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PERSPECTIVES

ON LABOUR AND INCOME

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- Immigrants' education and required job skills
- Age and earnings
- Trends in manufacturing employment
- Obesity on the job
- Year-end review
- Varia
Minimum wage



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Diane Galarneau and René Morissette

During the 1991 to 2006 period, the proportion of immigrants with a university degree in jobs with low educational requirements increased, not only among recent immigrants but also among established ones. The increases for established immigrants suggest that the difficulties, which have long plagued recent immigrants, are not necessarily temporary. Changes in the profile of established immigrants—particularly language and country of origin—accounted for only a quarter of the deterioration for established immigrants.

- 19 Age and earnings
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- 27 Trends in manufacturing employment
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Manufacturing employment has been declining in most OECD countries. From 2004 to 2008, more than one in seven manufacturing jobs were lost in Canada, with almost all manufacturing industries sharing in the downturn. The majority of job losses were in Ontario, but other parts of the country were also affected. Canada's large metropolitan areas were the hardest hit.

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Managing Editor

Henry Pold
613-951-4608
henry.pold@statcan.gc.ca

Editors

Nikki Burke
Lahouaria Yssaad

Data Services

Joanne Bourdeau

Production and Composition

Ann Trépanier
Suzanne Marsden
Aaron Brooks

Printing

Dissemination Division

Cover Art

Helen Johansen

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- E use with caution
- F too unreliable to be published

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37 Obesity on the job

Jungwee Park

Obesity among Canadian workers increased from 12.5% in the mid-1990s to 15.7% in 2005, with men and older workers generally more prone to obesity. While low income is associated with obesity for women, high income is a factor for men. A common factor for both sexes is low education. Marriage is linked to obesity for young workers, while it seems to have a protective effect for older ones. In the workplace, obesity is associated with more frequent absences.

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Following six years of strong employment growth, 2008 started well as Canada's employment rate hit a new high and the unemployment rate sank to a 33-year low. In the last quarter of the year, however, job losses in cyclically sensitive industries such as manufacturing, natural resources and construction led to a drop in overall employment.

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Perspectives on Labour and Income

The quarterly for labour market and income information

Highlights

In this issue

■ Immigrants' education and required job skills ... p. 5

Between 1991 and 2006, the proportion of male immigrants with a university degree in jobs with low educational requirements such as clerks, truck drivers, cashiers and taxi drivers increased from 12% to 21% for established immigrants, while the proportion remained stable at about 10% for native-born men.

From 1991 to 2006, the proportion of established female immigrants with a degree in jobs with low educational requirements increased more modestly from 24% to 29%, while remaining stable at around 12% for native-born women.

For recent immigrants, the proportion of university graduates in low-skill jobs increased between 1991 and 2006, but it remained within the levels measured for the period. These proportions were nearly 25% for men and a little under 40% for women.

In 1991, established immigrant men with a degree in a field of study leading to a regulated profession such as medicine, nursing, engineering, law and accounting had low-skill job rates comparable to those of native-born Canadian men. By 2006, these rates had increased sharply for both men and women, particularly for those trained in medicine and engineering.

■ Age and earnings ... p. 19

■ Among full-time full-year workers age 45 to 69 and not receiving a pension, age by itself is not significantly related to hourly earnings once other characteristics are controlled for.

■ Hourly earnings increase with work experience and, on average, reach a maximum at 25 to 29 years of experience and stabilize thereafter. Overall, work experience is a better predictor of hourly earnings than age.

■ Men with university degrees earn 36% more per hour than men with non-university postsecondary certificates. However, women of all education levels earn less than their male counterparts.

■ Trends in manufacturing employment ... p. 27

■ Manufacturing lost more than one in seven, or nearly 322,000, jobs between 2004 and 2008. In 2004, the industry accounted for 14.4% of total employment. In 2008, this proportion was only 11.5%.

■ Textiles and clothing, long one of the largest manufacturing employers in the country, was hardest hit. From 2004 to 2008, this industry lost nearly half of its workers.

■ The automobile industry was also hit very hard. From 2004 to 2008, one in five motor vehicle manufacturing jobs and more than one in four motor vehicle parts manufacturing jobs were lost.

■ The country's very large cities were hit as hard as small towns and rural areas. The latter were also as likely as very large cities to replace lost manufacturing jobs with jobs in other industries, particularly in the service sector or in construction. However, in small towns and rural areas, these new jobs often paid much less.

■ Obesity on the job ... p. 37

■ Obesity among Canadian workers increased over the last decade, from 12.5% in the mid-1990s to 15.7% in 2005.

- Low education was associated with obesity for both employed men and women as was low income for women.
- Work arrangements such as shift work and excessive hours were associated with obesity.
- Obesity was related to elevated levels of work stress—these workers had higher job strain and lower co-worker support.
- The odds of being absent from work were almost four times higher for obese young men than for those with normal weight.
- Among older women workers, obesity negatively affected productivity as measured by reduced work activities, disability days, and work injury.

■ The labour market in 2008 ... p. 47

- Employment followed an upward trend over the first nine months of 2008 (161,000 or 0.9%), but toward the end of the year began to fall, declining by 81,000 in the last quarter.
- Total actual hours worked dropped throughout 2008, ending the year 1.2% lower in the last quarter than in the same quarter of 2007.
- Average hourly earnings growth remained strong in 2008 at 4.3%, following a 4.9% increase in 2007.
- Although manufacturing lost 35,000 workers in 2008 (-1.7%), this was less than the 129,000 drop in 2007 (-6.1%).

■ What's new?

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Perspectives

Immigrants' education and required job skills

Diane Galarneau and René Morissette

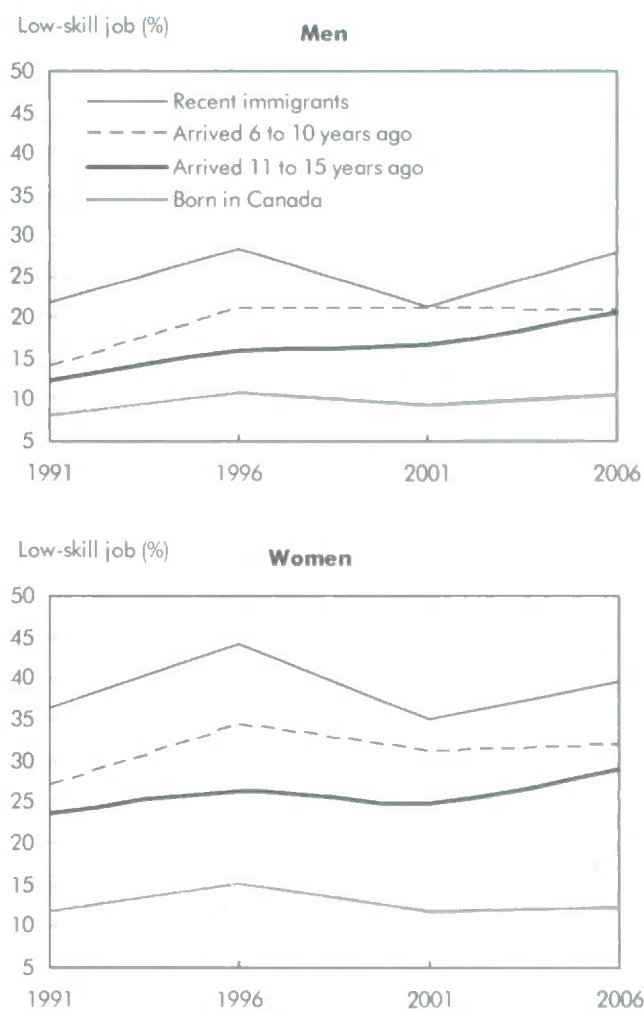
In 2006, the proportion of recent immigrants with a university degree was twice as high as among native-born Canadians. Despite this high level of schooling, several indicators reflect difficulties that recent immigrants entering the Canadian labour market encounter. Their employment and unemployment rates and their earnings are, in general, substantially different from those of native-born Canadians (Frenette and Morissette 2003, Picot et al. 2007, and Statistics Canada 2008).

The difficulties faced by immigrants have been attributed to several factors. One is the low rate of recognition of their credentials (Ferrer and Riddell 2004, and Green and Worswick 2004), which is partly reflected in the large proportion with university degrees in jobs with low educational requirements, such as retail sales clerks, truck drivers, office clerks, cashiers and taxi drivers. In 2006, 28% of recent immigrant men and 40% of women held this kind of employment (Chart A) compared with 10% and 12% of native-born Canadians.

This form of underemployment among new immigrants could be attributed to their recent arrival, their lack of information about the Canadian labour market, and their lack of contacts, but the differences would be expected to disappear over time.

This idea seemed plausible in 1991, since the chances of established immigrants with a university degree being in jobs with low educational requirements appeared to be very similar to those of native-born Canadians. In 1991, the rate for male immigrants who had arrived in Canada between 1975 and 1979 was 12%, slightly higher than the 8% for their native-born

Chart A Even after 15 years, immigrants with a university degree are still more likely than the native-born to be in low-skilled jobs



Source: Statistics Canada, Census of Population.

Diane Galarneau is with the Labour and Household Surveys Analysis Division. She can be reached at 613-951-4626 or diane.galarneau@statcan.gc.ca. René Morissette is currently working abroad.

counterparts. By 2006, however, the situation had changed. The rate for male immigrants who had arrived between 1990 and 1994 was 21%, 10 percentage points higher than for native-born men. For established female immigrants, the proportion in 1991 was already twice as high as for native-born women, and by 2006 the gap had widened.

This increase suggests that established immigrants had more difficulty finding jobs reflecting their educational attainment in 2006 than in 1991. This form of underemployment of immigrants reduces their contribution to Canada's economic prosperity and constitutes a loss of well-being for them because it affects their earnings (Galarneau and Morissette 2004). Such persistent gaps relative to native-born Canadians, especially if they extend to established immigrants, may also undermine Canada's ability to attract skilled immigrants.

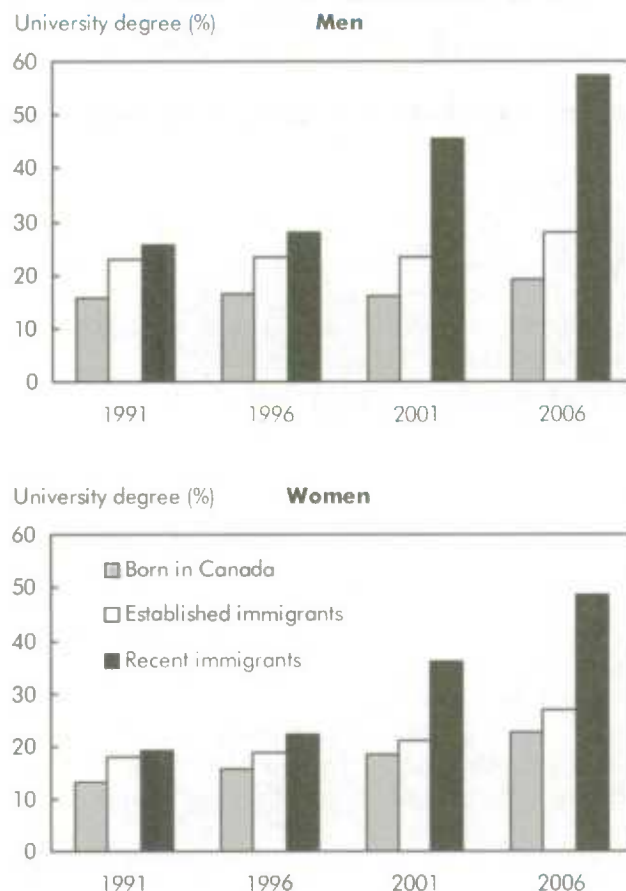
A previous study (Galarneau and Morissette 2004), found a correlation between the high proportion of recent immigrants with a university degree in jobs with low educational requirements and their country of origin, mother tongue, visible minority status and field of study. Little is known, however, about the situation for established immigrants. This article therefore focuses on this sub-group to determine the extent to which the increase in the proportion of established immigrants working in jobs with low educational requirements is related to the change in their socio-demographic profile (see *Data source and definitions*). The increase for recent immigrants was also examined, even though the 2006 proportions fell within the range observed since 1991.

Highly educated immigrants

Since 1991, educational attainment has increased across the board. The proportion of native-born Canadians with a university degree rose from 16% for men and 13% for women in 1991 to 19% and 23% in 2006 (Chart B). Among recent immigrants, the increase was much larger. In 2006, 58% of recent male immigrants and 49% of recent female immigrants had at least a bachelor's degree. The increase for immigrants who arrived 11 to 15 years ago was comparable to the increase for native-born Canadians. In 2006, the former had a slightly higher proportion with university degrees: around 28% of men and women.

More people with a university degree expanded the pool of candidates with degrees and likely increased competition for highly skilled jobs. That introduced upward pressure on recent immigrants' chances of

Chart B Recent immigrants are better educated than ever



Source: Statistics Canada, Census of Population.

being underemployed.¹ The favourable labour market conditions of recent years should have generated opposite pressures (Chart C).

The new face of immigration

The typical immigrant with a university degree changed over the 15-year period (Table 1). Compared with 1991, recent immigrants in 2006 were, on average, older, more likely not to have English or French as their mother tongue, and more likely to be from South or East Asia.² In 1991, despite the relative predominance of those areas of origin, immigrants with a university degree tended to be from a more diverse set of countries. Today's immigrants are also more likely to be members of a visible minority.

Table 1 Characteristics of employed immigrants, age 25 to 54 with a university degree

	Men				Women			
	Recent immigrants		Established immigrants		Recent immigrants		Established immigrants	
	1991	2006	1991	2006	1991	2006	1991	2006
Total	28,600	108,100	27,700	54,000	17,600	75,900	19,300	50,800
	%							
Age								
25 to 34	41	30	21	20	52	41	24	23
35 to 44	44	50	50	41	39	44	56	43
45 to 54	16	20	29	40	9	15	20	34
Education								
Bachelor's	66	64	71	71	75	72	79	78
Master's	25	30	21	22	21	25	18	18
Doctorate	9	6	8	7	4	4	3	3
Mother tongue								
English	23	12	37	16	28	14	36	18
French	4	4	4	4	3	4	5	4
Other	73	84	58	80	69	81	59	78
Category of worker								
Employee	91	92	89	91	94	93	92	93
Self-employed	9	8	11	9	6	7	8	7
Field of study								
Non applied	48	35	48	43	71	61	71	66
Teaching and fine arts	5	3	6	5	15	10	19	13
Humanities and social sciences	19	11	20	17	28	24	30	27
Administration	20	17	18	16	21	22	15	21
Other ¹	5	4	5	5	7	5	6	6
Applied	52	65	52	57	29	39	29	34
Engineering	26	41	26	32	4	14	3	9
Mathematics, applied sciences and technology	11	8	12	9	7	7	7	7
Computer science	5	10	5	9	3	5	3	5
Health	8	5	9	7	14	12	16	13
Region of origin								
North America	6	2	9	3	12	3	15	4
Central America, South America and Caribbean	7	6	8	6	5	7	8	7
Northern and Western Europe	10	6	19	6	9	6	14	6
Southern and Eastern Europe	13	15	8	17	13	16	7	19
Africa	10	9	10	11	6	7	7	8
Southern Asia	10	24	11	14	10	21	14	11
Southeast Asia	11	8	14	10	21	13	17	18
Eastern Asia	23	24	15	20	17	23	15	19
Western Asia	10	6	5	8	5	4	3	6
Oceania and other	1	1	1	3	1	1	1	2
Visible minority								
Yes	68	73	59	67	64	72	59	66
No	32	27	41	33	36	28	41	34
Metropolitan region								
Montréal	12	13	14	12	10	12	13	11
Ottawa-Gatineau	5	4	5	6	4	4	5	5
Toronto	46	47	36	42	48	46	37	43
Calgary	3	6	6	4	4	6	5	4
Vancouver	13	14	11	17	12	14	14	17
Other	21	17	27	18	23	18	27	19

1. Includes agriculture and all other fields of study not classified elsewhere.

Source: Statistics Canada, Census of Population.

Data source and definitions

From 1991 to 2006, workers covered by the census could be assigned to one of more than 500 occupational groups based on the nature of their work and their duties. An estimated skill level (derived from the National Occupational Classification) was attributed to each occupational group. The skill level reflects the educational attainment usually required to work in the occupation, along with the level of responsibility (supervisory duties, health occupations) and the associated level of risk (police officer, firefighter). The skill levels can be divided into occupations referred to as 'professions' that usually require a university education, occupations that usually require a college diploma, a certificate or an apprenticeship, and occupations that require no more than a high school diploma (low-skill jobs).

In this classification, no skill level was assigned to managers as an occupational group because of their wide range of experience and educational attainment. This study was interested in determining the proportion of university graduates in unskilled occupations (requiring high school level V or less). It therefore needed to identify only the occupations with the lowest skill level. Since managers have supervisory duties and hence some level of responsibility, managerial occupations were excluded from the low-skill group.

This article focused on employed people with *at least* a bachelor's degree but in an occupation requiring *at most* a high school education. Focusing on those cases avoids overestimating the *changes* in representation rates between 1991 and 2006. Occupations requiring a high school education or less in 1991 are unlikely to require a bachelor's

degree or higher today. Hence, it is reasonable to assume that, in both 1991 and 2006, recent immigrants with a university degree but working as taxi drivers, bartenders or manual labourers in a primary industry, for example, are in jobs that require less education than they have. This conservative measure of representation in jobs with low educational requirements thus excludes all other cases.

This current study is based on census microdata files representing 20% of the Canadian population. The sample consists of persons age 25 to 54 with a university degree (bachelor's degree, master's degree or doctorate) and working (as an employee or self-employed) during census week.

Representation in jobs with low education requirements is the ratio of employed university graduates age 25 to 54 in occupations requiring *at most* a high school education to all employed university graduates age 25 to 54.

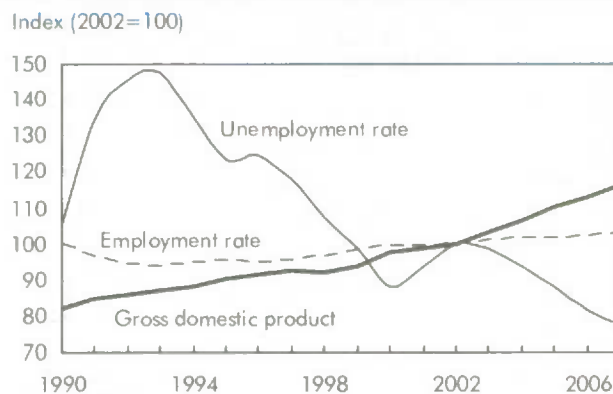
Recent immigrants are those who came to Canada between one and five years before the census reference year: in 2006, persons arriving between 2000 and 2004; in 2001, between 1995 and 1999; and in 1991, between 1985 and 1989. Immigrants arriving in the census year or the year immediately before were excluded to facilitate comparison with previous studies (Grant 1999, and Frenette and Morissette 2003).

Established immigrants are those who came to Canada between 11 and 15 years before the census reference year: in 1991, persons arriving between 1975 and 1979; in 2006, between 1990 and 1994.

In general, these new characteristics lower immigrants' chances of finding a job matching their education. Experience acquired in foreign countries is not always recognized in the Canadian labour market (Green and Worswick 2004, Ferrer and Riddell 2004, Picot and Sweetman 2005, Ferrer et al. 2004, and Aydemir and Skuterud 2004). Arriving in Canada at an older age usually increases immigrants' years of experience in other countries, which could, other things being equal, reduce their chances of finding a job consistent with their level of schooling.

Moreover, knowledge of an official language is a key aspect of skill level. The census does not measure language skills, but it does ask about mother tongue. A recent study (Ferrer et al. 2004) based on literacy and numeracy tests found a clear difference in language proficiency between native-born Canadians and immigrants. The increasing numbers of immigrants arriving in Canada with a mother tongue other than English or French may be less comfortable communi-

Chart C Favourable conditions recently should have enabled better access to jobs reflecting education



Note: Gross domestic product at market prices, implicit price indexes.

Sources: Statistics Canada, Labour Force Survey, and Income and Expenditure Accounts.

cating in an official language, which could increase their chances of working in a job with low educational requirements.

Similarly, the increasing numbers of immigrants from Asian countries, for which little information is available about education quality, may engender some mistrust among employers, thus preventing such recent immigrants from exploiting their credentials or finding a job commensurate with their educational attainment (Green and Worswick 2004, and Ferrer and Riddell 2004). Language, country of origin and visible minority status are difficult to separate from one another, but they generally account for a significant portion of the observed difference between the labour market outcomes of native-born Canadians and immigrants (Picot and Sweetman 2005).

A comparison of immigrants in 1991 who had been living in Canada for 11 to 15 years—in other words, arriving between 1975 and 1979—and the 2006 immigrants who arrived between 1990 and 1994 found differences similar to those observed for recent immigrants. In 2006, the more established immigrants were also older, more likely to be members of a visible minority, less likely to have French or English as their mother tongue, and also natives of a greater variety of countries.

Information and communications technology graduates

In general, the demand for applied science skills such as engineering, computer science and health sciences benefits immigrants with degrees in those fields (Galarneau and Morissette 2004). Compared with 1991, recent immigrants were even more likely to be applied sciences graduates in 2006, as the proportion of male immigrants in that field rose from 52% to 65%, primarily from an increase in engineering degrees. This growth was mainly at the expense of the humanities and social sciences. For women, the patterns were similar but much less pronounced.

Immigrants who arrived 11 to 15 years ago also showed an increase in the proportion of applied science graduates (from 52% to 57%), again mainly attributable to engineering. However, the increase was more modest than for more recent immigrants. A greater proportion of female established immigrants is in non-applied sciences, but that trend has been weakening since 1991 because of declining interest in teaching and fine arts.

