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LABOR MARKET INEQUALITY

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ABSTRACT

This paper examines educational earnings differentials in Canada in the 1980s and compares changes in differentials to those in the United States. Our major finding is that the college/high school differential increased much less in Canada than in the United States. We also find that within educational groups the distribution of earnings widened, gender pay gaps narrowed, and age pay gaps increased in Canada as in the United States. The greater growth of the college graduate proportion of the work force in Canada than in the United States is one important reason why differentials rose more modestly in Canada than in the United States. The greater strength of Canadian unions in wage-setting, and the faster growth of real national output, and better trade balance in Canada may also have contributed to the lesser rise in differentials. Because Canada and the United States have so many characteristics in common, we interpret our results as indicating that the massive rise of skill differentials in the United States was not the result of some inexorable shift in the economic structure of advanced capitalist countries, but rather reflected specific developments in the U.S. labor market and the way in which the country's decentralised wage-setting system adjusted to these developments.

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In the 1980s differentials in earnings and employment between more and less educated or skilled workers widened greatly in the United States (Murphy and Welch; Katz and Revenga; Blackburn, Bloom, and Freeman). The pay of college graduates, of professionals and managers and of other white collar workers increased relative to the pay of less educated and blue collar workers; joblessness increased among the less educated but not among college graduates (Freeman, 1990). Dispersion of earnings within educational groups increased (Murphy, Juhn, and Pierce). The rise in earnings and employment differentials was greatest among younger men: from the early 1970s through the 1980s the real earnings of 25-34 year old men with high school or less education fell by some 20%. Their employment-population rate dropped by over 10 percentage points while college graduates suffered no such losses.

What happened to earnings and employment differentials between more and less educated workers in Canada in this era of rising economic inequality in the United States? Did supply and demand for labor shift in the same way in Canada as in the United States? Did Canadian wage-setting institutions respond "more gently" to the market twist against the less skilled than those of the United States? What does the Canadian experience tell us about the causes of the 1980s rise in skill differentials in the United States?

To answer these questions we analyse data from the Canadian Survey of Consumer Finances (SCF) for 1976, 1980, 1987, and 1988 and the Canadian Census of Population (Census) for 1971, 1981, and 1986. The SCF surveys some 36,000-40,000 Canadian households as a supplement to the annual labor force survey and obtains individual and family incomes for the previous year.¹ The Census surveys also provide income information for the previous year, but for much larger samples, than the SCF. For U.S. comparisons we use the public use tapes of the March Current Population Survey (CPS), which asks 50-60,000 households their previous years' earnings and weeks worked.

Our major finding is that the college/high school differential increased much less in Canada than in the United States. We also find that within educational groups the distribution of earnings widened, gender pay gaps narrowed, and age pay gaps increased in Canada as in the United States. The greater growth of the college graduate proportion of the work force in Canada than in the United States is one important reason why differentials rose more modestly in Canada than in the United States. The greater strength of Canadian unions in wage-setting, and the faster growth of real national output, and better trade balance in Canada may also have contributed to the lesser rise in differentials. Because Canada and the United States have so many characteristics in common, we interpret our results as indicating that the massive rise of skill differentials in the United States was not the result of some inexora-

ble shift in the economic structure of advanced capitalist countries, but rather reflected specific developments in the U.S. labor market and the way in which the country's decentralised wage-setting system adjusted to these developments. We cannot, however, rule out the possibility that Canada may be lagging the United States in the rise in inequality.

Canadian micro earnings data

To see how educational earnings differentials changed in the 1980s in Canada, we calculated mean earnings by education and estimated regression coefficients on education dummy variables in log earnings equations using public use data tapes from the Survey of Consumer Finance and the Census of Population. Paralleling work on differentials in the United States (Blackburn, Bloom, and Freeman), we examine only workers aged 25-64 and refer to 25-34 years old as the younger subset. U.S. studies have found that the 1980s rise in educational differentials was concentrated among the young (as was the fall in differentials in the 1970s), presumably because young workers are more likely to be on the "active job market" and are thus more sensitive to changing market conditions than are older workers who are protected by seniority and specific training. We measure earnings by wages and salaries; limit our samples to civilian nonagricultural workers; and (where possible) exclude persons still in school. In addition, we examine several

measures of employment status: weeks worked, employment-population ratios, and unemployment rates.

