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## Analytical Paper

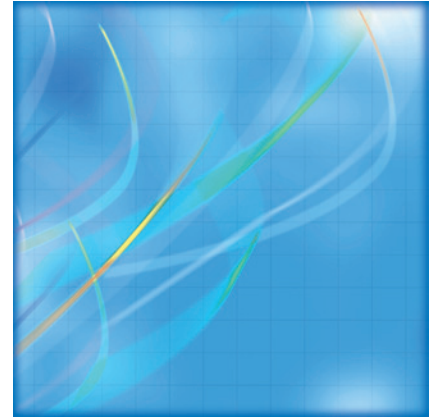
Insights on the Canadian Economy

# A Comparison of GDP Per Capita in Canada and the United States from 1994 to 2005

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## **Note of appreciation**

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

## ***Abstract***

This study examines differences in gross domestic product (GDP) per capita between Canada and the United States from 1994 to 2005. The gap in GDP per capita between the two countries has narrowed slightly over this period. The study decomposed the gap into two components: one due to labour productivity and one due to labour market conditions, and shows that the relative importance of the two changed considerably after 2000. The output gap has narrowed slightly since 2000, primarily because Canada's labour market experienced a faster rate of job growth relative to its population than did the United States.

## ***Executive summary***

This study compares gross domestic product (GDP) per capita in Canada and in the United States from 1994 to 2005. It shows that the amount of economic output per person in Canada is still lower than in the United States, but the gap between the two countries has narrowed since the turn of the millennium. In 2005, Canada's GDP per capita was 84.3% of U.S. GDP per capita, up from the low point of 81.0% in 1998.

This study also examines differences in labour productivity and so-called 'work intensity' between Canada and the United States—two factors that give rise to differences in GDP per capita. Labour productivity is the amount of GDP produced per hour worked, while work intensity is the number of hours worked per capita and comes from the product of two variables—hours worked per job and the number of jobs per capita that are generated by the economy.

The impact of these two factors on relative GDP per capita has been changing over time. Since 2000, labour productivity in Canada has declined compared to levels in the United States, while relative work intensity in Canada has increased dramatically. From 1994 to 1999, hours worked per capita in Canada averaged 88.1% of hours worked per capita in the United States. Since 2000, this gap in work intensity has narrowed substantially. By 2005, hours worked per capita in Canada stood at 94.7% of the U.S. level.

These gains in work intensity have more than offset recent declines in Canada's relative productivity—resulting in slight improvements in Canada's GDP per capita relative to the United States since 2000.

## ***Introduction***

This study examines differences in labour productivity and work intensity between Canada and the United States—two factors that give rise to differences in the level of gross domestic product (GDP) per capita from 1994 to 2005. GDP per capita is an indicator that is often used to measure the standard of living. In this study, labour productivity is measured by the value of GDP produced per hour worked, while work intensity is measured by the number of hours worked per person and is the product of two components—hours worked per job and the number of jobs per capita that are generated by the economy. GDP is converted into a common currency by using purchasing power parity indices.

The data used for this study were developed by Statistics Canada's Canadian Productivity accounts analysts for a special project that explored the data sources and methodology needed to compare productivity levels between Canada and the United States. This study provides an update of a previous study over the period 1994 to 2002.<sup>1</sup> This paper is an extract from a more detailed study *The Comparative Level of GDP per Capita in Canada and the United States: A Decomposition into Labour Productivity and Work Intensity Differences* which focus on a detailed description of all variables related to labour and population estimates used in this project.<sup>2</sup>

The first section presents the analytical framework that was used to compare GDP per capita and its components between the two countries. The second section examines the average Canada-US performance over the entire period. Finally, the last section analyses the trend of these variables from 1994 to 2005. It shows that the amount of economic output per person in Canada is still lower than in the United States, but the gap between the two countries has narrowed since the turn of the millennium; moreover, the relative contribution that differences in work intensity and labour productivity have on the gap in GDP per capita has changed dramatically since 2000.