Evolution of immigrants in occupations with low educational requirements

Representation in occupations with low educational requirements increased for all immigrant groups considered (Table 2). For male recent immigrants, representation generally fluctuated about 6 percentage points from census to census. The increase from 1991 to 2006, from 22% to 28%, is within the range observed since 1991. The representation by various characteristics shows the increase to be fairly widespread, but slightly larger for older immigrants and graduates in fields such as health, engineering, humanities and social sciences. Immigrants from Africa and East Asia had the largest increases between 1991 and 2006, as their representation climbed 8 percentage points. Nevertheless, male recent immigrants from South Asia and Southeast Asia still had the highest representation: 38% and 42% respectively.

Male established immigrants saw strong growth in their representation in positions with low education requirements, going from 12% to 21% between 1991 and 2006. For those immigrants, being unable to speak English or French and being from South Asia, Southeast Asia or Central America seemed to be associated with a sharper increase in their representation in occupations with low education requirements. Engineering, humanities and social science graduates were notable for an increase of more than 10 percentage points in their representation. The gap between established male immigrants and native-born Canadians widened over the 15-year period. This increase did not appear to be attributable to changes in the distribution by age and educational attainment between the two groups.³ In other words, the increase did not appear to be linked to Canadians in a particular age group increasing their educational attainment more rapidly than established immigrants of the same age.

Women had much higher representation rates than men, in both 1991 and 2006. The gap was partly because female immigrants tended to specialize in non-applied fields of study and they were not as highly educated as their male counterparts.⁴

Probably because of already high rates, their representation rose much more modestly during the observation period (4 percentage points for recent female immigrants and 5 points for those who arrived 11 to 15 years earlier). In both cases, the increase was more pronounced for women age 45 to 54 and for certain

Table 2 Immigrants' representation in occupations with low educational requirements

	Men				%	Women			
	Recent immigrants		Established immigrants			Recent immigrants		Established immigrants	
	1991	2006	1991	2006		1991	2006	1991	2006
Total	22	28	12	21		36	40	24	29
Age									
25 to 34	24	27	13	17		37	38	24	23
35 to 44	20	27	12	21		36	39	24	29
45 to 54	21	32	13	22		36	45	23	33
Education									
Bachelor's	26	32	15	24		41	44	27	32
Master's	17	22	6	15		25	32	14	20
Doctorate	2	8	1	4		9	8	3	7
Mother tongue									
English	14	20	9	15		25	31	18	23
French	13	20	7	16		18	26	16	18
Other	25	29	15	22		42	42	28	31
Category of worker									
Employee	23	28	13	21		38	41	25	30
Self-employed	14	25	9	21		15	23	9	15
Field of study									
Non applied	28	35	18	27		41	44	28	33
Teaching and fine arts	29	32	17	23		38	37	25	26
Humanities and social sciences	26	37	19	30		42	46	29	35
Administration	29	33	16	23		44	46	30	35
Other ¹	30	38	16	29		39	40	27	31
Applied	17	24	8	17		24	34	18	22
Engineering	16	25	7	18		24	34	8	19
Mathematics, applied sciences and technology	20	27	12	20		29	35	26	31
Computer science	11	16	8	11		13	31	11	15
Health	13	24	4	13		25	30	9	20
Region of origin									
North America	7	10	8	11		12	17	15	14
Central America, South America and Caribbean	28	25	14	24		40	35	22	26
Northern and Western Europe	6	9	5	6		17	18	13	16
Southern and Eastern Europe	22	25	12	17		32	36	16	22
Africa	18	26	9	16		25	31	21	22
Southern Asia	37	38	24	35		62	56	45	43
Southeast Asia	41	42	21	37		55	52	29	47
Eastern Asia	16	24	10	14		31	34	24	23
Western Asia	26	20	14	19		37	32	23	29
Oceania and other	13	18	7	18		20	25	12	27
Visible minority									
Yes	26	31	16	24		45	44	29	34
No	13	19	7	13		21	29	15	20
Metropolitan region									
Montréal	19	28	10	21		34	33	19	26
Ottawa-Gatineau	17	19	6	12		33	26	15	23
Toronto	24	31	15	22		40	43	26	29
Calgary	20	21	9	17		40	38	27	33
Vancouver	25	29	15	24		39	42	26	33
Other	17	22	11	17		29	35	22	29

1. Includes agriculture and all other fields of study not classified elsewhere.

Source: Statistics Canada, Census of Population.

fields of study, such as engineering and computer science. Women from Southeast Asia arriving 11 to 15 years earlier had an 18-point increase in their representation, narrowing the gap relative to their more recently arrived counterparts. Women from South Asia and Southeast Asia had high representation rates, above 50% for recent immigrants and slightly below 50% for established female immigrants.

A regression analysis was used to determine whether variables such as age, education, visible minority status, country of origin, field of study and region of residence were important in explaining the increase in the representation in occupations with low educational requirements between 1991 and 2006 (Table 3).⁵

In the case of male immigrants, country of origin and knowledge of a language other than English or French accounted for more than half of the 6-point increase in representation for recent immigrants and nearly a quarter of the 8-point increase for established immigrants. In other words, if 2006 male immigrants had had the same country-of-origin and mother-tongue distribution as 1991 male immigrants, the rate would have been less than 3 points higher for recent immigrants and only about 6 points for established immigrants.

On the other hand, field of study lowered an immigrant's chances of having a job with low educational requirements. Thus, it would appear that having a degree in an applied field still provides some protection against being in a job with low educational requirements, despite the less favourable situation in the information technology (IT) sector in recent years. The sector suffered employment losses between 2000 and 2005, and because of the high proportion of recent immigrants educated in IT, the sector's downturn had a significant effect on the earnings of recent immigrants (Frenette et al. 2008) and the proportion of highly educated immigrants with low incomes (Picot et al. 2007).

The correlation between field of study and the probability of having a job with low educational requirements was weaker for the period from 2001 to 2006 than for the period from 1991 to 2006. The protection effect still seemed to be there, but to a lesser extent than in the past,⁶ which reflects the sector's difficulties.

For women, language and country of origin alone explained all of the 3-point increase for recent immigrants and one-third of the 5-point increase for

Table 3 Accounting for the change in representation of university graduates in occupations with low educational requirements between 1991 and 2006

Weighting method ¹	Men				Women			
	Recent immigrants		Established immigrants		Recent immigrants		Established immigrants	
	One	Two	One	Two	One	Two	One	Two
	percentage points							
Change	6.0	6.0	8.3	8.3	3.0	3.0	5.3	5.3
Explainable	2.9	1.2	2.7	2.6	4.7	3.4	2.4	1.8
Visible minority	0.4	0.2	0.4	0.4	0.3	0.5	0.2	0.1
Educational attainment	0.0	0.1	0.0	0.0	-0.3	-0.4	-0.1	-0.1
Age	0.3	-0.5	0.4	0.1	0.3	-0.2	0.7	0.5
Mother tongue	1.0	0.6	1.4	0.3	1.3	0.5	1.1	0.6
Country	3.1	2.5	0.5	2.0	3.5	4.2	0.8	1.0
Field of study	-2.1	-1.8	-0.6	-0.7	-0.5	-1.4	-0.2	-0.5
Region of residence	0.1	0.2	0.5	0.4	0.1	0.2	-0.1	0.1

1. In the context of this study, the Oaxaca-Blinder decomposition can be used to answer the 2 following questions: What would be the representation rate of immigrants in low skill jobs in 2006 if they had the same characteristics as immigrants in 1991 (weighting method one). What would be the representation rate of immigrants in low skill jobs in 1991 if they had the same characteristics as immigrants in 2006 (weighting method two).

Source: Statistics Canada, Census of Population.

others. Field of study and educational attainment also slowed the upward movement of their representation in jobs with low educational requirements.

These results are consistent with the findings of similar studies on the subject (Picot and Sweetman 2005, Galarneau and Morissette 2004, and Aydemir and Skuterud 2004). In general, mother tongue and country of origin—which are also associated with the quality of education received and the lack of recognition of foreign experience—explain a large portion of the deterioration in immigrants' labour market situation. Class of immigrant may also be a factor. Some immigrants come to Canada as skilled workers, others for family reunification, and some as refugees. Skilled workers are generally expected to perform best in the labour market since they are accepted because of their qualifications. While that was true in the past (Chui 2003, and Chui and Zietsma 2003), it appears to be less so for immigrants arriving in the early 2000s. For example, belonging to the skilled worker class did not seem to help early 2000s immigrants escape low-income situations (Picot et al. 2007).

Nevertheless, an important dimension, which cannot be measured with census data, is the international mobility of immigrants. In other words, people who immigrate to Canada do not necessarily stay. Among immigrants arriving between 1980 and 1996, skilled workers, entrepreneurs and those from the United States or Hong Kong were more likely to leave the country (Aydemir and Robinson 2006). Four in 10 of these immigrants left within 10 years, on average. Economic downturns also increased the

probability of leaving the country. It is therefore possible that some of the immigrants who arrived around the 1990s subsequently left Canada, and so the study results are based on a subset of that cohort. If skilled workers left the country, particularly if they arrived during an economic slowdown—as was the case for immigrants who arrived in the early 1990s—it might partly explain the persistently high proportion of immigrants arriving around the 1990s who were in occupations with low educational requirements in 2006.

Entering the labour market during a recession may also have a negative effect for several years on the salaries that people earn (Oreopoulos et al. 2008). The effect would be greater early in their career and would tend to disappear

within 8 to 10 years. Hence, the recession of the early 1990s and the slow growth of employment during the subsequent recovery may also have affected new immigrants of that period. However, established immigrants in 1996 also arrived during a time when unemployment rates were relatively high (between 1980 and 1984), but their low skill rate increased more modestly (from 12% to 16%). The recessionary effect therefore appears to vary from one recession to another and from one group to another.

Regulated occupations

When occupations are regulated by professional associations, candidates often have to take examinations and prove that they have work experience in Canada and

Table 4 University graduates from fields of study leading to regulated occupations in jobs with low education levels

	Immigrants								
	Canadian born			Established			Recent		
	1991	2001	2006 ¹	1991	2001	2006 ¹	1991	2001	2006 ¹
	%								
Men									
Law	2	3	4*	18	25	21	28	35	40*
Accounting	6	6	5	17	24	20*	31	33	34*
Engineering	4	4	5*	7	11	18*	17	17	25*
Medicine	0	1	0	1	1	13*	10	19	16*
Nursing	6	6	6	..	..	..	..	..	..
Women									
Law	3	5	6*	9	11	26*	43	33	36
Accounting	12	9	8	32	30	31	49	47	48
Engineering	5	6	7*	9	18	19*	24	26	34*
Medicine	1	1	1	8	4	14*	15	15	24*
Nursing	4	4	3	7	22	21*	30	46	23

* The gap between the 1991 and 2006 rates is statistically significant at a threshold of 5%.

1. Between 2001 and 2006, the field of study classification changed. Statistics Canada will conduct empirical matching between the 2001 and 2006 classifications by coding all of the fields of study of 2006 respondents according to the old classification. This empirical matching could provide slightly different results.

Source: Statistics Canada, Census of Population.

Extending the analysis back to 1981

The analysis covers the period from 1991 to 2006 because the occupational classification used to assign skill levels was not available before 1991. To extend the analysis back to 1981, an attempt was made to assign skill levels to the 1981 classification codes using Statistics Canada's equivalency tables.

Because the 1981 classification was structured quite differently from the 1991 classification, each 1981 occupation is associated with more than one occupation in the 1991 classification. Some 1981 codes are associated not only with more than one occupation in the 1991 classification but also with more than one skill level.

Of the total of 595 occupation codes in the 1981 classification, 206 were associated with occupations that had a non-low skill level in the 1991 classification, and 146 were associated with occupations that had a low skill level. Those occupations presented no difficulty, since the aim was simply to assign a skill level (low or non-low) to each 1981 code and not to establish an exact equivalency between 1981 and 1991 occupations. The remaining codes were associated with occupations with more than one skill level (low and non-low).

Accordingly, two rates were established for 1981: a minimum rate if all codes that could not be associated with a single skill level are assumed to be non-low skill level, and a maximum rate for the opposite assumption, that all codes not associated with any skill level are low skill level (Table 5). The two rates are the upper and lower bounds of the range for the 1981 rates. Since the bounds have little meaning per se, it was decided to use a rate gap between immigrants and native-born Canadians.

In 1981, no gap was seen between native-born Canadians and immigrants who arrived 11 to 15 years earlier, no matter whether the minimum or the maximum rate for each subgroup was used (Table 6).

The focus was on the non-existent difference in representation for established immigrants in occupations with low educational requirements in 1981 because the assumption that recent immigrants and people just entering the labour market encountered similar difficulties seemed plausible at that time. In 1981, after living in Canada for 11 to 15 years,

Table 5 Canadians and immigrants in each skills group after skill levels assigned, 1981

	Men			Women		
	Canadian	Recent immigrants	Established immigrants	Canadian	Recent immigrants	Established immigrants
	%					
Skill level						
Non low	88	77	88	83	58	78
Low (lower bound)	5	14	5	10	33	15
Multi level	8	9	7	7	10	7
Low (upper bound)	12	23	12	17	42	22

Source: Statistics Canada, Census of Population.

Table 6 Gap in representation rates between Canadian-born and different immigrant groups in occupations with low educational requirements

	Immigrants arrived		
	11 to 15 years ago	6 to 10 years ago	1 to 5 years ago
	percentage points		
Men			
1981 minimum	0	6	9
1981 maximum	0	8	11
1991	4	6	14
1996	5	10	17
2001	7	12	12
2006	10	10	17
Women			
1981 minimum	4	18	22
1981 maximum	5	19	26
1991	12	15	25
1996	11	19	29
2001	13	19	23
2006	17	19	27

Source: Statistics Canada, Census of Population.

immigrants with a university degree seemed as likely as native-born Canadians to be in a job with low educational requirements. The gap widened as the number of years of residence in Canada shrank. For example, for recent immigrants—those who arrived between one and five years prior to 1981—the gap relative to native-born Canadians was 9 percentage points for the minimum rate and 11 for the maximum rate. For immigrants who arrived between six and ten years before 1981, the gap was 6 to 8 points.

In 1991, however, the gap was 4 points for native-born Canadians and, in 2006, it was 10 points.

Relative changes in country of origin, language and visible minority status are even more notable between 1981 and 2006 than between 1991 and 2006. In 1981, immigrants who arrived in Canada 11 to 15 years earlier (between 1965 and 1969) were much more likely to be from North America or Northern Europe. In addition, immigrants were much more likely to have English as their mother tongue, they were younger and they were much less likely to belong to a visible minority group (Table 7). However, all demographic characteristics combined explained only a small part of the increase between 1981 and 2006 in the representation of recent immigrants in occupations with low educational requirements (about 13%).⁷

Table 7 Working immigrants age 25 to 54 with a university degree who arrived 11 to 15 years ago

	Men			Women		
	1981	1991	2006	1981	1991	2006
Total	28,500	27,700	54,000	11,300	19,300	50,800
	%					
Age						
25 to 34	18	21	20	25	24	23
35 to 44	56	50	41	59	56	43
45 to 54	26	29	40	16	20	34
Education						
Bachelor's	58	71	71	74	79	78
Master's	18	21	22	7	18	18
Doctorate	24	8	7	19	3	3
Mother tongue						
English	47	37	16	48	36	18
French	7	4	4	8	5	4
Other	46	58	80	45	59	78
Category of worker						
Employee	91	89	91	93	92	93
Self-employed	9	11	9	7	8	7
Region of origin						
North America	12	9	3	18	15	4
Central America, South America and Caribbean	6	8	6	8	8	7
Northern and Western Europe	30	19	6	22	14	6
Southern and Eastern Europe	12	8	17	10	7	19
Africa	8	10	11	5	7	8
Southern Asia	12	11	14	8	14	11
Southeast Asia	5	14	10	15	17	18
Eastern Asia	11	15	20	11	15	19
Western Asia	3	5	8	2	3	6
Oceania and other	2	1	3	1	1	2
Visible minority						
Yes	40	59	67	45	59	66
No	60	41	33	55	41	34
Metropolitan region						
Montréal	16	14	12	17	13	11
Ottawa-Gatineau	7	5	6	7	5	5
Toronto	31	36	42	36	37	43
Calgary	5	6	4	4	5	4
Vancouver	2	11	17	2	14	17
Other	39	27	18	34	27	19

Source: Statistics Canada, Census of Population.

proficiency in English or French to be accredited under provincial law (Boyd 2000). This process may have an impact on immigrants' chances of finding a job consistent with their level of schooling.

Efforts are being made at the federal and provincial levels to address this problem and make it easier for immigrants to get into regulated occupations. For example, several programs offer language classes and remedial courses in specific subjects. Sometimes concerted efforts are being made by the provincial governments, colleges and universities, employers and regulatory organizations.⁸ The impact of these activities is difficult to measure, but it is interesting to examine the extent to which immigrants with a field of study leading to a regulated occupation are working in occupations with low educational requirements. For the purposes of this exercise, a subset of fields of study leading to regulated occupations was selected (Table 4).

Compared with native-born Canadians, the representation of immigrants with degrees in medicine (general and specialized), nursing, engineering, accounting and law in occupations with low educational requirements is generally higher, especially for recent immigrants. The representation of native-born Canadians was below 10% throughout the period for all of the occupations selected, with the exception of women in accounting in 1991. Moreover, in general there was little variation for native-born Canadians.⁹

In 1991, the representation of established male immigrants was similar to the representation of the native-born for medicine and engineering. Those are among the fields that saw the fastest growth for established immigrants between 1991 and 2006, especially medicine, where the representation rose from virtually zero to 13%. For the medical field, most of the

increase took place between 2001 and 2006, despite the persistent evidence of the shortage of physicians. For engineering as well, representation was substantially higher in 2006 (18% compared with 7%), and the increase was more pronounced between 2001 and 2006.¹⁰ That deterioration was likely related to the major employment losses in the IT sector. In 2006, established immigrants in medicine still barely had an advantage over more recent immigrants.

Even in 1991, representation rates were considerably higher for recent male immigrants than for native-born Canadians, and the gap has widened over the years.

Rates for established female immigrants in 1991 were slightly higher than those of their Canadian-born counterparts—accounting still being the exception, with much higher rates for established female immigrants. By 2006, representation was appreciably higher, particularly in law and nursing, whose rates tripled. Engineering and medicine also saw significant increases. Rates for recent female immigrants were already high in 1991 and they remained high in 2006, with medicine and engineering seeing the highest rates of growth.

In 2006, established immigrants still enjoyed an advantage over recent immigrants in that their representation was generally lower. But the advantage has eroded over the years.

Conclusion

During the 1991 to 2006 period, the proportion of immigrants with a university degree in jobs with low educational requirements (such as clerks, truck drivers, salespersons, cashiers and taxi drivers) increased. For recent immigrants, the proportions varied between 22% and 28% for men and between 36% and 44% for women. For established male immigrants, the trend was quite pronounced, as their proportion rose from 12% to 21%, while their female counterparts posted a more modest advance, climbing from 24% to 29%. Those proportions contrasted sharply with the stable proportion for native-born Canadians, about 10% for both men and women.

The increases for established immigrants suggest that the difficulties, which have long plagued recent immigrants, are today affecting established immigrants, which also suggests that difficulties experienced by recent immigrants are not necessarily temporary.

To understand the deterioration, the profiles of the two groups of immigrants were examined. However, the changes found in the profile of established immi-

grants—particularly language and country of origin—accounted for only a quarter of the deterioration for established immigrants. Furthermore, their field of study, usually applied sciences, slowed the upward movement of their representation in jobs with low educational requirements. That protection effect has weakened recently, though, as job losses occurred in the information technology sector. These findings applied to both men and women. Thus, if the profile of male immigrants arriving between 1990 and 1994 had remained the same as the profile of male immigrants arriving between 1975 and 1979, the proportion in occupations with low educational requirements in 2006 would have been 18% rather than 21%. For women, the proportion would have been about 27% instead of 29%.

Among recent male immigrants, profile changes explained just a fifth of the increase, while for recent female immigrants, they accounted for virtually 100% of the increase.

Hence a large share of the increase seems to be attributable to factors other than demographic characteristics. The remaining portion might be due to factors such as language skills, non-recognition of credentials, schooling or foreign experience (Green and Worswick 2004, Picot and Sweetman 2005, Ferrer et al. 2004, and Aydemir and Skuterud 2004) and the quality of education for nationals of relatively young countries of origin (Sweetman 2004). Moreover, immigrants arriving between 1990 and 1994 entered the labour market during a particularly harsh recession or the subsequent recovery characterized by slow employment growth. Launching a career when unemployment rates are high can have longer-term effects on earnings (Oreopoulos et al. 2008). It is therefore possible that recessions also affected immigrants' chances of having a job with low educational requirements. The skills of well-educated immigrants could easily erode over time, which might play a role in preventing them from remedying their situation as the years go by. In addition, well-educated immigrants are more likely to leave Canada, especially during recessions (Aydemir and Robinson 2006). That might also explain the observed increase in established immigrants' propensity to be in jobs with low educational requirements.

The accreditation process for regulated occupations may also have an impact on recent immigrants' chances of finding a job commensurate with their educational attainment. In general, the rates for established immigrants (men and women) with a degree in a field of

study leading to a regulated profession such as medicine, nursing, engineering, law or accounting but working in occupations with low educational requirements were comparable to those of native-born Canadians in 1991, but increased sharply thereafter. Medicine had the largest increase (despite persistent evidence of a doctor shortage), although engineering also saw appreciable increases, coinciding with the decline of the information technology sector in recent years.

In 2006, established immigrants still had an advantage over recent immigrants, as the proportion in jobs with low educational requirements was generally lower, but the proportions have been converging over time and the gap relative to native-born Canadians has widened.

