



Catalogue no. 11F0026MIE — No. 005

ISSN: 1709-7177

ISBN: 0-662-41206-0

## Research Paper

Economic analysis methodology paper series: National Accounts

# Annual Measure of the Volume of Work Consistent with the SNA: the Canadian Experience

by Jean-Pierre Maynard

Micro-economic Analysis Division  
18th Floor, R.H. Coats Building Ottawa, K1A 0T6

Telephone: 1 800 263-1136



Statistics  
Canada

Statistique  
Canada

Canada

# Annual Measure of the Volume of Work Consistent with the SNA: the Canadian Experience

by

Jean-Pierre Maynard

11F0026 No. 005

ISSN: 1709-7177

ISBN: 0-662-41206-0

Micro-Economic Analysis Division  
18th Floor, R.H. Coats Building  
Statistics Canada  
Ottawa, K1A 0T6

**How to obtain more information :**

National inquiries line: 1 800 263-1136

E-Mail inquiries: [infostats@statcan.ca](mailto:infostats@statcan.ca)

**August 2005**

I would like to thank John Baldwin, Des Beckstead, Andrée Girard, François Lequiller, Deborah Sunter and Marc Tanguay for the numerous and valuable comments on preliminary versions of this paper.

Published by authority of the Minister responsible for Statistics Canada

© Minister of Industry, 2005

All rights reserved. The content of this publication may be reproduced, in whole or in part, and by any means, without further permission from Statistics Canada, subject to the following conditions: that it is done solely for the purposes of private study, research, criticism, review, newspaper summary, and/or for non-commercial purposes; and that Statistics Canada be fully acknowledged as follows: Source (or "Adapted from," if appropriate): Statistics Canada, name of product, catalogue, volume and issue numbers, reference period and page(s). Otherwise, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopy, for any purposes, without the prior written permission of Licensing Services, Marketing Division, Statistics Canada, Ottawa, Ontario, Canada K1A 0T6.

**Cette publication est disponible en français.**

**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.

## *Table of Contents*

<b>Abstract</b> .....	<b>4</b>
<b>1. Introduction</b> .....	<b>5</b>
<b>2. Canadian methodology</b> .....	<b>5</b>
<b>3. Survey instruments</b> .....	<b>6</b>
<b>4. Estimation of jobs</b> .....	<b>7</b>
4.1 Splitting jobs and hours worked by large SNA sectors .....	11
4.2 Self-employed jobs.....	11
<b>5. Estimation of average annual hours per job</b> .....	<b>12</b>
5.1 Estimation of hours lost because of a civic holiday—clarifications of practices followed .....	17
5.2 Estimation of hours lost by employees.....	18
5.3 Spring break in education services .....	19
5.4 Other classes of workers.....	19
<b>6. Quality of data on hours worked in Canada</b> .....	<b>20</b>
<b>7. Summary</b> .....	<b>23</b>
<b>Appendix A</b> .....	<b>25</b>
<b>Appendix B</b> .....	<b>27</b>
<b>References</b> .....	<b>30</b>

## *Abstract*

The aim of this paper is to describe the actual methodology used to estimate annual hours worked by industry and province in Canada in view to be consistent with the System of National Accounts.

## ***1. Introduction***

The objective of this paper is to describe the methodology currently used at Statistics Canada to produce the annual volume of hours worked that is consistent with the Canadian System of National Accounts. This methodology was developed in the late 1960s by analysts in Statistics Canada's productivity measures group. Over the years, improvements have been made to both the methodology and the source data, but the basic principles have remained essentially unchanged.

Historically, estimates of hours worked served mainly as indicators of trends in labour input for purposes of measuring productivity growth. More recently, these data have been used to compare productivity growth across industries, regions and countries. They are also used to establish estimates of hourly compensation and the unit labour cost, to run simulations with the SNA Input-Output Model and integrated as inputs in most SNA satellite accounts (i.e., environment, tourism).

## ***2. Canadian methodology***

Over time, the composition of the labour force in Canada has changed substantially. More jobs are non-standard (i.e. part-time, temporary, self-employed) today than 20 years ago. If labour input is measured in terms of number of jobs (workers), comparisons through time and across countries can be biased because of differences in the mix of standard and non-standard workers. Accordingly, Statistic Canada uses hours worked as the appropriate measure for the total volume of work in its productivity estimates.<sup>1</sup>

To measure productivity accurately, the volume of work should correspond as closely as possible to the production boundary defined by the System of National Accounts. In practice, there is no single source in Canada to estimate a labour input that corresponds entirely to this frontier, both conceptually and with respect to coverage. Canadian data on hours worked are, therefore, obtained by combining the results of several surveys of establishments and households, supplemented by the results of the five-year censuses and administrative data. One should note that we ensure that our SNA labour data remained consistent and reconcilable with the Labour Force Survey results at the aggregate level.

At Statistics Canada, the measure of the annual volume of hours worked results from the combination of two independent but concurrent exercises. On one hand, average annual hours per job are estimated by province, industry and class of worker, and on the other hand, similar estimates are produced for the number of jobs. The volume of hours worked is obtained by multiplying these two components.

---

1. This is also the concept recommended by the International Labour Organization. It should be noted, however, that the OECD up until 2002 has generally not used hours worked—but rather jobs or employment.

$$\Sigma (J_{imn} \times H_{imn}) = Vh_{imn}$$

J = Number of jobs

Hm = Average hours worked per job

Vh = Volume of hours worked

Where i= industry, m=region and n=class of worker

The SNA (1993) also defines standards that are meant to be used to produce internationally comparable measures of labour input. Statistics Canada's productivity program takes data on labour market activity and produces a measure of labour input that accords with these definitions (Baldwin and Harchaoui, 2004).

### ***3. Survey instruments***

Data on labour inputs are collected by statistical agencies from two separate sources—from firm-based employer surveys on the one hand, and from household surveys on the other hand. Firm-based instruments survey employers in order to collect data, while household surveys sample the population of individuals who are potential workers. In Canada, the firm-based instrument is the Survey of Employment, Payrolls and Hours (SEPH), which is conducted at the establishment level and depends on administrative data for employment and a survey for hours-paid for production workers and standard hours for non-production workers. In the U.S., the Current Employment Statistics survey (CES) is an employer-based program that is derived from a sample of non-farm establishments and is collected jointly by the federal government and state employment security agencies. In Canada, the Labour Force Survey (LFS) is the large household survey providing employment and hours worked data; in the U.S., its equivalent is the Current Population Survey (CPS).

The accuracy of estimates generated by both types of surveys will depend on the sample size and the accuracy of the frame that is used for sampling purposes; however, because of the skewness in the size distributions of firms, errors in the survey frame used for firm surveys can have a much larger effect on the final estimates provided by firm-based employer surveys than inaccuracies in a household frame.

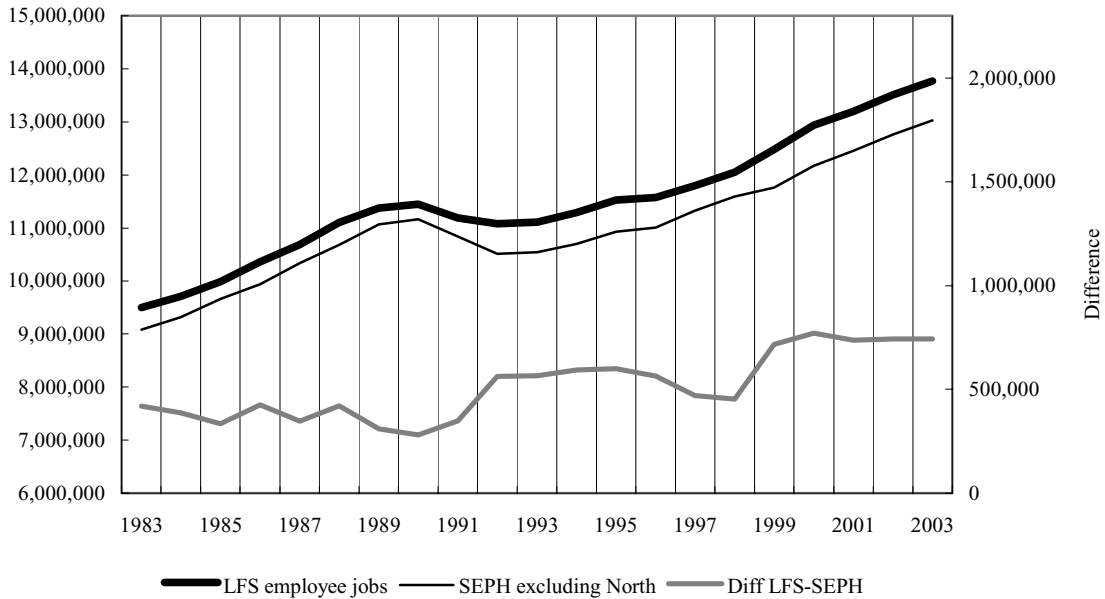
The Canadian experience in this area is illustrative. Throughout most of the 1990s, the employer-based survey (SEPH) has provided estimates of jobs worked that were well below those of the Labour Force Survey (LFS). Because of this, the productivity program at Statistics Canada relies on the household survey (LFS) for benchmark estimates of total jobs in the economy and their trend.<sup>2</sup> SEPH, on the other hand, is felt to provide a better split of employment across detailed industries because firms are more accurately assigned to industries in the employer survey because of the existence of a Business Register than workers are assigned to industries based on information collected on a household survey on the firm they are working in and the occupation

---

2. Since the LFS excludes the Armed Forces, Indian Reserves and, in the past, the Territories, the productivity estimates make adjustments for these exclusions.

of the worker. SEPH and other industry survey data are therefore used to split estimates of labour inputs at the aggregate level derived from the LFS into detailed industry estimates for the Canadian productivity program.