There are problems with both of the Canadian data sets that we use. The 1986 Canadian Census did not distinguish persons by school enrollment status, leading us to estimate differentials from the 1986 Census and earlier Censuses for samples that include those in school. This creates a possible bias in comparisons with estimated differentials from samples that exclude persons in school. To assess the potential magnitude of the bias, we estimated skill differentials in the SCF and in the earlier Censuses for samples that include those in school and for samples that exclude those in school. These estimates revealed only minor differences between the results for the two groups (presumably because there are relatively few in-school earners among persons aged 25 or more). Failure to determine enrollment status in the 1986 Census thus does not appear to mar our Census-based estimates of the change in differentials.

The SCF public use files that we use are limited to heads of households and spouses. We were able, however, to assess the potential magnitude of the problem of excluding other individuals by estimating earnings equations from the 1987 SCF individual file and the 1987 SCF household head file. We obtained similar results, indicating that for the 25 and older age group on which we focus analysis of the head of household files does not seriously bias estimated differentials in

earnings by education. For comparability over time, we limit analysis of SCF data to family heads and spouses for all years.

Finally, both the Census and SCF files exclude individuals with "extremely unusual characteristics". The U.S. CPS files also go through a "cleaning up" process, and in addition contain extrapolated figures based on the "hot deck" procedure (Bureau of the Census, 1976). Differences in the way statistical offices handle aberrant observations may affect the extremes of the earnings distributions but are unlikely to affect central tendencies or changes over time.

In addition to data problems, there are differences between the Canadian and American education systems that complicates comparisons of educational earnings and employment differentials. Although Canadians and Americans attain roughly the same years of schooling, Canadians do not follow the same pattern of attainment as Americans. In some provinces Canadians graduate high school after 11 years of schooling, while in others they graduate after 12 or 13 years, compared to the uniform 12 years in the United States. Canadians are more likely than Americans to leave school before completing high school but are also more likely to obtain post-high school non-university training. The education questions in the SCF and Census reflect these differences, producing different categorizations than in the U.S. CPS.² We deal with this problem by focusing on the difference between Canadian university graduates (comparable to Americans with 16 or more years of educa-

tion) and persons with 11-13 years of high school and no further training (comparable to Americans with 12 years of schooling).³

weekly earnings differentials among men

Table 1 records the mean real (1975 dollars) weekly earnings⁴ of 25-64 and 25-34 year old Canadian men with 11-13 years of schooling and with university degrees and the log differentials between those means from the 1970s through the 1980s. The upper panel gives data from the Survey of Consumer Finances while the lower panel gives data from the Census of Population. We summarize the changes in terms of average annual changes measured in log units (= differences in the log of earnings between years divided by the number of years). Multiplied by 100, the annual changes can be interpreted as approximate percentage growth rates of earnings: the $-.005$ for university graduates in the 1979-87 column represents a 0.5% average decrease in the real earnings of those workers per year -- which cumulates to an approximate 4% decrease over the 8 year period.

The annual change in real earnings in the 1980s for each group is negative, implying that the decade was one of falling real earnings for male Canadians. This finding is consistent with the results in other data sets that show declining real pay for substantial groups of Canadians in the 1980s. Statistics Canada reports that real compensation per hour fell from 1981 to 1987 and that most union wage settlements in the 1980s

were below the rate of inflation.⁵ OECD data indicate that over the same period real average weekly earnings in manufacturing fell by 0.5% per year in Canada, making Canada second to the U.S. in loss of real earnings among OECD countries.⁶ Finally, note that the decline in real earnings in table 1 is greater for 25-34 year old men than for 25-64 year olds shown in table 1 in all educational groups. This implies that the age-earnings profile shifted dramatically against younger workers in the 1980s in Canada. This is consistent with results reported by Myles, Picot, and Wannell using the 1981 Work History Survey and the 1986 Labour Market Activity Survey.

The lines labelled log earnings differentials in table 1 give log differences between the earnings of college and high school graduates and the annual change in those differentials over time. Despite differences in sampling design and years covered, the SCF and Census of Population show a similar pattern of change: a decline in the college premium in the 1970s consistent with Dooley's (1986) finding of falling educational earnings differentials for full-year full-time workers in that decade; followed by an increase in differentials in the 1980s. The magnitude of the 1980s increase differs modestly between the Census and SCF. For 25-64 year olds the SCF shows a rise in the college-high school premium of roughly 1% (.010 ln points) per year while the Census gives an annual increase of 1.2% per year. For 25-34 year olds the

increase in the premium in the SCF is 1% per year while the increase in the Census is 0.8% per year.

