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NEW ESTIMATES OF HOURS OF WORK AND REAL INCOME IN CANADA FROM THE 1880s TO 1930: LONG-RUN TRENDS AND WORKERS' PREFERENCES

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The first set of hours of work estimates constructed for Canada and its regions for the 1880–1930 period is presented in this article. These estimates suggest a trend decline in hours of work, especially following First World War. In addition, these estimates suggest that the decline in hours of work came at no or little cost in terms of real weekly income. The trends uncovered for Canada are found to be similar to those revealed for the U.S. In effect, by the early twentieth century workers were realizing their long expressed preferences for a shorter workweek at no loss in real income.

1. INTRODUCTION

There has been a resurgence in the discussion and analysis of the length of the workday in America at the turn of the century (Atack and Bateman, 1992; Shells, 1990; Whapples, 1990). However, the Canadian case is both little known and little discussed, and for good reason. Not much is known about the evolution or extent of hours worked per week or day in Canada from Confederation (1867) to 1930. This is in sharp contrast to the U.S. where careful estimates for hours worked were constructed long ago by Paul Douglas (1930) for the entire 1890–1926 time frame. His estimates are for manufacturing, construction, transportation, mining, unskilled workers, and government employees. More recently his estimates have been extended back to 1880 (Atack and Bateman, 1992).

In Canada, reference is typically made to census year weekly hours of work estimates quoted in Sylvia Ostry's and Mahmood Zaidi's textbook, *Labour Economics in Canada* (1975, pp. 60–61). However, this provides estimates for the manufacturing sector alone and for only five years of the entire 1870–1930 period: 64 hours (1870), 59 hours (1901), 57 hours (1911), 55 hours (1921), and 55 hours (1926). Worst still, one is left with little idea as to how most of these estimates were constructed. In fact, their 1901–31 estimates are from an unpublished and undated paper of George Sanders and Syed M. A. Hameed, which cannot be located. Another series by O. J. Firestone for weekly hours worked in manufacturing exists (1958, pp. 207, 322) for the years 1870, 1890, 1901, 1911, and 1931 of 64, 59, 57, and 53 hours respectively. The 1870 estimate in Ostry and Zaidi is

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from Firestone, and the latter estimate is no more than an educated guess. For 1890 Firestone relies on testimony by workers to the Royal Commission on Capital and Labour for the year of 1889 reported in 1896. His 1901 estimate is the average number of hours per week reported in the 1901 census and his 1911 estimate is drawn from a sample of manufacturing industries employing 5,000 or more employees. Firestone (1958, p. 322) concludes that "... no direct record of hours worked per week is available for any other year (apart from 1901) in the 1871–1910 period." Firestone's 1931 estimate is based on the average hours of work estimates for 1928 and 1932 in the *General Review of the Manufacturing Industries of Canada*. Apart for Firestone's 1901 and 1911 average estimates for Canada as a whole, the first reliable hours of work estimates for Canada are available only from 1926 (Urquhart and Buckley, 1965, pp. 79, 105).

In this article, I present time series estimates for Canadian annual hours worked per week for the 1880s and for the 1901–26 period. These estimates are for workers in the manufacturing and construction census occupational categories. My estimates, which are also presented on a regional basis, confirm the picture presented by the hours worked estimates found in manufacturing presented in Ostry and Zaidi, namely that hours worked per week fell by about 15 percent from the beginning of this century to the mid-twenties. This is true for both manufacturing and construction workers. On the other hand, no decline in hours worked took place in the late nineteenth century (Tables 1, 2, 3 and 4). This is in stark contrast to what is suggested by Firestone's guesstimates for the nineteenth century.

In addition to the estimates for hours worked, estimates for real income earned per week in manufacturing and construction are developed. These estimates suggest that although individuals worked fewer hours from one year to another real weekly income did not fall by much, if at all, in the first years of the twentieth century. By the 1920s, workers experienced a significant increase in real weekly income although weekly hours worked had fallen far below what they were in the pre-World War One period. Both my hours worked and real weekly income estimates are consistent with results found for the U.S. Moreover, they are consistent with the long-standing demands of Canadian workers for a shorter workday with no cut in real income. By the mid-1920s, the workweek had fallen to 51 hours in manufacturing and to 47 hours in construction. After decades of agitation by labor, the workweek finally approached workers' preferences until, of course, workers' preferences shifted towards an even shorter workday.

The reduction of hours worked in Canada took place in the context of dramatic increases in real GNP, manufacturing output, labor productivity, employment growth and structural change (Altman, 1987; 1992; 1994; 1999).[1] This is especially true of the 1896–1914 period, which experienced a wheat export boom.

[1]Altman (1992a) real GNP series are built upon Urquhart's (1986) nominal GNP estimates so as to correct for problems in the methodology adopted by Urquhart to deflate his nominal GNP estimates. The Altman estimates are derived by deflating Urquhart's nominal GNP using a set representatively weighted price index numbers. Urquhart's deflators are unweighted and for most years not representative of the components of GNP being deflated. For a discussion of these problems see Van Ark (1994) and Altman (1992a, 1999). See Urquhart (1994) for a critique of Altman's estimates and Urquhart (1986) for Urquhart's real GNP series.

It was this export boom that triggered an investment boom in various sectors of the economy which, in turn, helped fuel the process of Canadian economic growth. During this time Canada's real per capita growth was the fastest of all advanced economies, including Britain, Germany, and the U.S.[2] However, hours worked fell substantially only after the outbreak of World War One, once Canadian economic growth moderated. The next trend decrease in hours worked in Canada began in the mid-forties. By the end of the 1950s, the forty-hour week was a reality for most Canadian workers (Urquhart and Buckley, 1965, pp. 102, 105).