## ***The analytical framework***

GDP per capita and GDP per hour worked, better known as labour productivity, are often used interchangeably. Some observers will use GDP per capita as an indicator of efficiency or productivity. Others will use output per hour as an indicator of our standard of living. While productivity growth rates are at the heart of changes in our standard of living, they are not the only factor at work. While the summary statistics that are used to inform discussion of these two issues are different, they are related as shown in the following identity:

$$GDP / POP = (GDP / HRS) * (HRS / EMP) * (EMP / POP) \quad (1)$$

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1. See Baldwin, Maynard and Wong, *The Output Gap between Canada and the United States: The Role of Productivity (1994 to 2002)*. Insights on the Canadian Economy. Catalogue no 11-624-MIE2005009. Ottawa, Statistics Canada.

2. See Maynard (2007) for a more detailed description of the principles and methods that were used for this project to select the appropriate data sources and justify the necessary adjustments to produce the variables related to labour and population that are comparable between Canada and the United States.

where GDP is gross domestic product,  
POP is population,  
HRS is hours worked, and  
EMP is jobs or employment.

This identity decomposes GDP per capita (GDPCAP) into the product of labour productivity (GDP/HRS), effort (the hours worked per job [or per employee]), and the per capita employment rate (the ratio of the number of employees [or jobs] to the total population). The equation can be rewritten in the following manner:

$$GDPCAP = PROD * EFFORT * EMPRATE . \quad (2)$$

The amount available for consumption per person in a country (GDPCAP) will be higher when productivity (PROD) is higher, when employees work longer hours (EFFORT), and when a larger proportion of the population is employed (EMPRATE). The variables EFFORT and EMPRATE can also be grouped together in a variable that we refer to here alternately as work or labour intensity, which corresponds to the volume of hours worked per capita.

The comparison is done for the total economy, which consists of the business sector, the imputed rent of owner-occupied dwellings, the government and the non-profit sectors.<sup>3</sup>

Estimates of nominal GDP for the total economy are taken from official estimates (Statistics Canada's System of National Accounts [SNA] and the National Income and Product Accounts [NIPA] Tables of the United States Bureau of Economic Analysis). Both countries generally adhere to the international standards embodied in the SNA (1993) manual (Baldwin et al., 2005). While there are some minor differences, they are not regarded as a major problem for Canada/U.S. comparisons at the level of the total economy.<sup>4</sup>

For comparisons of GDP in Canada and the United States, a deflator must be chosen to allow us to compare estimates of GDP that are produced in different currencies. For the purpose of this paper, the traditional bilateral purchasing power parity indices that are produced by Statistics Canada are used to compare expenditures (Temple, 2007). In this paper, recently revised estimates of these indices are used.<sup>5</sup>

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3. This means that the productivity estimates in this study also refer to the total economy. Statistics Canada normally only produces productivity growth estimates for the business sector because the estimation procedure followed by the National Accounts for the non-business sector (the non-market sector) essentially assumes that productivity in that sector is zero. Cross-country comparisons of labour productivity for the total economy therefore will be affected by the size of the non-market sector. If all countries follow the same assumption of zero productivity in the non-market sector, those countries with larger non-market sectors will have lower labour productivity because of statistical assumptions not because they are necessarily any less productive.
  4. There are differences in specific industries that need to be considered when detailed comparisons are made at the industry level.
  5. These purchasing power parity indices (PPPs) have been revised to take into account new data for the government sector that the Americans recently released.

The ratios needed for Equation (2) are estimated for the period 1994 to 2005 and presented in Table 1. These include GDP per capita, labour productivity and work intensity for Canada relative to the United States (U.S.=100). To analyse more precisely some key factors of the standard of living, the work intensity variable is divided into three components—the number of hours per job, the number of jobs per participant of the potential labour force and the potential labour force relative to the overall population.

The potential labour force is defined as those who are aged 15 years and over. While it might be argued that the elderly should be excluded from this definition, it is difficult to choose a particular age (i.e., 65 years old) when we arbitrarily designate individuals as unemployable. Choosing a lower bound is facilitated by mandated education requirements.