**Figure 1. Number of employee jobs adjusted to the SNA concept from the Labour Force Survey and from the Survey of Employment, Payroll and Hours both adjusted to be more comparable in terms of geographical and industrial coverage**



#### 4. Estimation of jobs

In Canada's System of National Accounts (SNA), estimates of jobs and hours worked are produced for all the provinces and territories (13) at a detailed industry level (286) by class of worker and SNA sectors. Starting with 1997, the SNA has adopted the new North-American Industry Classification System (NAICS).<sup>3</sup>

Classes of workers are defined according to the recommendations of the 1993 SNA manual. As shown in Table 1, the classes of workers in the Labour Force Survey are sufficiently detailed to be aggregated to the classes recommended by the System of National Accounts.

3. The adoption of NAICS by the Canadian System of National Accounts has introduced an important break in many industrial series. A project is underway to revise the industry data historically back to 1961 to reflect NAICS.

**Table 1. Moving from Labour Force Survey class of worker to 1993 SNA job category**

LFS	Labour Force Survey Class	Canadian System of National Accounts Class	SNA
1	Paid workers – Public	Employee job	A
2	Paid workers – Private	Employee job	A
3	Self-employed owner of an incorporated business without paid help	Employee job	A
4	Self-employed owner of an incorporated business with paid help	Employee job	A
5	Self-employed owner of an unincorporated business with paid help	Self-employed job - Employer	B
6	Self-employed owner of an unincorporated business without paid help	Self-employed job - Own account	C
7	Unpaid family workers in a family related business	Self-employed job - Own account	C

All estimates in Canada are adjusted to a benchmark for the economy as a whole. In Canada, the coverage of the Labour Force Survey (LFS) is very close to the production boundary in the System of National Accounts and therefore it is used as the benchmark. Among other things, the LFS covers all classes of workers, whereas Canadian surveys of establishments generally focus solely on employees.

While statistical series on employment for individual industries are also created from other sources, the aggregated sum of these individual series is benchmarked to the national total. The use of a benchmark avoids the possibility of double counting when using different sources.

The employment benchmark for the National Accounts comes primarily from official data on employed persons from the Labour Force Survey. However, the number of employed persons, which corresponds to the concept used by the International Labour Office (ILO), is adjusted to the National Accounts jobs concept by adding the number of persons who have more than one job<sup>4</sup> and excluding persons absent from work who were not paid during the week of the survey. Unpaid absentees are excluded in order to make the job concept as consistent as possible with establishment surveys that capture only employment on the payroll of a firm. These adjustments convert the LFS-based number of employed persons into the number of jobs (SNA concept). Since the LFS survey does not cover jobs in the Northern Territories,<sup>5</sup> military personnel or jobs held on aboriginal reserves, these jobs are estimated from other sources and are added to the number of jobs from the LFS to create a comprehensive benchmark for the Canadian economy. (See the example in Table 2).<sup>6</sup>

---

4. In other words, we assume that persons who have more than one job have two jobs.

5. Canada's northern territories are divided into three administrative regions: Yukon, Northwest Territories and Nunavut.

6. Table 2 consists of an example since the benchmark exercise for the entire economy is done separately for the three categories of workers and for each province and territory.



**Table 2. Constructing the national employment benchmark based on the average annual number of employed persons from the Labour Force Survey**

Stage	1997	1998	1999	2000	2001	2002	2003
1 ILO_LFS all persons employed	13,774	14,140	14,531	14,910	15,077	15,412	15,746
2 Plus: multiple job holders	697	693	708	700	691	759	766
3 Plus: jobs in aboriginal reserves + military personnel	126	124	122	120	112	117	123
4 Plus: all jobs in the Territories + civil servants working outside Canada	46	45	47	47	50	51	52
5 Minus: unpaid absentee paid workers	398	411	415	430	474	526	565
6 Minus: self-employed with "zero" hours worked	138	151	142	144	130	143	150
7 SNA benchmark – all jobs	14,107	14,440	14,851	15,203	15,326	15,670	15,972

Source: Statistics Canada, National Accounts and Analytical Studies, MEAD, Canadian Productivity Accounts and CANSIM Table 383-0009.

Once the national benchmark of jobs is derived, a set of steps are followed to obtain an industry breakdown consistent with the System of National Accounts. Because the unit of production for the input-output accounts by industry corresponds to the establishment, we rely heavily on the Survey of Employment, Payroll and Hours (SEPH) to produce the industry detail. This survey collects monthly employee jobs and payroll data from all establishments in Canada except agriculture, fishing and trapping, services to agriculture, private household services, religious organizations and defence services. Since 1998, employers must report number of employees and gross payroll, ideally for the last pay period of the month, to the national tax authority (Canada Revenue Agency) when remitting payroll deductions. Because this is a census and establishments are coded by industry through the STC Business Register, this source provides the type of detailed industry information needed by the System of National Accounts.<sup>7</sup>

There are 286 industries produced in the Input / Output accounts. Table 3 describes the sources used for each sub-group of industries. For example, the starting point of estimation for the 13 industries groups under Transportation and Storage is taken from the Survey of Employment, Payroll and Hours.

In the small number of industries where we rely on the Labour Force Survey for an industry breakdown of jobs, the second job of multiple jobholders are coded by industry based on the annual Survey of Labour Income Dynamics (SLID). This is necessary since the Labour Force Survey coding by industry is based on the main job only. SLID is a longitudinal household survey that collects annual information about all working activities of a sample of workers during the previous year. This step is particularly important for industries like agriculture where many farmers have more than one job.

Once the first estimates are produced, the coherence of these estimates is compared with the industry breakdown of the input-output tables. Micro adjustments are made where there are earnings with no employment and vice versa; where the estimate of average annual earnings per hour worked does not make sense; where the growth rate of jobs is not consistent with labour income and output growth from the SNA, and where special events such as a major labour

7. This administrative data source is supplemented by a monthly survey of 11,000 businesses to collect data on employment, earnings and paid or usual hours by class of workers (paid by the hour, salaried and others).

dispute started and ended between two consecutive reference periods used by the source survey. (See the Table in Appendix A).

**Table 3. Description of the different sources used to estimate the number of employee jobs by industry**

Industry	Source of data by industry
Agriculture, fishing and support activities for these industries	The Labour Force Survey adjusted to the concept of jobs
Forestry and support activities	The Survey of employment payroll and hours
Oil and gas extraction	The Survey of employment payroll and hours
Other mining	SEPH for the current years and the Census of mining once available (usually two years later)
Support activities for mining	The Survey of employment payroll and hours
Utilities	The Survey of employment payroll and hours
Construction	The Labour Force Survey adjusted to the concept of jobs for contract construction.
Manufacturing	The Survey of employment payroll and hours
Wholesale trade	The Survey of employment, payroll and hours
Retail trade	A geometric mean of LFS and SEPH. This geo mean should compensate for an important part for the undercoverage of SEPH when compared to LFS total trade.
Transportation and storage	The Survey of employment payroll and hours
Information and culture industries	The Survey of employment payroll and hours
Finance, insurance and real estate	The Survey of employment payroll and hours
Professional services	The Survey of employment payroll and hours
Administrative and other services	The Survey of employment payroll and hours
Education services	Administrative data from Public Institution Division
Hospitals	Administrative data from Public Institution Division
Health care and social services	The Survey of employment payroll and hours
Arts, entertainment and recreation	The Survey of employment payroll and hours
Accommodation and Food Services	The Survey of employment payroll and hours
Other services (excl. Religious org. and private households)	The Survey of employment payroll and hours
Religious organisations and private households	The Labour Force Survey adjusted to the concept of jobs
National defence (military)	Administrative data from Public Institution Division
National defence (civil)	Administrative data from Public Institution Division
Federal public administration	Administrative data from Public Institution Division
Other public administration	The Survey of employment payroll and hours

In the Canadian Accounts, the construction industry includes the construction activity contracted out as well as the own account construction.<sup>8</sup> The job level for own account construction is estimated from the Labour Force Survey where we identify the number of employees that occupied a Construction occupation outside the Construction industry. These employees are removed from the industry of their employer and added to construction. In 1999, own account construction represented about 13% of the hours worked in total construction activity in Canada. (Step 4).