2. The Derivation of New Hours Worked Estimates

Estimates for hours worked per week are constructed from scratch from a variety of sources on a regional and national basis. The most consistent series for hours worked are produced from data in the *Labour Gazette* and in the *Canada Year Book*.[3] These data were collected by the Department of Labour from 1900. However, these data, collected on the basis of surveys sent to selected employees, are for union labor alone, whose share of the non-agricultural labor force increased from about 8 percent in 1910–11 to 14 percent in 1920–21, falling back to just over 11 percent by 1930–31 (Urquhart and Buckley, 1965, pp. 59, 105). These sources nevertheless permit the construction of hours-worked series for the 1901–26 period.[4] The data are for standard hours worked (hours worked which did not require the payment of overtime) and are consistent with hours worked estimates made for the 1930s and 1940s in Canada as well as with historical hours worked estimates produced for the United States. Relevant data are available for Halifax, St. John, Quebec City, Montreal, Ottawa, Toronto, Hamilton, Winnipeg, Regina, Edmonton, Calgary, Vancouver, and Victoria for what the producers of these data sets consider to be a representative sample of workers in the building,

[2]For a classic statement on the indirect impact of the export wheat boom of Canadian growth, see Buckley (1974) and Mackintosh (1978). Wheat exports grew by 3.3 percent per year from 1871 to 1896 and by 15.5 percent from 1896 to 1913. Moreover, wheat exports as a percentage of total wheat output increased from 21 to 51 percent from 1896 to 1913. Thereafter, the rate of growth in wheat exports decelerated. For example, from 1913 to 1925 wheat exports grew at a rate of 8 percent per year (Altman, 1999, Table 9). Moreover, annual per capita real GDP growth in Canada in the 1896–1913 period was 4.7 percent compared to 1.3 percent from 1870 to 1896 and 0.05 percent from 1913 to 1925 (Altman, 1992a). In comparison, for example, in the U.S., the annual per capita GDP growth rate for the 1896–1913 period was 2.5 percent. In Germany this growth rate was 1.6 percent, in France 1.5 percent, in the U.K. 1.1 percent, and in Australia 2 percent (from Maddison, 1995, Tables D1-a and D1-d). Some of the most current literature links Canada's impressive and superior growth performance in the 1896–1913 period with both the direct and indirect effects of its export wheat boom (Altman 1986, 1992a, 1999; Green and Urquhart 1994; Inwood and Stengos, 1991; Urquhart 1986).

[3]These data are found in, Department of Labour, *Wages and Hours of Labour in Canada, 1901–20*, Report No. 1 Supplement to the *Labour Gazette*, March, 1921, pp. 449–79; Dominion Bureau of Statistics. *The Canada Year Book, 1921*, pp. 634–39; Dominion Bureau of Statistics, *The Canada Year Book, 1922–23*, pp. 634–38; Dominion Bureau of Statistics, *The Canada Year Book, 1925*, pp. 722–29; Dominion Bureau of Statistics, *The Canada Year Book, 1926*, pp. 713–21; Dominion Bureau of Statistics, *The Canada Year Book, 1927–28*, pp. 772–73; Dominion Bureau of Statistics, *The Canada Year Book, 1929*, pp. 365–67; Dominion Bureau of Statistics, *The Canada Year Book, 1942*, pp. 385–89.

[4]For a detailed discussion on the collection of historical hours of work data see Hartle (1965, 67–68).

metal products, and printing trades. The metals and printing trades data yield what I refer to as the basic manufacturing series. And, these occupations represent, together, close to 20 percent of manufacturing workers. Data are also available for common or unskilled manufacturing labor. This series is constructed both for Canada as a whole and on regional basis. The building trades data yield my construction industry series (Table 3). Building trades data are available for bricklayers, carpenters, electrical workers, painters, plumbers, stonecutters, and common labor.[5] All in all, manufacturing workers net of common or unskilled laborers comprised over 28 percent of all non-agricultural workers in 1901, 21 percent in 1911, 20 percent in 1921, and 18 percent by 1931. In addition, construction or building trade workers net of common laborers constituted 8.4 percent of all non-agricultural workers in 1901 and 1911, 7.8 percent in 1921, and 7.3 percent in 1931. Common laborers comprise 12 percent of non-agricultural workers in 1901, 18 percent in 1911, 14 percent in 1921, and 15 in 1931. These occupational categories encompass 49 percent of the non-agricultural Canadian workforce in 1901, falling to 40 percent in 1931. We lack reliable hours worked data on the large component of white collar workers (clerical, finance and trade, and service workers) who comprised 37 percent of non-agricultural workers in 1901, rising to 44 percent by 1931 (derived from Urquhart and Buckley, 1965, p. 59).

Data from the *Labour Gazette* and the *Canada Year Book* are also used to construct, what I refer to as a supplementary series of hours worked in manufacturing for the 1911–26 period, consisting of data on cottons, furniture, carriage manufacturing, harness and saddlery, boots and shoes, tobacco, meat packing, pulp and paper, and sawmill labor. These data are largely for Quebec and Ontario and incorporate non-union labor. These two provinces contributed 63 percent to Canada's population in 1900 and 61 percent by 1930. This series is brought back to 1901 using data published by Board of Inquiry into the Cost of Living (Coats, 1915), which also incorporates non-union labor, for textiles, furniture, carriage manufacturing, boots and shoes, and sawmill labor. These occupational categories incorporate over 20 percent of manufacturing workers. Finally, the above three sources are used to construct a series for hours worked per week by unskilled or common labor in manufacturing. Unskilled workers comprised over 20 percent of workers in manufacturing in the 1900–30 period. Unlike the supplementary series, a consistent time series for common laborers can be constructed on both a regional and national basis. All told, the three occupational sub-categories in manufacturing for which we have representative sample data comprise about 65 percent of manufacturing workers. Although these series are derived from different sources and are, therefore, not strictly comparable, they provide the most comprehensive estimates for weekly hours worked in manufacturing. Moreover, these estimates are presented in a most transparent manner so that the reader can clearly delineate the differences in hours worked between the series. It is evident that hours worked were consistently greater in the union labor based basic series compared to the non-union labor based supplementary and

[5]Buckley and Urquhart (1965, p. 88), report some of the data used in this article. However, this is only for the years 1905, 1910, 1915, 1920, and 1925 and only for carpenters, electricians, plumbers, and laborers in Halifax, Montreal, Toronto, Winnipeg, and Vancouver.

common labor series, albeit trend changes in hours worked are the same for all series (Table 2). These differences were invariably a product of unionization or the different occupations of the workers in question, or some combination of the two. The determination of these differences is a question that needs be addressed, although it lies outside the scope of this paper.

The basic and common laborer series are spliced together to yield one variant (Average II) of an average hours-worked series for Canadian manufacturing. Another variant (Average I) is produced by splicing the basic, common laborer, and supplementary series together (Table 2). These series are weighted averages based on their components' percentage contribution to the manufacturing occupations covered by the sample. The average weight given to the basic series is 29 percent; to the supplementary series, 39 percent; to the common laborer series, 33 percent. In addition, each of the component series is a weighted average, based on the percentage contribution of their constituent components' contribution to the manufacturing occupations in the basic and supplementary series respectively. For example, in the basic series the weight assigned to metals is 80 percent and to printing, 20 percent. It is important to note that the weighted series' averages differ from the unweighted series' averages to any significant extent only for Average II, where the average difference in hours worked per week is just over 3 percent in favor of the weighted average, with the difference diminishing from about 4 to 1 percent from the first decade of the century to the 1920s. In effect, the weighted average series suggests a greater decline in hours worked from 1901 to 1926 of about 1 hour per week than does the unweighted series. The construction hours worked series is constructed by splicing the common construction laborer series with the series developed from data on the relatively skilled construction workers. The two series are combined by assigning a weight to each series based on each series' average contribution to construction occupations. Common labor is assigned a weight of 33 percent (Table 3). One should note that common construction labor worked similar, albeit slightly more, hours per week than their relatively more skilled counterparts until 1917. Thereafter, the gap between these two categories of construction workers widened. My final hours worked series is produced by splicing the manufacturing basic hour worked series with the construction series to generate an hours of work time series for an even wider spectrum of Canadian workers, representing about 40 percent of Canada's non-agricultural labor force by the 1920s. This series is produced for both Canada and its regions and is weighted by each occupational category's contribution to the manufacturing and construction labor force (Table 4).

