	Average Annual Growth Rate						
87-95	6.13	4.42	1.63	8.76	5.66	2.93	-1.26
95-00	13.07	6.79	5.88	14.55	6.11	7.96	-1.93
00-06	0.96	4.90	-3.76	-0.56	4.86	-5.17	1.49
87-06	6.23	5.19	0.98	7.18	5.52	1.57	-0.58

Source: GDP at market price in the Canadian business sector from Statistics Canada, CANSIM II: V31185389 .

GDP at market price for the U.S business sector from BEA National Economic Accounts : Table 1.3.5.

ICT Investment for Canadian business sector from Statistics Canada unpublished data.

ICT Investment for U.S. business sector from B.E.A. National Economic Accounts: Table 2.7.

Note: ICT Investment in Canada and U.S. includes investment in computers and peripheral equipment, software including own account software and communication equipment.

Original table from the CSLS ICT Database - Summary Table 9

Table 6: Computer ICT Investment as a share of GDP in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	Computers Investment, billions of current Canadian dollars	GDP at market price, billions of current Canadian dollars	Computers Investment as a share of GDP, per cent	Computers Investment, billions of current U.S. dollars	GDP at market price, billions of current U.S. dollars	Computers Investment as a share of GDP, per cent	Computers Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$3.8	\$428	0.88	\$35.8	\$3,670	0.98	90.6
1988	3.17	468	0.68	38.0	3,949	0.96	70.3
1989	3.49	502	0.70	43.1	4,243	1.02	68.5
1990	3.15	510	0.62	38.6	4,463	0.86	71.3
1991	2.95	504	0.59	37.7	4,569	0.83	71.0
1992	3.64	510	0.71	43.6	4,840	0.90	79.3
1993	3.47	532	0.65	47.5	5,096	0.93	70.0
1994	4.33	570	0.76	51.9	5,444	0.95	79.8
1995	4.94	605	0.82	65.5	5,701	1.15	71.1
1996	5.07	630	0.80	72.1	6,057	1.19	67.6
1997	5.89	673	0.88	81.1	6,472	1.25	69.9
1998	7.98	700	1.14	86.9	6,827	1.27	89.6
1999	8.47	759	1.12	95.7	7,243	1.32	84.4
2000	9.09	840	1.08	101.2	7,667	1.32	82.0
2001	7.74	862	0.90	85.2	7,841	1.09	82.6
2002	7.91	895	0.88	77.1	8,041	0.96	92.2
2003	8.06	942	0.86	77.5	8,412	0.92	92.8
2004	8.29	1,004	0.83	80.1	8,988	0.89	92.7
2005	8.43	1,067	0.79	88.7	9,603	0.92	85.5
2006	8.15	1,119	0.73	91.1	10,193	0.89	81.5
	Average Annual Growth Rate						
87-95	3.40	4.42	-0.98	7.84	5.66	2.07	-2.99
95-00	12.99	6.79	5.80	9.09	6.11	2.81	2.91
00-06	-1.81	4.90	-6.40	-1.74	4.86	-6.29	-0.11
87-06	4.13	5.19	-1.01	5.04	5.52	-0.46	-0.56

Source: GDP at market price in the Canadian business sector from Statistics Canada, CANSIM II: V31185389 .

GDP at market price for the U.S business sector from BEA National Economic Accounts : Table 1.3.5.

Computers Investment for Canadian business sector from Statistics Canada unpublished data.

Computers Investment for U.S. business sector from B.E.A. National Economic Accounts: Table 2.7.