The revised industry estimates is then forced to the benchmark that is derived from the Labour Force Survey. (Step 3 in Appendix A).

8. Own account construction consist of construction activity carried out by the own workers of a given industry.

## ***4.1 Splitting jobs and hours worked by large SNA sectors***

Productivity analysts often focus on a sub-sector of the total economy that is referred to as the business sector. The business sector excludes non-market activity. There are two reasons for dividing up the economy into a business and non-business sector. First, it may be inherently useful to understand how productivity is growing in each sub-sector. Second, statistical agencies face difficulties in estimating productivity in the non-market sub-sector because it is difficult to measure real output in this sub-sector. As a result, productivity estimates are only meaningful for business sector activities.

For Canadian purposes, the non-business sector is defined to include the government sector (general government, national defence, public education and public health care), the non-profit institutions serving households and the rent that is imputed to owner-occupied housing.<sup>9</sup> In 1999, the non-business sector of the Canadian economy accounted for 22.8% of the total economy GDP.

Government and non-profit organisations exist in many industries. For some like National Defence, the whole industry is essentially non-commercial. In other cases, industries are composed of both commercial and non-commercial establishments. In industries such as health and education, the non-commercial establishments dominate, while in others (e.g. transportation, insurance) commercial establishments are the major players.

When an industry is composed of commercial and non-commercial establishments, employment is split on the basis of the labour income data by sector that is produced by the input-output tables. It is assumed that in a given industry, workers receive the same average annual earnings per job in commercial and non-commercial establishments.

In the case of government-sector establishments, we benchmark to administrative data on employment produced by the Public Institutions Division of the SNA. If the estimates derived from the methodology described above differ from this benchmark, then the difference is added to the business sector. We have to proceed in two stages, because the data produced by Public Institutions Division are classified by institution and not by industry. Once the non-commercial sector has been estimated, the business sector is obtained residually. (Step 5 in Appendix A).

## ***4.2 Self-employed jobs***

The main data source used to estimate the number of self-employed jobs is the Labour Force Survey. However, due to the sample size, the industry breakdown is mainly based on linear interpolations between quinquennial Censuses. For recent years, linear projections from the last Census are used until the next Census becomes available. These results are adjusted annually to

---

9. As in many countries, there is no employment data available to estimate labour input for the industry of owner-occupied housing.

special LFS sub-total<sup>10</sup> benchmarks for each province and category of self-employed (employer or own-account).

Since the Labour Force Survey uses the Census of Population to benchmark its population weights, the labour market data collected from this instrument are consistent with the former. In a long questionnaire randomly distributed to every fifth household, the Census collects employment and hours data similar to the LFS for the full reference week preceding the Census Day. For industries where seasonality is important, the Census level is adjusted with a ratio to reflect the annual average.

By definition, the self-employed jobs in the SNA all appear in the business sector. Self-employed jobs that were coded by the household surveys in industries composed uniquely of non-commercial establishments are recoded to business services in the SNA. This represents less than one percent of the total number of jobs. (Step 6 in Appendix A).

## ***5. Estimation of average annual hours per job***

The concept used in Canada to estimate hours worked that are included in productivity measures corresponds exactly to the resolution adopted by the International Labour Office (ILO) in 1962 at the 10<sup>th</sup> International Conference of Labour Statisticians. The 1993 *System of National Accounts* manual also refers precisely to this definition when it describes total hours worked as the most appropriate measure for determining the volume of work.

Accordingly, statistics on hours worked that are calculated for Statistics Canada's productivity program include:

- a) hours actually worked during normal periods of work;
- b) time worked in addition to hours worked during normal periods of work, and generally paid at higher rates than the normal rate (overtime);
- c) time spent at the place of work on work such as the preparation of the workplace, repairs and maintenance, preparation and cleaning of tools, and the preparation of receipts, time sheets and reports;
- d) time spent at the place of work waiting or standing-by for such reasons as lack of supply of work, breakdown of machinery, or accidents, or time spent at the place of work during which no work is done but for which payment is made under a guaranteed employment contract; and
- e) time corresponding to short periods of rest at the workplace, including tea and coffee breaks.

---

10. The LFS sub-groups are divided into 12 industry aggregates. These industry sub-groups are composed by taking into consideration both the similarities of self-employed characteristics and to minimise the coefficient of variation of each sub-group (reasonable sample size).

Statistics of hours actually worked exclude:

- a) hours paid for but not actually worked, such as paid annual leave, paid public holidays, paid sick leave;
- b) meal breaks; and
- c) time spent on travel to and from home and work.<sup>11</sup>

To accurately represent the time devoted to work, productivity measures need to capture hours worked and not hours paid. Both employer and household surveys have potential problems with capturing data on hours worked. Firm-based employer surveys typically collect data on hours paid (or standard hours paid), rather than hours worked. Records of hours paid are the usual measure that employers keep in their management information systems and that therefore can be collected from an employer survey. Hours paid includes hours not worked because of vacation, illness, holiday, etc., and excludes hours worked but not paid (e.g. unpaid overtime). While hours paid can be adjusted to derive hours worked using a supplementary survey, this approach ignores the unpaid overtime that has gained importance in the last two decades.

The problem of estimating actual hours worked rather than hours paid is more readily solved in household surveys. A well designed household survey will ask the respondent directly for hours worked—and with a well crafted set of questions, household surveys at least can focus directly on the concept that is required for productivity purposes. Employer surveys do not do this. Furthermore, even if this was attempted in an employer survey, the employer would be unlikely to be able to report the unpaid overtime of employees that need to be included in the hours-worked estimate for productivity measures.

Obtaining data in this area is important. The share of employees engaged in unpaid overtime in an average week has grown in Canada from 7.4% in 1997 to 9.1% in 2002. In comparison, paid overtime workers have increased from 6.4% to 7.5% over the same period. In terms of hours of work, unpaid overtime accounts for approximately 2.4% of total actual hours, compared with 1.8% from paid overtime. In Canada, unpaid overtime is significant. Failing to account for it leads to an underestimate of actual hours worked, and an overestimate of the labour productivity level. (Maynard and Sunter, 2003).

Both SEPH and LFS suffer from reference-week problems. They both collect data on employment and hours for a limited number of weeks. When that week is not representative because it contains a holiday that the other weeks do not contain (or vice versa), extrapolating the result from the reference week in which the survey was taken to the rest of the month is problematic. But while both types of surveys have to wrestle with this problem, household surveys can and have been designed to tackle the problem by asking special questions of the respondents. Employer surveys generally do not take such events into consideration. In contrast, estimates of hours worked derived from household surveys can be adjusted when combined with other information on holidays in periods other than the reference week.

One of the advantages of household surveys is that they can be designed with a set of prompts to handle special events. One approach to reducing response error is to use a series of questions that assist the respondent in reconstructing work hours for the previous week and in recalling specific

---

11. System of National Accounts 1993, p. 410.

events that may have reduced the number of hours worked, such as a particular holiday. Typically, the questions start with an anchor such as usual hours, then proceed to elicit information about absences, paid and unpaid overtime that may have occurred in the reference week, and then finish with a question about hours actually worked in the reference week. Sequences of questions such as these allow estimates to be derived of usual hours worked (without an usual event such as a holiday) that can be used to extrapolate the answers derived from a reference week that contains the special event to other weeks in the month when the survey was not being performed. Firm-based employer surveys tend not to capture the information that allows for these types of calculations.

The Canadian LFS adopted this approach to deriving estimates of hours-worked in 1976, and added some refinements in 1997. A further enhancement to the Canadian LFS was made in the late 1990s. Taking advantage of the fact that the LFS is administered through computer assisted interviewing, an automated modification was made to the question on absence from work whenever a holiday had occurred during the reference week. The modified question included a reminder to respondents about the holiday.

Accordingly, the methodology used to estimate average hours worked per job is based primarily on LFS data.

In Canada, the Labour Force Survey (LFS) collects information on some 53,000 households that amounts to labour market data for over 100,000 persons aged 15 and over living in these households. This survey is conducted every month with respect to a specific week that generally includes the fifteenth day of the month. It includes a series of questions on the work schedule of persons employed during the reference week. The questions concern the regular schedule, paid overtime, unpaid overtime<sup>12</sup> and hours lost. The respondent is then asked to specify the number of hours worked during the reference week. In the event that hours were lost during the reference week, the respondent is also asked to state the main reason for his or her absence.