In addition to the weights assigned to the occupational components of the various series, each of the national series for hours worked are also weighted for each province's contribution to the relevant occupational group. The provincial series are then grouped by region: Eastern Canada (Prince Edward Island, New Brunswick, Nova Scotia), Central Canada (Quebec and Ontario), the West (Manitoba, Saskatchewan, Alberta), and British Columbia.[6] Each provincial series is assigned a weight consistent with its labor force's contribution to the relevant

[6]Since no hours worked data are available for Prince Edward Island, the occupational weight of this province is equally divided between the other two eastern provinces.

occupational group. This yields a weighted average regional series for hours worked. The weights are derived from the Censuses for the years 1910–11, 1920–21, and, 1930–41. The weights for these census years are applied to the 1901–10, 1911–20, and, 1921–26 segments of my different hours worked series respectively. The final step in my calculations is to convert the hours worked time series to index numbers with a 1901 base year so as to ascertain and compare the extent of change in hours worked amongst the different regions and occupational categories.[7]

Finally, estimates are constructed for hours worked in the 1884–89 period (Table 1). These estimates are produced from data found in various annual reports to Ontario's Bureau of Industries.[8] Data, for up to nine of the occupations used in this article, were previously presented by Douglas Hartle in Urquhart and Buckley (1965, pp. 93, 96). These occupations are butchers, carpenters, cotton mill employees, laborers, machinists, millwrights, paper mill machine tenders, plumbers, and printers. The annual reports provide data for more than 400 occupations. The data used in this article are drawn from thousands of responses to questionnaires provided to both employees and employers. It is not possible to tell whether the sampling procedures adopted by the Ontario bureau was biased or not. Nevertheless, these data provide a more appropriate basis to construct hours of work estimates than the testimony before a Royal Commission utilized by Firestone. I construct three series for hours worked from these data for the 1884–89 period. Moreover, I use the estimates provided by Hartle to construct two sets of hours of work estimates for the same period. One set (Hartle 1) is based on responses from employees and employers while the other set (Hartle 2) is based on responses from employees alone. My first set of estimates is simply the unweighted average for all occupations. This set also contains the most all-inclusive hours of work estimates provided in Table 1. The other set of estimates is a weighted average for the manufacturing occupations also incorporated in my 1901–26 series. The third series is a weighted average for the manufacturing and construction sectors. These five sets of estimates yield similar results. Obviously, increasing the sample size does not significantly affect the value of the estimates. In fact, there is little difference in hours worked per week between most occupations. Indeed, the percentage variation about the average hours worked is about 3 percent for all years and for all series, or about 1.8 hours. In all five series, there is no tendency for weekly hours worked to diminish in the 1880s. Moreover, average weekly hours worked vary between 58 and 60 hours (see Table 1).

[7]In this article only index numbers for the various national series are presented. The regional index numbers are easily calculated from the hours of work series presented.

[8]See, *Bureau of Industries for the Province of Ontario, Second Annual Report, 1883*, Sessional Papers of the Province of Ontario, No. 55, Tables 23, 24; *Bureau of Industries for the Province of Ontario, Third Annual Report, 1884*, Sessional Papers of the Province of Ontario, No. 84, Table 24, 25; *Bureau of Industries for the Province of Ontario, Seventh Annual Report, 1888*, Part IV, Wages and Cost of Living, Sessional Papers of the Province of Ontario, No. 80, p. 25 and Tables 1 and 2; and *Bureau of Industries for the Province of Ontario, Eighth Annual Report, 1889*, Part IV, Wages and Cost of Living, Sessional Papers of the Province of Ontario, No. 80, Tables 3, 7, 9.

TABLE 1

MANUFACTURING: HOURS WORKED PER WEEK IN ONTARIO IN THE 1880s

	All Occupations Basic Series Unweighted	Manufacturing Basic Series Weighted	Manufacturing & Construction Basic Series Weighted	Hartle 1 Unweighted	Hartle 2 Unweighted
1884	60.2	59.7	59.6	59.1	58.8
1885	59.1	59.7	59.3	59.7	58.3
1886	57.5	58.5	57.6	59.3	58.2
1887	56.7	59.0	58.4	59.5	60.0
1888	57.7	58.8	57.2	59.7	57.9
1889	58.8	59.4	58.6	60.0	59.2
Average	58.3	59.2	58.5	59.6	58.7

Source: My estimates are drawn from returns to questionnaires by both employers and employees. Hartle 1 is based on the returns from both employers and employees whereas Hartle 2 is derived from returns by employees alone. For further details see the text.

3. THE RESULTS

Hours worked per week differed amongst the different broad occupational grouping presented in this article. As already mentioned, common laborers as well as workers in the supplementary occupations worked consistently more hours than individuals in basic manufacturing. They also worked more hours than the relatively more skilled workers in construction. Moreover, they worked longer hours than common laborers in construction until the 1920s, when these three categories of workers labored approximately the same number of hours per week. Workers in metal products and printing, on the other hand, worked more hours than both the relatively more skilled and common construction workers, at least until 1920 when they only worked more hours than the relatively more skilled construction workers. For Canada as a whole, hours worked per week ranged from about 56 hours in construction and metal products and printing to over 58 hours for the other occupations in 1901. By 1926, hours worked per week ranged from about 46 hours for the relatively skilled construction workers to about 52 hours for the common labor in general and workers in the supplementary manufacturing occupations. This suggests that by 1926 an eight-hour day prevailed in those occupations covered by the available sources, given the prevalence of the 6-day week. In manufacturing, the majority of the decline took place in the closing years and immediately following World War One. In construction, the majority of the decline took place prior to the outbreak of World War One (Tables 2 and 3). Splicing the manufacturing and construction hours worked series also yields a clear trend decline in hours worked (Table 4). All in all, hours worked fell by about 13 percent from 1901 to 1926 in manufacturing and by 16 percent in construction (Tables 2 and 3). Finally, in the 1880s hours worked per week in manufacturing was about 59 hours (Table 1). This implies that manufacturing workers as well as workers in other occupations typically worked about 10 hours per day given the dominance of the six-day week at the time. This matches the 10-hour day estimated for U.S. manufacturing workers for 1880 (Atack and Bateman, 1992). Thus, at least from Confederation in 1867 to the beginnings of

Canada's wheat export boom in 1896, there is no clear evidence of a decline in hours worked.