Original table from the CSLS ICT Database - Summary Table 10

Table 7: Communications ICT Investment as a share of GDP in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	Communications Investment, billions of current Canadian dollars	GDP at market price, billions of current Canadian dollars	Communications Investment as a share of GDP, per cent	Communications Investment, billions of current U.S. dollars	GDP at market price, billions of current U.S. dollars	Communications Investment as a share of GDP, per cent	Communications Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$2.7	\$428	0.63	\$39.2	\$3,670	1.07	59.3
1988	3.2	468	0.68	43.7	3,949	1.11	61.5
1989	3.5	502	0.70	43.6	4,243	1.03	68.4
1990	3.8	510	0.75	45.2	4,463	1.01	73.6
1991	3.6	504	0.72	43.7	4,569	0.96	74.8
1992	4.0	510	0.78	46.2	4,840	0.95	82.1
1993	3.7	532	0.70	48.7	5,096	0.96	72.9
1994	3.5	570	0.61	56.8	5,444	1.04	58.5
1995	3.5	605	0.57	63.5	5,701	1.11	51.4
1996	3.7	630	0.60	70.8	6,057	1.17	50.9
1997	5.1	673	0.76	80.0	6,472	1.24	61.3
1998	5.0	700	0.72	87.4	6,827	1.28	55.9
1999	6.1	759	0.81	99.3	7,243	1.37	58.7
2000	7.6	840	0.90	124.1	7,667	1.62	55.9
2001	7.9	862	0.92	110.1	7,841	1.40	65.5
2002	6.8	895	0.76	84.5	8,041	1.05	72.1
2003	6.4	942	0.68	81.8	8,412	0.97	70.4
2004	7.2	1,004	0.72	85.0	8,988	0.95	76.3
2005	7.1	1,067	0.67	86.2	9,603	0.90	74.4
2006	8.1	1,119	0.72	93.9	10,193	0.92	78.4
	Average Annual Growth Rate						
87-95	3.13	4.42	-1.24	6.22	5.66	0.53	-1.75
95-00	17.00	6.79	9.56	14.34	6.11	7.76	1.67
00-06	1.05	4.90	-3.67	-4.54	4.86	-8.97	5.81
87-06	5.93	5.19	0.70	4.70	5.52	-0.78	1.49

Source: GDP at market price in the Canadian business sector from Statistics Canada, CANSIM II: V31185389 .

GDP at market price for the U.S business sector from BEA National Economic Accounts : Table 1.3.5.

Communications Investment for Canadian business sector from Statistics Canada unpublished data.

Communications Investment for U.S. business sector from B.E.A. National Economic Accounts: Table 2.7.

Original table from the CSLS ICT Database - Summary Table 11

Table 8: Software ICT Investment as a share of GDP in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	Software Investment, billions of current Canadian dollars	GDP at market price, billions of current Canadian dollars	Software Investment as a share of GDP, per cent	Software Investment, billions of current U.S. dollars	GDP at market price, billions of current U.S. dollars	Software Investment as a share of GDP, per cent	Software Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$2.5	\$428	0.58	\$29.0	\$3,670	0.79	73.6
1988	3.10	468	0.66	34.2	3,949	0.87	76.4
1989	3.50	502	0.70	41.9	4,243	0.99	70.6
1990	3.96	510	0.78	47.6	4,463	1.07	72.8
1991	4.12	504	0.82	53.7	4,569	1.18	69.7
1992	4.22	510	0.83	57.9	4,840	1.20	69.1
1993	5.19	532	0.98	64.3	5,096	1.26	77.4
1994	6.05	570	1.06	68.3	5,444	1.25	84.6
1995	6.04	605	1.00	74.6	5,701	1.31	76.3
1996	6.85	630	1.09	85.5	6,057	1.41	77.1
1997	7.84	673	1.17	107.5	6,472	1.66	70.2
1998	8.96	700	1.28	124.0	6,827	1.82	70.5
1999	9.47	759	1.25	152.6	7,243	2.11	59.2
2000	10.00	840	1.19	176.2	7,667	2.30	51.8
2001	10.93	862	1.27	174.7	7,841	2.23	56.9
2002	10.76	895	1.20	167.7	8,041	2.09	57.7
2003	10.26	942	1.09	171.4	8,412	2.04	53.4
2004	10.95	1,004	1.09	183.0	8,988	2.04	53.6
2005	11.61	1,067	1.09	193.8	9,603	2.02	53.9
2006	12.03	1,119	1.08	203.3	10,193	1.99	53.9
	Average Annual Growth Rate						
87-95	11.74	4.42	7.00	12.54	5.66	6.51	0.46
95-00	10.61	6.79	3.57	18.76	6.11	11.92	-7.46
00-06	3.13	4.90	-1.69	2.41	4.86	-2.33	0.66
87-06	8.65	5.19	3.29	10.79	5.52	4.99	-1.62

Source: GDP at market price in the Canadian business sector from Statistics Canada, CANSIM II: V31185389 .

GDP at market price for the U.S business sector from BEA National Economic Accounts : Table 1.3.5.

Software Investment for Canadian business sector from Statistics Canada unpublished data.

Software Investment for U.S. business sector from B.E.A. National Economic Accounts: Table 2.7.