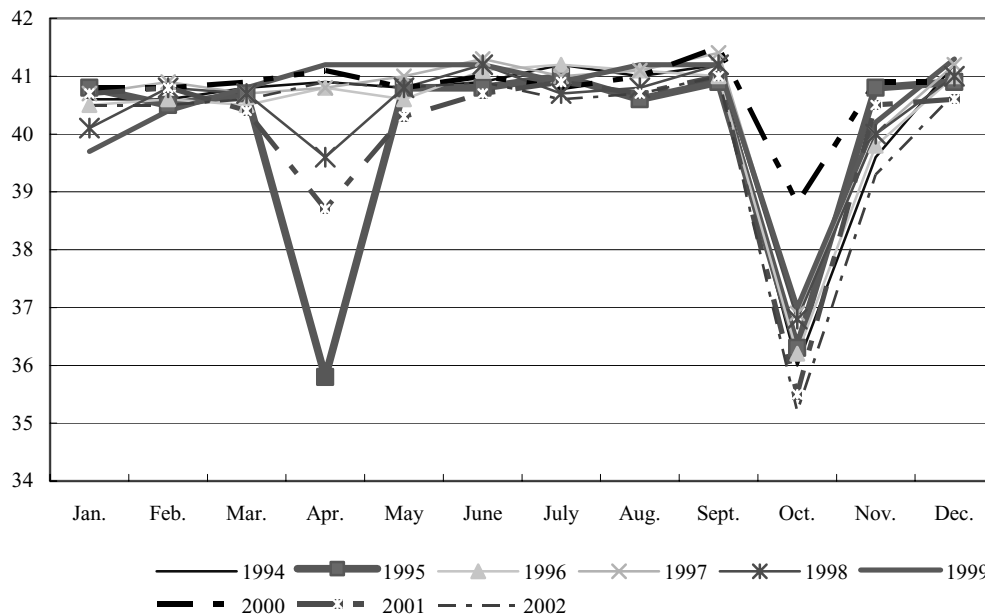
Despite the advantages of using the household based survey, the monthly frequency of the survey requires a special methodology to handle the reference-week problem. On an annual basis, then, the LFS yields information on hours worked for twelve weeks each year.

Figure 2 shows the hours worked per job collected by the Labour Force Survey for the twelve reference weeks for the 1994-2002 period. As this Figure shows, the twelve reference weeks used by the LFS are not entirely representative of the other forty weeks of the year. During the survey's reference weeks, special events may occur that have no probability of occurring during the other weeks of the year. These events cause an abrupt drop in average hours when they occur during the reference week. They consist primarily of civic or other holidays. For example, the drop in average weekly hours observed in October and November for the years 1994 to 2002 represent the Thanksgiving and Remembrance Day holidays. Similar drops are observable in April, but not for all years.

---

12. The distinction between paid overtime and unpaid overtime has been available in the LFS since the survey was redesigned in 1997. Previously, the question concerned overtime in general.

**Figure 2. Average hours worked per job in LFS reference weeks—Manufacturing**



Some civic holidays, such as those in the Easter period (April), fall within the LFS reference week sporadically. This results in major biases in measuring annual hours worked if no correction is applied. Table 4 shows the effect of the sporadic presence of the Good Friday (1995) and Easter Monday holidays (1998) on the growth rate of average annual hours per job in the manufacturing sector between 1994 and 1999 as well as the impact of adjusting hours worked on their levels. These biases need to be set in the context of their use in the productivity program where rate of productivity growth averages 1.5% in the 1990s. Without the correction, these rates would have been off by up to 50% in some years.

To produce annual data that are representative of the hours worked during all the weeks of the year, analysts in the productivity measures group in Statistics Canada have developed a method for annualizing the LFS data. Using this method, they correct the biases in the growth rate and at the same time estimate the annual volume of hours worked in Canada.

**Table 4. Impact of not adjusting the Labour Force Survey hours worked data for special events on level and growth of annual hours worked per job in manufacturing, Canada**

	a) LFS x 52 Level	b) Adjusted Level	Diff b - a	c) LFS x 52 Growth %	d) Adjusted Growth %	Diff d - c
1994	2,056.8	1,983.1	-73.8			
<b>1995</b>	<b>2,037.9</b>	<b>1,982.5</b>	<b>-55.5</b>	<b>-0.9</b>	<b>0.0</b>	<b>+0.9</b>
1996	2,050.9	1,991.6	-59.2	0.6	0.5	-0.1
1997	2,057.1	1,898.2	-67.9	0.3	-0.1	-0.4
<b>1998</b>	<b>2,038.7</b>	<b>1,981.5</b>	<b>-57.3</b>	<b>-0.9</b>	<b>-0.4</b>	<b>+0.5</b>
1999	2,060.8	1,996.7	-64.0	1.1	0.8	-0.3

The method used to produce these annual estimates based on the twelve weeks of the Labour Force Survey proceeds in five main stages:

1. Hours actually worked per job in the reference week are first standardised by putting back civic holidays and other non-random events. This entails adding up the hours lost because of a civic holiday or other non-random events such as the “school spring break”. Hours lost for other reasons (e.g. illness) are assumed to be representative of other weeks of the month and are left as is.
2. The results, which we call standardized LFS weeks, are then interpolated linearly between the reference weeks to obtain estimates of hours worked per job for all weeks of the year. Since the first and last reference week for a given year occur several weeks before the end of the year, the LFS data for the first month of the following year and the last month of the preceding year are also used to estimate the average hours of the first and last weeks of the year.
3. The third step is to make any necessary adjustments to the hours worked per job by removing the hours lost due to a civic holiday or other non-random event. These estimates are drawn directly from the LFS when these holidays occur during the reference week. When they occur outside the survey weeks, the hours lost are estimated from those for similar holidays during the reference week. The civic holidays that occur each year in the LFS are Thanksgiving in October and Remembrance Day in November. Good Friday, Easter Monday and Family Day in Alberta are sporadically present in the LFS survey weeks.

Lastly, the one-week March school break appears in the survey regularly in Ontario, sporadically in most other provinces and not at all in Quebec and Alberta. All other civic holidays listed in Canadian labour legislation never occur during the reference weeks of the survey. (See Table 5).

4. For each month and each calendar year, the first week does not always start on a Sunday and the last week does not always end on a Saturday. Specialized survey data on working time schedule of work<sup>13</sup> were used to estimate, for a given week, the average number of hours worked each day of the week in different industries. These data are used to calculate the daily weights that are used to estimate the number of hours worked from the first day of each month or the year (e.g., a Wednesday) to the last day of each month or the year (e.g., a Monday). The daily weights used to make these adjustments by industry can be found in Table B1 in Appendix B).
5. The volume of hours worked monthly is then obtained first by multiplying the average hours per job for each complete or partial week in the month by the estimated average number of jobs during the reference week for that month. The total hours for each month are then summed to obtain an LFS-based annual volume of hours worked, which are then divided by the annual average number of jobs in that survey (Step 5, Table A1).

---

13. These data are obtained from the Survey of Work Arrangements, a supplement to the LFS conducted in November 1995.



Finally, the LFS-based average annual hours for each industry by region by class of worker are multiplied by the corresponding average number of jobs, as determined by combining the results of a number of Statistics Canada surveys to obtain individual industry data that sums to the LFS economy benchmarks (Step 7).

### ***5.1 Estimation of hours lost because of a civic holiday—clarifications of practices followed***

When respondents state that they held a job during the reference week but were absent from work during part or all of the reference week, they must state the number of hours that they lost because of a labour dispute, illness, etc. or leave (vacation, civic holidays, etc.). The total number of hours lost will be coded according to the main reason for the absence.

The two types of absence that are likely to cause biases in estimating the annual volume of hours worked are those that are due to a civic holiday and those caused by vacations in certain industries and/or at specific periods of the year.

An examination of the various Canadian labour laws yielded a list of thirteen civic holidays in Canada that are non-working days for Canadian wage and salary workers. Since labour legislation in Canada is mainly under provincial jurisdiction, some of these holidays do not apply to Canada as a whole.

New Year's Day, Victoria Day (May), Canada Day, Labour Day (September), Thanksgiving Day (October) and Christmas are holidays throughout Canada.

Good Friday is a non-working day in most Canadian provinces except Quebec, where the legislation allows employers to grant either Good Friday or Easter Monday as a holiday. Since these holidays are sporadically present in the LFS, this difference is an important one.

Regional holidays such as Family Day in Alberta, Saint-Jean-Baptiste Day in Quebec and the Civic Holiday (first Monday in August) in other parts of Canada are non-working days that are equivalent to the nationwide holidays mentioned above.

The holidays described above are all major holidays in the sense that they are granted to all employees in jurisdictions where they apply. Also, when one of these holidays occurs on a weekend, it is carried over to the next working day.

However, Remembrance Day and Boxing Day are holidays of more limited scope. These are non-working days for employees under federal jurisdiction and most employees of provincial and municipal governments. In addition, being more limited in coverage, these holidays are not carried over for many Canadian employees when they fall on a non-working day. The hours lost on the Remembrance Day holiday, which occurs each year during the LFS reference week, diminish considerably when the holiday falls on a Saturday or Sunday.