The regional hours of work series for manufacturing suggests some variation in hours worked in the basic manufacturing series or metal products and printing (Table 2, Graph 2). What stands out most is that in British Columbia workers worked fewer hours than did workers in other parts of the country, except for at the very beginning of the twentieth century. Also of interest is that workers in the Prairies labored more hours than did workers anywhere else in the country from 1901 to outbreak of World War One. In the building trades a similar regional pattern emerges (Table 3). However in construction, British Columbia workers labored more hours per week throughout the period under examination without exception and workers in the East registered more hours than construction workers elsewhere in Canada throughout most of the first two decades of the century. Still, all regions experienced a trend decline in hours worked per week, with British Columbia experiencing its entire reduction in hours worked in the first decade of the century.

4. Hours Worked and Real Weekly Income

The new annual estimates of hours worked per week can serve to shed some light on questions related to changes in workers' standard of well-being over the 1901–26 period. Douglas (1930) initially carried out a similar exercise for the U.S. First, one can compare movements in hours worked in manufacturing and in real wages per hour. There are a variety of real wage per hour series for Canada. I exploit the Bertram–Percy (1979) series (B–P) and the Chambers (1985) series. Of the two series, only the B–P index covers the entire 1901–26 period. Chambers covers only the 1901–14 period and focuses on Toronto.[9] It is clear that as hours worked declined there was no trend decline in real wages per hour according to any of the indexes (Table 5). And according to the B–P index there was a trend increase over the 1901–26 period. In fact, there was a very high negative correlation between hours worked and real hourly wages for both the Canadian (about –0.90) and U.S. series (between –0.80 for union labor and –0.90 for non-union labor). Real hourly wages only dropped in the 1914–17 period so that by 1917 real wages fell below their 1901 level. However, this was a period when Canada experienced an extraordinary increase in prices. From 1901 to 1914 the general price level rose by about 25 percent or 1.5 percent per annum. However, from 1914 to 1917, the general price level jumped by over 44 percent or 13 percent per annum (Altman, 1992a). During this time of falling real wages there was little movement in hours worked per week. Indeed, hours worked did not fall at all in construction and fell by no more than one hour or by 2 percent in manufacturing. The major reduction in hours worked took place only when real hourly wages

[9]See also, Piva (1979), pp. 27–59, for a discussion of real wages in the Toronto area. Mackinnon (1996), presents nominal and real wage series (using the B–P deflator) for employees in the Mechanical Department of the Canadian Pacific Railway for the 1900–30 period. She finds a similar trend real wage increase as do Bertram and Percy (1979) in their multi-sector study for the 1901–26 period, although the railway workers apparently experienced a much greater rate of increase than did other manufacturing workers in Canada.

TABLE 2

MANUFACTURING: HOURS WORKED PER WEEK AND INDEX NUMBERS, 1901–26

	Hours Per Week									Index Numbers: 1901 = 100			
	Canada					Provincial Basic + Common Series				Canada			
	Average I	Average II	Basic	Common	Suppl.	East	Central	West	BC	Average I	Basic	Common	Suppl.
1901	58.4	57.8	55.6	59.6	59.5	55.3	56.8	58.0	55.8	100	100	100	100
1902	58.4	57.7	55.5	59.6	59.5	55.3	56.8	58.0	55.5	100	99.8	100	100
1903	58.3	57.5	55.1	59.6	59.5	55.3	56.7	58.0	54.0	99.8	99.1	100	100
1904	57.9	56.9	53.7	59.6	59.5	55.3	55.9	57.9	53.7	99.1	96.5	100	100
1905	57.7	56.6	53.3	59.5	59.5	54.6	54.7	57.9	53.6	98.8	95.8	99.8	100
1906	58.0	57.1	54.3	59.5	59.5	54.0	55.4	57.7	53.6	99.3	97.6	99.8	100
1907	57.6	56.8	53.8	59.5	58.9	54.0	55.1	57.3	53.5	98.6	96.7	99.8	99.0
1908	57.4	56.8	53.8	59.5	58.4	54.0	55.1	57.3	53.5	98.3	96.7	99.8	98.2
1909	56.7	56.8	53.7	59.5	56.5	54.0	55.1	57.1	53.4	97.1	96.6	99.8	94.9
1910	56.7	56.7	53.7	59.3	56.5	54.0	55.1	56.3	53.4	97.0	96.5	99.6	94.9
1911	57.4	56.7	53.5	59.3	58.7	53.9	55.1	55.4	53.3	98.3	96.2	99.6	98.6
1912	56.6	55.7	53.2	57.9	58.0	52.9	54.6	55.4	52.9	96.9	95.7	97.1	97.5
1913	56.3	55.4	52.8	57.6	57.8	52.9	54.3	55.3	52.9	96.4	95.0	96.7	97.2
1914	56.3	55.4	52.6	57.9	57.8	53.1	54.3	54.9	52.9	96.4	94.6	97.1	97.2
1915	56.3	55.4	52.5	57.8	57.8	53.1	54.3	54.3	52.9	96.4	94.5	97.0	97.2
1916	56.1	55.2	52.3	57.8	57.6	53.0	54.1	53.9	52.0	96.1	94.0	96.9	96.9
1917	55.6	54.5	51.7	56.9	57.4	53.0	53.6	53.7	49.1	95.1	93.0	95.4	96.4
1918	54.9	54.2	50.5	57.3	56.1	53.1	53.0	52.8	48.7	94.0	90.8	96.1	94.3
1919	52.9	52.7	49.2	55.7	53.3	51.6	51.8	51.2	47.8	90.5	88.5	93.4	89.5
1920	51.8	51.3	48.8	53.5	52.5	50.9	50.5	50.2	47.8	88.7	87.7	89.8	88.3
1921	50.6	50.2	47.5	52.4	51.4	49.2	49.7	49.0	47.8	86.7	85.4	88.0	86.4
1922	50.7	49.8	48.2	51.2	52.0	49.7	49.4	49.8	47.0	86.7	86.7	85.9	87.4
1923	50.4	49.7	47.9	51.1	51.6	49.7	49.3	49.3	47.2	86.3	86.2	85.8	86.8
1924	50.5	49.9	47.8	51.7	51.5	49.7	49.6	49.3	47.0	86.5	86.0	86.7	86.5
1925	50.8	49.9	47.8	51.6	52.4	48.9	49.6	49.1	47.0	87.0	86.0	86.6	88.0
1926	50.6	49.8	47.9	51.4	52.0	49.1	49.6	49.9	44.9	86.6	86.2	86.2	87.3

Source: See text. Average I is based on the three manufacturing hours worked series and Average II is derived using the Basic and Common manufacturing hours worked series. These averages are weighted according to their components' contribution to the index in the 1901–26 period. The basic series has an average weight of 29 percent, the common laborer series, 33 percent, and the supplementary series, 39 percent.