Original table from the CSLS ICT Database - Summary Table 12

Table 9: Total ICT Investment as a share of Total Investment in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	Total ICT Investment, millions of current Canadian dollars	Total Investment, millions of current Canadian dollars	Total ICT Investment as a share of Total Investment, per cent	Total ICT Investment, millions of current U.S. dollars	Total Investment, millions of current U.S. dollars	Total ICT Investment as a share of Total Investment, per cent	Total ICT Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$8,974	\$68,064	13.19	\$104,000	\$518,400	20.06	65.7
1988	9,464	79,274	11.94	115,900	557,800	20.78	57.5
1989	10,512	85,527	12.29	128,600	599,900	21.44	57.3
1990	10,917	85,063	12.83	131,400	618,400	21.25	60.4
1991	10,680	79,859	13.37	135,100	590,800	22.87	58.5
1992	11,861	73,093	16.23	147,700	602,800	24.50	66.2
1993	12,364	73,371	16.85	160,500	664,700	24.15	69.8
1994	13,863	82,977	16.71	177,000	728,200	24.31	68.7
1995	14,444	86,994	16.60	203,600	811,300	25.10	66.2
1996	15,670	91,057	17.21	228,400	881,200	25.92	66.4
1997	18,824	111,121	16.94	268,600	971,200	27.66	61.3
1998	21,956	119,289	18.41	298,300	1,056,100	28.25	65.2
1999	24,056	125,566	19.16	347,600	1,136,000	30.60	62.6
2000	26,694	132,891	20.09	401,500	1,234,000	32.54	61.7
2001	26,598	133,879	19.87	370,000	1,174,400	31.51	63.1
2002	25,447	129,836	19.60	329,300	1,064,600	30.93	63.4
2003	24,762	134,139	18.46	330,700	1,074,200	30.79	60.0
2004	26,484	146,466	18.08	348,100	1,146,800	30.35	59.6
2005	27,150	160,775	16.89	368,700	1,265,100	29.14	57.9
2006	28,272	174,755	16.18	388,300	1,391,600	27.90	58.0
	Average Annual Growth Rate						
87-95	6.13	3.11	2.92	8.76	5.76	2.84	0.08
95-00	13.07	8.84	3.88	14.55	8.75	5.33	-1.38
00-06	0.96	4.67	-3.54	-0.56	2.02	-2.53	-1.04
87-06	6.23	5.09	1.08	7.18	5.33	1.75	-0.66

Source: CSLS ICT Database Table 1v and 18v

Original table from the CSLS ICT Database - Summary Table 13

Table 10: Computer ICT Investment as a share of Total Investment in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	Computer ICT Investment, millions of current Canadian dollars	Total Investment, millions of current Canadian dollars	Computer ICT Investment as a share of Total Investment, per cent	Computer ICT Investment, millions of current U.S. dollars	Total Investment, millions of current U.S. dollars	Computer ICT Investment as a share of Total Investment, per cent	Computer ICT Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$3,780	\$68,064	5.55	\$35,800	\$518,400	6.91	80.4
1988	3,172	79,274	4.00	38,000	557,800	6.81	58.7
1989	3,493	85,527	4.08	43,100	599,900	7.18	56.8
1990	3,146	85,063	3.70	38,600	618,400	6.24	59.3
1991	2,950	79,859	3.69	37,700	590,800	6.38	57.9
1992	3,643	73,093	4.98	43,600	602,800	7.23	68.9
1993	3,470	73,371	4.73	47,500	664,700	7.15	66.2
1994	4,333	82,977	5.22	51,900	728,200	7.13	73.3
1995	4,938	86,994	5.68	65,500	811,300	8.07	70.3
1996	5,070	91,057	5.57	72,100	881,200	8.18	68.0
1997	5,888	111,121	5.30	81,100	971,200	8.35	63.5
1998	7,983	119,289	6.69	86,900	1,056,100	8.23	81.3
1999	8,469	125,566	6.74	95,700	1,136,000	8.42	80.1
2000	9,094	132,891	6.84	101,200	1,234,000	8.20	83.4
2001	7,737	133,879	5.78	85,200	1,174,400	7.25	79.7
2002	7,905	129,836	6.09	77,100	1,064,600	7.24	84.1
2003	8,056	134,139	6.01	77,500	1,074,200	7.21	83.2
2004	8,290	146,466	5.66	80,100	1,146,800	6.98	81.0
2005	8,427	160,775	5.24	88,700	1,265,100	7.01	74.8
2006	8,150	174,755	4.66	91,100	1,391,600	6.55	71.2
	Average Annual Growth Rate						
87-95	3.40	3.11	0.27	7.84	5.76	1.97	-1.67
95-00	12.99	8.84	3.81	9.09	8.75	0.31	3.49
00-06	-1.81	4.67	-6.19	-1.74	2.02	-3.69	-2.60
87-06	4.13	5.09	-0.92	5.04	5.33	-0.28	-0.64