**Table 5. Civic holidays in Canada recognised by Provincial or Federal Regulations as non-working days**

Month / day	Holidays	Jurisdictions												
		Federal	Newfoundland and Labrador	Prince-Edward Island	Nova Scotia	New Brunswick	Québec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories
<b>January 1</b>	<b>New Year's Day</b>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>February</i>	<i>Family Day</i>										X		X	
<b>March or April</b>	<b>Good Friday</b>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>March or April</i>	<i>Easter Monday</i>	X					X							
<b>May</b>	<b>Victoria Day</b>	X					X	X	X	X	X	X	X	X
June 24	St-Jean-Baptiste						X							
<b>July 1</b>	<b>Canada Day</b>	X	X	X	X	X	X	X	X	X	X	X	X	X
August	Civic Holiday		X			X				X		X	X	X
<b>September</b>	<b>Labour Day</b>	X	X	X	X	X	X	X	X	X	X	X	X	X
<b><u>October</u></b>	<b><u>Thanksgiving Day</u></b>	X					X	X	X	X	X	X	X	X
<b><u>November</u></b>	<b><u>Remembrance Day</u></b>	X		X	X				X	X	X	X	X	X
<b>December 25</b>	<b>Christmas Day</b>	X	X	X	X	X	X	X	X	X	X	X	X	X
December 26	Boxing Day	X						X						

Note: The holidays in "bold" are non-working days in most provinces; when they are also in "italics" they happen at least in some years during the reference week of the Labour Force Survey; when they are "underlined" and in "italics", they occur most of the time during the LFS reference week.

## 5.2 Estimation of hours lost by employees

When respondents have lost hours for more than one reason during the reference week, the Labour Force Survey records only the main reason for their absence. When the LFS reference week includes a civic holiday, there is therefore a probability that some respondents are also taking leave for other reasons. In the case of respondents who reported vacations as their main reason, some of these lost hours are recoded as civic holiday time. This partially corrects the bias caused by the single coding of the main reason and provides a more accurate estimate of hours lost for civic holidays falling outside LFS weeks.

The ratio of these lost hours for wage and salary jobs is then calculated. This is done for each industry by region, by dividing the number of hours lost by the number of hours worked plus the hours lost.

Ratio of lost hours = Hours lost because of civic holidays, adjusted / (Hours actually worked + Hours lost because of civic holidays, adjusted).

This ratio is then used to adjust hours lost for the main civic holidays that fall outside LFS weeks (Christmas, New Year's Day, etc.). When graphed, the different holidays have a seesaw affect on the trend for hours worked. To illustrate this, Appendix B contains figures for 2002 showing the effect of corrections for non-random events for industries in the manufacturing sector (B1) and

education (B3) in Ontario and for public administration (B2) and the construction industry (B4) in Quebec. The sharp drop in average hours during the first week and the last week of the year is due to the fact that January 1 and December 31 were on a Tuesday, (a part week of three days in 2002) combined with the presence of the civic holidays of the season.

### ***5.3 Spring break in education services***

Since the late 1970s, the Canadian provinces have all started granting a week of leave in the Spring to teachers at the elementary and secondary levels. This week of leave and its annual timing have been instituted by the departments of education of each province. In Ontario, this annual one-week break always coincides with the LFS week in March. It coincides with the LFS week sporadically in a number of provinces, but never in New Brunswick, Quebec, Manitoba and Alberta. Since this is a non-random event, the hours lost as a result of vacations in the elementary and secondary education sector are treated the same as a civic holiday. The ratios estimated on the basis of provinces whose one-week break falls during the survey week are used to estimate hours lost in the other provinces. The effect of the spring break on LFS estimates is illustrated in Figure B3 of Appendix B. As may be seen, the adjustment technique brings out the hours lost only during the tenth week of the year (second week of March) whereas its non-inclusion, combined with the presence of Easter Monday, boosts the number of hours lost between week 6 and week 15 inclusively.

Since this week of leave also disrupts all workers who have school-age children, the hours lost because of vacations in the provinces in which the break coincides with the LFS week are also treated as a non-random event. This pattern of hours lost during spring break when it falls within the survey, is then used to estimate the pattern for the other provinces. The introduction of this correction may be seen in Figures B1, B2 and B4 of Appendix B. Hours lost because of vacations are especially evident in the case of public administration in Quebec (B2).

The construction sector in Quebec also receives special treatment. Construction workers in Quebec belong to a highly centralized organization which, in the 1970s, instituted compulsory annual vacations during the last two weeks of July. In some years, the first week of these vacations falls within the LFS reference week and in other years it does not. This causes a major bias in estimating the hours worked in this industry. The problem is corrected by treating these vacations as a non-random event. The lost hours estimated by the LFS owing to vacations in July in this industry in Quebec are used to estimate hours lost during years when these holidays fall outside the LFS in that province. (See Figure B4 in Appendix B).

### ***5.4 Other classes of workers***

In 1997, the LFS dropped the question on the reason for hours lost owing to a civic holiday for self-employed workers. Since civic holidays legally apply only to wage and salary jobs, the survey dropped the question because it was generally difficult for the self-employed respondent to think about his schedule as fixed and therefore to identify time absent. However, an analysis of hours actually worked by self-employed workers indicates that they reduce their hours when the LFS includes a civic holiday, although they do so to a lesser extent than paid workers. Also,

the LFS definition of self-employed workers includes owners of incorporated businesses, who are added to employees in the National Accounts universe.

In order to correct this problem, an estimate of hours lost because a civic holiday falls within the survey week is obtained by comparing hours usually worked and hours actually worked for self-employed workers during months when employees have a civic holiday.

## ***6. Quality of data on hours worked in Canada***

The technique that is used to annualize hours worked from the Labour Force Survey, which is based on a monthly reference week, corrects the biases caused by non-random events that affect both the level and the trend in series on hours worked. The methodology used is based on a number of assumptions that are informed by Canadian labour legislation. In the absence of a weekly survey to confirm the validity of these assumptions, we are obliged to assess the quality of annual hours using other available information.

Table 6 shows the annual estimates of hours lost by main reason for absence. The data for civic holidays and vacations are estimated from the series obtained by the methodology to annualize hours worked.<sup>14</sup>

In Canada, labour legislation requires a minimum of two weeks of vacation per year. An average of twelve days lost as a result of vacations is therefore reasonable. As noted above, the majority of Canadian full-time workers are entitled to eight major holidays. About a quarter of full-time workers, primarily those in the government sector, are entitled to a maximum of eleven civic holidays. Considering that part-time work, seasonal work and essential services (health, security, etc.) are common; the average of 6.7 days lost for this reason is therefore quite acceptable. When we consider only the full time workers, the average number of hours lost because of an annual leave increase to 102.6 hours (13.7 days), while the same number for a civic holiday reaches 62 hours lost or 8.3 days.

Since we are not controlling for reasons of absence other than civic holidays and vacations, it is possible that a slight bias remains that would have the effect of underestimating hours lost because of a civic holiday. Reasons for absence consisting of family responsibilities or “Other reasons” are the most likely to interact with specific events such as spring break or the holiday season.

---

14. A similar table appears in a document produced by OECD: Annual hours of work: definitional and comparability issues.

**Table 6. Absences from work in hours and days, employee jobs, Canada—2002**

Reason for absence	Hours lost	Days lost	Percentages
Annual leave	90.2	12.0	42%
Holidays	50.3	6.7	20%
Short-time	4	0.6	2%
Illness or accident	51	6.8	20%
Bad weather	1	0.2	0%
Industrial disputes	1	0.2	1%
Personal and family responsibilities	9.2	1.7	3%
Maternity	20	2.7	8%
Other	11	1.5	4%

Note: The number of days lost is obtained by dividing the hours lost by 7.5 hours. This corresponds to the reported usual hours of work in Canada, assuming a five-day work week.

Source: Statistics Canada, National Accounts and Analytical Studies, MEAD, Canadian Productivity Accounts and Labour Statistics Division.

While a household survey can potentially provide more accurate data in areas that an employer survey cannot, there is nevertheless the question about overall accuracy. When it comes to estimating hours-worked, household surveys are sometimes criticized for problems that arise from proxy reporting and from recall bias. Research in other countries have compared the results of time use surveys, which provide a detailed set of results on work hours that are captured in diaries, to the results of labour force surveys. Time use surveys may provide data that are more accurate because the information in the diaries is collected on an ongoing basis, while that coming from a labour force survey may involve recall bias on the part of respondents who are expected to report their work hours in a previous period.<sup>15</sup> However, studies in both the U.K. and Canada confirm that the results from a household survey approximate closely the results from time use surveys.

The U.K. Labour Force Survey produces estimates of basic weekly hours worked that are higher than its employer earnings survey (New Earnings Survey—NES). (Williams, 2004). In order to investigate the validity of the LFS hours-worked number, Williams (2004) compared the results of the Time Use Survey with the Labour Force Survey from the U.K. Office for National Statistics. A comparison of the LFS and TUS for average actual hours worked showed the two were almost the same.