Perspectives

■ Notes

1. In this article, 'underemployment' and 'underemployed' are used for persons who have a university degree but are in jobs that require no more than a high school diploma.
2. South Asia comprises India, Bangladesh, Maldives, Nepal, Pakistan, Sri Lanka and East Timor; East Asia, the People's Republic of China, Hong Kong, Japan, North and South Korea, Macao, Mongolia and Taiwan.
3. To verify this, two regressions were estimated (one for 1991 and one for 2006) for established male immigrants and native-born Canadians. The dependent variable was a dichotomous variable whose value was 1 if the person was in a job with low educational requirements and 0 otherwise. The independent variables were age, age squared, educational attainment and a dichotomous variable whose value was 1 for established immigrants and 0 otherwise. The coefficient of the last variable increased as much as the gap rate between the two groups, suggesting that the gap increase is not due to changes in the age and educational attainment structure of these two groups.
4. These findings are derived from an Oaxaca-Blinder decomposition model. First, ordinary least square regressions were estimated. The dependent variable was a dichotomous variable whose value was 1 if the person was in a job with low educational requirements and 0 otherwise. Even though the dependent variable was dichotomous, an OLS estimation was performed because the probability of being in a job with low educational requirements was not close to 0 or 1 (see Moffitt 1999). The independent variables were age, age squared, educational attainment (to separate bachelor's degrees from master's degrees and doctorates), field of study, visible minority status, region of residence and country of origin. Female immigrants' field of study and educational attainment accounted for at least a quarter of the difference between men and women. Also, women tend to come to Canada as spouses or for family reunification, whereas men come as economic immigrants. The latter usually have higher employment rates and generally fare better in the labour market than other classes of immigrants. While the census provides no information on class of immigrant, that may also have some impact on the strong prevalence of women in occupations with low educational requirements.
5. Regression models were estimated for four different groups: recent male immigrants, established male immigrants, recent female immigrants and established female immigrants. The dependent variable was the probability that a person with a university degree was in a job with low educational requirements. The independent variables were age, age squared, educational attainment (to separate bachelor's degrees from master's degrees and doctorates), visible minority status, country of origin, field of study and region of residence. After estimating an OLS model (see Note 4) for the four different groups and for 1991 and 2006, an Oaxaca-Blinder decomposition was carried out to determine which variables explained the increase in representation between 1991 and 2006. Certain factors may be associated with a strong representation in occupations with low educational requirements, but if neither the factor level nor the representation has changed, it cannot be concluded that they are associated with an increase.
6. This result is derived from an Oaxaca-Blinder decomposition of the same variables used previously, but for the period from 2001 to 2006.
7. These findings are derived from an Oaxaca-Blinder decomposition in which the results for immigrants who arrived in Canada 11 to 15 years earlier in 1981 and 2006 were compared using age, sex, education, visible minority status, country of origin and region of residence. The decompositions were calculated for the 1981 minimum and maximum rates. For the minimum rate, the decomposition explained between 2 and 9 points of the 16-point gap, and for the maximum rate, it explained between 3 and 8 points of the 8-point gap. A dynamic decomposition taking into account the changes for both native-born Canadians and immigrants during the 1981 to 1991 period was also attempted. For that decomposition, identical variables were needed for the two subpopulations. Country of origin was therefore dropped from the list of explanatory variables, since all Canadians are from Canada. However, these decompositions proved inconclusive because of the small number of variables available for analysis.

8. See, among others, www.settlement.org and www.citizenship.gov.on.ca, as well as *Measures to Facilitate Access to Regulated Professions and Trades*, implemented by the ministère de l'Immigration et des Communautés culturelles and its partners (<http://www.micc.gouv.qc.ca/publications/en/dossiers/AccessProfessionsTrades-MeasuresFebruary2008.pdf>).
9. The classification of fields of study changed between the 2001 Census and the 2006 Census. To make the fields of study selected from 1991 and 2001 compatible with those from 2006, a preliminary matching file was used. However, rates could be slightly different if the final matching file had been used.
10. The difference between the 1991 and 2006 values was significant at the 5% level.

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Age and earnings

May Luong and Benoît-Paul Hébert

As people age and gain work experience, their earnings might be expected to continue to rise or at least remain stable until retirement. However, this appears not to be the case with traditional age-earnings profiles (Chart A). These show increases in earnings in the early years, a peak around middle age, and a decline thereafter. This inverted U-shaped pattern between age and earnings, based on the average earnings by age for all workers at a given time, is found in a wide range of data. For example, cross-sectional census data show that the earnings of men employed full time, full year declined after their mid-forties (Saint-Pierre 1996). The same pattern is found in cross-sectional data from the Survey of Labour and Income Dynamics (SLID).

The age-earnings profile is commonly used to describe the growth of earnings over the life cycle (Thornton et al. 1997). It is also widely used by forensic economists in the projection of future earnings when calculating earnings loss in personal litigations. The age-earnings profile also helps explain why older workers have a more difficult time adjusting to job loss since their higher earnings often reflect firm-specific skills.

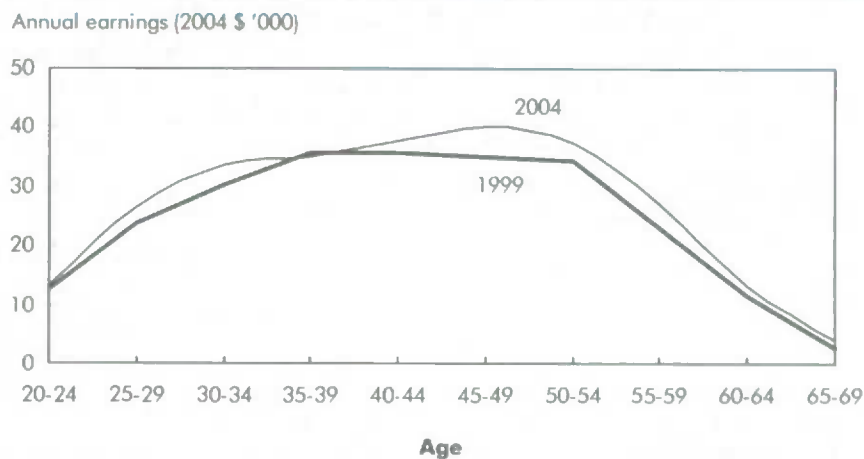
However, the traditional age-earnings profile has many problems, including the use and interpretation of cross-sectional data, selection problems, bias from voluntary changes in hours, and occupations of working retirees. This article addresses these problems in more detail and estimates a 'pure' age effect. Using the 1999 to 2004 SLID panel, the study re-examines the age effect on hourly rather than annual earnings in order to control

for changes in hours worked (see *Data source*). In addition, it uses multivariate analysis to test whether aging by itself results in lower hourly earnings when other related factors are controlled for.

Problems with traditional age-earnings profiles

One issue with the traditional age-earnings profile is that the effect attributed to age may also capture

Chart A Conventional cross-sectional profiles show annual earnings declines after age 50



Source: Statistics Canada, Survey of Labour and Income Dynamics.

May Luong is with the Labour and Household Surveys Analysis Division. She can be reached at 613-951-6014 or may.luong@statcan.gc.ca. Benoît-Paul Hébert is with Human Resources and Social Development Canada. He can be reached at 613-957-6771 or benoit.hebert@hrsdc-rhdsc.gc.ca.

Data source

The **Survey of Labour and Income Dynamics (SLID)** covers roughly 97% of the Canadian population, excluding those in the territories, in institutions, an First Nations reserves or in military barracks. Each panel of respondents, approximately 15,000 households and 30,000 adults, is surveyed for six consecutive years. A new panel is introduced every three years, so two panels always overlap. This study used the third panel of SLID, which followed respondents from 1999 to 2004. The longitudinal nature of the survey allows for the tracking of hourly and annual earnings of individuals over a maximum of six consecutive years.

Since this study examines the age-earnings profile before retirement, the sample was restricted to individuals age 45 and over. As SLID does not collect labour-related information from individuals age 70 and over, the sample consists of individuals age 45 to 69.

Exploratory analysis with separate models for men and women indicated that differences between the sexes could easily be modelled as interactions in a single model for the pooled sample.

In order to overcome the issue of selection effect where older workers with higher earnings may be more likely to leave the labour market, only full-year, full-time workers

were included in the sample, which allowed for a fairly consistent cohort. Individuals were excluded when they began receiving pension benefits (from an employer-sponsored plan or the Canada/Quebec Pension Plan¹), since receipt of such benefits tends to occur after individuals have retired from their career job and the focus of this study was to understand earnings prior to retirement. In fact, the limitation of the sample to non-pensioners is crucial. Working pensioners are different from workers in their career job in that pensioners who return to the labour market typically work at a reduced capacity and these jobs are also, on average, lower in pay (Hébert and Luong 2008). However, since they are also receiving pension payouts, their total income may be equal to or exceed its pre-retirement level.²

The final sample consisted of 2,102 respondents for a total of 9,556 observations. The panel is unbalanced as the number of observations varied across respondents.

Nominal earnings were converted to 2004 dollars. For variables where information was missing for a large number of respondents, a distinct category for missing values was added to prevent these respondents from being dropped from the multivariate analysis.

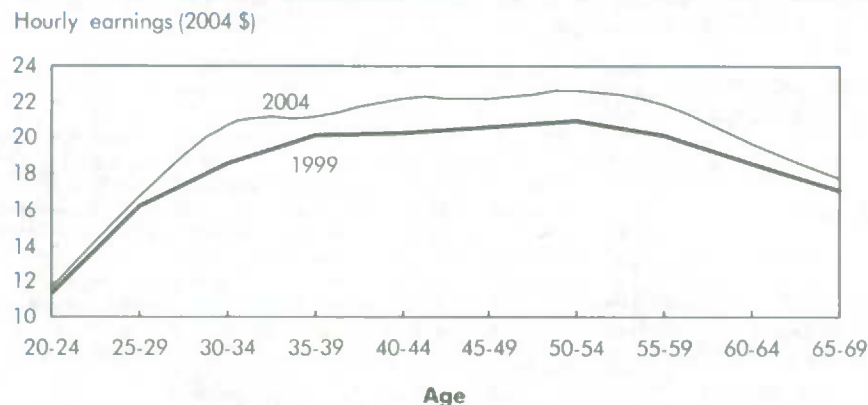
the effects of other factors related to, but distinct from, age. The original human capital earnings function was used to explain the decline in earnings at older ages as reflecting declines in productivity due to deterioration in human capital (Mincer 1974). However, conclusions based on cross-sectional data may be confounding differences between individuals at different points in their lives and differences within persons over time. Detailed longitudinal data and quantitative methods measuring within-person differences are required in order to determine whether individuals' earnings rise or fall over time.

The second issue is the correlation between age and work experience—the older the individual, the more years of work experience likely gained. While age is not irrelevant and often is accompanied by health issues which depreciate human capital stock, work experience remains a dominant factor in earnings. However, early estimates of the age-earnings profile had to derive work experience by subtracting years of schooling from age since work experience was not available. Furthermore, the effects of age and work experience on earnings were estimated separately rather than within the same model (Mincer 1974). Indeed, age has commonly been used as a proxy for years of

work experience since information on work experience is typically unavailable in both longitudinal administrative data and cross-sectional survey data. In order to estimate the 'pure' age effect on earnings, work experience must be controlled for. In addition, the majority of research on the age-earnings profile controls only for education and sex. However, other personal and job characteristics may also be at play.

Thirdly, studies often do not consider that some workers may have started transitioning into retirement. For example, older workers may voluntarily reduce their work hours to gradually phase into retirement. In fact, between 1999 and 2004, 60% of workers age 45 to 69 who experienced a fall in their annual earnings had reduced their work hours. On the other hand, 44% of older workers with a rise in their annual earnings had increased their hours.³ Previous findings of lower annual earnings for older workers may thus reflect decreased work hours. Indeed, individuals' hourly earnings may remain stable or even rise over time and therefore provide a more accurate measure of true earnings potential. Even with cross-sectional data, the age-earnings profile shows a less pronounced slope at older ages using hourly figures (Chart B).

Chart B Conventional cross-sectional profiles based on hourly earnings show more moderate declines after age 50



Source: Statistics Canada, Survey of Labour and Income Dynamics.

Another issue pertaining to the transition to retirement and its effect on earnings involves working pensioners. With pension benefits, these older workers can afford to either reduce their hours of work or take up a new job paying less than their pre-retirement one. Indeed, a study based on longitudinal data and a fixed-effects model found that hourly earnings declines begin only after age 60 and are attributable to pension benefits—that is, individuals receiving pension benefits but continuing to work would reduce their earnings in part by switching from full-time to part-time jobs (Johnson and Neumark 1996). Estimates for workers not receiving pension benefits reveal even weaker evidence of earnings declines at older ages.

This study excludes workers from the sample when they began receiving pension benefits from an employer-sponsored plan or the Canada/Quebec Pension Plan (C/QPP). Benefits from Old Age Security (OAS) and the Guaranteed

Income Supplement (GIS) are not taken into account. While a sample of non-retired workers likely reduces the biases induced by working pensioners, some selection

effect may well remain since the C/QPP provides reduced benefits starting at age 60, full benefits at 65, and increased benefits up to age 70.

The selection effect involves the movement into and out of employment and changes in the cohort composition of older workers. Indeed, one longitudinal study (Myck 2007) suggested that the propensity of those with higher earnings to leave employment earlier contributes to the inverted U-shaped age-earnings profile. In order to account for this type of selection effect, the model was estimated for older adults working full year, full time to restrict the sample to a fairly consistent cohort (Chart C). Full-year full-time workers have higher hourly earnings on average than all workers, and the highest is for those age 65 to 69⁴ (due to the small number of observations in this age category, however, that average should be used with

Chart C Longitudinal profiles show only a modest drop in hourly earnings for older workers with no pension benefits



1. Excluding working retirees.

Source: Statistics Canada, Survey of Labour and Income Dynamics, 2004.

caution). Nevertheless, the data suggest that the lower earnings found for older workers in the traditional age-earnings profiles are likely a result of older workers retiring from their career job, activating their pension, and continuing to work at lower pay, which ultimately drags down the average for older workers. Older workers continuing uninterrupted work will, on average, maintain high earnings according to the sample used.

A new approach using multivariate analysis

In order to account for the many personal, job, and demographic factors that may affect earnings, a random-effects model (Frees 2004) was used to estimate the age-earnings relationship. As suggested by other studies (Robinson 2003, and Murphy and Welch 1990), the model included different functions to test for linear or non-linear relationships between age and earnings (see *Statistical model*).

Overall, coefficients for age and its powers were close to zero (Table). While the coefficients for age squared and age to the fourth were statistically significant on their own, the age variables, when tested as a whole, were not statistically different from zero, which indicates that when other personal and job-related characteristics are taken into account, a worker's age does not appear to be related to earnings. This is in contrast to many studies that used cross-sectional data to illustrate declining earnings for older workers prior to retirement. This difference arises in part because older workers are excluded from the longitudinal sample as soon as they start to receive a pension, contrary to previous studies.⁵ Another contributing factor is the use of longitudinal data.

While the results suggest that age is not significantly related to hourly earnings, they indicate that work experience, defined as years working full time for at least six months, is important in explaining variations. Indeed, the results show that, compared with workers having 30 to 34 years of work experience, those with 0 to 4 years earned almost 15% less, those with 5 to 14 years, 10% less, and those with 15 to 24 years, 5% less.⁶ However, contrary to previous research that indicated decreasing earnings for those with the most experience, this study showed that workers with either 25 to 29, or 35 and more years of experience were not statistically different from those with 30 to 34 years of work experience, which suggests that hourly earnings stabilize after more than 25 years of experience.

Statistical Model

SLID panel data for the years 1999 to 2004 were used to estimate variants of the random-effects model

$$\ln(y_{it}) = \beta_0 + \beta_1 \text{Age}_{it} + \beta_2 \text{Age}_{it}^2 + \beta_3 \text{Age}_{it}^3 + \beta_4 \text{Age}_{it}^4 + \gamma' x_{it} + T_i + u_i + \varepsilon_{it}$$

where y_{it} is the composite hourly earnings of individual i in year t , Age is the individual's age (centred at age 55), β_1 to β_4 are coefficients affecting Age and its powers, x_{it} is a vector of personal and employment characteristics (including work experience) that may or may not vary over time, and γ is a vector of regression coefficients. A series of dummy variables (T_i) is used to account for year-specific effects. Individual-specific effects are accounted for by the time-constant u_i , and ε_{it} is the error term. Standard errors for parameter estimates were calculated with the bootstrap method.

Other possible models for longitudinal or panel data include fixed-effects, random-coefficients, and population-averaged models. The fixed-effects model was not ideal for this study as it cannot estimate the effect of time-constant variables. Using generalized estimating equations, the population-averaged model roughly corresponding to the random-effects specification above yielded very similar results. A fully specified random-coefficients model proved difficult to estimate, but results from models including limited subsets of variables were in agreement with the results from the random-effects and population-averaged models. Also, an ordinary least squares (OLS) regression using 2004 data only was estimated for comparison purposes. Overall, the results from the OLS model were in agreement with the results from the random-effects and population-averaged models.

Overall, the results suggest that work experience is a better predictor of hourly earnings than age. This is plausible, since work experience, rather than age, is more directly tied to accomplishments, which are typically assessed when determining promotions and job offers.

Similar to other research, this study found sex and education to be significantly related to earnings. Results of the random-effects model suggest that men with university degrees earned 36% more than those with a non-university postsecondary certificate. On the other hand, men who completed high school did not have significantly different hourly earnings than men with non-university postsecondary education, but men with less than high school earned 11% less per hour. An earnings gap between men and women was also apparent. Women of all educational levels earned less than their male counterparts. For example, women with a non-university postsecondary certificate earned 15% less than their male counterparts.

Table Results of log-linear random effects

	Random effects model	
	Coefficient	Exponential coefficient
Age		%
Age squared	-0.005	-0.5
Age cubed	-0.002**	-0.2
Age to the fourth power	0.000	0.0
	0.000**	0.0
Sex and education (ref. men, non-university postsecondary)		
Men, less than high school	-0.116***	-10.9
Men, high school	0.048	5.0
Men, university	0.310***	36.3
Women, less than high school	-0.403***	-33.2
Women, high school	-0.278***	-24.3
Women, non-university postsecondary	-0.162***	-14.9
Women, university	0.048	4.9
Work experience (ref. 30 to 34 years)		
0 to 4 years	-0.158***	-14.7
5 to 14 years	-0.107***	-10.2
15 to 24 years	-0.047**	-4.5
25 to 29 years	-0.011	-1.1
35 or more years	-0.006	-0.6
Immigrant status (ref. non-immigrant)		
Immigrant	-0.018	-1.7
Visible minority status (ref. non-visible minority)		
Visible minority	-0.231***	-20.6
Disability status (ref. no disability reported)		
Disability reported	0.002	0.2
Job status (ref. permanent)		
Non-permanent job	0.004	0.4

** statistically significant or significantly different from the reference group (ref.) at 0.05

*** significantly different from the reference group (ref.) at 0.01

Note: Some variables had missing values. Other variables used, but not shown, comprise occupation, industry, region, area of residence size and year effects.

Source: Statistics Canada, Survey of Labour and Income Dynamics, 1999 to 2004.

Job permanency is another indicator of job quality. However, the results indicate that older workers with non-permanent jobs (i.e. seasonal, temporary, term or contract, casual, or through a temporary help agency) did not have significantly different earnings than older workers with permanent jobs. While permanent jobs

in theory are more likely to be unionized, which typically leads to better pay, the non-significant finding here likely resulted from restricting the sample to full-year, full-time workers. In fact, only about 4% of the sample had non-permanent positions.

Immigrants and visible minorities may also earn less due to different starting levels and growth rates for reasons such as language barriers, lack of social networks, lack of recognition of credentials by employers, and discrimination. However, immigrants' earnings were not statistically different than earnings of non-immigrants. While existing research indicates a gap in earnings between *recent* immigrants and non-immigrants (Statistics Canada 2008, and Frenette and Morissette 2003), the sample also included immigrants who had arrived earlier and perhaps from different countries. However, earnings of visible minority individuals were estimated to be almost 21% less than for other workers.⁷

As individuals age, they have a higher likelihood of developing disabilities that may affect their ability to continue working in their job. They may then choose to reduce their hours of work, change jobs, or withdraw from the labour force, which would likely have a negative impact on their earnings. However, the results in the sample used here do not support this hypothesis, which could be related to a selection effect. For example, workers with a disability may have switched to another job or they may have withdrawn from the labour market (Pyper 2006). Therefore, only those whose disability did not affect job performance may have remained. Since SLID does not have detailed information on the type and severity of a disability,⁸ those in the sample who reported having a disability may have had minor or less limiting disabilities.

Conclusion

Age-earnings profiles have been important in the understanding of individuals' earnings over the life cycle. However, they are often created using cross-sectional data that compare earnings of workers at different ages rather than following the earnings trajectory of workers over time. Since this method does not examine the year-to-year earnings of older workers, its capacity for assessing whether earnings fall as workers age is limited. Rather, the interpretation can suggest at best that older workers of a certain age earn less, on average, than workers in their 40s.

This study builds on previous work by using longitudinal data, which allows for the examination of earnings over time while controlling for differences in educational, personal, demographic, and job characteristics. In addition, hourly instead of annual earnings were used in order to account for changes in work hours over time, which would affect annual but not hourly earnings. In general, the findings show that age had no significant effect on hourly earnings after controlling for other factors. This result is attributable to the exclusion of working pensioners in combination with the use of longitudinal data. The results are mostly in line with those of an earlier study which found a very weak relationship between age and earnings after pensioners had been excluded (Johnson and Neumark 1996).

The results show that hourly earnings increase with work experience, reaching a maximum for those with 25 to 29 years of experience and essentially plateauing after that. Therefore, experience-hourly-earnings profiles would be more accurate in estimating the earnings trajectory of individuals over the life cycle.