Source: CSLS ICT Database Table 2v and 19v

Original table from the CSLS ICT Database - Summary Table 14

Table 11: Communications ICT Investment as a share of Total Investment in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	Communications ICT Investment, millions of current Canadian dollars	Total Investment, millions of current Canadian dollars	Communications ICT Investment as a share of Total Investment, per cent	Communications ICT Investment, millions of current U.S. dollars	Total Investment, millions of current U.S. dollars	Communications ICT Investment as a share of Total Investment, per cent	Communications ICT Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$2,708	\$68,064	3.98	\$39,200	\$518,400	7.56	52.6
1988	3,191	79,274	4.02	43,700	557,800	7.83	51.4
1989	3,525	85,527	4.12	43,600	599,900	7.27	56.7
1990	3,806	85,063	4.47	45,200	618,400	7.31	61.2
1991	3,605	79,859	4.51	43,700	590,800	7.40	61.0
1992	3,998	73,093	5.47	46,200	602,800	7.66	71.4
1993	3,705	73,371	5.05	48,700	664,700	7.33	68.9
1994	3,481	82,977	4.20	56,800	728,200	7.80	53.8
1995	3,465	86,994	3.98	63,500	811,300	7.83	50.9
1996	3,748	91,057	4.12	70,800	881,200	8.03	51.2
1997	5,097	111,121	4.59	80,000	971,200	8.24	55.7
1998	5,013	119,289	4.20	87,400	1,056,100	8.28	50.8
1999	6,113	125,566	4.87	99,300	1,136,000	8.74	55.7
2000	7,598	132,891	5.72	124,100	1,234,000	10.06	56.9
2001	7,933	133,879	5.93	110,100	1,174,400	9.38	63.2
2002	6,781	129,836	5.22	84,500	1,064,600	7.94	65.8
2003	6,447	134,139	4.81	81,800	1,074,200	7.61	63.1
2004	7,242	146,466	4.94	85,000	1,146,800	7.41	66.7
2005	7,118	160,775	4.43	86,200	1,265,100	6.81	65.0
2006	8,088	174,755	4.63	93,900	1,391,600	6.75	68.6
	Average Annual Growth Rate						
87-95	3.13	3.11	0.02	6.22	5.76	0.43	-0.41
95-00	17.00	8.84	7.50	14.34	8.75	5.14	2.24
00-06	1.05	4.67	-3.46	-4.54	2.02	-6.43	3.18
87-06	5.93	5.09	0.80	4.70	5.33	-0.60	1.41

Source: CSLS ICT Database Table 3v and 20v

Original table from the CSLS ICT Database - Summary Table 15

Table 12: Software ICT Investment as a share of Total Investment in the Business Sector in Canada and the United States, current dollars, 1987-2006

	Canada			United States			Canada VS. U.S.
	Software ICT Investment, millions of current Canadian dollars	Total Investment, millions of current Canadian dollars	Software ICT Investment as a share of Total Investment, per cent	Software ICT Investment, millions of current U.S. dollars	Total Investment, millions of current U.S. dollars	Software ICT Investment as a share of Total Investment, per cent	Software ICT Investments share: Canada / U.S, per cent
	A	B	C=A/B*100	D	E	F=D/E*100	G=C/F*100
1987	\$2,487	\$68,064	3.65	\$29,000	\$518,400	5.59	65.3
1988	3,102	79,274	3.91	34,200	557,800	6.13	63.8
1989	3,495	85,527	4.09	41,900	599,900	6.98	58.5
1990	3,964	85,063	4.66	47,600	618,400	7.70	60.5
1991	4,125	79,859	5.17	53,700	590,800	9.09	56.8
1992	4,220	73,093	5.77	57,900	602,800	9.61	60.1
1993	5,190	73,371	7.07	64,300	664,700	9.67	73.1
1994	6,049	82,977	7.29	68,300	728,200	9.38	77.7
1995	6,042	86,994	6.95	74,600	811,300	9.20	75.5
1996	6,852	91,057	7.53	85,500	881,200	9.70	77.6
1997	7,838	111,121	7.05	107,500	971,200	11.07	63.7
1998	8,961	119,289	7.51	124,000	1,056,100	11.74	64.0
1999	9,474	125,566	7.55	152,600	1,136,000	13.43	56.2
2000	10,002	132,891	7.53	176,200	1,234,000	14.28	52.7
2001	10,928	133,879	8.16	174,700	1,174,400	14.88	54.9
2002	10,761	129,836	8.29	167,700	1,064,600	15.75	52.6
2003	10,259	134,139	7.65	171,400	1,074,200	15.96	47.9
2004	10,952	146,466	7.48	183,000	1,146,800	15.96	46.9
2005	11,605	160,775	7.22	193,800	1,265,100	15.32	47.1
2006	12,035	174,755	6.89	203,300	1,391,600	14.61	47.1
	Average Annual Growth Rate						
87-95	11.74	3.11	8.36	12.54	5.76	6.41	1.83
95-00	10.61	8.84	1.62	18.76	8.75	9.20	-6.94
00-06	3.13	4.67	-1.47	2.41	2.02	0.38	-1.84
87-06	8.65	5.09	3.39	10.79	5.33	5.18	-1.70