The U.K. study concludes that under the assumption that an accurate benchmark is provided by the Time Use survey method, similarities with the LFS average actual hours worked estimates imply that the recall approach used in the LFS is accurate at recording average actual hours worked at an aggregate level.

Canadian data confirm these findings. Recent work that compares the LFS to the Canadian Time Use Survey finds close similarities at the aggregate level (Table 7). The total actual hours worked per person derived from the LFS for 1998 was 33.9 hours per week while it was 34.2 hours in the TUS—a difference of only 0.3 hours.

---

15. Time use surveys also potentially force respondents to be exhaustive in their assignment of hours during a day to different purposes and therefore may provide for more accurate estimates.

**Table 7. Average annual actual weekly hours worked (all workers), 1998**

	Canadian Labour Force Survey	Canadian Time Use Survey	Difference (hours)
Total	33.9	34.2	-0.3
Gender			
Male	37.7	37.7	0.0
Female	29.4	29.8	-0.4

Source: Chung, Maynard and Sunter, 2004.

Another concern that has sometimes been expressed over the use of the LFS, which is a household survey, is the accuracy of the industry hours per job data that are produced by household surveys in general—especially when the survey is used to produce labour input data that will be used with industry economic indicators (i.e. GDP) that come from industry surveys. The industry breakdown of most source data used to produce the national accounts are based on the business register which provides a consistent industry coding of all establishment surveys, including the administrative sources. On the other hand, the household surveys code the industry on the basis of the information provided by the respondent. The Labour Force Survey asks the name of the business, its description, the kind of work and the main activities. This is combined with the information collected about the employee (address, earnings, size of place of work) and is used to provide an industry code to each respondent that has a job. Ideally, matching industry classification of household surveys with the business register would technically remove a major hurdle in achieving better integration between the two sources.<sup>16</sup> In practice though, this is difficult because the business names used by the respondent for the establishment unit where he/she works often do not correspond to the business name of the enterprise stored in the Business Register.

Table 8 compares at the “2-digit industry level” the number of employee jobs in industries that are theoretically comparable in terms of coverage from the Labour Force Survey, which is the household survey used for benchmarking, with the Survey of Employment, Payroll and Hours, which is an employer survey. When we take account of the 5% difference observed at the aggregate total, the variations at 2 digit industry level are less than 10% in most industries, except wholesale trade, finance, insurance and real estate, professional services and administration and support services, waste management and remediation. This suggests that the hours data derived from the LFS pertain to basically the correct industry jobs total that comes from SEPH.

The difference in the case of wholesale trade is largely offset by a gap of the opposite sign in retail trade. Respondents, particularly when it comes to another member of the household, may have difficulty in providing precise information about the nature of the business. Many businesses in these industries are composed of multi-establishments that are often involved in at least two activities.

---

16. More information about this important issue is provided in Eunice Lau, International Questionnaire – report on initial findings, 2003 and in OECD, Annual hours of work: definitional and comparability issues.

**Table 8. Comparison of the number of employee jobs for 2-digit industry where industry is theoretically comparable in terms of coverage—in thousands**

Industry name (NAICS code)	SEPH	LFS	%	Correlation
			SEPH / LFS	coefficient
	2002	2002	2002	1987-2003
Mining, oil and gas extraction	140	164	85%	62%
Utilities (22)	114	131	87%	87%
Construction (23)	615	703	87%	96%
Manufacturing (31-33)	2,052	2,239	92%	74%
Wholesale trade (41)	737	519	142%	90%
Retail trade (44-45)	1,550	1,760	88%	88%
Transportation and storage (48-49)	612	670	91%	82%
Information and communication (51)	334	367	91%	67%
Finance, insurance and real estate (52,53,55)	886	818	108%	66%
Professional services (54)	654	807	81%	98%
Admin. and support, waste mgmt. and remediation services (56)	563	485	116%	98%
Education (61)	953	1,003	95%	86%
Health and social services (62)	1,311	1,481	89%	96%
Arts, entertainment and recreation (71)	232	280	83%	98%
Accommodation and food (72)	957	958	100%	88%
Public administration (91)	725	789	92%	81%
Total excluding 11 and 81	12,447	13,143	95%	93%

Source: Statistics Canada, National Accounts and Analytical Studies, MEAD, Canadian Productivity Accounts and Labour Statistics Division.

Nevertheless, it should be recognized that even business registers do not have an easy task distinguishing manufacturing and wholesale operations or wholesaling from retailing activities.

In the case of the service industries mentioned above, respondents may also have difficulties identifying if they are self-employed (incorporated or not) or an employee. On the other hand, the Survey of Employment, Payroll and Hours often misses the creation of new establishments due to the existence of a lag in updating the Business Register of Statistics Canada.

The correlation coefficients contained in Table 8 provide an indicator of the comparability of the trends derived from the two surveys over the period 1987-2003. At the aggregate level, the two series have a correlation of 93%. Surprisingly, some industries that are very close in terms of level show relatively poor correlations in terms of trends. It is important to mention that the Survey of Employment Payroll and Hours went through many methodological changes since the early 1990s.

## 7. Summary

In Canada, the Labour Force Survey, a household survey, is used as the foundation for the calculation of total hours worked for several reasons. It covers the production boundaries most closely associated with the National Accounts. With a professionally designed sampling process, it is designed to provide exhaustive coverage of the population being examined.

The use of the Labour Force Survey as a benchmark also avoids the risk of double counting since its coverage include all working categories and the civil population of age 15 and over of the ten Canadian provinces for all industries. In addition, this survey captures sufficient information to translate the number of persons employed into the SNA concept of jobs.

In Canada, only the Labour Force Survey measures hours worked according to the 1962 ILO concept. It collects sufficient information to allow the reference week problem to be resolved. It closely approximates the estimates of hours worked per person derived from time-use surveys. As a result, the Canadian methodology relies heavily on this survey to produce aggregate hours worked that are consistent with the Canadian System of National Accounts.

Table 9 below summarizes the methodology used to produce Canadian estimates of the number of jobs and hours worked that is consistent with the System of National Accounts.

**Table 9. Summary of the methodology used to produce estimates of jobs and hours worked consistent with SNA concepts**

	Number of jobs	Average annual hours worked
Employee jobs	Detailed estimates by industry and province/territory using data from several sources, adjusted to the LFS benchmark.	Mainly LFS. However, when the detailed level necessary is not available from this survey we used hours paid from the Survey of Employment, Payrolls and Hours to split the corresponding aggregate from LFS.
Self-employed jobs	Industry detail interpolated and projected from the quinquennial Census of Population and adjusted to LFS sub-total benchmarks.	Primarily LFS.

It should be noted that while the Canadian methodology relies primarily on the Labour Force Survey to estimate the aggregate business sector and about one-quarter of the 2-digit breakdowns, the productivity program also makes extensive use of establishment surveys and of the Census of population to estimate more detailed industries. However, we insure that all of these data sum at the national totals to a benchmark derived from the household survey.



## Appendix A

**Table A1. Example of the different steps to produce the volume of hours worked consistent with the Canadian System of National Accounts—Part 1**