Perspectives

■ Notes

1. Although Old Age Security is also considered a public pension, it is received by all Canadians regardless of whether they had ever entered the labour force. Excluding OAS recipients would exclude almost everyone over 65 from the sample.
2. Using data from SLID, the average hourly earnings of working pensioners were not statistically different from the previous year (while they were still in career employment). However, their annual earnings fell from \$46,500 to \$38,400 while their total annual income increased from \$47,300 to \$57,500 during the survey period. These differences in annual earnings and total income were statistically significant at the 5% level.
3. Survey of Labour and Income Dynamics, panel 3, 1999 to 2004.
4. The average hourly earnings for full-year, full-time workers age 65 to 69, excluding working pensioners, were statistically different from those age 60 to 64.
5. The OLS model yielded similar results when working pensioners were excluded from the sample. When working pensioners were included in the sample, the age effect was not significant in the random effects model but was in the OLS model using 2004 cross-sectional data, suggesting that the combination of the presence of working pensioners in the sample and the use of longitudinal data results in a negative relationship between age and hourly earnings.
6. Differences in percentage terms were obtained by exponentiating the coefficients.
7. While it would be interesting to explore an interaction between immigrant and visible minority status, it was not possible due to inadequate sample size in each of the cells.
8. In SLID, respondents are flagged as having a disability if they answer positively to at least one of a series of questions inquiring about difficulty carrying out activities related to daily living, or about having physical or mental conditions or health problems that reduce the amount or kind of activity they can do in any of a few different types of situations (e.g. at home or at work).

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Trends in manufacturing employment

André Bernard

The challenges experienced by Canadian manufacturers in the past few years are a subject of public policy interest (Industry Canada 2007). These challenges have very real effects on the economy. From 2004 to 2008, more than one in seven manufacturing jobs, nearly 322,000, disappeared. In some regions of the country where the economy is not very diversified, the loss of manufacturing jobs can have particularly negative effects. In these regions, the closure of even a single plant, supplied by several companies, can weaken the economy.

At the same time, job growth in other industries has been relatively strong. In fact, from 2004 to 2008, over 1.5 million jobs were created in the rest of the economy—a growth of 11%. The national unemployment rate through 2007 and 2008 was also regularly among the lowest in the past 30 years. Manufacturing is clearly faring worse than the rest of the economy.

This study paints a detailed picture of employment trends in manufacturing in Canada from 1998 to 2008. Most of the data are from the Labour Force Survey (LFS) (see *Data source and definitions*).

The global context

Canada is far from being the only country having to deal with a downturn in its manufacturing base. The United States, which continues to be Canada's largest trading partner, lost close to one-quarter (4.1 million) of its manufacturing jobs between 1998 and 2008.¹

The vast majority of other Organisation for Economic Co-operation and Development (OECD) member countries have also recorded major job losses in this industry in the past few years (Pilat et al. 2006). From 1990 to 2003, employment in manufacturing

decreased by 29% in the United Kingdom, 24% in Japan, 20% in Belgium and Sweden, and 14% in France. Ireland was the only country to experience impressive growth (25%). However, this growth was in the specific context of an influx of foreign investment and a service sector that grew even more rapidly than manufacturing. Mexico, Spain, and, to a lesser extent, Canada and New Zealand were the only other countries to increase manufacturing jobs from 1990 to 2003. The last available year for purposes of international comparisons being 2003, the result for Canada does reflect the significant job losses since 2004. The share of manufacturing in total employment has regressed persistently in almost all OECD member countries. This is not a recent trend. For example, in the early 1970s, more than one in five jobs in the United States were in manufacturing. In 2003, this proportion barely exceeded 11%. In the United Kingdom, over 30% of jobs in the early 1970s were in manufacturing. In 2003, this proportion dropped to 12%.²

Data source and definitions

The Canadian data come from the **Labour Force Survey** (LFS). The LFS is a monthly survey of about 54,000 households. The LFS sample is representative of the civilian non-institutionalized population 15 years of age and over. The LFS excludes those living on reserves, full-time members of the Canadian Armed Forces, and institutional residents. The territories are also excluded from this study. Industries are classified according to the **North American Industry Classification System** (NAICS). Manufacturing corresponds to codes 31 to 33.

Contrary to surveys of companies, the LFS counts workers, not jobs. The number of workers can be different from the number of jobs since a worker can have more than one job. In the case of those with more than one job, the characteristics presented are for the main job (defined by hours worked in the reference week). For simplicity, **workers** and **jobs** are used interchangeably.

The LFS being a cross-sectional survey, it is impossible to draw conclusions on the dynamics of job replacement and entries into and exits from unemployment spells.

André Bernard is with the Labour and Household Surveys Analysis Division. He can be reached at 613-951-4660 or andre.bernard@statcan.gc.ca.

Over the long term, the proportion of service-sector jobs has increased while manufacturing's share has declined in almost all OECD countries. This phenomenon, if it can explain the long-term trends in the relative share of manufacturing jobs in total employment, does not explain the decline in the absolute number of manufacturing jobs. Other factors are likely to contribute on various scales to this general trend among the most industrialized countries: structural contributors such as the phenomenon of production moving to countries like China (Pilat et al. 2006, and Banister 2005), demographic contributors (Pilat et al. 2006), productivity growth (Wölfl 2005 and Forbes 2004), and tariff reduction (Beaulieu 2000 and Larochelle-Côté 2007). There are also more conjunctural contributors, for example, brisk fluctuations in exchange rates like those that Canada experienced for about ten years.

As manufacturing activity has declined in relative importance in OECD countries, China has become the world centre of manufacturing employment. In fact, the number of workers in manufacturing in China was estimated at 109 million in 2002, which represents more than double the combined total (53 million) in all of the G-7 member countries (Pilat et al. 2006, and Banister 2005).

Demographics (in particular the aging of the population observed in almost all developed countries) contribute to the increase in demand for services at the expense of manufactured products. In fact, the total final demand in numerous OECD countries shows a progressive decrease in the demand for manufactured products (Pilat et al. 2006).

When productivity growth in manufacturing is greater than that in the services-producing sector, a reallocation of manufacturing jobs to the service sector can be expected (Wölfl 2005). In the United States, for example, labour productivity growth in manufacturing was far greater than that in the entire non-agricultural economy since the 1970s, contributing to a decrease in the importance of the manufacturing industry in employment. Of course, rapid productiv-

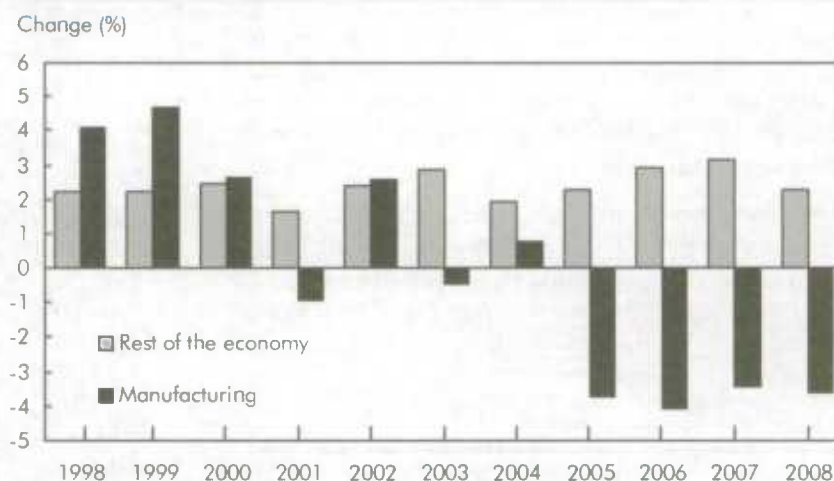
ity growth is greatly beneficial to the economy. Increased productivity contributes to an increase in the standard of living and to the improvement of competitiveness. However, increased productivity also means that a firm can produce the same quantity of goods with fewer workers, which can lead to job losses (Forbes 2004).

Variations in the exchange rate certainly have a significant impact on manufacturing in any country actively involved in international trade. Canada has experienced major fluctuations in its exchange rate for the last ten years with no general trend in appreciation or depreciation. The effect on manufacturing firms is unclear because the effect on income from exports can be compensated in large part by the effect on the prices of imported inputs (Ghanem and Cross 2008). A strong appreciation in the exchange rate will decrease an exporter's income while also making imported supplies, parts, and equipment more affordable.

Trends in Canada

Over the past ten years, the labour market in manufacturing was marked by a period of great drive, slowdown, and a significant decline. The recovery of the labour market in Canada since the mid-1990s first coincided with a boom in employment in manufacturing, which had been hit quite hard by the recession of 1991 to 1993. From 1998 to 2000, growth in manu-

Chart A After increasing in the late 1990s, manufacturing employment stagnated and then declined



Source: Statistics Canada, Labour Force Survey.

facturing employment was strong, peaking at 4.7% in 1999, and was greater than growth in the rest of the economy for those three years (Chart A). From 2001 to 2004, employment remained relatively stagnant, with the exception of relatively good growth in 2002 following the general economic challenges of 2001. After recording very weak growth of 0.7% in 2004, employment in manufacturing experienced a clear downward trend with successive annual losses of at least 3% from 2005 to 2008. In these four years, more than one in seven manufacturing jobs were lost.

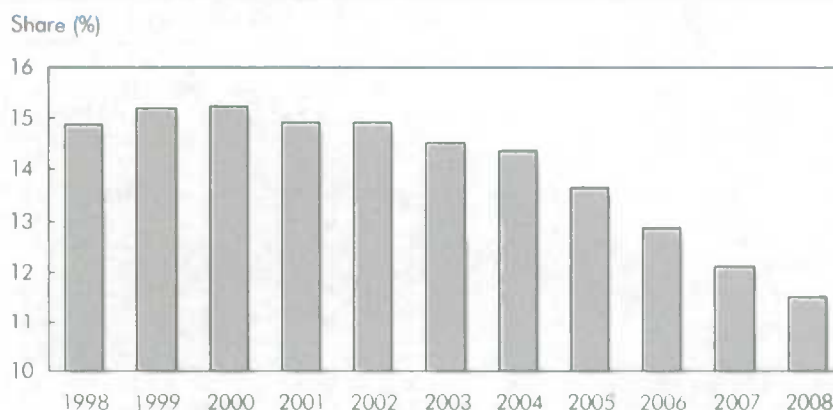
These losses resulted in the rapid erosion of the share of manufacturing jobs in the economy, from 14.9% in 1998 to 14.4% in 2004 before falling sharply to 11.5% in 2008 (Chart B).

Job losses in manufacturing were compensated by major gains in the service sector and construction industry (Table 1). Accordingly, from 1998 to 2008, when the share of manufacturing jobs fell by 3.4 percentage points, the shares for services and construction increased by 2.5 and 2.0 points respectively, with 9 of the 15 service industries seeing their share increase.

General downturn in manufacturing since 2004

Almost all manufacturing industries have been in sharp decline since 2004. Of the 23 studied, only 6 showed job growth from 2004 to 2008, notably those pertaining to transportation equipment other than automobiles and automobile parts (9.2%), oil and coal products (8.5%), and computer and electronic products (7.4%). Conversely, 17 industries had job losses, often in high proportions (Table 2).

Chart B Manufacturing's share of employment has fallen sharply since the turn of the century



Source: Statistics Canada, Labour Force Survey.

Textiles and clothing, which has long been one of the largest manufacturing employers in the country, was the hardest hit among the manufacturing industries. From 2004 to 2008, clothing manufacturers and textile and textile product mills saw almost half of their jobs disappear.

Table 1 Jobs by industry, share of total employment

	1998	2001	2004	2008
	%			
Goods sector	26.0	25.3	25.0	23.5
Agriculture, forestry, fishing and hunting	3.8	2.8	2.7	2.4
Mining, quarrying, and oil and gas extraction	1.3	1.2	1.2	1.5
Utilities	0.8	0.8	0.8	0.9
Construction	5.2	5.5	6.0	7.2
Manufacturing	14.9	14.9	14.4	11.5
Service sector	74.0	74.7	75.0	76.5
Wholesale trade	3.2	3.7	3.7	3.7
Retail trade	11.9	12.1	12.1	11.9
Transportation and warehousing	5.1	5.2	5.0	5.0
Information and cultural industries	2.7	2.7	2.4	2.3
Finance and insurance	4.3	4.3	4.3	4.5
Real estate, rental and leasing	1.8	1.6	1.7	1.7
Professional, scientific and technical services	6.1	6.6	6.4	7.0
Management of companies and enterprises	0.0	0.0	0.0	0.0
Administrative and support, waste management and remediation services	3.4	3.6	3.9	4.0
Educational services	6.6	6.6	6.5	7.0
Health care and social services	10.2	10.3	10.9	11.1
Arts, entertainment and recreation	1.7	2.0	2.2	2.1
Accommodation and food services	6.5	6.3	6.3	6.3
Other services	5.0	4.5	4.4	4.4
Public administration	5.6	5.3	5.2	5.4

Source: Statistics Canada, Labour Force Survey.

Table 2 Jobs in manufacturing industries

	2008	Change 1998 to 2004		Change 2004 to 2008	
	number		%	number	%
Textile mills	9,600	3,400	20.7	-10,200	-51.5
Clothing	44,400	-32,700	-28.5	-37,800	-46.0
Textile product mills	14,700	-14,700	-37.1	-10,200	-41.0
Wood products	129,000	37,900	25.5	-57,300	-30.8
Motor vehicle parts	98,700	37,200	36.4	-40,600	-29.1
Plastics and rubber products	103,300	26,700	23.9	-35,300	-25.5
Motor vehicles	64,500	3,800	5.0	-15,900	-19.8
Machinery	112,300	35,100	33.9	-26,200	-18.9
Furniture and related products	103,600	32,100	33.9	-23,100	-18.2
Miscellaneous	85,600	12,900	14.3	-17,800	-17.2
Primary metal	77,400	-15,100	-14.0	-15,000	-16.2
Paper	90,600	-17,900	-14.7	-13,200	-12.7
Printing and related	101,100	19,000	20.2	-11,900	-10.5
Clay and refractory products	59,000	14,800	29.4	-6,200	-9.5
Chemicals	109,800	9,300	8.6	-7,800	-6.6
Food	259,400	45,600	20.0	-14,000	-5.1
Electrical equipment, appliances and components	47,800	-1,900	-3.8	-900	-1.8
Metal products	177,500	17,500	11.0	1,500	0.9
Beverage and tobacco products	38,700	-600	-1.6	1,400	3.8
Leather and allied products	8,000	-6,200	-44.6	300	3.9
Computer and electronic products	109,500	-3,300	-3.1	7,500	7.4
Petroleum and coal products	19,100	-1,000	-5.4	1,500	8.5
Transportation equipment (except motor vehicles and parts)	106,700	-2,900	-2.9	9,000	9.2

Source: Statistics Canada, Labour Force Survey.

The Canadian automotive industry was also hard hit. Automotive parts manufacturing lost more than one-quarter of its employees from 2004 to 2008, while motor vehicle manufacturing lost one-fifth. Parts manufacturers saw their jobs go from 139,300 to 98,700, which completely cancelled the strong growth from 1998 to 2004. For their part, motor vehicle manufacturers lost 15,900 jobs between 2004 and 2008, following a rather modest job growth of 5.0% from 1998 to 2004. The Canadian automotive industry, concentrated mainly in Ontario, has been changing for several years. Vehicle production by the 'Big Three' U.S. automakers has been in sharp

decline since 1998, while it has increased in Japanese-owned plants (Roy and Kimyani 2007).

All industries related to wood and paper are beleaguered. Wood product manufacturers lost 57,300 jobs from 2004 to 2008, which more than negated all of the growth experienced from 1998 to 2004 (37,900 jobs). The entire lumber industry has experienced major challenges in these past few years, having to deal with the imposition of antidumping and countervailing duties by the United States from 2002 to 2006, the increase in energy and raw materials prices, the decrease in the demand for and price of lumber and the increase in the exchange rate of the

Canadian dollar (Dufour 2007). The paper manufacturing industry has, for its part, been in a constant downturn for ten years, employment having declined successively by 14.7% from 1998 to 2004 and by 12.7% from 2004 to 2008. Mirroring the slump in the paper industry, the printing industry lost 10.5% of its jobs from 2004 to 2008.

Decline in unionization in manufacturing

Looking at the attributes of manufacturing jobs helps to determine whether certain types of jobs were more affected and to what

Table 3 Job characteristics

	1998	2008
Manufacturing sector	%	
Full-time jobs	96.0	95.9
Part-time jobs	4.0	4.1
Company size		
Less than 20 employees	12.4	12.9
20 to 99 employees	20.4	20.2
100 to 500 employees	19.5	19.6
More than 500 employees	47.7	47.3
Unionization rate	32.2	26.4
Average age (years)	38.8	41.4
Average years of seniority	9.0	9.6
Average earnings (current \$)	15.6	20.8
Rest of the economy	%	
Full-time jobs	78.6	79.7
Part-time jobs	21.4	20.3
Company size		
Less than 20 employees	23.7	20.3
20 to 99 employees	15.8	15.4
100 to 500 employees	15.1	13.4
More than 500 employees	45.4	50.9
Unionization rate	30.1	29.5
Average age (years)	38.3	39.9
Average years of seniority	7.9	8.0
Average earnings (current \$)	12.6	17.7

Source: Statistics Canada, Labour Force Survey.

extent the face of employment in manufacturing in Canada is changing. Only a very small minority (4.1% in 2008) of manufacturing jobs are part time and this proportion has remained virtually unchanged since 1998, which shows that proportionately as many full-time as part-time jobs were lost (Table 3). The very low proportion of part-time employment is an attribute peculiar to manufacturing—over 20% of jobs in the rest of the economy are part time.

Unionization is generally seen, among other things, as an indicator of job quality. Unionized jobs typically benefit from a wage pre-

mium, even when employee and workplace attributes are taken into consideration (Fang and Verma 2002). From 1998 to 2008, unionized jobs in manufacturing disappeared twice as quickly as non-unionized ones. Consequently, the rate of unionization decreased from 32.2% to 26.4%. For the rest of the economy, unionization declined less, from 30.1% to 29.5%.

The distribution of manufacturing jobs according to firm size has also not experienced notable change in the past ten years, which means that job losses did not hit small businesses harder than large businesses. Large businesses could have been expected to find it easier to deal

with adverse market conditions because of their better financial capacity and their ability to diversify their activities more easily. This does not mean that jobs in small businesses are more protected, because less pronounced job losses in small businesses could mask a very significant turnover in the workforce and in firms themselves. In fact, layoff rates are much higher in small businesses than in large businesses (Galarneau and Stratychuk 2001).

Central Canada hit harder

Quebec and Ontario make up Canada's industrial core. Outside these two provinces, there are

Table 4 Changes in jobs by province

	Change 1998 to 2004		Change 2004 to 2008		Manufacturing jobs in 2008	
	number	%	number	%	number	% of total employ- ment
Manufacturing	198,600	9.5	-321,800	-14.0	1,970,300	11.5
Newfoundland and Labrador	1,400	8.9	-3,100	-18.0	14,100	6.4
Prince Edward Island	800	14.8	-100	-1.6	6,100	8.7
Nova Scotia	2,600	6.3	-4,500	-10.3	39,100	8.6
New Brunswick	5,300	14.5	-6,700	-16.0	35,200	9.6
Quebec	30,200	5.0	-86,700	-13.8	543,600	14.0
Ontario	119,200	12.2	-198,600	-18.1	901,200	13.5
Manitoba	6,000	9.5	-200	-0.3	68,700	11.3
Saskatchewan	-400	-1.4	2,100	7.3	30,900	6.0
Alberta	18,400	14.6	-300	-0.2	144,100	7.2
British Columbia	15,300	7.8	-23,800	-11.3	187,400	8.1
Rest of the economy	1,702,100	14.2	1,500,700	11.0	15,155,600	88.5
Newfoundland and Labrador	20,500	11.6	9,100	4.6	206,200	93.6
Prince Edward Island	6,500	12.0	3,500	5.8	64,200	91.3
Nova Scotia	44,300	12.5	15,500	3.9	414,100	91.4
New Brunswick	29,500	10.6	22,800	7.4	331,000	90.4
Quebec	392,800	14.8	287,900	9.4	3,338,100	86.0
Ontario	744,000	16.6	569,400	10.9	5,786,100	86.5
Manitoba	36,400	7.7	30,300	6.0	538,000	88.7
Saskatchewan	9,600	2.2	30,900	6.9	481,800	94.0
Alberta	229,200	16.6	256,100	15.9	1,869,200	92.8
British Columbia	189,000	11.4	275,400	14.9	2,126,900	91.9

Source: Statistics Canada, Labour Force Survey.

generally proportionately fewer manufacturing jobs. In 2008, manufacturing jobs in Quebec and Ontario represented 14.0% and 13.5% of jobs, respectively, whereas the national average was 11.5% (Table 4). Together, these two provinces account for more than 1.4 million (73.3%) of the manufacturing jobs in Canada. Manitoba also has a significant manufacturing presence, with 11.3% of its jobs depending on it. The proportions for all the other provinces are below the national average. Saskatchewan, which is more natural resources-oriented, is the province with the fewest jobs in manufacturing (6.0%).

In six provinces, at least one in ten manufacturing jobs were lost from 2004 to 2008.³ The largest drop was in Ontario, where 198,600 jobs, almost one in five (18.1%), disappeared in only four years. Significant drops were also seen in Newfoundland and Labrador (-18.0%), New Brunswick (-16.0%), Quebec (-13.8%), British Columbia (-11.3%) and Nova Scotia (-10.3%).

Do small urban areas have more difficulty dealing with job losses?

While many manufacturers are located in large metropolitan areas such as Toronto, Montréal and Vancouver, many are found in smaller, 'one-industry' towns. In these less diverse locales, lost manufacturing jobs may be harder to replace. To find out, employment trends were compared on an urban-rural gradient: very large CMAs (Toronto, Montréal and Vancouver); large CMAs (Québec, Ottawa-Gatineau, Hamilton, Winnipeg, Calgary and Edmonton); small CMAs (a population between

100,000 and 500,000); and small towns and rural regions (census agglomerations with fewer than 100,000 inhabitants and rural areas).