Source: CSLS ICT Database Table 4v and 21v

Original table from the CSLS ICT Database - Summary Table 16

Table 13: Comparison of Canada-U.S. Total ICT Investment per Worker and Capital Stock per Worker by Industry, U.S. current dollars (Market Exchange Rate Adjusted), 2006

	Investment per Worker			Capital Stock per Worker		
	Total ICT Investment per Worker in Canada	Total ICT Investment per Worker in the United States	Total ICT Investment per Worker share: Canada/U.S., per cent	Total ICT Capital Stock per Worker in Canada	Total ICT Capital Stock per Worker in the United States	Total Capital Stock per Worker share: Canada/U.S., per cent
	A	B	C=A/B*100	D	E	F=D/E*100
Business Sector	1,842	3,317	55.5	3,925	9,513	41.3
Agriculture Forestry Fishing and Hunting	274	399	68.7	570	988	57.7
Utilities	9,169	7,363	124.5	17,089	16,696	102.4
Construction	211	899	23.5	335	2,254	14.9
Manufacturing	1,160	2,923	39.7	2,355	6,979	33.7
Wholesale Trade	2,760	5,204	53.0	5,720	14,074	40.6
Retail Trade	586	720	81.4	1,194	2,097	56.9
Transportation and Warehousing	2,064	3,665	56.3	4,123	15,698	26.3
Information and Cultural Industries	14,704	16,686	88.1	38,180	70,814	53.9
Finance and Insurance	5,266	6,283	83.8	10,759	14,209	75.7
Real Estate Rental and Leasing	6,529	6,911	94.5	12,335	18,789	65.6
Professional Scientific and Technical Services	2,085	7,823	26.7	3,995	17,893	22.3
Administrative and Support	436	2,323	18.8	1,254	6,525	19.2
Educational Services	735	341	215.9	1,406	696	202.0
Health Care and Social Assistance	309	996	31.0	642	2,450	26.2
Arts Entertainment and Recreation	1,226	487	251.7	2,089	1,722	121.3
Accommodation and Food Services	172	367	46.7	312	945	33.0
Other Services(except Public. Admin.)	590	426	138.7	1,414	1,171	120.7
Public Administration	3,744	n.a	n.a.	8,494	n.a	n.a.

Source: CSLS ICT Database Table 9a-w to 12a-w and Table 26a-w to Table 29a-w

Note: 1, ICT Investment in Canada and U.S. includes investment in computers and peripheral equipment, software including own account software and communication equipment.

2 Data for Mining and Oil and Gas Extraction have been dropped due to the underestimated ICT assets in these two industries for Canada.

Original table from the CSLS ICT Database - Summary Table 17

Table 14: Comparison of Canada-U.S. Computer ICT Investment per Worker and Capital Stock per Worker by Industry, U.S. current dollars (Market Exchange Rate Adjusted), 2006