TABLE 3

CONSTRUCTION: HOURS WORKED PER WEEK AND INDEX NUMBERS, 1901–26

	Hours Per Week							Index Numbers: 1901 = 100		
				All Occupations						
	Canada Net of Laborers	Canada Laborers Only	Canada	East	Central	West	BC	All Occupations	Canada Net of Laborers	Laborers Only
1901	55.6	55.8	55.7	55.0	54.7	58.9	52.3	100.0	100.0	100.0
1902	54.9	55.8	55.2	54.8	54.2	58.6	51.6	99.2	98.8	100.0
1903	53.6	54.7	54.0	54.8	53.3	56.8	48.2	97.0	96.4	98.0
1904	52.8	54.7	53.4	54.8	52.6	56.7	47.0	96.0	95.0	98.0
1905	52.4	54.0	52.9	54.5	52.5	55.4	46.0	95.1	94.3	96.7
1906	51.9	54.0	52.6	54.5	52.2	54.3	46.0	94.5	93.4	96.7
1907	51.7	53.1	52.1	54.5	51.6	53.8	46.0	93.7	93.0	95.2
1908	51.5	53.1	52.0	54.3	51.6	53.6	45.6	93.5	92.7	95.2
1909	51.1	52.9	51.7	54.0	51.3	53.4	44.4	92.9	91.9	94.9
1910	50.6	52.1	51.1	53.8	50.4	53.3	44.2	91.8	90.9	93.4
1911	49.3	51.1	49.9	53.7	49.5	50.8	44.0	89.7	88.7	91.7
1912	49.0	50.4	49.5	53.6	49.1	50.0	44.0	88.9	88.2	90.3
1913	48.7	50.4	49.3	52.2	48.8	51.1	44.0	88.6	87.7	90.3
1914	48.6	50.4	49.2	52.2	48.8	50.3	44.0	88.4	87.4	90.3
1915	48.4	50.4	49.1	52.0	48.8	49.5	44.0	88.2	87.1	90.3
1916	48.2	50.4	48.9	51.0	48.7	49.4	44.0	87.9	86.7	90.3
1917	48.3	50.4	49.0	51.0	48.7	49.9	44.0	88.0	86.9	90.3
1918	47.7	50.3	48.6	51.0	48.2	49.8	44.0	87.3	85.8	90.2
1919	46.7	49.5	47.7	49.5	47.5	47.4	44.0	85.7	84.1	88.8
1920	45.2	48.5	46.3	48.2	45.8	46.7	44.0	83.2	81.2	87.0
1921	46.0	51.8	47.9	48.4	48.5	47.7	44.0	86.1	82.7	92.9
1922	45.7	53.0	48.1	47.8	48.7	47.7	45.0	86.5	82.2	95.0
1923	45.6	52.7	47.9	46.7	48.7	47.7	44.0	86.2	82.0	94.4
1924	45.6	52.7	47.9	46.7	48.7	47.7	44.0	86.2	82.0	94.4
1925	45.5	52.7	47.9	46.7	48.7	47.7	43.6	86.0	81.8	94.4
1926	45.5	52.5	47.8	45.7	48.7	47.7	43.6	85.9	81.8	94.0

Source: See text.

TABLE 4

BASIC + COMMON MANUFACTURING AND CONSTRUCTION: HOURS OF WORK AND INDEX NUMBERS, 1901–26

	Hours Per Week					Index Numbers 1901 = 100
	Average	East	Canada Central	West	BC	Canada
1901	57.1	55.2	56.2	58.3	54.8	100
1902	57.0	55.2	56.1	58.2	54.4	99.7
1903	56.5	55.2	55.7	57.6	52.3	98.9
1904	55.9	55.2	54.9	57.6	51.8	97.8
1905	55.5	54.5	54.0	57.1	51.4	97.2
1906	55.8	54.2	54.5	56.7	51.4	97.6
1907	55.5	54.2	54.1	56.3	51.3	97.1
1908	55.5	54.1	54.1	56.3	51.2	97.0
1909	55.3	54.0	54.0	56.1	50.8	96.8
1910	55.1	53.9	53.7	55.4	50.7	96.4
1911	54.7	53.9	53.5	54.1	50.6	95.7
1912	53.9	53.1	53.0	53.8	50.3	94.3
1913	53.6	52.7	52.7	54.0	50.3	93.9
1914	53.6	52.8	52.7	53.6	50.3	93.8
1915	53.5	52.8	52.7	52.9	50.3	93.7
1916	53.4	52.4	52.6	52.6	49.6	93.4
1917	52.9	52.4	52.2	52.6	47.6	92.6
1918	52.5	52.5	51.6	51.9	47.3	91.9
1919	51.2	51.0	50.6	50.1	46.7	89.6
1920	49.9	50.1	49.1	49.2	46.7	87.3
1921	49.5	49.0	49.4	48.6	46.7	86.6
1922	49.3	49.1	49.2	49.2	46.4	86.3
1923	49.2	48.8	49.1	48.8	46.3	86.0
1924	49.3	48.8	49.3	48.8	46.2	86.4
1925	49.3	48.3	49.4	48.7	46.0	86.2
1926	49.2	48.1	49.4	49.3	44.5	86.1

Source and notes: Tables 2 and 3. The above series are produced by weighting their component's occupational contribution to the labor force in the 1901–26 period. The manufacturing series is given a weight of 71 percent and construction, 29 percent.

witnessed a persistent trend increase, commencing with the increase from 1917 to 1918. It was from 1917 and, more particularly from 1918 to 1921, that hours worked declined most dramatically in manufacturing, falling by about 4 hours to about 50 hours per week, where it was to remain for the remainder of the decade. By 1921 real hourly wages recovered all losses suffered during the great inflation of the war years so that by 1921 real hourly wages exceeded the 1901 average by 36 percent (Tables 2 to 5).