To obtain measures of college-high school pay differentials net of other wage-determining factors, we estimated log weekly earnings equations that control for age, region, and marital status. The earnings differentials in the regressions differ from the differences in table 1 for two reasons: addition of covariates (primarily for age); and differences between the log of the geometric mean (the regression concept) and the log of arithmetic mean (the table 1 measure). Table 2 summarizes the results of our regressions for Canadian men aged 25-64 and aged 25-34 in terms of the estimated college/high school earnings differentials in each year and the annual log point changes over time. In addition, it gives comparative differentials and changes in differentials for the United States based on essentially identical regressions. All of the estimated differentials have sufficiently small standard errors to justify omitting standard errors from the table for ease of presentation.

The data for Canada and the United States in the column "annual change" in table 2 shows that Canada experienced **much smaller** increases in educational earnings differentials in the 1980s than did the United States. For 25-64 year old men, the Census-based 0.4% annual increase in the college premium in Canada and the SCF-based 0.5% annual increase are far below the 2.0% increase in the United States. As college-high school

differentials declined in Canada by about as much as in the United States in the 1970s (from 1975 to 1979 the drop in the SCF was .05 compared to a .05 drop in the CPS), this conclusion holds up even if we extend the period covered several years back. For 25-34 year olds, the Canadian Census-based increase in the differential is one-sixth as large as the CPS-based increase in the United States, while the SCF-based increase is one-fifth as large as the U.S.'s increase. From 1979 to 1987 the college/high school differential among 25-34 year olds rose by 0.21 log points in the United States but by just 0.04 log points in Canada! Extending the comparison back to 1975 makes the differences are even more striking. Canadian differentials fell from 1975 to 1979, though here we caution that U.S. differentials fell sharply from 1969 to 1975 (Freeman, 1976) so that 1975-87 comparisons may overstate the change. Still, it is evident from table 2 that something very different was going on in the labor markets in the two countries, particularly for young men, during this period.

differentials in labor utilization

Shifts in labor market conditions can alter labor utilization as well as rates of pay. In the United States the increased pay differential among education groups was accompanied by increased differences in unemployment rates, employment-population ratios, and weeks worked -- a pattern that implies that changes in weekly earnings differentials **understate** the market shift against the less educated. Is the same true in

Canada? Were the smaller increases in earnings differentials in Canada offset by larger increases in labor utilisation differentials, so that educational differentials overall increased as much in Canada as in the United States?

To answer these questions we estimated 1980s changes in differentials in weeks worked, unemployment, and employment-population ratios in Canada and in the United States. Our evidence, summarized in table 3 and in figures 1 and 2, shows that the employment prospects of high school graduate men worsened relative to that of college graduates, particularly among the young, in the 1980s in Canada as well as in the United States. Most but not all of the statistics show greater declines in the relative utilisation of the less educated in Canada. Consider first the estimated log differentials in weeks worked in Canada in the upper panel of table 3. These differentials are based on regressions of log weeks worked on education and age dummies and the same additional control variables as in the table 2 weekly earnings regressions. Both the Census and SCF data show an increase in the differential in weeks worked between high school and college graduates in Canada. The Census places most of the rise in weeks worked differentials in the 1970s while the SCF places most of the rise in the 1980s⁷. For 25-64 year olds the increase in the differential in weeks worked is larger in Canada than in the United States. However, Blackburn, Bloom, and Freeman report that employment-population and unemployment rate differentials

among educational groups widened more in the 1970s than in the 1980s in the United States, raising the possibility that the greater increase in differentials in weeks worked in Canada in the 1980s may largely be a matter of timing. Among 25-34 year olds, the SCF shows a larger increase in the differential in weeks worked between college and high school graduates in Canada than in the United States. But the Census shows no increase in the differential in Canada at all in the 1980s, giving an ambiguous picture overall.

Figure 1, which records unemployment rates for college and high school men in Canada and the United States, gives greater support to the proposition that the job prospects of the less educated deteriorated more in Canada than in the United States. Between 1976 and 1987, when the unemployment rate of 25-64 year old college graduates was virtually unchanged in Canada and the United States, the rate of unemployment of 25-64 year old high school men increased by 4.3 points in Canada compared to a 1974-88 increase of 2.7 points in the United States. Over the same period the rate of unemployment of 25-34 year old high school men in Canada increased by 5.4 points compared to a 3.1 point increase in the United States. Greater growth in the unemployment of less educated men in Canada than in the United States is consistent, we note, with the greater increase in the aggregate unemployment rates in Canada than in the United States post the 1973 oil shock (Ashenfelter and Card).