From 2004 to 2008, very large CMAs lost the most manufacturing jobs proportionally. More than 150,000 jobs were lost in one of these three very large CMAs, a collective drop of 17.2% (Table 5). In smaller regions, the drops were not as large, but were significant nonetheless. In small CMAs and in small towns and rural areas, manufacturing jobs decreased by 14.8% and 11.8% respectively. Although small towns and rural areas lost fewer jobs proportionally, the rest of their economy also progressed more slowly. Total employment growth from 2004 to 2008 was 7.6% in very large CMAs, compared with 6.6% in small towns and rural areas.

Over this period then, small town economies appear as resilient to manufacturing job losses as those of very large cities. One way of measuring this resilience is by

examining the ability of regions to replace lost manufacturing jobs with jobs in other industries. On average, for each manufacturing job lost in very large cities between 2004 and 2008, 3.8 jobs were created in other industries. In small towns and rural areas, for each manufacturing job lost, 4.7 jobs were created elsewhere. The difference between these two ratios is not statistically significant.⁴

However, the pool of non-manufacturing jobs is generally lower paying in small towns and rural areas than in very large CMAs. In small towns and rural areas, wages and salaries in manufacturing are on average 25.3% higher than in non-manufacturing, compared with a difference of 11.2% in very large CMAs (Table 6).⁵

Manufacturing output and productivity

Examining the evolution of industrial production, measured by gross domestic product (GDP), provides a different perspective than em-

Table 5 Change in jobs by type of region

	2008	Change 1998 to 2004		Change 2004 to 2008	
	'000	'000	%	'000	%
Manufacturing	1,970.3	198.6	9.5	-321.8	-14.0
Montréal-Toronto-Vancouver	742.4	69.2	8.4	-154.2	-17.2
Large census metropolitan areas	273.8	30.8	11.5	-23.9	-8.0
Small census metropolitan areas	267.4	16.0	5.4	-46.5	-14.8
Small towns and rural areas	691.7	82.6	11.8	-92.3	-11.8
Rest of the economy	15,155.6	1,702.1	14.2	1,500.7	11.0
Montréal-Toronto-Vancouver	5,323.8	706.5	17.5	581.1	12.3
Large census metropolitan areas	2,885.1	367.7	16.7	309.8	12.0
Small census metropolitan areas	2,124.9	233.4	13.7	182.5	9.4
Small towns and rural areas	4,827.2	394.5	9.9	432.9	9.9

Source: Statistics Canada, Labour Force Survey.

Table 6 Job characteristics by type of region

	Union- ization	SME ¹	Average age	Average seniority	Average hourly earnings
	%		years	years	\$
Manufacturing sector					
Montréal-Toronto-Vancouver (ref.)	21.7	58.6	41.9	8.7	20.09
Large census metropolitan areas	20.8	51.1*	40.6*	8.8	22.87*
Small census metropolitan areas	30.8*	44.5*	41.1*	10.5*	22.76*
Small towns and rural areas	32.4*	50.5*	41.0*	10.4*	19.78*
Rest of the economy					
Montréal-Toronto-Vancouver (ref.)	27.0	48.6	39.9	7.6	18.06
Large census metropolitan areas	30.6*	42.7*	39.0*	7.4	19.93*
Small census metropolitan areas	31.9*	45.6*	39.4*	8.2*	17.82*
Small towns and rural areas	30.4*	55.9*	40.7*	8.6*	15.79*

* significantly different from the reference group (ref.) at the 0.05 level

1. A small or medium-sized enterprise is defined as a business with less than 500 employees.

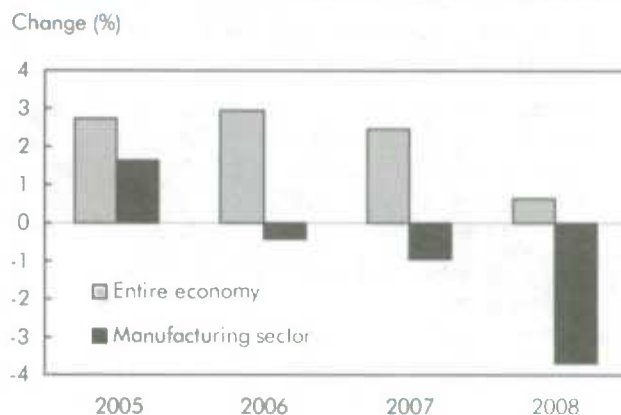
Source: Statistics Canada, Labour Force Survey, 2008.

ployment data. Industrial production was in a slump from 2004 to 2007, and dropped 3.7% in the first two quarters of 2008 (Chart C). Each year, industrial production increased less than the total overall production. However, production generally decreased less than employment, meaning that some of the job losses can be attributed to increased productivity in manufacturing industries. In 3 out of 4 years from 2004 to 2007, and 7 out of 10 years from 1998 to 2007, labour productivity increased more quickly for manufacturing industries than for the economy as a whole (Kowaluk and Gibbons 2008). In other words, while production was decreasing, businesses were also becoming more efficient and could produce more with the same workforce. This trend of labour productivity increasing more quickly in manufacturing is neither new nor specific to Canada. In fact, manufacturing generally contributes greatly to overall productivity growth in most OECD countries (Pilat et al. 2006).

Conclusion

From 2004 to 2008, more than one in seven manufacturing jobs (322,000) disappeared in Canada. The majority came from Ontario, but drops were also evident in other parts of the country. In six provinces, at least 1 in 10 manufacturing jobs disappeared from 2004 to 2008. These losses occurred during a period of economic turbulence in the country as the exchange rate fluctuated widely.

These trends are not unique to Canada—manufacturing has been declining in most OECD countries. The situation in Canada was noticeable for being somewhat delayed, with manufacturing jobs beginning to decline only in 2004, while other countries, notably the United States, had already registered significant job losses for several years.

Chart C While overall GDP grew from 2005 to 2008, manufacturing output declined since 2006

Source: Statistics Canada, Income and Expenditure Accounts Division.

Canada's very large metropolitan areas were hit harder than other regions of the country. The country's small towns and rural areas fared slightly better in comparison. In addition, contrary to what may have been expected, small towns and rural areas were at least as capable as very large metropolitan regions of replacing lost manufacturing jobs with jobs in other industries. However, in small towns and rural areas, jobs in other sectors have lower salaries than those in manufacturing. This is also the case in very large metropolitan regions, but to a lesser extent.

The employment decline has affected almost all manufacturing industries. However, textiles, clothing, and motor vehicle and automotive parts, as well as industries related to wood and paper, were hit hardest. The jobs lost were more likely to be unionized jobs.

The trends described show that the services shift in the Canadian economy is continuing in major cities and smaller regions alike. It is not known whether this trend will pick up speed, as data from recent years would seem to indicate, or whether the major adjustments are over, in which case manufacturing jobs should stabilize in the coming years.

Perspectives

Notes

1. The latest data for the United States, unlike other data in this section, are from the Current Employment Statistics Program, United States Bureau of Labor Statistics.
2. These international data come from the OECD STAN Indicators Database for Structural Analysis (December 2005 version). Historical data from 1970 onward are presented in Pilat et al. (2006).
3. Newfoundland and Labrador, Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia.
4. A *t* test did not dismiss the possibility that the two ratios were equal at a threshold of 5%. The test was also repeated by limiting the sample to the two largest manufacturing provinces—Quebec and Ontario—with similar results.
5. Without a longitudinal analysis, it cannot be determined whether persons laid off in manufacturing can access some of the highest paying service sector jobs. This type of study is currently in progress.

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Obesity on the job

Jungwee Park

Obesity in the workplace is a growing phenomenon, with repercussions for both workers and their employers. International studies have found that the combination of a sedentary job and poor eating habits often leads to obesity, which can put the heart at risk and pave the way for a litany of other diseases. Obesity is a risk factor for type 2 diabetes, cardiovascular disease, gall bladder disease, and some cancers (Brunner et al. 2007). As well, obese workers have a substantially higher prevalence of metabolic, circulatory, musculoskeletal, and respiratory disorders (Thomson Healthcare 2007).

Obesity in the workplace can have economic costs as well: obese employees in Australia had more frequent and lengthier work absences (Australian Institute of Health and Welfare 2005), and in the United States obesity was associated with 39 million lost work days, 239 million restricted-activity days, 90 million bed days and 63 million physician visits in 1994 (Wolf and Colditz 1998).

Although numerous studies have looked at obesity as a health issue, less is known about obesity among Canadian workers and its economic implications. Using the Canadian Community Health Sur-

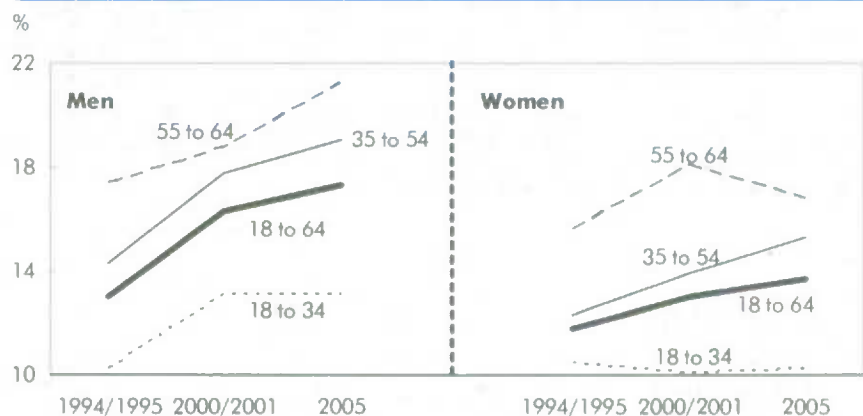
vey (CCHS) and the National Population Health Survey (NPHS), this study investigates trends in obesity among the employed and looks at the sociodemographic and labour force correlates of obesity.¹ Multivariate models help investigate the persistent effects of some factors by controlling for health conditions and behaviours. Also examined is the prevalence of work stress indicators to shed light on the relationship between obesity and workplace stress (see *Data sources and definitions*). Finally, this

article analyzes the associations between obesity and job performance measures such as work activity limitations, disability days, work injuries and absences.

Obesity on steady rise among workers

In 2005, more than two million employed Canadians age 18 to 64 were obese. Based on self-assessed weight and height, the obesity rate among workers has steadily increased, especially for men (Chart A).² Obesity was most prevalent

Chart A Obesity rates have increased faster for male workers



Sources: Statistics Canada, National Population Health Survey, 1994/1995; Canadian Community Health Survey, cycle 1.1, 2000/2001; Canadian Community Health Survey, cycle 3.1, 2005.

Jungwee Park is with the Labour and Household Surveys Analysis Division. He can be reached at 613-951-4598 or jungwee.park@statcan.gc.ca.

Data sources and definitions

The **National Population Health Survey** (NPHS), which began in 1994/1995, collects information about the health of the Canadian population every two years. It covers household residents in all provinces and territories, except on Indian reserves, on Canadian Forces bases, and in some remote areas. This analysis is based on the survey's cross-sectional component for household residents. The 1994/1995 non-institutional sample consisted of 27,263 households, of which 88.7% agreed to participate.

The **Canadian Community Health Survey** (CCHS), which began in 2000/2001, collects population-level information on health determinants, health status and health system utilization. The CCHS comprises a general health survey in the first year of the cycle that samples approximately 130,000 Canadians and provides information at the level of provincial health regions, and a focused topic survey in the second year that samples approximately 35,000 and provides provincial information.

A description of the CCHS methodology is available in a published report (Béland 2002). In this analysis, data from cycle 1.1 (2000/2001) and cycle 3.1 (2005) were used to calculate obesity rates of male and female workers for examining historical trends. Cycle 2.2 (2004), which focused on nutrition, was used to obtain body mass index (BMI) information based on measured height and weight. In CCHS 2.2, height and weight measurements were conducted for 62% of survey respondents age 12 years or older. With a special sample weight applied, the estimates for this group represented the Canadian population. These data were used to determine obesity and being overweight for workers age 18 to 64. Cycle 1.2 (2002, Mental Health and Well-being) was used to examine the association between work stress and occupational factors and obesity among workers. Cycle 3.1 was used to analyze sociodemographic correlates of obesity and the effects of obesity on job performance.

To account for the survey design effects of the CCHS, coefficients of variation and p-values were estimated and significance tests were performed using the bootstrap technique. The significance level was set at $p \leq 0.05$.

To measure work stress, the CCHS employed an abbreviated version of Karasek's Job Content Questionnaire (JCQ). The CCHS measured work stress of respondents who worked at a job or business in the past 12 months. Twelve items

in the JCQ (for detailed measurements, see Park 2008) were used to measure job control, psychological demands, job insecurity, physical exertion and social support at the workplace. The job strain ratio was calculated by dividing the adjusted score for psychological demands by that of job control. A small constant (0.1) was added to both the numerator and denominator to avoid division by 0. To deal with outliers, scores greater than 3 were set to 3. Respondents were classified as being in **high job strain** if the ratio was 1.2 or higher.

Respondents who strongly disagreed, or disagreed with the statement "your job security is good" were classified as having **job insecurity**. Respondents who strongly agreed or agreed with the statement, "your job requires a lot of physical effort" were classified as having **high physical exertion**. Respondents were classified as having **low social support at the workplace** if they either agreed or strongly agreed with being exposed to hostility or conflict from co-workers or disagreed or strongly disagreed with supervisors or co-workers being helpful in getting the job done.

In addition, respondents were asked about satisfaction with their job. Those answering not too satisfied or not at all satisfied were classified as having **job dissatisfaction**.

Self-perceived work stress at the main job or business in the past 12 months was measured by asking "Would you say that most days at work were: not at all stressful? not very stressful? a bit stressful? quite a bit stressful? extremely stressful?" Respondents who answered quite a bit or extremely were classified as having **high self-perceived work stress**.

Occupations were collapsed into **white-collar** (management; professional; technologist, technician or technical occupation; and administrative, financial or clerical), **sales and service**, and **blue-collar** (trades, transport or equipment operator; farming, forestry, fishing or mining; and processing, manufacturing or utilities).

Shift work refers to anything other than a regular day-time schedule (i.e. evening, night, rotating, or split shifts).

Respondents who worked mainly in their own business, farm or professional practice were defined as **self-employed**.

among older workers (age 55 to 64)—17% in 1994/1995, 19% in 2000/2001, and 21% in 2005.³ The pattern held for both men and women, although the prevalence was lower among women.⁴ Overall, the prevalence of obesity among employed women increased from 12% to 14%. Although only a small portion of workers were severely obese (obesity class II or III; body mass index (BMI) of 35 or more)—with a high health risk and needing more aggressive approaches to weight loss—a similar increasing trend

was observed (from 2.8% in 1994/1995 to 4.1% in 2005). The increasing trend of obesity among workers may be attributable to an environment that, in multiple ways, encourages excessive eating and discourages physical activity (Raine 2004) and to increases in more sedentary jobs (Finkelstein et al. 2005).

When height and weight were measured, even higher rates of obesity and being overweight⁵ were observed.⁶ For example, based on self-reporting, 59% of employed men were obese or overweight in 2005,

compared with 63% based on actual measurement in 2004 (Chart B).^{7,8} Also, more than three-quarters of men age 55 to 64 were either overweight or obese according to physical measurement—8 percentage points more than the self-reported figure. Discrepancies were more pronounced among women. Based on measured height and weight, half of employed women were obese or overweight. The under-reporting of body weight may indicate the stigma associated with obesity and being overweight. This may also explain the greater tendency to under-report weight among women, who may feel more pressure to conform to ‘desirable’ standards (Shields et al. 2008b).

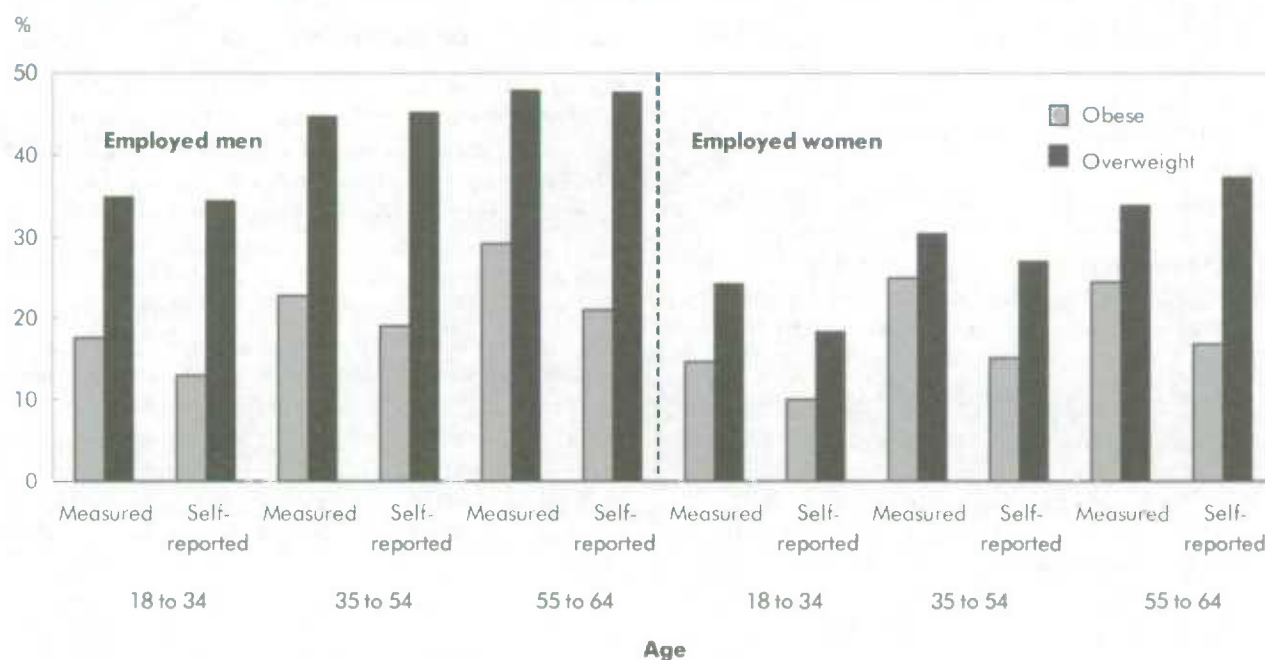
Sociodemographic correlates of obesity

Multivariate logistic regression models were used to investigate whether any specific groups of workers are at a greater risk of being obese. Associations between obesity and personal and labour market characteristics were examined while controlling for possible

confounders such as sex, age, student status and self-perceived health. Since these multivariate analyses were based on cross-sectional data, neither causality nor temporal ordering can be inferred.

An interesting difference between men and women was found in the relationship between obesity and personal income. Men age 35 to 54 in the bottom half of the personal income distribution were less likely to be obese than their contemporaries in the top quarter (Table 1). However, women age 18 to 54 with low personal income were more likely than high-income earners to be obese. This may be related to differing symbolic values of body size and shape for men and women (McLaren 2007). According to a recent study using measured BMI, a greater frequency of dining out among higher-income groups may also be associated with the inverse relationship between income and being overweight among men (Kuhle and Veugelers 2008).

Chart B Obesity and overweight rates are higher with measured versus self-reported data, especially for women



Sources: Statistics Canada, Canadian Community Health Survey, 2004, cycle 2.2 for measured body mass index; Canadian Community Health Survey, 2005, cycle 3.1 for self-reported body mass index.

Table 1 Adjusted¹ odds ratios of correlates of obesity among the employed

	18 to 64		18 to 34		35 to 54		55 to 64	
	Men	Women	Men	Women	Men	Women	Men	Women
adjusted odds ratio								
Age								
18 to 34 (ref.)	1.00	1.00	...	...	...	...	...	...
35 to 54	1.22*	1.42*	...	...	...	...	...	...
55 to 64	1.23*	1.42*	...	...	...	...	...	...
Personal income								
Bottom quarter	0.78*	1.45*	1.00	2.69*	0.71*	1.42*	0.66*	1.15
Second quarter	0.91	1.37*	1.10	2.60*	0.84*	1.33*	0.91	0.97
Third quarter	1.07	1.29*	1.24*	2.03*	0.99	1.28*	1.12	1.03
Top quarter (ref.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Education								
Less than high school	1.38*	1.35*	0.98	1.02	1.60*	1.56*	1.42*	1.31
High school graduate	1.15*	1.05	1.07	1.03	1.18*	1.04	1.22	1.30
Some postsecondary	1.22*	1.34*	1.01	1.19	1.33*	1.59*	1.45	1.13
Postsecondary graduate (ref.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Marital status								
Married (ref.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never married	0.74*	1.11	0.58*	0.82*	0.99	1.48*	0.91	1.56*
Previously married	0.82*	1.29*	0.66	1.15	0.85	1.33*	0.87	1.31*

* significantly different from the reference group (ref.) at the 0.05 level

1. Adjusted for student status, self-perceived health, chronic condition.

Source: Statistics Canada, Canadian Community Health Survey, 2005, cycle 3.1.

However, low education significantly increased the odds of obesity for both men and women, except for young workers (age 18 to 34). For example, the odds were 1.6 times as high for workers age 35 to 54 with less than high school graduation as they were for workers with completed postsecondary education. This is consistent with previous research suggesting correlations between education level and healthy lifestyles (including eating habits and physical activity levels), which, in turn, determine body weight (Raine 2004).

Compared with married workers, never-married workers age 18 to 34 were less likely to be obese. It may be inferred that never-married workers tend to put more value on their body image when they are young. However, older never-married women had higher odds of being obese. As well, previously married female employees age 35 to 64 were more likely to be obese than their currently married colleagues.