The hours worked estimates allow us to estimate the implied changes in real weekly income given the combined movements in hours worked and real hourly wages. I construct such estimates for manufacturing and construction (Table 5). These estimates reveal the extent to which real weekly income increased or decreased, on average, as hours of work and real hourly wages typically moved in opposite directions over the 1901–26 period. For real weekly income to at least remain constant in face of declining hours worked, real hourly wages must, at a minimum, rise sufficiently to compensate for the decline in hours worked. This required, hypothetical, real hourly wage increase is also estimated. For real

TABLE 5

REAL WAGE AND REAL INCOME INDEX, 1901–26: 1901 = 100

	Real Wages		Hyp Wages for Constant Weekly Income Given Hours of Work		Implied Changes in Real Weekly Income			
	Chambers	B–P	Mfg.	Constr.	Chambers Mfg.	B–P	Chambers Const.	B–P
1901	100	100	100	100	100	100	100	100
1902	101.7	101.4	100.0	101	102	101	101	101
1903	99.5	102.9	100.2	103	99	103	96	100
1904	100.5	104.3	101.0	104	100	103	96	100
1905	100.7	105.8	101.2	105	99	105	96	101
1906	100.2	101.8	100.7	106	99	101	95	96
1907	98.1	103.6	101.4	107	97	102	92	97
1908	99.8	105.5	101.7	107	98	104	93	99
1909	102.3	107.3	103.0	108	99	104	95	100
1910	105.3	109.1	103.1	109	102	106	97	100
1911	108.8	111.0	101.8	111	107	109	98	100
1912	101.1	108.8	103.2	112	98	105	90	97
1913	103.9	111.4	103.7	113	100	107	92	99
1914	105.1	115.9	103.7	113	101	112	93	102
1915		113.0	103.8	113		109		100
1916		101.9	104.1	114		98		90
1917		95.2	105.1	114		91		84
1918		101.2	106.4	115		95		88
1919		112.3	110.4	117		102		96
1920		122.7	112.8	120		109		102
1921		135.8	115.4	116		118		117
1922		133.9	115.3	116		116		116
1923		136.8	115.9	116		118		118
1924		138.2	115.7	116		120		119
1925		134.1	115.0	116		117		115
1926		138.8	115.4	116		120		119

Sources and notes: See text and Tables 2 and 3. The estimates for a constant real weekly income are derived by dividing the hours worked index number for 1901 by the index numbers for the following years. The estimates for the implied change in real income, which incorporates the changes in real wages and hours worked, are derived by dividing the index numbers for the change in the real wage by the corresponding index numbers for the hypothetical real wage required to generate a constant weekly income.

income to increase, actual real hourly wages must increase by more than the estimated hypothetical real hourly wage increase. According to my estimates, the B–P real hourly wage series generates no persistent decline in real income in manufacturing from 1901 to 1915 as hours of work fall. Real income per week in 1914 actually rose to 12 percent above its 1901 level. Only during the 1916–18 period did real income drop below its 1901 level and this was by 2 percent in, 1916, 9 percent in 1917, and 5 percent in 1918. In this period, Canada underwent a serious recession, experiencing a declining GNP from 1916 to 1921 (Altman, 1992a). Nevertheless, by 1926 real weekly income was more than 20 percent greater than it was in 1901 in spite of hours worked falling by about 16 percent. In the construction industry a different situation might have prevailed since there was a more dramatic fall in hours worked here than in manufacturing. We can only venture an educated guess since we have no real hourly wage data for this

important sector. Be this as it may, the B–P real hourly wage series suggests that construction workers experienced no trend increase in real weekly income until the 1920s. However, neither did construction workers suffer a decline in real income in the 1901–20 period, apart from the highly inflationary period following the beginning of World War One.

Chambers' index tells a different tale. His real hourly wage index suggests that real weekly income remains below its 1901 level for most of the period covered by this index, although only marginally so. Only in 1902, 1910–11 and 1914 was real income greater than what it was in 1901. For construction workers, Chambers' real hourly wage index suggests that real income was somewhat lower than what is suggested by the B–P real hourly wage index. On average, for the 1901–14 period, his real hourly wage index suggests that weekly real income was only 2 percent below its 1901 level. However, during the 1901–14 period hours worked fell by about 12 percent. The real hourly wage indexes of Bertram and Percy and of Chambers suggest that, at worst, reduced hours of work in manufacturing was purchased with a small loss of weekly income. The cost to construction workers was greater, at least before World War One, according to the Chambers index.

5. Hours of Work and Real Income in Canada and the U.S.

Paul Douglas' (1930) series for weekly hours worked in manufacturing can be compared to my estimates for the average in Canadian manufacturing and common labor (Tables 2, 6 and Graph 1). Both of my variants for average manufacturing hours worked per week are just about identical to Douglas' series for all manufacturing. This is especially true for my Average I. In addition, the correlation coefficient for the relationship between Douglas' series and my Average I is 0.98 and between his series and my average for manufacturing and construction workers combined is 0.99. In contrast, my hours worked series sits above Douglas' series for unionized workers in manufacturing while his hours worked series derived from payroll data sits above all the other hours worked series for both the U.S. and Canada. Nevertheless, all series experience a trend decline in hours worked.

Finally, I compare the implied changes in real income for Canada and the U.S. as a product of the combined movements in real wages and hours worked (Tables 5 and 6). For the U.S., I use the real wage per hour estimates of Douglas (1930) and the more recent and more accurate series of Rees (1961). Rees' estimates extend to 1914 only. Over this period, if one uses Rees' real hourly wage estimates, U.S. workers in manufacturing achieved shorter hours whilst realizing persistent increases in real income. However, Douglas' real hourly wage series spins a tale for the U.S. similar to the one emanating from Chambers' real hourly wage estimates for Canada. Real weekly income remains below its 1901 level from 1902 to 1919, but never by very much. By 1926, real weekly income in the U.S. rose to 14 percent above its 1901 level. As in Canada, U.S. manufacturing workers purchased a reduction in hours worked as real hourly wages increased at no or little cost in terms of real weekly income. It is important to note that the real hourly wage series for the U.S. and Canada are highly correlated (Graph 1). The

similarity of hours worked in both countries as well as in trend movements in hours worked plus the similarity in trend changes in real hourly wages raises questions as to the similarity of market conditions and of union activity in Canada and the U.S. at this time.