## *Empirical analysis for the whole period*

**Table 1**  
**Decomposition of gross domestic product (GDP) per capita: Canada relative to the United States – Canada as percentage of United States**

Years	GDP per capita	Labour productivity	Work intensity	Work intensity		
				Hours worked per job	Ratio of jobs to population aged 15 years and over	Ratio of population aged 15 years and over to population
1994	82.3	92.6	88.8	96.0	90.7	101.9
1995	83.1	93.9	88.6	96.3	90.1	102.0
1996	82.0	93.2	88.0	96.2	89.5	102.1
1997	81.4	93.2	87.3	95.6	89.3	102.3
1998	81.0	92.6	87.5	95.3	89.7	102.4
1999	81.6	92.2	88.5	95.2	90.6	102.7
2000	83.3	94.1	88.4	94.5	91.0	102.9
2001	84.3	94.0	89.7	94.7	91.9	103.1
2002	85.6	92.6	92.5	94.3	95.0	103.2
2003	85.1	90.3	94.2	94.0	96.9	103.4
2004	84.6	88.6	95.5	94.6	97.4	103.6
2005	84.3	89.0	94.7	93.9	97.0	104.0
<b>Average sub-period</b>						
1994 to 1999	81.9	93.0	88.1	95.8	90.0	102.2
2000 to 2005	84.5	91.4	92.5	94.3	94.9	103.4
1994 to 2005	83.2	92.2	90.3	95.1	92.4	102.8

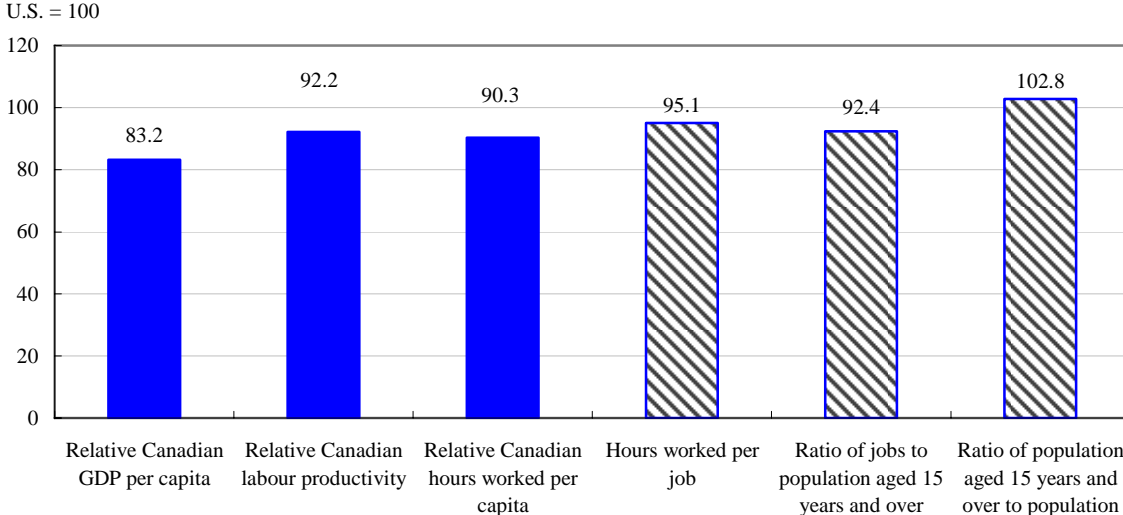
1. Canada as percentage of United States. United States = 100.  
Source: Statistics Canada, Canadian Productivity Accounts.

The period from 1994 to 2005 that is covered in this study has been chosen because comparable Canada-U.S. data on hours worked per job can only be constructed for this period. For this comparison, Canadian Productivity Accounts (CPA) analysts have used data on hours worked per job from household surveys. This data has only become truly comparable since 1994. That year, the *Bureau of Labor Statistics* adopted a similar set of questions as Statistics Canada to collect data on working time.

Over the entire period, the level of GDP per capita in Canada averaged only 83.2% of GDP per capita in the United States (Figure 1). In other words, the output gap in favour of the United States was 16.8% in terms of the GDP per capita. But the gap between Canada and the United States in labour productivity was much less—at only 7.8% of the U.S. productivity level. This means that the average difference in labour productivity over this period accounted for 45% of the total percentage point difference in the GDP per capita of the two countries. That is, if work intensity was the same in the two countries, more than half of the difference in GDP per capita would disappear. Over this period, hours worked per capita in Canada were only 90.3% of the hours worked per capita in the United States.

When this variable is decomposed into the three components mentioned above, substantial differences between Canada and the United States can be found in each of the two former areas. Over the period 1994 to 2005, the hours worked per job figure in Canada was only 95.1% of hours worked per job in the United States. Jobs per potential member of the labour force in Canada averaged 92.4% of the United States job rate. The relative Canada/U.S. labour force ratios—the number of individuals who are older than 15 divided by the total population—averaged 102.8% over the entire period. This reflects the fact that the Canadian population is older on average than in the United States. This ratio has continuously increased over time, moving from 101.9% in 1994 to 104.0% in 2005.