	Investment per Worker			Capital Stock per Worker		
	Computer ICT Investment per Worker in Canada	Computer ICT Investment per Worker in the United States	Computer ICT Investment per Worker share: Canada/U.S., per cent	Computer ICT Capital Stock per Worker in Canada	Computer ICT Capital Stock per Worker in the United States	Computer ICT Capital Stock per Worker share: Canada/U.S., per cent
	A	B	C=A/B*100	D	E	F=D/E*100
Business Sector	531	778	68.2	830	1,482	56.0
Agriculture Forestry Fishing and Hunting	107	127	84.4	168	228	73.9
Mining and Oil and Gas Extraction	700	884	79.3	1,155	1,508	76.6
Utilities	2,710	1,123	241.3	3,878	1,973	196.5
Construction	160	112	143.3	241	213	113.4
Manufacturing	350	464	75.5	556	871	63.8
Wholesale Trade	806	1,863	43.3	1,262	3,431	36.8
Retail Trade	221	244	90.7	362	488	74.2
Transportation and Warehousing	534	735	72.6	823	613	134.4
Information and Cultural Industries	1,490	1,787	83.3	2,272	3,425	66.3
Finance and Insurance	1,499	2,785	53.8	2,355	5,307	44.4
Real Estate Rental and Leasing	2,928	4,185	70.0	4,502	8,199	54.9
Professional Scientific and Technical Services	948	1,257	75.4	1,512	2,329	64.9
Management of Companies and Enterprises	9,200	24,936	36.9	15,186	48,968	31.0
Administrative and Support	311	455	68.4	505	856	59.0
Educational Services	350	83	419.8	564	154	366.7
Health Care and Social Assistance	130	238	54.4	211	457	46.1
Arts Entertainment and Recreation	742	204	363.1	1,044	416	250.9
Accommodation and Food Services	87	84	103.7	135	163	82.9
Other Services(except Public. Admin.)	209	99	209.6	350	201	173.6
Public Administration	817	n.a	n.a.	1,343	n.a	n.a.

Source: CSLS ICT Database Table 9a-w to 12a-w and Table 26a-w to Table 29a-w

Note: Data for Mining and Oil and Gas Extraction have been dropped due to the underestimated ICT assets in these two industries for Canada.

Original table from the CSLS ICT Database - Summary Table 18

Table 15: Comparison of Canada-U.S. Communications ICT Investment per Worker and Capital Stock per Worker by Industry, U.S. current dollars (Market Exchange Rate Adjusted), 2006

	Investment per Worker			Capital Stock per Worker		
	Communications ICT Investment per Worker in Canada	Communications ICT Investment per Worker in the United States	Communications ICT Investment per Worker share: Canada/U.S., per cent	Communications ICT Capital Stock per Worker in Canada	Communications ICT Capital Stock per Worker in the United States	Communications ICT Capital Stock per Worker share: Canada/U.S., per cent
	A	B	C=A/B*100	D	E	F=D/E*100
Business Sector	527	802	65.7	1,341	4,507	29.7
Agriculture Forestry Fishing and Hunting	75	81	93.2	196	419	46.6
Mining and Oil and Gas Extraction	397	306	129.8	890	1,838	48.4
Utilities	n.a	668	n.a.	n.a	4,738	n.a.
Construction	n.a	231	n.a.	n.a	1,123	n.a.
Manufacturing	127	132	96.5	285	963	29.6
Wholesale Trade	186	1,538	12.1	438	7,443	5.9
Retail Trade	47	215	21.9	108	1,158	9.3
Transportation and Warehousing	417	2,157	19.3	900	13,496	6.7
Information and Cultural Industries	10,557	9,966	105.9	29,025	57,183	50.8
Finance and Insurance	626	415	151.0	1,437	2,642	54.4
Real Estate Rental and Leasing	732	1,720	42.5	1,675	8,840	19.0
Professional Scientific and Technical Services	616	773	79.7	1,359	3,641	37.3
Management of Companies and Enterprises	1,402	7,701	18.2	3,450	44,223	7.8
Administrative and Support	n.a	671	n.a.	183	3,273	5.6
Educational Services	35	16	223.9	99	95	103.8
Health Care and Social Assistance	28	160	17.6	66	842	7.9
Arts Entertainment and Recreation	92	207	44.6	252	1,133	22.3
Accommodation and Food Services	n.a	106	n.a.	n.a	489	n.a.
Other Services(except Public. Admin.)	n.a	59	n.a.	130	414	31.4
Public Administration	537	n.a	n.a.	1,514	n.a	n.a.

Source: CSLS ICT Database Table 9a-w to 12a-w and Table 26a-w to Table 29a-w

Note: Data for Mining and Oil and Gas Extraction have been dropped due to the underestimated ICT assets in these two industries for Canada.