6. Conclusion

The hours worked estimates for Canada developed here clearly show that there was a trend decrease in hours worked per week in Canada in the first part of the twentieth century. This is true for all of the hours-worked series developed in this article. It is also apparent from the historical literature that workers in both Canada and the U.S. desired to work fewer hours. They demanded a shorter work week at, in the very least, the same level of real income (they attributed a positive utility to working less at a given level of real income).[10] For this objective to be realized, real hourly wages would have to be increased sufficiently; thus the opposition of so many employers to the shorter work day and work week. Employers feared increasing unit costs and reduced profits or, in the very least, the investment in time, effort and money that would make more costly labor more productive. The available evidence suggests that workers were realizing their objectives by the early twentieth century. It is also arguable that the level of well-being of the typical worker probably increased for much of the period under study, especially after World War One when both real weekly income increased and hours worked decreased. Workers' level of well-being must have increased during the pre-War period as well if workers attached some value to more leisure time or to the acquisition of more time to engage in non-market activity while experiencing only insignificant, if any, decline in real income. In fact, measuring changes in workers' well-being simply in terms of changes in real income is inappropriate when workers value both higher real income and a shorter work week.

The historical record suggests that, on average, Canadian workers, not unlike their U.S. counterparts, appear to have established *a target* number of weekly hours and *a minimum target* weekly income which were inconsistent with the actual combination of hours worked and real hourly wages by the end of the nineteenth century. The number of hours worked was too many, but a shorter work week at prevailing real hourly wage rates would have resulted in real income falling below the minimum target income. To realize their objective of reducing hours worked while maintaining real income required that real hourly wages rise. Under these conditions, increasing real wages would be devoted towards reducing hours worked per week. Leisure or non-market activities in general would be purchased with higher real wages. The struggle by workers for a shorter work week went hand in hand with their demands for a higher real hourly wage. Without higher real hourly wages workers would have been unable to purchase a reduced work week. Indeed, when real hourly wages and real weekly income diminished with the great inflation of the war period, workers took action. Union

[10]See, for example, Lipton (1973, pp. 29–36, 72–73, 230). In 1872 unionized workers were demanding a 55 hour work week and in 1887–88 they were demanding a 48 hour work week. By 1919 they were calling for a legal work week of 44 hours. For the U.S. see Cahill (1968) and Whaples (1990).

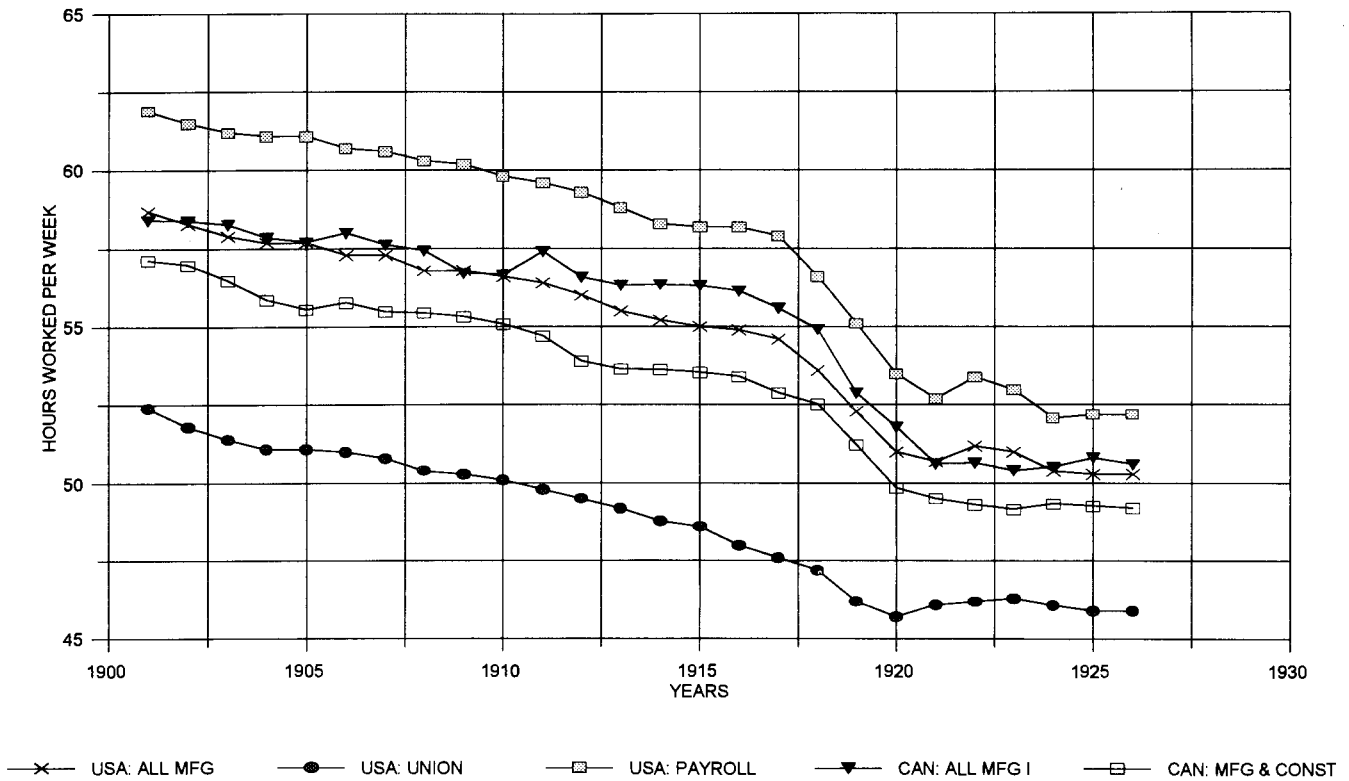
TABLE 6

AMERICAN WEEKLY HOURS, REAL WAGE AND REAL INCOME INDEX, 1901–26: 1901 = 100

	Hours Worked			Real Wages		Hyp. Wages for Constant Weekly Income Given Hours Worked	Implied Changes in Real Weekly Income	
	All Mfg.	Mfg. (Union)	Mfg. (Payroll)	Rees	Douglas		Rees	Douglas
1901	100	100	100	100	100	100	100	100
1902	99.3	98.9	99.4	103.6	101.0	100.7	102.9	100.3
1903	98.6	98.1	98.9	104.8	100.0	101.4	103.3	98.6
1904	98.3	97.5	98.7	102.4	101.0	101.7	100.6	99.3
1905	98.3	97.5	98.7	104.8	103.1	101.7	103.0	101.3
1906	97.6	97.3	98.1	110.7	103.1	102.4	108.1	100.6
1907	97.6	96.9	97.9	109.5	101.0	102.4	106.9	98.6
1908	96.8	96.2	97.4	108.3	102.0	103.3	104.8	98.7
1909	96.8	96.0	97.3	109.5	103.1	103.3	106.0	99.7
1910	96.4	95.6	96.6	113.1	100.0	103.7	109.0	96.4
1911	96.1	95.0	96.3	114.3	98.0	104.1	109.8	94.1
1912	95.4	94.5	95.8	115.5	102.0	104.8	110.2	97.3
1913	94.5	93.9	95.0	121.4	103.1	105.8	114.8	97.4
1914	94.0	93.1	94.2	119.0	102.0	106.3	111.9	96.0
1915	93.7	92.7	94.0		104.1	106.7		97.5
1916	93.5	91.6	94.0		107.1	106.9		100.2
1917	93.0	90.8	93.5		101.0	107.5		94.0
1918	91.3	90.1	91.4		104.1	109.5		95.0
1919	89.1	88.2	89.0		109.2	112.2		97.3
1920	86.9	87.2	86.4		113.3	115.1		98.4
1921	86.4	88.0	85.1		122.4	115.8		105.8
1922	87.2	88.2	86.3		124.5	114.6		108.6
1923	86.9	88.4	85.6		131.6	115.1		114.4
1924	85.9	88.0	84.2		133.7	116.5		114.8
1925	85.7	87.6	84.3		133.7	116.7		114.5
1926	85.7	87.6	84.3		132.7	116.7		113.7