Year 2002	Industry	A		B		C = A+B		D		E = C + D		F		G = E - F		H		I		
		Step 1	Step 2	Step 3	Step 4	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5	Step 5
		Employee	Micro adjustments and benchmarking	Source data adjusted to benchmark	Adjustments for Own-construction	Employee	Source data adjusted to benchmark	Employee	Non-commercial	Employee	Business sector	Employee	Non-commercial	Employee	Business sector	Employee	Non-commercial	Employee	Business sector	
		Source data	adjustments and benchmarking	adjusted to benchmark	construction	Source data adjusted to benchmark	adjusted to benchmark	Employee	Non-commercial	Employee	Business sector	Employee	Non-commercial	Employee	Business sector	Employee	Non-commercial	Employee	Business sector	
	Agriculture, forestry, fishing and hunting	226	9	235	-2	233	233	224	10	224	224	10	2035	2,035	224	2,035	1,951	2,035	224	1,951
	Mining and oil and gas extraction	166	23	189	-25	165	165	165	0	165	165	0	2,190	2,190	165	2,190	0	2,190	165	0
	Utilities	114	20	133	-25	108	108	96	12	96	96	12	1,838	1,838	96	1,838	1,894	1,838	96	1,894
	Construction	703	10	713	101	814	814	814	0	814	814	0	1,990	1,990	814	1,990	0	1,990	814	0
	Manufacturing	2,052	-113	1,939	-5	1,933	1,933	1,933	0	1,933	1,933	0	1,900	1,900	1,933	1,900	1,900	1,933	1,900	1,900
	Wholesale trade	737	69	806	0	806	806	806	0	806	806	0	1,942	1,942	806	1,942	1,907	1,942	806	1,907
	Retail trade	1,650	16	1,666	0	1,666	1,666	1,666	2	1,664	1,664	2	1,575	1,575	1,664	1,540	1,540	1,664	1,540	1,540
	Transportation and warehousing	612	83	695	-10	685	685	685	34	651	651	34	1,893	1,893	651	1,893	1,893	651	1,893	1,893
	Information and cultural industries	334	57	391	-2	389	389	389	35	354	354	35	1,726	1,726	354	1,726	1,627	1,726	354	1,627
	Finance, insurance, real estate and renting and leasing	886	42	928	-2	926	926	926	26	899	899	26	1,718	1,718	899	1,718	1,700	1,718	899	1,700
	Professional, scientific and technical services	654	3	657	0	657	657	657	5	652	652	5	1,871	1,871	652	1,871	1,813	1,871	652	1,813
	Administrative and support, waste management and remediation services	563	16	579	0	579	579	579	2	577	577	2	1,714	1,714	577	1,714	1,679	1,714	577	1,679
	Education services	953	-17	936	-2	934	934	934	883	51	51	883	1,543	1,543	51	1,532	1,543	51	1,532	1,543
	Health care and social assistance	1,311	81	1,392	-2	1,390	1,390	1,390	904	485	485	904	1,519	1,519	485	1,519	1,534	485	1,519	1,534
	Arts, entertainment and recreation	280	-22	259	0	258	258	258	51	208	208	51	1,527	1,527	208	1,527	1,618	208	1,527	1,618
	Accommodation and food services	958	134	1,092	-1	1,091	1,091	1,091	6	1,085	1,085	6	1,502	1,502	1,085	1,502	1,709	1,085	1,502	1,709
	Other services (except public administration)	576	174	750	0	750	750	750	223	527	527	223	1,622	1,622	527	1,622	1,622	527	1,622	1,622
	Public administration	725	47	772	-25	746	746	746	746	0	0	746	1,687	1,687	0	1,687	1,687	0	1,687	1,687
	Total Economy	13,564	568	14,131	0	14,131	14,131	14,131	2,941	11,191	11,191	2,941	1,732	1,732	11,191	1,732	1,594	1,732	11,191	1,594

Source: Statistics Canada, National Accounts and Analytical Studies, MEAD, Canadian Productivity Accounts and CANSIM Table 383-0009.

**Table A1. Example of the different steps to produce the volume of hours worked consistent with the Canadian System of National Accounts—Part 2**

Year 2002	Industry	J		K		L = J - K		M		N = M x N		P = E + M		Q = J + O		R = Q / P
		Step 7 Employee Volume of Hours worked – Total ECN	Step 7 Employee Volume of hours worked – commercial	Step 7 Employee Volume of hours worked – Business Sector	Step 6 Self employed Number of jobs	Step 5 Self employed Average hours worked	Step 5 Self employed Volume of hours worked	Step 7 Self employed	All jobs Total economy	All hours Total economy	Avh					
	Agriculture, forestry, fishing and hunting	475,126	18,700	456,426	196	2,198	430,724	429	905,849	2,109						
	Mining and oil and gas extraction	360,738	0	360,738	4	1,668	5,947	168	366,685	2,179						
	Utilities	198,910	23,524	175,386	1	1,715	904	109	199,814	1,838						
	Construction	1,620,486	0	1,620,486	158	1,913	302,987	973	1,923,473	1,977						
	Manufacturing	3,774,994	909	3,774,085	39	1,933	76,088	1,973	3,851,082	1,952						
	Wholesale trade	1,565,130	481	1,564,649	31	2,047	62,514	836	1,627,644	1,946						
	Retail trade	2,624,040	2,588	2,621,452	127	1,777	226,036	1,793	2,850,076	1,590						
	Transportation and warehousing	1,319,464	64,779	1,254,686	84	2,293	192,829	769	1,512,293	1,966						
	Information and cultural industries	671,668	57,477	614,191	19	1,922	35,754	408	707,422	1,735						
	Finance, insurance, real estate and renting and leasing	1,590,451	44,548	1,545,903	68	1,748	119,267	994	1,709,718	1,720						
	Professional, scientific and technical services	1,229,682	8,974	1,220,708	234	1,632	382,160	891	1,611,842	1,808						
	Administrative and support, waste management and remediation services	992,533	2,957	989,577	99	1,451	143,725	678	1,136,259	1,676						
	Education services	1,430,501	1,362,090	68,410	46	1,053	48,857	980	1,479,357	1,509						
	Health care and social assistance	2,110,733	1,387,343	723,390	166	1,810	300,547	1,556	2,411,280	1,550						
	Arts, entertainment and recreation	394,612	81,946	312,666	71	1,326	94,124	329	488,736	1,484						
	Accommodation and food services	1,639,010	10,590	1,628,421	46	2,211	101,048	1,137	1,740,059	1,531						
	Other services (except public administration)	1,218,852	362,179	856,674	133	1,737	230,510	883	1,449,362	1,642						
	Public administration	1,259,390	1,259,390	0	0	0	0	746	1,259,390	1,687						
	Total Economy	24,476,321	4,688,475	19,787,846	1,522	1,810	2,754,021	15,653	27,230,341	1,740						

Source: Statistics Canada, National Accounts and Analytical Studies, MEAD, Canadian Productivity Accounts and CANSIM Table 383-0009.

## Appendix B

**Table B2. Showing daily weights by industry in Canada that are used to estimate part week ratios for start and end month or year in the derivation of hours worked per job**

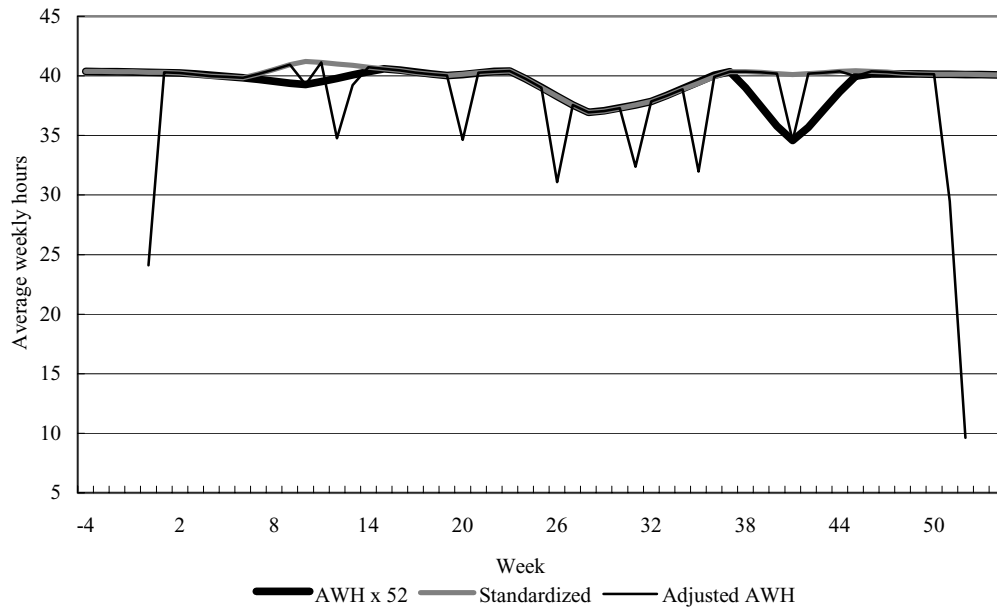
Industry	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Agriculture	0.08	0.16	0.16	0.16	0.16	0.16	0.11
Other primary industries	0.05	0.18	0.18	0.18	0.18	0.17	0.06
Utilities	0.02	0.19	0.19	0.19	0.19	0.19	0.02
Construction	0.02	0.19	0.19	0.19	0.19	0.19	0.04
Manufacturing	0.02	0.19	0.19	0.19	0.19	0.19	0.03
Wholesale trade	0.02	0.19	0.19	0.19	0.19	0.19	0.03
Retail trade	0.07	0.16	0.16	0.16	0.17	0.17	0.11
Transportation and storage	0.06	0.18	0.18	0.18	0.17	0.17	0.07
Information and cultural industries	0.02	0.19	0.19	0.19	0.19	0.19	0.02
Finance, insurance and real estate	0.02	0.19	0.19	0.19	0.19	0.19	0.03
Professional, scientific and technical services	0.02	0.19	0.19	0.19	0.19	0.19	0.03
Administrative services	0.02	0.19	0.19	0.20	0.19	0.19	0.02
Education services	0.01	0.19	0.20	0.20	0.20	0.19	0.01
Health and social services	0.05	0.18	0.18	0.18	0.18	0.17	0.06
Accommodation, food and leisure services	0.10	0.14	0.15	0.15	0.16	0.17	0.13
Other services	0.04	0.18	0.18	0.18	0.18	0.18	0.05
Public administration	0.03	0.19	0.19	0.19	0.19	0.19	0.03

Note: For each industry, these rates sum to one. Each rate represents how many hours on average of a given week have been worked on that day.