Original table from the CSLS ICT Database - Summary Table 19

Table 16: Comparison of Canada-U.S. Software ICT Investment per Worker and Capital Stock per Worker by Industry, U.S. current dollars (Market Exchange Rate Adjusted), 2006

	Investment per Worker			Capital Stock per Worker		
	Software ICT Investment per Worker in Canada	Software ICT Investment per Worker in the United States	Software ICT Investment per Worker share: Canada/U.S., per cent	Software ICT Capital Stock per Worker in Canada	Software ICT Capital Stock per Worker in the United States	Software ICT Capital Stock per Worker share: Canada/U.S., per cent
	A	B	C=A/B*100	D	E	F=D/E*100
Business Sector	784	1,737	45.2	1,754	3,523	49.8
Agriculture Forestry Fishing and Hunting	92	192	48.0	206	340	60.6
Mining and Oil and Gas Extraction	585	4,169	14.0	1,175	7,620	15.4
Utilities	n.a	5,573	n.a.	n.a	9,986	n.a.
Construction	51	556	9.2	94	919	10.3
Manufacturing	683	2,328	29.3	1,514	5,144	29.4
Wholesale Trade	1,768	1,803	98.0	4,020	3,200	125.6
Retail Trade	318	260	122.0	724	452	160.2
Transportation and Warehousing	1,113	773	144.1	2,399	1,589	151.0
Information and Cultural Industries	2,657	4,933	53.9	6,883	10,206	67.4
Finance and Insurance	3,141	3,083	101.9	6,967	6,260	111.3
Real Estate Rental and Leasing	2,869	1,006	285.2	6,158	1,750	351.8
Professional Scientific and Technical Services	522	5,793	9.0	1,125	11,922	9.4
Management of Companies and Enterprises	11,330	76,643	14.8	26,896	167,803	16.0
Administrative and Support	247	1,197	20.6	566	2,397	23.6
Educational Services	351	242	145.1	743	447	166.2
Health Care and Social Assistance	151	598	25.3	364	1,151	31.7
Arts Entertainment and Recreation	392	75	520.2	792	173	458.9
Accommodation and Food Services	n.a	178	n.a.	n.a	293	n.a.
Other Services(except Public. Admin.)	382	267	142.6	934	556	168.0
Public Administration	2,389	n.a	n.a.	5,637	n.a	n.a.

Source: CSLS ICT Database Table 9a-w to 12a-w and Table 26a-w to Table 29a-w

Note: Data for Mining and Oil and Gas Extraction have been dropped due to the underestimated ICT assets in these two industries for Canada.

Original table from the CSLS ICT Database - Summary Table 20

Table 17: Comparison of Canada-U.S. Average Annual Deflator Growth for Total ICT, Computer ICT, Communications ICT and Software ICT Investment by industry, 1987-2006

	Total ICT Investment Deflator Growth, 1987-2006*		Computer ICT Investment Deflator Growth, 1987-2006		Communications ICT Investment Deflator Growth, 1987-2006		Software ICT Investment Deflator Growth, 1987-2006	
	Canada	United States	Canada	United States	Canada	United States	Canada	United States
Business Sector	-6.24	-5.94	-14.45	-15.09	-2.03	-2.15	-2.54	-1.70
Agriculture Forestry Fishing and Hunting	-6.60	-7.38	-14.48	-15.30	-2.03	-2.22	-2.58	-4.76
Mining and Oil and Gas Extraction	-2.99	-5.46	-14.48	-15.54	-2.03	-2.15	-2.09	-1.88
Utilities	-9.40	-6.63	n.a	-16.48	n.a	-2.15	n.a	-2.47
Construction	-10.74	-4.17	-14.48	-13.94	n.a	-2.65	-3.23	-2.54
Manufacturing	-7.47	-4.70	-14.48	-15.14	-2.03	-2.15	-2.37	-1.14
Wholesale Trade	-6.56	-8.62	-14.48	-14.57	-2.01	-2.15	-2.62	-2.57
Retail Trade	-7.23	-5.85	-14.48	-13.26	-2.03	-2.15	-2.67	-3.48
Transportation and Warehousing	-6.45	-2.84	-14.48	-11.05	-2.03	-2.15	-2.20	-1.61
Information and Cultural Industries	-2.59	-4.86	-14.07	-15.38	-2.03	-2.15	-2.13	-1.82
Finance and Insurance	-6.54	-10.23	-14.48	-15.77	-2.03	-2.15	-2.44	-1.76
Real Estate Rental and Leasing	-7.91	-11.66	-14.48	-14.98	-2.03	-2.15	-2.85	-3.07
Professional Scientific and Technical Services	-10.61	-4.43	-14.48	-15.24	-2.03	-2.15	-3.48	-0.92
Management of Companies and Enterprises	-6.93	-5.83	-14.55	-15.08	n.a	-2.15	-2.45	-1.03
Administrative and Support	-12.58	-5.43	-14.48	-15.26	n.a	-2.16	n.a	-2.24
Educational Services	-8.41	-7.66	-14.48	-16.32	-2.03	-2.15	-3.12	-2.99
Health Care and Social Assistance	-9.38	-5.34	-14.48	-14.03	n.a	-2.15	n.a	-2.23
Arts Entertainment and Recreation	-8.13	-7.07	-14.48	-13.73	-2.03	-2.11	-2.77	-0.88
Accommodation and Food Services	-8.59	-4.33	-14.48	-12.56	n.a.	-2.14	n.a.	-3.44
Other Services(except Public. Admin.)	-8.44	-5.26	-14.48	-14.02	n.a	-2.15	-3.48	-1.44
Public Administration	-5.68	n.a.	-14.48	n.a.	-2.03	n.a.	-2.57	n.a.