Labour force characteristics

Significant differences in age-adjusted prevalence rates of obesity were found in some occupation-related categories for men. Compared with men in white-collar jobs, a higher proportion of blue-collar workers were obese in 2002 (Table 2).⁹ Similarly, compared with other workers, higher obesity rates were found among men whose usual daily activities or work habits for the past three months were doing heavy work or carrying very heavy loads. Men working longer hours (more than 40 per week) were also more likely to be obese than regular full-time workers (30 to 40 hours per week). Being self-employed or an employee did not make any significant difference in obesity. Compared with regular-schedule workers, however, a greater proportion of shift workers (both men and women) were obese.

Although a definite causation between labour force characteristics and obesity cannot be determined, work stress caused by irregular arrangements (for example,

Table 2 Age-adjusted prevalence of obesity among the employed, age 18 to 64

	Men	Women
	%	
Occupation		
White-collar (ref.)	16.0	15.1
Sales and service	18.8	16.8
Blue-collar	19.2*	16.1
Weekly work hours		
Less than 30	18.1	16.0
30 to 40 (ref.)	16.0	15.7
Over 40	19.2*	16.0
Self employment		
Yes (ref.)	19.0	16.7
No	17.1	15.6
Shift work		
Yes (ref.)	19.8	18.5
No	16.8*	14.9*

* significantly different from the reference group (ref.) at the 0.05 level

Source: Statistics Canada, Canadian Community Health Survey, 2002, cycle 1.2.

excessive hours or shift work) may be related to obesity—it was associated with other conditions of well-being like work-life imbalance (Williams 2008). Non-standard work schedules may also make it more difficult for workers to engage in healthy eating patterns.

Work stress

Stress may contribute to obesity via its effects on behaviour and metabolism (Brunner et al. 2007). In 2002, a significantly higher proportion of obese workers reported having high job strain (Table 3). High job strain comes from having high psychological demands (how mentally challenging a job is) and low job control. This suggests that obesity may be a result of the biological and behavioural effects of stress. Previous research has found that the development of obesity may be directly related to biological effects of chronic stress, tending to cause the deposition of intra-abdominal fat (Schulte et al. 2007). Obesity can also be caused by unhealthy coping mechanisms such as overeating, physical inactivity and excessive alcohol consumption (Park 2008). However, a temporal ordering cannot be determined from cross-sectional data—higher job strain may precede obesity, but being obese at work may also increase work stress.

Measuring obesity

Body mass index (BMI) was used in calculating obesity. BMI is equal to a person's weight in kilograms divided by the square of their height in metres. A BMI cutoff of 30 kg/m² was used to classify adults as obese (25 to 29 for overweight, 18.5 to 24.9 for normal weight) in accordance with the health risks associated with classification in this BMI category (Health Canada 2003). BMIs for workers age 18 to 64, excluding pregnant women, were calculated to determine their obesity. Particular caution should be used when classifying naturally very lean adults, very muscular adults, some ethnic and racial groups, and seniors. Unless otherwise stated, obese workers were compared with normal-weight workers.

Furthermore, in 2002, a higher proportion of obese men and women felt that they received low social support from colleagues and supervisors at work. In other words, obese workers perceived not only high levels of job strain, but also an insufficiency of an important buffer against work stress. High psychological workload, together with a lack of proper social support at work, may act as a causal factor for obesity.

In addition, obese men were more likely to indicate that their work required a lot of physical effort compared with their normal-weight colleagues. This may be related to the high prevalence of obesity among men in blue-collar occupations.

Table 3 Age-adjusted prevalence of work stress indicators, employed persons age 18 to 64

	Men		Women	
	Obese	Normal weight	Obese	Normal weight
	%			
Job insecurity	17.4	14.8	15.3	14.9
Job dissatisfaction	9.5	9.2	9.9	9.8
High physical exertion	50.9*	46.7	41.3	38.4
Low co-worker support	44.0*	39.9	43.9*	38.1
High job strain	22.6*	18.9	31.9*	27.1
High self-perceived work stress	30.6	28.7	34.1	34.2

* significantly different from normal weight workers at the 0.05 level
Source: Statistics Canada, Canadian Community Health Survey, 2002, cycle 1.2.

Job performance

Obesity and job performance are clearly correlated in the data. The CCHS asked: "Last week, did you have a job or business from which you were absent?" For this study, those absent from work and indicating their own illness or injury as the primary reason for absence were considered absent due to a health problem. The odds of being absent from work were almost four times higher for obese young men (18 to 34) than for those with normal weight, after controlling for socio-economic and health-related confounding factors (Table 4). Among older men and women, however, the effect of obesity on illness absence was not found. This may be because many older obese people are already out of the labour market and only those who are healthier tend to continue working.

Research has shown that obesity, especially for women, may have a negative impact on workers more often through presenteeism (that is, reduced productivity on the job) rather than absenteeism (Gates et al. 2008). Indeed, obese women age 35 to 64 were more likely than those with normal weight to report reduced work activities due to a long-term health problem.¹⁰ As well, compared with their normal-weight colleagues, obese men age 55 to 64 had a higher risk of reducing their work activity due to a long-term health problem.

Similar to the findings on reduced work activity, women's obesity was related to their probability of taking a disability day. This refers to any days in the past two weeks where the person stayed in bed all or most of the day (including nights in hospital), cut down on normal activities, or required extra effort in daily

activities because of illness or injury. Obese women age 35 to 64 were significantly more likely than their normal-weight colleagues to take a disability day.

Obesity is clearly associated with a person's inability to work due to poor health.¹¹ However, the analysis shows that obesity has a persistent effect on job performance after controlling for self-perceived health.¹² Non-health factors may further prevent obese workers from being productive.

Finally, excess weight can reduce work activity due to the increased chances of injury on the job.¹³ Obese women age 35 to 54 were significantly more likely to have reported a work injury during the past year than those with body weight in a normal range.¹⁴ This is consistent with previous research that found obese women to be significantly more likely to be injured at work than those in the normal weight range (Wilkins and Mackenzie 2007). The association between injury and obesity is related to fatigue, sleepiness, physical limitations and ergonomics (Pollack et al. 2007). Obese workers' use of medications due to their chronic conditions can also increase the risk of injury. In addition, it is possible that personal protective equipment, such as gloves and eye goggles, is less likely to be used by obese workers due to lack of comfort, fit or availability.

Conclusion

The prevalence of obesity in the Canadian workforce has increased over the last decade, from 12.5% in the mid-1990s to 15.7% in 2005. Overall, men and older workers are more prone to obesity. Low education is

Table 4 Adjusted¹ odds ratios of obesity on job performance for workers age 18 to 64

	18 to 64		18 to 34		35 to 54		55 to 64	
	Men	Women	Men	Women	Men	Women	Men	Women
	adjusted odds ratio							
Absence due to illness, past week	2.74*	0.84	3.70*	0.79	2.86	0.72	1.78	1.53
Reduced activity, long-term health problem	1.26*	1.53*	1.18	1.19	1.19	1.57*	2.09*	1.81*
Disability day, past two weeks	1.15*	1.37*	1.10	1.21*	1.19	1.46*	1.26	1.52*
Work injury, past year	1.11	1.73*	0.90	1.25	1.18	2.12*	1.86	1.83

* significantly different from normal weight workers at the 0.05 level

1. Adjusted for income, education, marital status, student status, work arrangement and self-perceived health.

Sources: Statistics Canada, Canadian Community Health Survey, 2005, cycle 3.1; Canadian Community Health Survey, 2002, cycle 1.2.

associated with obesity for both employed men and women, and low income for women. However, income had the opposite effect on men, with high personal income linked to obesity. For young workers, marriage was positively associated with obesity, but it seemed to have a protective effect for older workers. Work arrangements such as shift work and excessive working hours were associated with obesity.

The effects of obesity appeared to be quite age and sex specific. Obesity affected work absenteeism for young men, but work presenteeism for older women. Workers' obesity was also related to elevated levels of work stress as these workers had higher job strain and lower co-worker support.

Findings of this analysis reveal costs of obesity in multiple dimensions. Obesity can cause personal stress and long-term health problems. Moreover, it can lead to significant societal costs by reducing labour market productivity. More specifically, the implication is that reducing or preventing obesity in the workplace would have multiple potential benefits, including better health and well-being, and higher productivity and better job performance. It may be cost-effective for employers to actively sponsor health promotion initiatives in the workplace, including weight maintenance programs. Similarly, public health interventions to prevent weight gain may have societal benefits beyond improvements in workers' personal health.

Perspectives

■ Notes

1. This analysis provides information for specific sex and age groups, not only because the prevalence of obesity is strongly related to age and sex (Clarke et al. 2008; Wellness.com 2009) but also because obesity may have different social significance for specific population groups. For instance, a high BMI tends to be more acceptable among men and older individuals.
2. Unless otherwise stated, workers are defined as those who worked at or were absent from a job or business in the week prior to the survey.
3. This increasing trend may be underestimated as the 2005 CCHS was done mostly via telephone interviews, while large proportions of the 1994/1995 NPHS and the 2000/2001 CCHS were based on in-person interviews. A tendency to under-report body weight was more prevalent in telephone surveys than in face-to-face interviews.
4. Obesity may be associated with lower rates of labour force participation among those age 50 to 69. Among those not working for health reasons, a higher proportion were obese compared with people in the same age group who were working (Pyper 2006).
5. Overweight people tend to become obese over time. Almost one-quarter of those who were previously overweight had become obese in eight years (Le Petit and Berthelot 2005).
6. On average, men over-reported their height by 1 cm; women, by 0.5 cm. Women under-reported their weight by an average of 2.5 kg; men, by 1.8 kg. As a result, when based on measured rather than self-reported height and weight, the prevalence of obesity increased (Shields et al. 2008b).
7. Due to limited sources of physical measurement of height and weight, it was not possible to analyze the recent trends in obesity based on measured BMI.
8. Compared with U.S. workers, a lower proportion of Canadian workers, especially women, were obese. Based on equivalent physical measurement data, 29% of American workers (26% of men and 33% of women) were obese in 1999/2000 (Hertz and McDonald 2004), while the rate for Canadian workers was 22% in 2004 (22% for men and 21% for women).
9. This occupational difference may be due to education levels. If education is controlled for, occupational differences in the prevalence of obesity disappear.
10. Reduced work activities in the CCHS were based on a response of often or sometimes (versus never) to: "Does a long-term physical or mental condition or health problem reduce the amount or kind of activities you can do at work?"
11. As this analysis is based on self-reported data, associations between obesity and obesity-related health conditions may be exaggerated (Shields et al. 2008a). This is because respondents with substantially higher BMIs tended to be classified as obese by self-reported height and weight.
12. Even after controlling for health status and health behaviours such as smoking, drinking, and physical inactivity, statistical associations between obesity and job performance found in the current models stayed significant.
13. In the CCHS, respondents were instructed to report injuries that were serious enough to limit their normal activities. In this analysis, work injury was defined as a serious injury that took place while respondents were working at a job or business.

14. To minimize bias due to the healthy-worker effect, the sample for the work injury analysis comprised data from respondents who had been employed at some time during the year leading up to their survey interview, even if they were not employed at the time of their interview. These respondents were included so that those who had been injured and then ceased working—perhaps because of their injury—would be not be excluded (Wilkins and Mackenzie 2007).

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In the works

Some of the topics in upcoming issues

■ Time-crunched families

A profile of time-crunched families in the context of increased labour market participation of women with children and a higher share of dual-earner families.

■ Employer top-ups

A look at the trends in the proportion of mothers with a paid job who receive a top-up from their employer after birth, as well as their socio-demographic and job characteristics.

■ The family work week

A look at historical trends in the total hours worked and average weekly earnings among employed couples (those with at least one spouse employed), the proportion of hours contributed by husbands and wives, and the type of earning family. Also examined are family work hours by preference of hours and perceptions of work-life balance and time stress.

■ Trajectory into Guaranteed Income Supplement

This study will use tax data to examine the income and earnings patterns of middle-aged individuals and couples to identify the characteristics most closely associated with future Guaranteed Income Supplement receipt.

■ Health and labour market activities

A look at the relationship between mental and physical health and employment and hours worked for working-age men and women.

■ Child wage penalty

The earnings gap between women with and without children is examined using data from the Survey of Labour and Income Dynamics.

■ Non-tax-sheltered investments

This study examines families with investment income from non-tax-sheltered savings and presents a comparative profile of investors and non-investors.

■ Job quality indicators

A look at the provincial differences in the socio-economic well-being of employed persons by occupation-education mix of factors.

Perspectives

The labour market in 2008

Jeannine Usalcas

Following six years of strong employment growth averaging 2.2% per year, 2008 started with promise—Canada's unemployment rate was at a 33-year record low of 5.8% in January and the employment rate hit a record high of 63.9% in February.

Employment followed an upward trend over the first nine months of 2008 (161,000 or 0.9%), but toward the end of the year, as the global economic crisis worsened, employment began to fall, declining by 81,000 in the last quarter. As a result, employment grew by only 0.5% over the year and the unemployment rate jumped 0.7 percentage points from its record low, settling at 6.6% in December.

Total actual hours worked (more sensitive to economic change than employment) dropped throughout 2008, ending the year 1.2% lower in the last quarter than in the same quarter of 2007. This was the largest year-over-year quarterly drop since 2001, the last time a slowdown hit the labour market. This decline in hours was mainly due to a shift toward hiring part-time workers in 2008. Both employees and the self-employed worked fewer hours over the year.

Average hourly earnings growth remained strong in 2008 at 4.3%, following a 4.9% increase in 2007. Although earnings increased in all provinces in 2008, the pace of growth slowed in Ontario, Alberta, Newfoundland and Labrador, and Nova Scotia over the year.

Recession in the United States

While Canada experienced employment growth in both 2007 and 2008, the United States experienced declines in both years, with the sharpest contraction in over 50 years occurring in 2008. Close to 3.0 million American workers lost their jobs that year, with more than half of the losses in the last quarter.

The United States had employment declines in many industries in 2008—manufacturing; business, building and other support services; construction; and professional, scientific and technical services being the hardest hit. Canada, on the contrary, had strong employment gains in construction and professional, scientific and technical services.

The unemployment rate increased for the second consecutive year in the United States, reaching 7.2% in December 2008, from its most recent low of 4.4% in March of 2007 (Chart A). With the increase in the U.S. unemployment rate, Canada's rate¹ was not only lower in 2008, but the gap of 1.4 percentage points was the largest on record. The last times the Canadian rate was lower were in the recessions of the mid-1970s and early 1980s.

Along with an employment contraction in the United States, and a slowdown in Canada, signs of underemployment emerged in both countries in 2008. Involuntary part-timers—those wanting to work full time but working part time because their hours had been cut back or because they were unable to find full-time jobs—rose by 73% (3.4 million) in the United States over the last 12 months, while they increased by 19% (125,000) in Canada, mostly in Ontario.²

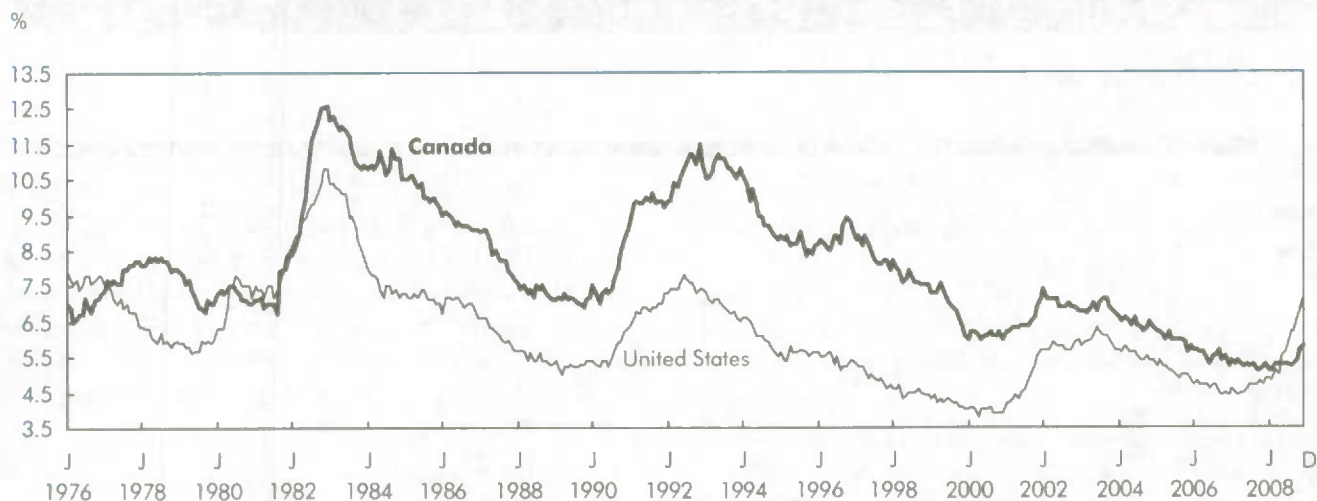
Manufacturing declines in Canada for the sixth consecutive year

Although manufacturing lost 35,000 workers in 2008 (-1.7%), this was less than the 129,000 drop in 2007 (-6.1%). Continued job losses in Ontario in 2008 were partially offset by increases in Alberta and Quebec.

Since 2002, Canada has shed 371,000 manufacturing workers (-16.0%), with approximately two-thirds of the losses in Ontario and one-third in Quebec. The losses were persistent in Ontario, the only province

Jeannine Usalcas is with the Labour Statistics Division. She can be reached at 613-951-4720 or jeannine.usalcas@statcan.gc.ca.

Chart A U.S. recession drives their unemployment rate above Canada's



Note: Canadian data has been adjusted to approximate US measurement concepts.

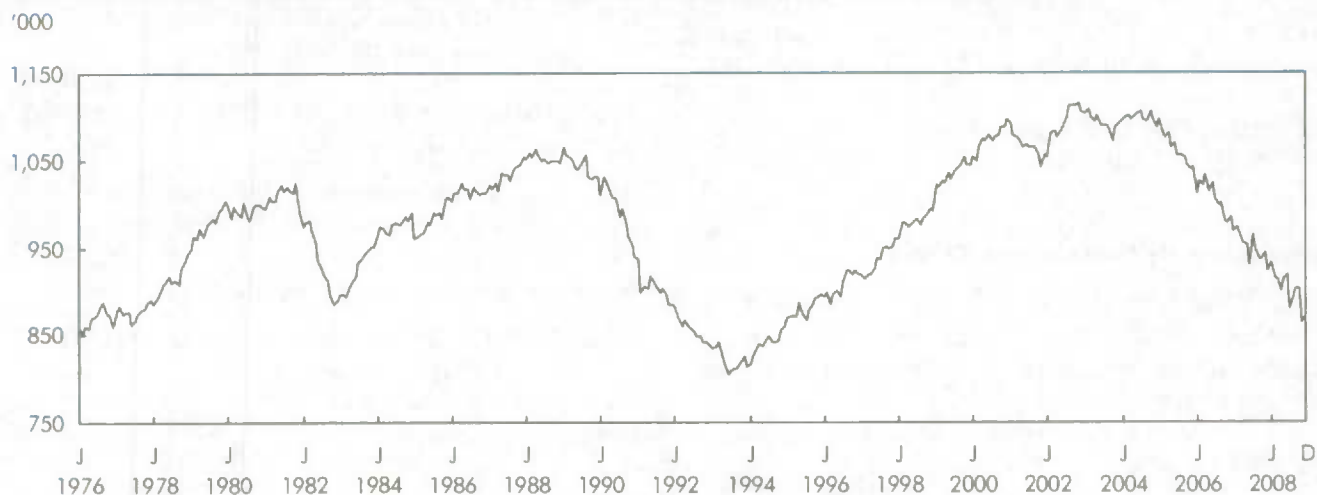
Sources: Statistics Canada, Labour Force Survey; Bureau of Labor Statistics, Current Population Survey.

with six consecutive years of declines (Chart B). This left manufacturing employment in the province in December 2008 (871,000)

just above the level of the mid 1970s and approaching the record low (806,000) reached in the early 1990s recession.

In December 2008, 13.1% of Ontario's workers were employed in manufacturing, compared with 18.2% in November 2002. Losses

Chart B Manufacturing employment in Ontario down for sixth consecutive year



Source: Statistics Canada, Labour Force Survey.

Data source and definitions

The **Labour Force Survey (LFS)** is a monthly household survey that collects information on labour market activity from the civilian, non-institutionalized population 15 years of age and over. The survey uses a rotating sample of approximately 54,000 households, with each household remaining in the sample for six consecutive months.

The LFS divides the working-age population into three mutually exclusive classifications: employed, unemployed, and not in the labour force. For a full listing and description of LFS variables, see *Guide to the Labour Force Survey* (Statistics Canada Catalogue no. 71-543-G).

The employment rate is employed persons as a percentage of the population 15 years of age and over. The rate for a particular group (for example, youth age 15 to 24) is the employed in that group as a percentage of the population for that group.

The unemployment rate is the unemployed as a percentage of the labour force. The unemployment rate for a particular group is the unemployed in that group as a percentage of the labour force for that group.

Public sector employment growth was a subdued 1.4% in 2008 compared with the robust 6.7% in 2007. Growth among the self-employed was weaker in 2008 (0.8%) than in 2007 (4.3%), while growth among private-sector employees remained flat (0.1% in 2008 versus 0.4% in 2007).

Construction and housing tumble in last quarter of 2008

Employment in construction grew by an average of 6.1% annually from 2002 to 2007 (Chart C). Although up 3.9% in 2008, construction employment faltered in the last quarter of the year, as increases of 88,000 in the first nine months were offset by losses of 42,000 in the last quarter.