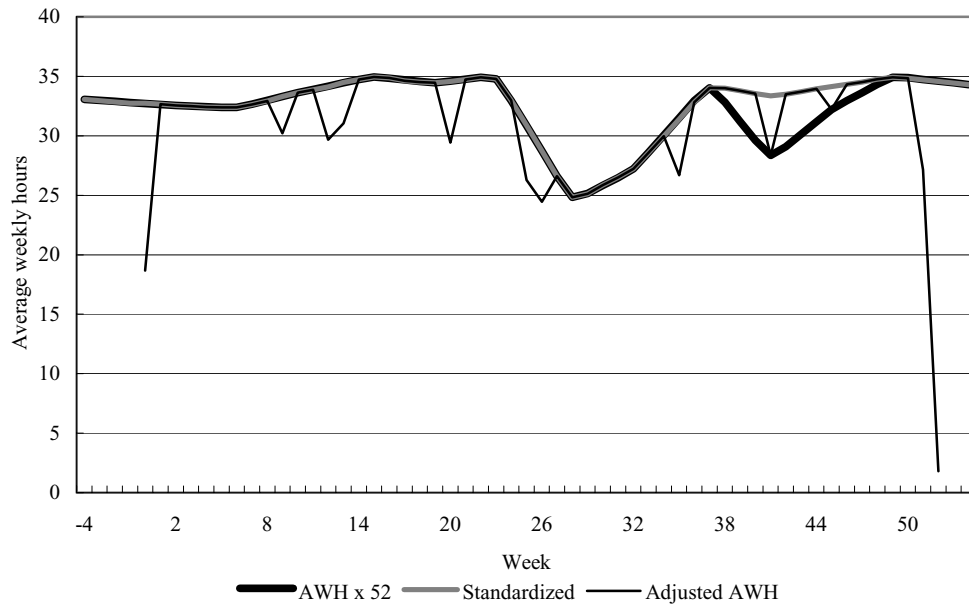
### Legends of the figures B1 to B4

- AWH x 52: Average weekly actual hours obtained from the twelve reference weeks of the Labour Force Survey.
- Standardized: Represents the average weekly hours worked after that we have added back the hours lost due to a special event (civic holiday, March break,...) and that was captured by the Labour Force Survey.
- Adjusted AWH: Represents the average hours worked adjusted for special events and that are used in the SNA.

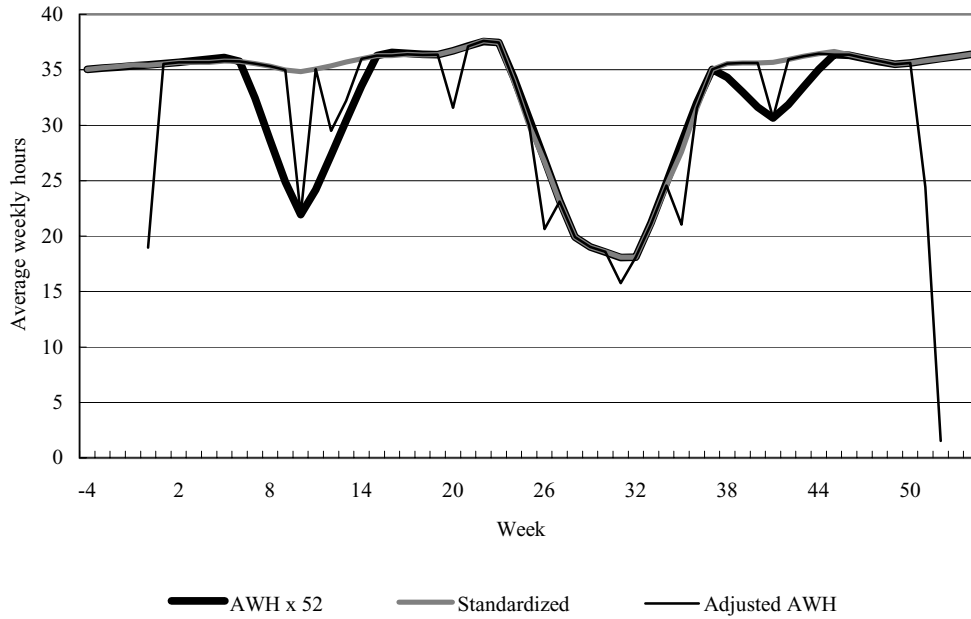
**Figure B1. Adjustment of hours worked for the year 2002 in Manufacturing, Ontario**



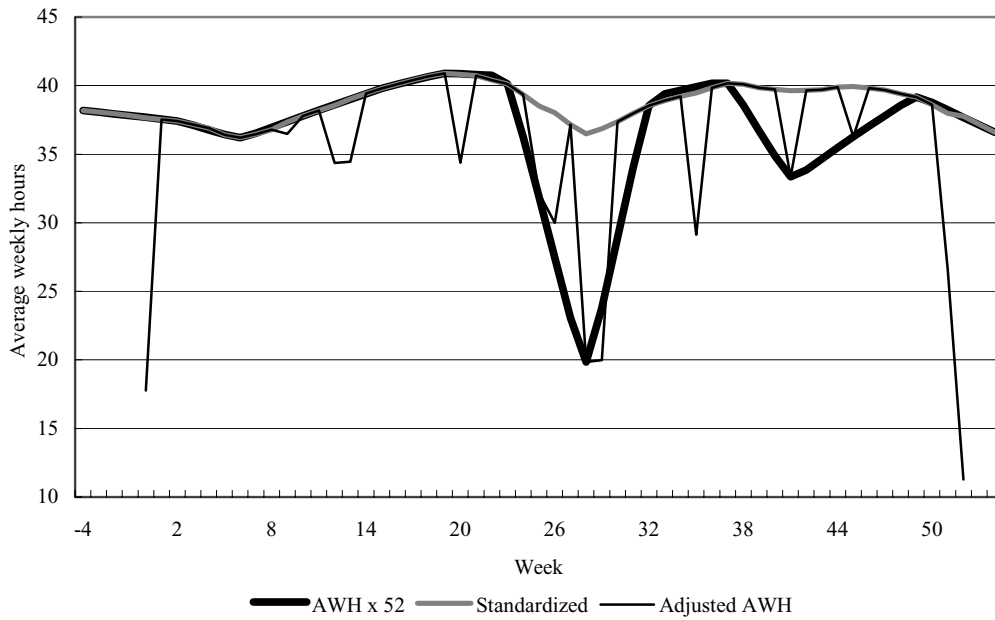
**Figure B2. Adjustment of hours worked for the year 2002 in Public Administration, Quebec**



**Figure B3. Adjustment of hours worked for the year 2002 in Education, Ontario**



**Figure B4. Adjustment of hours worked for the year 2002 in Construction, Quebec**



## *References*

Baldwin, J.R. and T.M. Harchaoui. 2004. "The Integration of the Canadian Productivity Accounts within the System of National Accounts - Current Status and Challenges Ahead." Paper prepared for the NBER-CRIW Conference on the New Architecture for the U.S. National Accounts, 16-17 April 2004, July 2004, 34 p.

Employment Standards Legislation in Canada, Human Resources Development Canada, and Internet: [labour.hrdc.gc.ca/psait\\_spilat/mnex-eslc//index.cfm/doc/english](http://labour.hrdc.gc.ca/psait_spilat/mnex-eslc//index.cfm/doc/english) last updated: 03/13/2002.

Lau, E. "International Questionnaire – report on initial findings." Report produced in the scope of the project: *Consistency of employment and earnings statistics in Labour Force Survey and National Accounts for productivity*, NSI, 2003, 14 p.

Lemaître, G. "Activities of the working party on employment and unemployment statistics – Estimates of annual hours actually worked in OECD countries." OECD, Paris, November 2001, 11 p.

Maynard, J.-P. and D. Sunter. 2003. "Hours of Work and Productivity: concepts and measures." Statistics Canada, Paper presented to the 2003 Paris Group Meeting, NSI, London, 11 p.

OECD - Working Party on Employment and Unemployment Statistics, "Annual hours or work: definitional and comparability issues." Document presented at the 16<sup>th</sup> Meeting held in Paris on March 23-24, 1998, 20 p.

Statistics Canada, *Productivity Growth in Canada*. Catalogue No. 15-204-XPE. Analytical Studies Branch. Ottawa: Statistics Canada. January 2001, 204 p.

System of National Accounts (SNA). 1993. Published jointly by the Commission of the European Communities/Eurostat, the International Monetary Fund, the Organisation for Economic Co-operation and Development, the Statistics Division of the former Department for Economic and Social Information and Policy Analysis and the regional commissions of the United Nations Secretariat, and the World Bank. Copyright (c) 1993, European Communities, IMF, OECD, United Nations and World Bank.

Williams, R.D. 2004. "Investigating Hours Worked Measurements." *Labour Market Trends*. Office of National Statistics. February. London:U.K. 9 p.