Source: Derived from Rees (1961) and Douglas (1930). See also, Table 5.

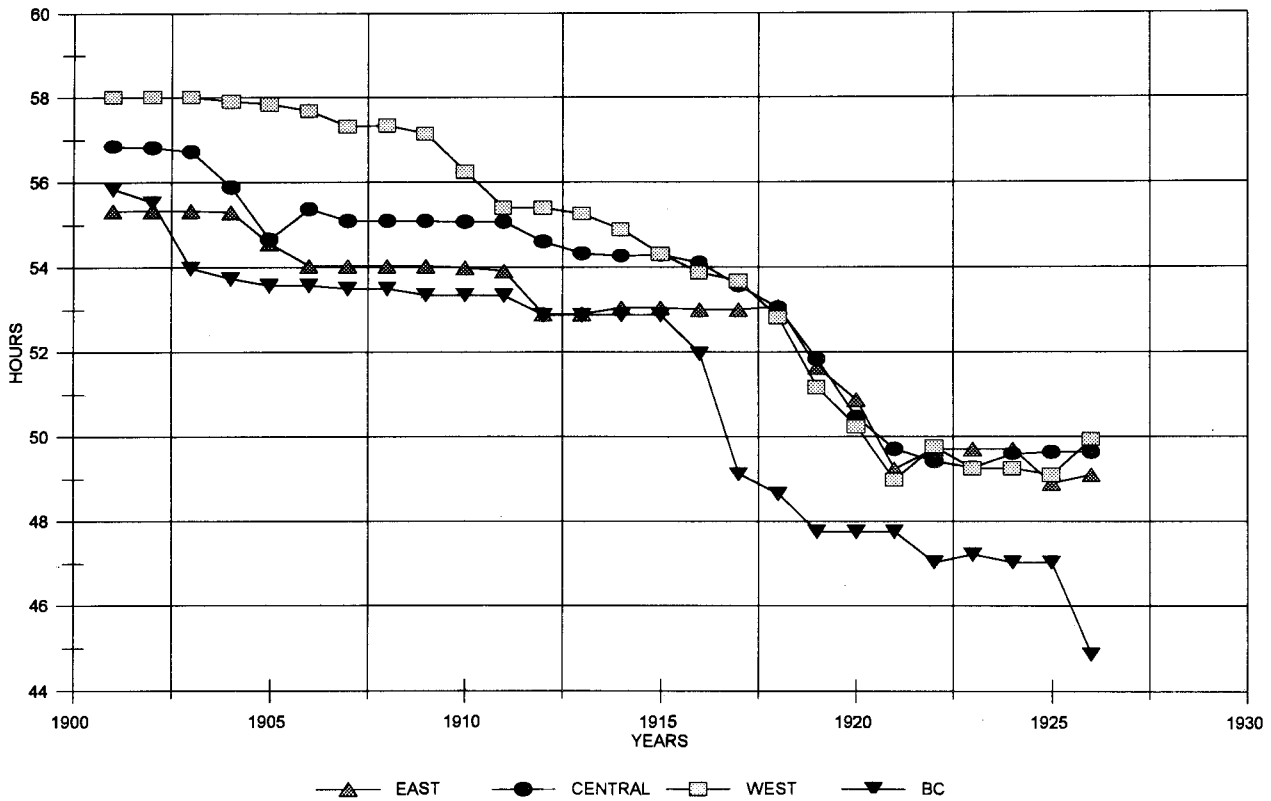
GRAPH ONE
MFG HOURS WORKED IN CANADA AND THE USA



Graph I. MFG. Hours Worked in Canada and the U.S.A.

GRAPH TWO

PROVINCIAL MANUFACTURING HOURS WORKED



Graph 2. Provincial Manufacturing Hours Worked

membership soared, rising from 166,000 in 1914 to 205,000 in 1917 and to 378,000 in 1919, the year of Canada's great general strike. The number of strikes also increased from 44 in 1914 to 148 in 1917, peaking at 298 in 1919. These strikes affected only 8,600 workers in 1914. By, 1917, 48,000 were involved, peaking at 139,000 by 1919.[11] In short shrift workers were, on average, able to purchase a reduced work week when real hourly wages began to increase once again.

On the supply-side of the labor market, a shorter work week combined with a higher real hourly wage rate could generate higher unit costs and lower profits, *ceteris paribus*. The struggle for a shorter work week, therefore, might very well have contributed towards the search by employers for more efficient and effective ways of employing labor at the turn of the century which would have made the combination of a shorter work week and higher real hourly wages compatible with the competitive position of the firm.[12] Keep in mind that it was this period of time which also just happens to be one which was characterized by rapid growth in labor productivity in Canada's manufacturing sector as well as in the economy in general (Altman, 1986, 1992a, 1994). In the absence of workers' struggle for a shorter work day, it is quite possible that labor productivity in Canada would not have risen as rapidly as it did at the turn of the century. On the other hand, without the vibrant productivity increases which took place in the Canadian economy in the pre-Great Depression years, a shorter work week at no cost in real income to workers would have been difficult to manage in the face of competitive pressures on the product market.

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[11]Dominion Bureau of Statistics, *The Canada Year Book, 1927–28*, Ch. 8, Tables 2, 11 and 18.

[12]Efficiency wage theory clearly suggests that there is a very powerful relationship between movements in wage rates and labor productivity (Akerlof and Yellen, 1986). In behavioral economics the argument is made that higher wages serve to pressure firms into becoming more technically efficient (X-efficient) and into adopting and developing more cost efficient technologies and forms of firm organization. Without such pressures it can be expected that productivity would be less than it could otherwise be (Altman, 1990, 1992b, 1996).

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