Both housing starts and building permits showed decreased activity in 2008. According to the Canada Mortgage and Housing Corporation, housing starts dipped in December to their lowest level in seven years. Based on the Building Permits Survey, which provides

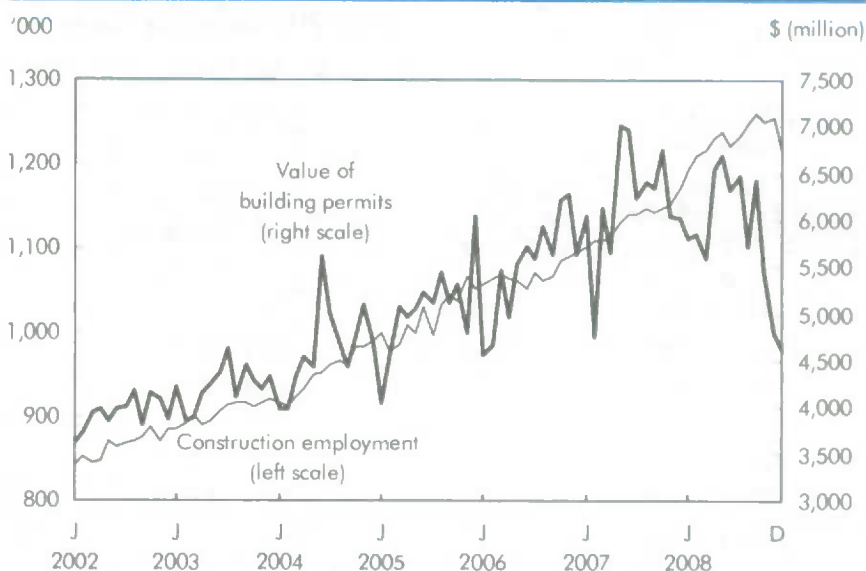
in 2008 were not only in transportation equipment but also in chemicals, plastics and rubber, machinery and food.

Weakness in some industries offset strength in others

Along with manufacturing, several other industries experienced employment declines in 2008: business, building and other support services (-5.8%); agriculture (-3.7%); information, culture and recreational services (-3.4%); forestry, fishing, mining, oil and gas (-2.6%); and trade (-1.8%).

On the other hand, construction employment was up 3.9%, despite significant weakness in the last quarter of the year. Employment was also strong in professional, scientific and technical services (3.8%), health care and social assistance (3.8%), and public administration (3.2%).

Chart C Decline in construction employment in fourth quarter of 2008 follows building intentions



Sources: Statistics Canada, Labour Force Survey; Building Permits Survey.

an early indication of building activity, December's value of planned construction activities was 20% less than at the start of the year, with greater losses in non-residential (-22%) than in residential construction (-19%).

Hours worked drops in fourth quarter of 2008

Fewer hours were worked in 2008 than in 2007 (Chart D). The average actual hours worked per week fell to 32.7 in the last quarter of 2008,³ much lower than the quarterly average of 33.4 in 2007. A combination of factors brought this number down. Employment growth in 2008 was all in part-time work compared with mostly full-time increases in 2007. As well, more workers were putting in shorter hours in 2008, that is, less than 35 hours per week.

Actual hours worked declined for both employees and the self-employed over this period, while overtime hours remained the same. The overall hours decline was widespread, hitting most industries and provinces.

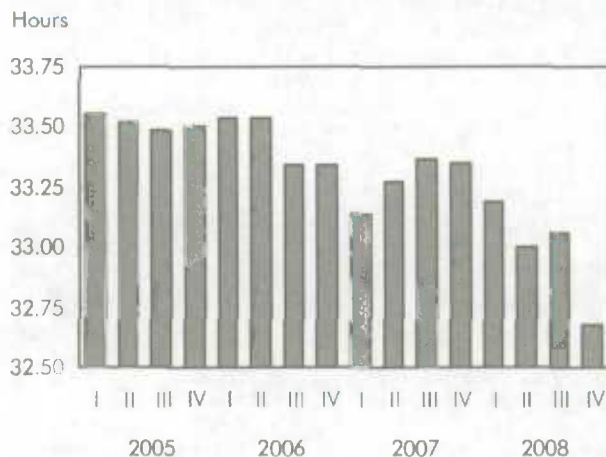
Saskatchewan leads employment gains in 2008

In 2008, Saskatchewan registered the strongest employment growth in the country at 3.2%, while Manitoba (1.7%) and Alberta (1.4%) were the only other provinces with employment growth above the national average of 0.5% (Chart E).

Saskatchewan's employment gains were driven by full-time work, with strength in the goods-producing sector, particularly in construction, as well as in mining, oil and gas extraction and utilities. By December 2008, 67.2% of the province's working-age population was employed, trailing only Alberta, at 71.6%.

Employment growth in Alberta slowed considerably in 2008, after increases above 4% in both 2006 and 2007. In 2008, gains in the goods-producing sector partially offset losses in the service sector. Employment in mining, oil and gas extraction remained at the same level in December 2008 as in

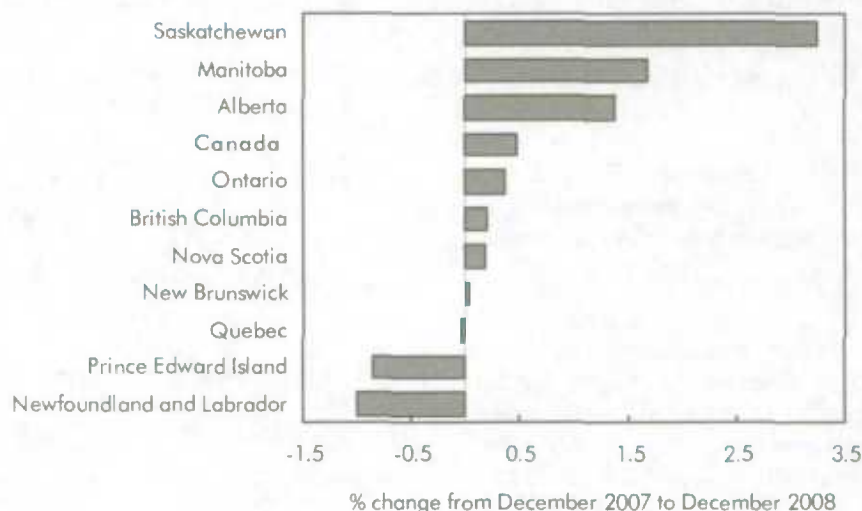
Chart D Actual hours decline throughout 2008, but especially in last quarter



Source: Statistics Canada, Labour Force Survey.

December 2007, but gains were seen in manufacturing and agriculture. Alberta's unemployment rate remained one of the lowest in the country at 4.2% in December 2008, and the province continued to have the highest hourly earnings, at \$24.50.

Chart E Saskatchewan tops in employment growth in 2008



Source: Statistics Canada, Labour Force Survey.

In Manitoba, employment grew at just below 2% for the second consecutive year in 2008, leaving the employment rate at 66.6% by December 2008, the third highest in Canada. The unemployment rate of 4.3% by year end was among the lowest in the country, and up by only 0.1 percentage point over the year.

Employment growth slows in central Canada and British Columbia

Employment growth in Ontario was close to the national average (0.4%) in 2008, the province's slowest growth since 2001. Gains in transportation and warehousing, construction, and finance, insurance, real estate and leasing, as well as professional, scientific and technical services barely offset declines in manufacturing, educational services, and business, building and other support services. Ontario's gains of 24,000 over the year were all in part-time work. Another indication of Ontario's slowing labour market and the paucity of full-time jobs was the rise in involuntary part-time workers. The proportion of part-time workers who would have preferred full-time work, but were unable to find it, increased from 23% in December 2007 to 30% 12 months later. Over the same period, Ontario's unemployment rate posted a 0.8 percentage point increase, to 7.2% in December 2008.

In Quebec, employment was unchanged in 2008, following 2.4% growth in 2007. Gains in health care and social assistance, public administration and manufacturing partially offset losses in trade, education and agriculture over the 12 months of 2008, resulting in zero net growth. After reaching a record low of 6.8% in January 2008, the unemployment rate increased by 0.5 percentage points to 7.3% by December 2008.

Following strong gains in the previous six years, employment in British Columbia in 2008 ended with a small gain (0.2%), as job creation in the first eight months was partially countered by losses in the last four months. Employment was particularly weak in the goods-producing sector in the last quarter of 2008, driven by losses in construction. The province's unemployment rate was 5.3% in December 2008, up 1.2 percentage points from 12 months earlier.

In the Atlantic provinces, employment declined in Newfoundland and Labrador (-1.0%) and Prince Edward Island (-0.9%) in 2008, while Nova Scotia edged up (0.2%) and New Brunswick saw virtually no

change. By year end, employment rates were down in each of these provinces and their unemployment rates were up.

Gains for older workers

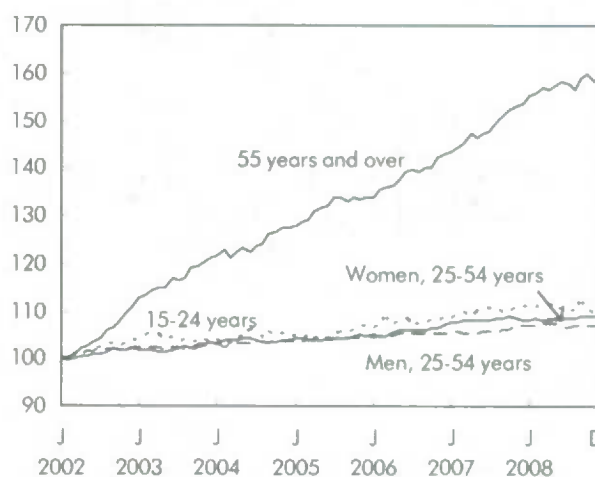
Employment growth in 2008 was driven by gains among older workers, continuing the upward climb that began in 2001 with the first of the boomers hitting 55 (Chart F). Women age 25 to 54 also benefited, while youth and core-age men saw employment declines.

In 2008, employment fell by 2.1% (-55,000) for those age 15 to 24. The unemployment rate for young people increased by almost two percentage points since the start of the year, from 11.0% to 12.9% in December.

Older workers, on the other hand, posted an employment increase of 4.1% (105,000) over the year and boosted their employment rate by 0.2 percentage points. Despite this employment increase, their unemployment rate also trended up in 2008, from 4.6% to 5.6%, as more people 55 and over were looking for work.

Chart F Employment growth continues to reflect population aging

Index (January 2002=100)



Source: Statistics Canada, Labour Force Survey.

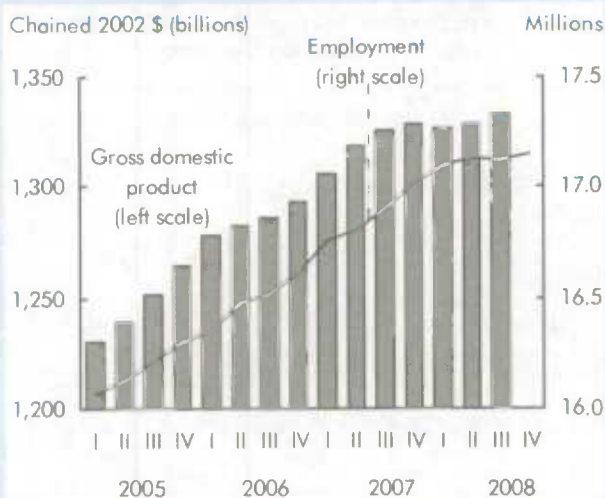
December -to-December change

Throughout this analysis, the change in employment and other labour market indicators during 2008 is determined by comparing seasonally adjusted figures for December 2008 with December 2007, in order to pick up changes sooner than is possible with annual averages. For example, employment averaged 17.1 million in 2008, 1.5% higher than in 2007. This would seem to indicate modest employment growth during 2008, whereas the trend was flat (Chart G). This flatness is best demonstrated with the December-to-December change, which can also be thought of as the sum of the monthly employment changes for the year, which amounted to only 80,000 or 0.5%.

Annual employment growth based on annual averages is higher than that shown by the December-to-December comparison because of the strong growth during the first nine months of 2008 and the losses toward the end of the year.

Of course, neither December-to-December nor annual averages are perfect. December-to-December change can be misleading due to end-point bias. In this case, the greater volatility of the monthly numbers can lead to different interpretations of a trend that might be better described with more stable quarterly or annual average estimates.

Chart G Gross domestic product and employment growth stall in 2008



Sources: Statistics Canada, Labour Force Survey; Income and Expenditure Accounts.

While employment for core-age men remained flat in 2008, women age 25 to 54 had an increase of 46,000 (0.8%). However, the unemployment rate for both increased slightly from December of 2007 (to 5.8% and 4.9% respectively).

Perspectives

Notes

1. Adjusted to U.S. definitions of unemployment.
2. Part-time workers in the United States are those who usually work less than 35 hours per week; in Canada, the cut-off is 30 hours.
3. To minimize monthly fluctuations, the hours worked analysis is based on quarterly averages.

What's new?

Recent reports and studies

■ From Statistics Canada

■ *Household spending*

Canadian households spent an average of \$69,950 in 2007, up 3.3% from 2006. This increase was faster than the annual rate of inflation of 2.2%.

Households in Alberta spent the most on average, \$85,910, but this was only a 0.8% increase, the slowest rate among the provinces. Household spending in Saskatchewan rose 7.7% to \$63,940, the fastest rate of growth.

Personal taxes accounted for 21% of the average household's budget in 2007, while shelter represented 20%, transportation 13% and food 10%. These shares changed only slightly from 2006.

Average personal taxes amounted to \$14,450 in 2007, up 6.0% from 2006, while spending on shelter rose to \$13,640, a 5.1% increase.

Households spent an average of \$9,400 on transportation, up 1.7%. A 6.9% increase in spending on gasoline and other fuels was offset by a 6.3% decline in average spending for automobile purchases.

On average, households spent \$7,310 on food in 2007, up 3.7% from 2006, the fastest annual increase in this category since 2002. Food prices rose by 2.7% in 2007, as measured by the Consumer Price Index.

Food, shelter and clothing accounted for more than half (52%) of spending for the lowest income group, while personal taxes accounted for 3%. The corresponding proportions for the top fifth of households were 28% and 29% respectively.

For more information, see the December 22, 2008 issue of *The Daily* on the Statistics Canada's website (www.statcan.gc.ca).

■ *Aboriginal peoples living off-reserve and the labour market*

The employment rate of core working-age Aboriginals (25 to 54) living off-reserve in the 10 provinces was 70.1% in 2007, and below the 82.5% for non-Aboriginal people. The employment rate gap between Aboriginals and non-Aboriginals was smallest in Alberta and largest in Saskatchewan.

The employment rate for Aboriginals was highest in Alberta (77.7%) and the closest to that of non-Aboriginals (86.3%).

Between 2004 and 2007, the strength of Alberta's job market especially benefited Aboriginal people: the employment rate of Aboriginals rose 5.1 percentage points, compared with 1.2 percentage points for non-Aboriginals.

In Saskatchewan, despite the strong growth in the employment rate of Aboriginal people living off-reserve over the last few years, 66.4% of them were employed, compared with 88.3% of non-Aboriginals.

The difference between the employment rates for Aboriginal and non-Aboriginal people was also large in Quebec and Manitoba.

The unemployment rate for Aboriginal people reached 8.8% in 2007, compared with 5.0% for non-Aboriginal people. The unemployment rate for Aboriginal people living off-reserve had fallen in each of the four western provinces since 2004, particularly in British Columbia.

For more information, see the December 15, 2008 issue of *The Daily* on the Statistics Canada's website (www.statcan.gc.ca).

■ *Labour productivity*

The labour productivity of Canadian businesses remained unchanged in the third quarter of 2008, extending the weakness that began in the second quarter of 2007.

In the third quarter of 2008, the gross domestic product of Canadian businesses and the hours worked related to this production increased in tandem, at a rate of 0.2%. The increase in the number of hours worked was similar to that of the first two quarters of the year. In the first three quarters of 2008, hours worked grew at less than half the pace recorded in the first three quarters of 2007.

Labour productivity in the goods producing industries grew by 0.3% in the third quarter, after five consecutive quarterly declines. Increased productivity in manufacturing and in mining, oil and gas extraction industries more than offset decreased productivity in construction. Against a backdrop of declining employment, the manufacturing sector saw a second consecutive increase in its productivity.

Productivity in the services sector remained flat. Marked increases in retail trade and administrative and remediation services were offset by significant declines in accommodation and food services and in finance, insurance and real estate.

In the United States, productivity grew 0.4% in the third quarter of 2008, down from the rates observed in the two previous quarters. Production by American businesses registered its steepest decline in seven years, with hours worked declining for a fifth consecutive quarter.

For more information, see the December 10, 2008 issue of *The Daily* on the Statistics Canada's website (www.statcan.gc.ca).

■ *Savers, investors and investment income*

The number of taxfilers reporting investment income, as well as the amount of investment income they reported, both increased for the fourth consecutive year in 2007.

Over 8.9 million people reported \$46.9 billion of income from investments. The number of people reporting investment income was up 8.6% from 2006, while the income rose 12.3%.

The proportion of taxfilers reporting investment income grew from 35.1% in 2006 to 37.5% in 2007, while the median investment income increased from \$530 to \$610.

For more information, see the November 6, 2008 issue of *The Daily* on the Statistics Canada's website (www.statcan.gc.ca).

■ *Registered retirement savings plan contributions*

Just under 6.3 million taxfilers contributed to registered retirement savings plans (RRSP) in 2007, up 1.6% from 2006. Their contributions rose by 5.3% to \$34.1 billion. The highest percentage increase in the number of contributors occurred in Newfoundland and Labrador (+5.3%). The largest increase in contributions occurred in Saskatchewan (+12.8%).

Almost 88% of taxfilers were eligible to contribute to an RRSP for the 2007 tax year, the same proportion as in 2006. Of this group of eligible taxfilers, 31% actually made contributions, unchanged from 2006.

The \$34.1 billion in RRSP contributions in 2007 represented about 6.0% of the total room available to eligible taxfilers, down from 7.0% in 2006.

For more information, see the November 5, 2008 issue of *The Daily* on the Statistics Canada's website (www.statcan.gc.ca).

■ *Studies from other organizations*

■ *The U.S.-Canada education-premium difference*

This paper analyzes the differences in wage ratios of university graduates to less than university graduates, the education premium, in Canada and the United States from 1980 to 2000.

Both countries experienced a similar increase in the fraction of university graduates and a similar increase in skill-biased technological change based on capital-embodied technological progress, but only the United States had a large increase in the education premium.

The study finds that the cross-country difference is in equal proportion due to the effective stock of capital equipment, the growth in skilled labour supply relative to unskilled labour and the relative abundance of skilled population in 1980. Growth in the working-age population is unimportant for the difference. See *What Accounts for the U.S.-Canada Education-Premium Difference?* by Oleksiy Kryvtsov and Alexander Ueberfeldt, Bank of Canada, Working Paper 2009-4, January 2009.

■ ***Labour, capital and labour market imperfections***

In continental Europe, labour shares in national income have exhibited considerable variation since 1970. Empirical and theoretical research suggests that the evolution of labour markets and labour market imperfections can, in part, explain this phenomenon.

This paper analyzes the role of capital market imperfections in the determination of the distribution of national income, comparing European and Anglo-Saxon countries. It uses a simple general-equilibrium model to trace the effects of credit and labour market imperfections on factor shares.

Improvements in capital markets can explain lower labour shares. An increase in the degree of employee power results in higher labour shares. Improvements in credit markets and decreasing employee bargaining power have contributed to shrinking labour shares, especially in Europe. Openness is a negative determinant of labour shares. See *Labour Shares and the Role of Capital and Labour Market Imperfections* by Lena Suchanek, Bank of Canada, Discussion Paper 2009-2, January 2009.

■ ***American jobs and service outsourcing***

With the rise of service work being outsourced to China and India has come something new for Americans: for the first time ever, educated U.S. workers are competing with educated but low-paid foreign workers.

Using Current Population Survey data, this study examines the effects of offshore outsourcing and the reverse flow (termed “in-shoring”), which is the sale of services produced in the United States to unaffiliated buyers in China and India. The study considers impacts on occupation and industry switching, weeks spent unemployed as a share of weeks in the labour

force, and earnings. It estimates very small positive effects of in-shoring and even smaller negative effects of offshore outsourcing. These effects are estimated with substantial precision. The net effect of in-shoring and offshore outsourcing is positive for U.S. workers. See “American jobs and the rise of service outsourcing to China and India,” *NBER Digest*, February 2009.

■ ***Welfare reform: More work and less education***

Over many decades, welfare programs in the United States focused on education and training as a means of developing “human capital”—skills and knowledge that increase the value of labour. The goal was to help those on public assistance become self-sufficient, aiding them in the ascent out of poverty. By the mid-1990s, however, in response to increasing caseload numbers, welfare reformers turned away from the human capital approach in favour of policies requiring welfare recipients to work in order to receive benefits and making benefits time limited.

Using data from the Current Population Survey, this study—whose primary focus is adult women—finds that welfare reforms have reduced both the probability that women aged 21-49 will attend high school and that those aged 24-49 will attend college, by 20-25%. These findings suggest that gains in reducing welfare caseloads have come at a cost of lowering the educational attainment of women at risk for relying on welfare. See “Welfare reform has led to more work but less education,” *NBER Digest*, January 2009.

■ ***Civic virtue and labour market institutions***

This paper shows that economies with stronger civic virtues are more prone to provide insurance through unemployment benefits rather than through job protection. It provides cross-country empirical evidence of a strong correlation between civic attitudes and the design of unemployment benefits and employment protection in OECD countries over the 1980 to 2003 period. It then uses an epidemiological approach to estimate the existence of a potential causal relationship from inherited civic virtue to labour market insurance institutions. See “Civic virtue and labor market institutions” by Yann Algan and Pierre Cahuc, *American Economic Journal: Macroeconomics*, January 2009.

■ *The labour wedge*

This article reviews research on the behaviour of the labour wedge, the ratio between the marginal rate of substitution of consumption for leisure and the marginal product of labour.

According to competitive, market-clearing macroeconomic models, the ratio is easy to measure and should be equal to the sum of consumption and labour taxes. The observation that the wedge is higher in continental Europe than in the United States has proved useful for understanding the extent to which taxes can explain differences in labour market outcomes. The observation that the ratio rises during recessions suggests some failure of competitive, market-clearing macroeconomic models at business cycle frequencies. The latter observation has guided recent research, including work on sticky wage models and job search models. See "Convergence in macroeconomics: The labor wedge" by Robert Shimer, *American Economic Journal: Macroeconomics*, January 2009.