**Figure 1**  
**Decomposition of gross domestic product (GDP) per capita, Canada as percentage of United States<sup>1</sup>**

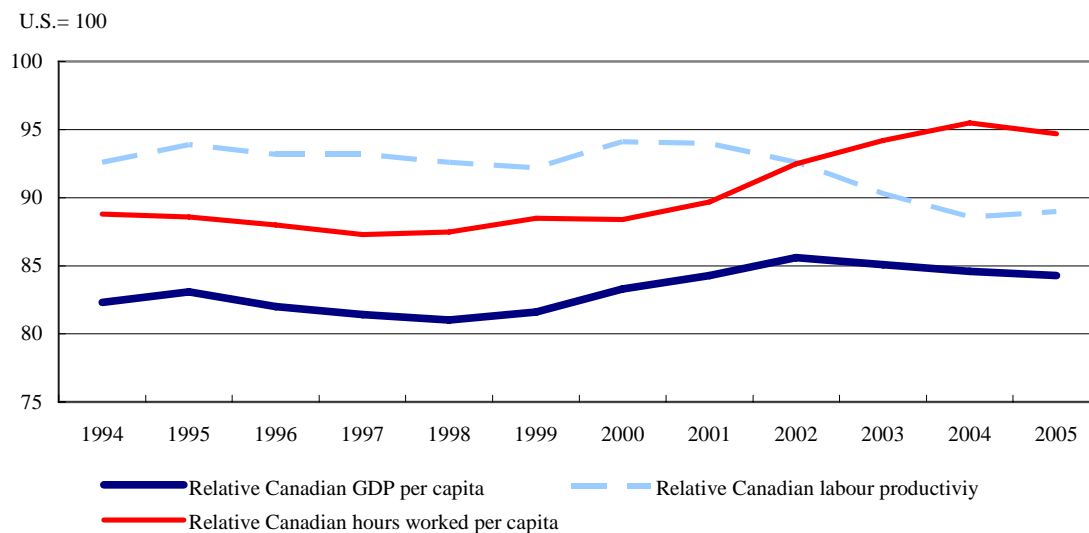


1. Average ratio for 1994 to 2005.  
 Source: Statistics Canada, Canadian Productivity Accounts.

## *Net pick up of the Canadian employment rate after 2000*

The trend of relative Canada/U.S. gross domestic product (GDP) per capita, labour productivity and hours worked per capita over the period 1994 to 2005 is plotted in Figure 2. The ratio of gross domestic product per capita remained relatively stable over the period, but increased slightly after 2000. Moreover, the period before 2000 differs substantially from the period after 2000 in terms of the movement in the two main components—labour productivity and hours worked per capita.

**Figure 2**  
**Canadian gross domestic product (GDP) per capita relative to the United States, 1994 to 2005**



Source: Statistics Canada, Canadian Productivity Accounts.

Prior to 2000, both components—labour productivity and work intensity—are relatively constant. Relative Canadian labour productivity is 93.0% of U.S. labour productivity and relative Canadian hours worked per capita is 88.1%. During this time, lower hours worked per capita in Canada account for over two-thirds of the gap observed in favour of the United States in GDP per capita.