Source: CSLS ICT Database Tables 17a-w and Tables 34-a-w

Note: Data for Mining and Oil and Gas Extraction have been dropped due to the underestimated ICT assets in this industry for Canada.

*Data for Canada for total ICT investment is for 1987-2005 as real total ICT investment in Canada is not available for 2006, and therefore the deflator can not be calculated for 2006.

Original table from the CSLS ICT Database - Summary Table 29

Table 18: Purchasing Power Parity Estimates for Machinery and Equipment Beyond 2005

	Canada			United States			PPP for M&E, US dollars per Canadian dollar		
	M&E Investment, millions of current Canadian dollars	M&E Investment, millions of 2002 chained Canadian dollars	Implicit M&E Price Deflator	M&E Investment, millions of current U.S. dollars	M&E Investment, millions of 2000 chained U.S. dollars	Implicit M&E Price Deflator	Official PPP Values*	Official PPP Change	Implicit PPP Change
	A	B	C=A/B*100	D	E	F=D/E*100	G	H = (G _t /G _{t-1} - 1)*100	I=(F _t /F _{t-1} - C _t /C _{t-1})*100
1992	48,676	51,249	95.0	439,600	371,100	118.5	0.83	-	-
1993	48,811	50,233	97.2	489,400	417,400	117.2	0.81	-2.4	-3.3
1994	54,505	54,979	99.1	544,600	467,200	116.6	0.78	-3.7	-2.6
1995	58,370	58,116	100.4	602,800	523,100	115.2	0.78	0.0	-2.5
1996	60,986	61,048	99.9	650,800	578,700	112.5	0.77	-1.3	-1.9
1997	73,490	73,160	100.5	718,300	658,300	109.1	0.77	0.0	-3.5
1998	80,510	79,211	101.6	777,300	745,600	104.3	0.74	-3.9	-5.6
1999	87,155	87,775	99.3	851,700	840,200	101.4	0.76	2.7	-0.5
2000	92,085	93,158	98.8	918,900	918,900	100.0	0.78	2.6	-0.9
2001	91,082	91,340	99.7	854,200	874,200	97.7	0.77	-1.3	-3.2
2002	89,315	89,315	100.0	787,100	820,200	96.0	0.78	1.3	-2.1
2003	90,905	97,751	93.0	800,200	843,100	94.9	0.83	6.4	5.9
2004	94,880	107,205	88.5	856,300	905,100	94.6	0.86	3.6	4.5
2005	101,636	119,160	85.3	937,500	991,800	94.5	0.89	3.5	3.5
2006	105,444	127,997	82.4	992,600	1,050,600	94.5	0.92	-	3.4

Source: PPP from Statistics Canada, Purchasing Power Parities and Real Expenditures, United States and Canada, Item Catalogue no. 13-604-MIB no.53, 2007.

M&E data from Statistics Canada CANSIM II series v1070249 and v4419816 and Bureau of Economic Analysis NIPA Tables 5.3.5 and 5.3.6.

* Official PPP values for 1992-2005. For 2006, the PPP estimate is obtained by applying the implicit PPP growth rate (US-Canada difference in M&E price deflator growth in 2006) to the 2005 PPP.

Original table from the CSLS ICT Database - Summary Table 46