■ *Offshoring, labour market and productivity*

This article summarizes some key findings in the literature on the impact of offshoring on employment, wages, and productivity in developed economies.

Offshoring has affected the Canadian economy in much the same way as it has other industrialized economies, despite the country's above-average offshoring intensity. In the case of employment and wages, this outcome attests to the flexibility and resilience of Canada's labour market in adjusting to the challenges of globalization.

It could also mean that Canadian businesses have taken advantage of the opportunities presented by a more open world market. Continued technological improvements and labour shortages resulting from population aging in many industrialized countries could further encourage offshoring. See "Offshoring and its effects on the labour market and productivity: A survey of recent literature" by Calista Cheung, James Rossiter and Yi Zheng, *Bank of Canada Review*, Autumn 2008.

■ *Adjusting to the commodity-price boom*

Between 2002 and 2008, global commodity prices rose to unprecedented levels. This article examines the process of adjustment to the commodity boom in four industrialized, commodity-exporting countries (Australia, Canada, New Zealand, and Norway). It focuses on both the direct adjustment within the commodity-producing sectors (via increased employment and capital spending) and the indirect adjustment in the macro economy.

The analysis finds that the indirect adjustment process, which was triggered by the increase in incomes that the commodity-price boom generated, has been the most important part of the adjustment in all four economies. Through this channel, aggregate demand rose, exchange rates appreciated, and adjustment was facilitated in other sectors, such as manufacturing and construction. See "Adjusting to the commodity-price boom: The experiences of four industrialized countries" by Michael Francis, *Bank of Canada Review*, Autumn 2008.

■ *Labour force participation of older men*

Using data from the United States, Canada, and the United Kingdom, this study exploits the cohort effects driving recent increases in older women's participation rates to identify the effect of a wife's participation decision on her husband's participation decision. It then decomposes the changes in older married men's participation rates, demonstrating that husbands' responses to increases in wives' participation in the labour force can explain one-fourth, one-half, and one-third of the increase in the United States, Canada, and the United Kingdom, respectively. See "Why have the labor force participation rates of older men increased since the mid-1990s?" by Tammy Schirle, *Journal of Labor Economics*, October 2008, Vol. 26, No. 4.

■ *Labour market incentives of Canada's public pensions*

This paper examines the incentives for retirement imposed by Canada's public pension system. It finds the largest work disincentives among older Canadians are generated by the income-tested Guaranteed Income Supplement, as it interacts with the Canada/Quebec Pension Plan and with earned income to give the least well-off a reduced financial return to working. It then illustrates how various policy reforms would alleviate some aspects of the incentives problem and partially remove barriers to continued labour market participation among older Canadians. See "Improving the labour market incentives of Canada's public pensions" by Kevin Milligan and Tammy Schirle, *Canadian Public Policy*, September 2008, Vol. 34, No. 3.

■ *Workers and firm size*

This paper examines how firms of different sizes reward measured skills and unmeasured ability. An analysis of panel data from the Canadian Survey of Labour and Income Dynamics for two periods, 1993-1998 and 1996-2001, reveals statistically significant differences between firms of different sizes. In particular, returns to unmeasured ability are higher in medium-sized firms than in either small firms or large firms.

The firm-size wage gap and the differential in returns to unmeasured ability between small and medium-sized firms are mainly explained by ability sorting. The

fact that larger firms reward ability less than medium-sized firms is consistent with an explanation based on monitoring costs. When firms become "too large," monitoring costs may prevent them from rewarding ability directly through wages. See "Should workers care about firm size?" by Ana Ferrer and Stephanie Lluís, *Industrial and Labor Relations Review*, October 2008, Vol. 62, No. 1.

■ *Sexual orientation, work and income in Canada*

This article provides the first evidence on sexual orientation and economic outcomes in Canada using confidential data that ask adults a direct question about their sexual orientation. Gay men have 12% lower personal incomes and lesbians have 15% higher personal incomes than otherwise similar heterosexual men and women, respectively. Different labour force patterns can account for some of the income differentials. The study shows that applying couples-based approaches common in this literature greatly overstates the magnitudes of gay/straight income gaps. See "Sexual orientation, work, and income in Canada" by Christopher S. Carpenter, *Canadian Journal of Economics*, November 2008, Vol. 41, No. 4.

Perspectives

Varia

In this issue: Minimum wage

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CONTACTS

Administrative data

Small area and administrative data
Customer Services
613-951-9720

Business surveys

Annual Survey of Manufactures and Logging
Client Services
613-951-9497

Annual surveys of service industries
Client Services
613-951-4612

Business Conditions Survey of Manufacturing Industries
Claude Robillard
613-951-3507

Census

Labour force characteristics
Sandra Swain
613-951-6908

Income statistics
Eric Olson
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Employment and income surveys

Labour Force Survey
Marc Lévesque
613-951-4090

Survey of Employment, Payrolls and Hours
Sylvie Picard
613-951-4003

Employment Insurance Statistics Program
Gilles Groleau
613-951-4091

Major wage settlements
Workplace Information Directorate
(Human Resources and Social Development Canada)
819-997-3117 or 1-800-567-6866

Labour income
Anna MacDonald
613-951-3784

Survey of Labour and Income Dynamics
Survey of Financial Security
Survey of Household Spending
Client Services
613-951-7355 or 1-888-297-7355

General Social Survey

Education, Work and Retirement
Aging and Social Support
Time Use
Client Services
613-951-5979

Pension surveys

Pension Plans in Canada Survey
Bruno Pépin
613-951-4023

Quarterly Survey of Trusteed Pension Funds
Gregory Sannes
613-951-4034

Special surveys

Adult Education and Training Survey
Client Services
613-951-7608 or 1-800-307-3382

National Graduates Survey
Client Services
613-951-7608

Minimum wage

Minimum-wage legislation exists in every province and territory as part of provincial employment standards legislation. The minimum wage is the lowest wage employers can pay employees covered by the legisla-

tion (see *Data source and definitions*). To evaluate the potential impact of any changes, it is important to understand who works for minimum wage and what types of jobs they hold.

Data source and definitions

The Labour Force Survey (LFS) is a monthly household survey of about 53,000 households across Canada. Demographic and labour force information is obtained for all civilian household members 15 years of age and older. Excluded are persons living in institutions, on Indian reserves, or in the territories.

Every province and territory stipulates a minimum wage in its employment standards legislation. It is an offence for employers to pay eligible employees less than the set rate, regardless of how remuneration is calculated (hourly, daily, weekly, monthly, or on a piecework basis). Likewise, employees are prohibited from accepting pay that is less than the applicable minimum. The minimum wage rate varies from province to province, and a change can become effective at any time of the year.

The self-employed are not covered by minimum wage legislation and as such are not included in the analysis. Unpaid family workers are also excluded.

Other exclusions and special coverage provisions vary and include young workers (Ontario and Newfoundland and Labrador), workers with disabilities (Alberta, Manitoba and Saskatchewan—rarely used), domestic and live-in care workers (New Brunswick, Prince Edward Island, Manitoba and Quebec), farm labour (Alberta, Manitoba, Ontario and Saskatchewan), and home-based workers (for example, teleworkers, and pieceworkers in the clothing and textile industry). Other specific minimums cover non-hourly and

tip-related wage rates (for example, Ontario has a special minimum wage rate for employees who serve alcoholic beverages in licensed establishments). A more complete description of exclusions and special rates is available from Human Resources and Social Development Canada's database on minimum wages (<http://srv116.services.gc.ca/wid-dimt/mwa/>).

The number of employees working for minimum wage was calculated using the applicable minimum wage for experienced adult workers (also known as the general adult rate) for each province for each month of 2008. The average of these 12 monthly observations provides the annual estimate for each province and for Canada.

To determine whether an employee worked at or below the general adult rate wage for each province, usual hourly earnings were used based on the reported wage or salary before taxes and other deductions, including tips, commissions and bonuses. In principle, tips, commissions and bonuses should have been excluded to capture only those whose true base hourly wage was at or below the provincial general adult rate, but the required information is not collected. The result is a slight downward bias in the number of employees working at or below the official general adult rate set by each province. However, none of the exclusions or special minimum wage rates (such as special minimum wage rates for tip earners and young workers) were used, which introduces an upward bias.

In 2008, some 751,400 individuals worked at or below the minimum wage set by their province. This represented 5.2% of all employees in Canada, up slightly from 5.0% the previous year. Minimum wages ranged from \$7.75 per hour in New Brunswick to \$8.75 per hour in Ontario. Newfoundland and Labrador had the highest proportion of employees (7.7%) working at or below the minimum wage. Alberta continued to have by far the lowest proportion of

employees working at or below minimum wage (1.6%). Alberta's average hourly wages were highest at \$23.68, while Ontario's were \$22.15, and its unemployment rate was by far the lowest (3.6%). Newfoundland and Labrador had one of the lowest average hourly wages at \$18.85 (only Nova Scotia, New Brunswick and Prince Edward Island posted lower averages), and by far the highest unemployment rate (13.2%).

Table 1 Lowest proportion in Alberta

	Total employees	Minimum wage		General adult minimum wage	Average hourly wage	Unemployment rate
		Total	Incidence			
	'000	'000	%	\$/hour	Date	%
Province						
Newfoundland and Labrador	197.0	15.1	7.7	8.00	April 2008	13.2
Ontario	5,684.9	374.3	6.6	8.75	March 2008	6.5
Nova Scotia	396.1	25.4	6.4	8.10	May 2008	7.7
Quebec	3,339.3	195.6	5.9	8.50	May 2008	7.2
Prince Edward Island	60.9	3.4	5.6	8.00	October 2008	10.7
Manitoba	521.3	27.7	5.3	8.50	April 2008	4.2
Canada	14,496.2	751.4	5.2	...	...	6.1
New Brunswick	324.2	15.6	4.8	7.75	March 2008	8.6
Saskatchewan	419.2	16.1	3.8	8.60	May 2008	4.1
British Columbia	1,886.0	50.8	2.7	8.00	November 2001	4.6
Alberta	1,667.3	27.4	1.6	8.40	April 2008	3.6

Source: Statistics Canada, Labour Force Survey, 2008.

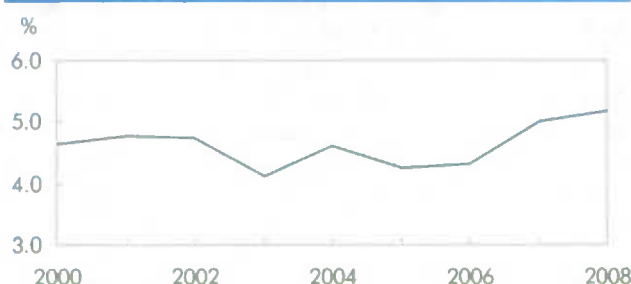
Table 2 Share of employees working for minimum wage or less, by province

	2000	2001	2002	2003	2004	2005	2006	2007	2008
	%								
Canada	4.7	4.8	4.8	4.1	4.6	4.3	4.3	5.0	5.2
Newfoundland and Labrador	8.7	5.7	7.4	8.4	6.5	6.1	7.6	7.4	7.7
Prince Edward Island	3.7	3.2	4.4	4.0	4.4	5.1	4.7	6.9	5.6
Nova Scotia	4.9	4.1	4.6	5.9	5.6	5.1	5.9	6.2	6.4
New Brunswick	6.0	4.2	4.2	4.1	2.5	3.1	4.1	5.6	4.8
Quebec	5.4	7.0	6.1	5.1	4.4	4.6	4.2	5.4	5.9
Ontario	4.6	4.1	3.9	3.5	5.3	4.3	4.7	6.3	6.6
Manitoba	5.1	4.5	4.8	4.5	4.9	4.9	4.8	5.5	5.3
Saskatchewan	5.9	4.4	4.8	5.0	3.3	3.9	5.4	3.2	3.8
Alberta	2.0	1.5	1.1	1.1	0.9	1.3	1.7	1.0	1.6
British Columbia	4.5	6.0	7.7	5.6	6.2	5.6	4.6	3.4	2.7

Source: Statistics Canada, Labour Force Survey.

All provinces except British Columbia raised their minimum-wage rates in 2008. The proportion of minimum-wage workers increased in six provinces: Newfoundland and Labrador, Nova Scotia, Quebec, Ontario, Saskatchewan and Alberta, while decreasing in four: Prince Edward Island, New Brunswick, Manitoba and British Columbia.

Chart Proportion of employees earning minimum wage or less increased for the second consecutive year



Source: Statistics Canada, Labour Force Survey.

Women accounted for 60% of all minimum-wage workers, but just under half of all employees. This translated into a higher proportion of women working for minimum wage: nearly 1 in 16 compared with nearly 1 in 25 men. The overrepresentation of women was observed for all age groups.

Nearly 35% of teenagers age 15 to 19 worked for minimum wage. This age group traditionally has, by far, the highest rate of minimum-wage workers—almost half of all minimum-wage workers were teenagers. Another 17% were age 20 to 24. In total, more than 60% of minimum-wage workers were under 25, while this age group represented only 17% of all employees. This translates into an incidence rate eight times that of those 25 and older—18.9% versus 2.3% respectively. A very large number of these young minimum-wage employees attend school full time or part time.

A sizeable proportion (29%) of minimum-wage workers were age 25 to 54. As was the case for the other age groups, women remained the majority of these workers. For these individuals in their core working and peak earning years, minimum-wage work may be less temporary.

The incidence of working for minimum wage declines sharply with age before rising slightly among those 55 and older. The latter could reflect some of the low-wage occupations in which a number of working seniors tend to be concentrated: retail salespersons and sales clerks; general office clerks; janitors, caretakers and building superintendents; babysitters, nannies and parents' helpers; and light duty cleaners.

The proportion of employees earning minimum wage or less increased for the second consecutive year in 2008. The increase from 2007 to 2008 was less (0.2 percentage points) than that from 2006 to 2007 (0.7 percentage points).

Table 3 Most minimum-wage workers are women and young

	Total employees '000	Minimum wage	
		Total '000	Incidence %
Both sexes			
15 and over	14,496.2	751.4	5.2
15 to 24	2,522.1	476.2	18.9
15 to 19	992.7	345.4	34.8
20 to 24	1,529.5	130.7	8.5
25 and over	11,974.1	275.2	2.3
25 to 34	3,275.2	73.2	2.2
35 to 44	3,334.8	68.0	2.0
45 to 54	3,439.9	76.8	2.2
55 and over	1,924.3	57.3	3.0
Men			
15 and over	7,301.6	299.9	4.1
15 to 24	1,262.5	205.0	16.2
15 to 19	485.2	150.3	31.0
20 to 24	777.3	54.7	7.0
25 and over	6,039.0	94.9	1.6
25 to 34	1,695.4	29.8	1.8
35 to 44	1,692.5	21.5	1.3
45 to 54	1,685.8	22.0	1.3
55 and over	965.3	21.6	2.2
Women			
15 and over	7,194.6	451.5	6.3
15 to 24	1,259.6	271.2	21.5
15 to 19	507.4	195.1	38.4
20 to 24	752.1	76.1	10.1
25 and over	5,935.1	180.3	3.0
25 to 34	1,579.7	43.4	2.7
35 to 44	1,642.3	46.5	2.8
45 to 54	1,754.1	54.8	3.1
55 and over	959.0	35.6	3.7

Source: Statistics Canada, Labour Force Survey, 2008.

Table 4 Education makes a difference

	Total employees	Minimum wage	
		Total	Incidence
	'000	'000	%
Education	14,496.2	751.4	5.2
Less than high school	1,818.7	294.0	16.2
Less than grade 9	312.7	37.2	11.9
Some high school	1,506.0	256.9	17.1
High school graduate	2,906.3	163.2	5.6
At least some postsecondary	9,771.2	294.2	3.0
Some postsecondary	1,299.5	107.8	8.3
Postsecondary certificate or diploma	4,706.3	110.8	2.4
University degree	3,765.3	75.6	2.0

Source: Statistics Canada, Labour Force Survey, 2008.

Minimum-wage work is concentrated in the service sector. Accommodation and food services had by far the highest incidence, with more than 1 in 5 workers at or below minimum wage. Working for minimum wage is also very prevalent in trade where the proportion was 1 in 9. These industries are characterized by high concentrations of youth and part-time workers, both of whom often have less work experience and weaker attachment to the labour force. Also, these industries generally do not require specialized skills or postsecondary education, and have low levels of unionization. Many jobs are part time, which may favour a higher presence of women or young people.

Agriculture continues to have an increased incidence of minimum-wage workers—more than 1 in 8. Farm labour has traditionally been excluded from minimum-wage provisions. Workers in this industry are not often unionized, but may profit from non-wage benefits such as free room and board as compensation for lower wages.

Highly unionized industries such as construction, public administration and manufacturing were among those with the lowest shares of minimum-wage workers.

Those with less than a high school diploma were five times more likely than those with at least some postsecondary training to be working for minimum wage or less—1 in 6 compared with 1 in 33. Four in 10 minimum-wage workers did not have a high school diploma compared with 1 in 8 employees in general. This is in line with the high rates of minimum-wage work among young people, many of whom have not yet completed their studies.

Table 5 Where do they work?

	Total employees	Minimum wage	
		Total	Incidence
	'000	'000	%
Industry	14,496.2	751.4	5.2
Goods-producing	3,296.3	56.9	1.7
Agriculture	123.5	14.5	11.8
Forestry, fishing, mining, oil and gas	291.9	4.1	1.4
Utilities	151.6	F	F
Construction	859.9	11.1	1.3
Manufacturing	1,869.4	26.3	1.4
Service-producing	11,199.9	694.6	6.2
Trade	2,388.7	258.0	10.8
Transportation and warehousing	711.0	14.8	2.1
Finance, insurance, real estate and leasing	896.6	19.8	2.2
Professional, scientific and technical	801.8	11.5	1.4
Management, administrative and other support	520.5	28.9	5.6
Education	1,140.9	24.5	2.1
Health care and social assistance	1,669.7	31.3	1.9
Information, culture and recreation	635.6	41.3	6.5
Accommodation and food	983.4	212.1	21.6
Public administration	925.7	11.3	1.2
Other services	525.9	41.0	7.8

Source: Statistics Canada, Labour Force Survey, 2008.

Table 6 Part-time employment prominent

	Total employees	Minimum wage	
		Total	Incidence
	'000	'000	%
Both sexes	14,496.2	751.4	5.2
Men	7,301.6	299.9	4.1
Women	7,194.6	451.5	6.3
Full-time	11,910.6	306.5	2.6
Men	6,511.9	132.4	2.0
Women	5,398.7	174.1	3.2
Part-time	2,585.6	445.0	17.2
Men	789.7	167.5	21.2
Women	1,795.9	277.4	15.4

Source: Statistics Canada, Labour Force Survey, 2008.

More than half of minimum-wage workers had been in their current job for one year or less, compared with less than one-quarter of all employees. Working for minimum wage was most prevalent among those who had held a job for three months or less (1 in 7), and least common among those in a job for more than five years (1 in 71).

Four in 10 minimum-wage workers were employed by large firms (more than 500 employees) and another 32% by small firms (less than 20 employees). The incidence of working for minimum wage was highest in small firms—more than double that of large firms. Very few minimum-wage workers (9%) belonged to a union or were covered by a collective agreement, compared with almost one-third of all employees. Only 2% of union members worked for minimum wage or less, versus 7% of non-union members. The large number of part-time workers, as well as students and other young people working for minimum wage, combined with their sizeable presence in smaller firms, tends to limit the ability of these workers to organize, making unionization more difficult.

Minimum-wage work among part-time workers was almost seven times higher than among full-time workers (17.2% versus 2.6%). Almost 60% of minimum-wage workers worked part time, compared with less than 20% of all employees.

Table 7 Most minimum-wage jobs are short term, in both large and small firms, and rarely unionized

	Total employees	Minimum wage	
		Total	Incidence
	'000	'000	%
Job tenure	14,496.2	751.4	5.2
1 to 3 months	1,140.9	154.7	13.6
4 to 6 months	978.4	116.5	11.9
7 to 12 months	1,351.1	138.9	10.3
13 to 60 months	4,639.9	250.3	5.4
61 months or more	6,385.9	91.1	1.4
Firm size	14,496.2	751.4	5.2
Less than 20 employees	2,806.9	243.2	8.7
20 to 99 employees	2,321.1	116.3	5.0
100 to 500 employees	2,061.1	77.2	3.7
More than 500 employees	7,307.0	314.8	4.3
Union membership	14,496.2	751.4	5.2
Union member or covered by collective agreement	4,527.0	69.1	1.5
Non-member and not covered by collective agreement	9,969.2	682.3	6.8

Source: Statistics Canada, Labour Force Survey, 2008.

Table 8 Most minimum-wage workers do not live with a spouse

	Total employees	Minimum wage	
		Total	Incidence
	'000	'000	%
Member of a couple	8,341.2	183.8	2.2
Spouse not employed	1,553.9	42.9	2.8
Spouse unemployed	287.9	9.2	3.2
Spouse not in the labour force	1,266.0	33.7	2.7
Less than 55	771.9	19.8	2.6
55 and over	494.1	13.9	2.8
Spouse employed	6,787.3	140.9	2.1
Earning minimum wage or less	115.9	10.8	9.3
Earning more than minimum wage	5,715.7	105.2	1.8
Self-employed	955.7	25.0	2.6

Source: Statistics Canada, Labour Force Survey, 2008

The vast majority of minimum-wage workers lived with their parents, alone or were the head of a household without a spouse. Only one-quarter of minimum-wage workers lived with a spouse. On the other hand, more than 75% had a spouse who earned more than the minimum wage.

Perspectives

For further information, contact
Philippe Gougeon,
Labour and Household Surveys Analysis Division,
at (613) 951-6546 or philippe.gougeon@statcan.gc.ca.



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