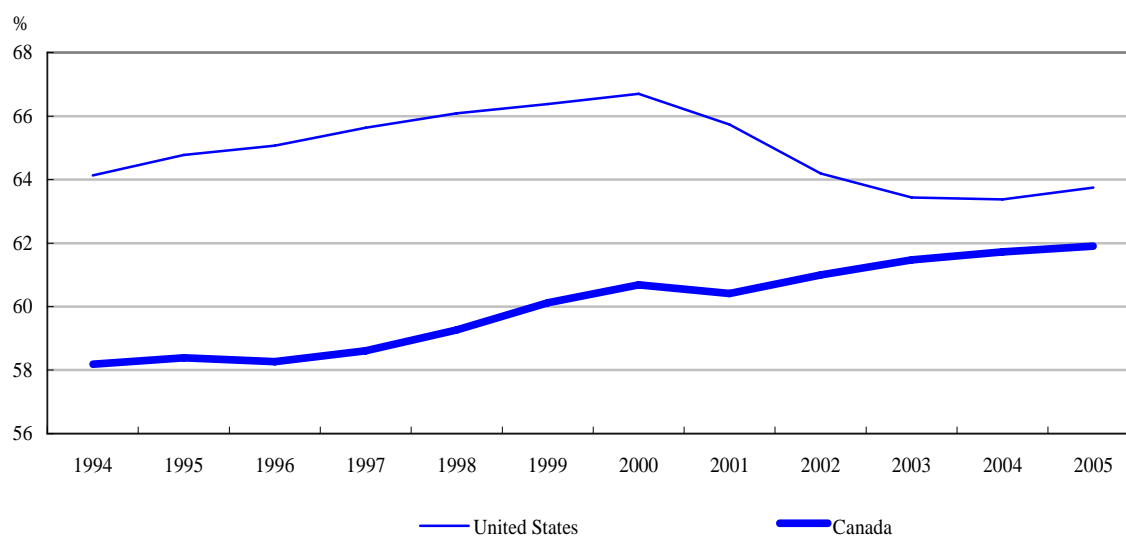
In contrast, after 2000, Canadian relative productivity falls while its relative work intensity rises dramatically. Relative Canadian labour productivity decreased from 94.1% in 2000 to 89.0% in 2005. During the same period, the Canada/U.S. ratio of the number of hours worked per capita increased from 88.4% in 2000 to 94.7% in 2005. This was due mainly to a regular increase in the extent to which the Canadian economy was providing jobs for its population, while employment in the United States declined between 2001 and 2003. Consequently, the Canada/U.S. ratio of the number of jobs divided by the population aged 15 years and over increased from 91.0% in 2000 to 97.0% in 2005. By 2005, most of the gap in GDP per capita is due to the gap in labour productivity, not the gap in work intensity.



Between 2000 and 2005, employment increased considerably in Canada at an average annual rate of 1.8% compared to the United States with an average rate of only 0.3%. This phenomenon is the result of a continuous growth in jobs over the period 2000 to 2005 in Canada, while in the United States a reduction in employment was observed in 2001 and 2002, followed by stagnation the subsequent year. On average, hours per job diminished at about the same pace in both countries over the period 2000 to 2005.

Figure 3 compares employment rates for Canada and the United States calculated by the Canadian Productivity Accounts Division. The employment rate in Canada generally increased after 1996. On the contrary in the United States, the employment rate dropped after 2000.

**Figure 3**  
**Employment rate based on BMW<sup>1</sup> employment ratios for resident population aged 15 years and over**



1. Baldwin, Maynard and Wong, 2005.

Notes: The number of jobs for the United States is the underlying estimate used by the Bureau of Labor Statistics productivity growth program while it corresponds to the number of jobs estimated by the Canadian Productivity Accounts for Canada. The population estimates correspond to the resident population aged 15 years and over derived from intercensal population estimates for Canada and from the Census Bureau for the United States.

Source: Statistics Canada, Canadian Productivity Accounts.

However, the recent increases in relative hours worked per capita in Canada have been partly offset by the relative decline in labour productivity in Canada. Between 2000 and 2005, labour productivity in Canada compared to the United States has declined from 94.1% to 89.0%.

## *Conclusion*

In summary, this study shows that the amount of economic output per person in Canada is still lower than in the United States in 2005, but the gap between the two countries has narrowed since the turn of the millennium. In 2005, Canada's gross domestic product (GDP) per capita was 84.3% of GDP per capita south of the border, up from 81.0% in 1998. Since 2000, this narrowing of the output gap came mainly from better labour market performance—increases in the number of jobs per capita—in Canada relative to the United States.

## Appendix A – Data Sources

**Table A1**  
**Canadian data**

Year	GDP <sup>1</sup>	GDP <sup>1</sup> adjusted to PPP <sup>2</sup>	Hours worked	Jobs	Population over age 15	Population
	\$ millions					
1994	770,873	640,595	23,626,206	13,407	23,041	28,999
1995	810,426	675,895	23,985,703	13,620	23,329	29,302
1996	836,864	703,803	24,419,755	13,764	23,625	29,611
1997	882,733	740,613	24,787,390	14,025	23,930	29,907
1998	914,973	774,067	25,336,204	14,340	24,199	30,157
1999	982,441	823,286	26,037,717	14,719	24,485	30,404
2000	1,076,577	888,176	26,606,886	15,052	24,805	30,689
2001	1,108,048	928,544	26,791,467	15,204	25,167	31,021
2002	1,152,905	975,358	27,181,228	15,583	25,547	31,373
2003	1,213,408	1,014,409	27,593,613	15,913	25,884	31,669
2004	1,290,788	1,077,808	28,377,150	16,193	26,233	31,974
2005	1,371,425	1,142,397	28,607,286	16,459	26,585	32,271

**Table A2**  
**United States data**

Year	GDP <sup>1</sup>	PPP <sup>2</sup>	Hours worked	Jobs	Population over age 15	Population
	\$ millions	CAN\$/US\$				
1994	7,072,200	0.831	241,616,008	131,675	205,323	263,455
1995	7,397,700	0.834	246,406,214	134,738	208,007	266,588
1996	7,816,900	0.841	252,829,892	137,101	210,690	269,714
1997	8,304,300	0.839	259,150,256	140,165	213,560	272,958
1998	8,747,000	0.846	265,032,245	143,001	216,374	276,154
1999	9,268,400	0.838	270,372,149	145,436	219,085	279,328
2000	9,817,000	0.825	276,863,193	147,993	221,891	282,429
2001	10,128,000	0.838	274,748,578	147,652	224,610	285,371
2002	10,469,600	0.846	270,105,128	145,955	227,344	288,253
2003	10,960,800	0.836	269,193,074	145,948	230,072	291,114
2004	11,712,500	0.835	273,292,625	147,591	232,864	293,933
2005	12,455,800	0.833	277,647,909	150,034	234,960	296,677

1. Gross domestic product.

2. Purchasing power parity.

For Canada, the source used in this study for population employed and *number of jobs* is the Labour Force Survey (LFS). For coverage purposes, an adjustment is made to include the number of jobs in the North, for Indian reserves and for military personnel. In the United States, the source used in this study is the Current Employment Statistics (CES) survey. The coverage of the CES survey does not include all employees; it covers only the Civilian non-farm wage-earner jobs. The CES survey was supplemented in this study with farm jobs and self-employed jobs from the Current Population Survey. Finally to obtain complete coverage of U.S. employment, administrative data for the military were added.

The estimates of the number of jobs used in this report correspond essentially to the official estimates produced in the Productivity Accounts of Canada and the United States.<sup>6</sup>

In the case of *hours worked per job*, we produce adjusted hours actually worked using the labour market household surveys in the two countries—the LFS in Canada and the CPS in the United States. Since 1994, the surveys of both countries have used a similar set of questions to measure actual hours worked. Because these surveys are conducted for one specific week every month, the hours worked obtained from this survey need to be adjusted to produce appropriate annual data. These adjustments were done based on the Canadian methodology developed in the Canadian Productivity Accounts.<sup>7</sup> A more detailed discussion of the adjustments is contained in Maynard (2005).

The volume of hours worked are finally obtained by calculating the product of the number of jobs by the number of hours worked per job, that is the two variables described above.

The nominal *Gross Domestic Product* used for this analysis is calculated at market prices. It can be found in NIPA table 1.1.5 on the website of the Bureau of Economic Analysis for the United States and in CANSIM, table 380-0016 (v646925) for Canada. The *purchasing power parities* (PPP) were taken from CANSIM table 380-0058, v13930490 up to 2005.

The *total population* estimates are obtained from the Estimates of Population by Age and Sex for Canada (CANSIM table 050-0001, v466668), while they come from NIPA Table 7.1 (Population at mid-period). The *population of 15 and over* is obtained residually for both countries. In Canada, we removed from the total population, the population of 0 to 14 years old extracted from CANSIM table 050-0001, v466956). In the United States the population 0 to 14 is obtained from the Intercensal population estimates from the Bureau of the Census website (Table titled Resident Plus Armed Forces Overseas Population by Age Group and Sex).

For more details on the data sources used, see Maynard (2007).

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6. In Canada, the Canadian Productivity Accounts are under the responsibility of the Micro-economic Analysis Division, National Accounts and Analytical Studies field. In the United States, the Productivity Program is run by the Bureau of Labor Statistics.

7. For more information about this methodology, see Maynard (2004).

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