The employment-population ratios in figure 2 present a more mixed picture of the changes in relative labor utilisation in the two countries due to differences in the timing of the deterioration of the position of the less educated. In the United States, the employment-population ratio for high school men fell in the late 1970s, then roughly stabilized, while in Canada the employment-population ratio of high school graduates fell largely in the 1980s. The larger drop in the employment-population ratio in Canada in the 1980s is consistent with the notion that Canada responded to the deteriorating job market for the less educated with a relatively greater quantity adjustment than with price adjustment. But the decline in employment-population ratios for high school graduates in the United States in the late 1970s suggests that the timing of the drop in employment-population ratios may be the key differentiating feature between the two labor markets: U.S. high school graduate men took their "hit" in employment in the 1970s while their Canadian peers took their "hit" in the 1980s.

annual earnings

To what extent do differences in the pattern of change in labor utilisation between the United States and Canada alter our principal claim, that educational differentials increased less in Canada in the 1980s? One way to answer this question is to estimate annual earnings differentials between college and high school graduates in the two countries. While one can argue about how to weight differentials in rates of pay and in

employment in any assessment of overall changes, yearly earnings provides a convenient metric for aggregating patterns of change in weekly earnings and weeks worked. Accordingly, we estimated university-high school differentials in log earnings using the same samples and covariates as in our weekly earnings and weeks worked regressions.¹

The lower panel of table 3 presents the estimated differentials in yearly earnings between college and high school graduate men in Canada, annual changes in the differentials, and comparable differentials and changes for American men. It shows that even after taking account of the occasionally greater increase in weeks worked differentials in Canada, **the increase in educational earnings differentials was markedly less in Canada than in the United States.** Among 25-64 year old men the SCF-based increase in differentials is 1.3% per year in the 1980s; the Census-based increase in differentials is 0.6% per year. These figures compare to a 2.1% increase in the U.S. CPS-based differential. Among 25-34 year olds, the SCF shows an increase in Canada in the 1980s that is just half that in the United States. The larger Census sample shows an increase that is less than one-seventh the comparable increase in the United States.

Finally, to make sure that the smaller increase in skill differentials in Canada is not due to the particular years for which we obtained SCF data or the years of the Census, we examined time series data on the annual incomes of college

graduates and men with some high school education yearly for Canada and the United States. For Canada our data come from published and unpublished data from Statistics Canada's Income Distribution by Size in Canada reports, which give total incomes for men with university degrees and with some high school, but not for high school graduates, which dictates the comparison of college graduates to persons with some high school education. For comparability for the United States, we grouped income from the CPS Consumer Income Report Series P-60 for men with 12 years of schooling and men with 9-11 years to obtain earnings for persons with some high school, and contrasted their incomes with that of men with college degrees.

Panel A of figure 3 graphs the time path of these income ratios for men in the two countries. It shows that the smaller rise in differentials in Canada in our micro survey analysis is not due to any peculiarity of the years covered. In the mid-1970s the university-high school income ratio was greater in Canada than in the United States; thereafter the U.S. ratio rises more rapidly until by 1987 it exceeds the Canadian ratio. If we carried the U.S. figures back further, we would find a marked decline in the differential from the late 1960s through the mid 1970s (Freeman, 1976) similar to the decline in Canada from 1976 through 1980. This finding again suggests that part of the difference in the pattern of changes in earnings differentials may be due to differences in the timing of changes

between the two countries but does not gainsay the more modest 1980s rise in educational differentials in Canada.⁹

within education and overall inequality

One of the most striking changes in the distribution of earnings in the United States in the 1980s was the growth of inequality among persons with the same education (Murphy, Juhn, and Pierce). According to Murphy, Juhn, and Pierce, indeed, within-group dispersion rose even in the 1970s, offsetting the effects of the falling college premium on overall earnings inequality. Has there been an analogous increase in earnings inequality for workers within educational categories in Canada? How do changes in within-group inequality compare between the countries?

Figure 4 records ln differences in annual earnings between the highest and lowest deciles for college and high school men in Canada in 1975, 1979, and 1986 from the Survey of Consumer Finances. The figures show that earnings inequality increased among workers with the same educational attainment in Canada. Among college graduates aged 25-64, the log differential between those in the top and bottom deciles rose from 1.39 in 1979 to 1.55 in 1986, while among men with 11-13 years of school the increase is even greater.¹⁰ Similarly, among men 25-34 the decile differential increased moderately among college graduates and massively among those with 11-13 years of school. The pattern of increasing within-group inequality in earnings in the 1980s is comparable to that found in the United

States. Where the countries differ is in the 1970s changes. From 1975 to 1979, figure 4 shows that in Canada the decile differential were roughly unchanged for college graduates and rose only modestly for high school men -- in contrast to the increase in earnings inequality within education groups found in the United States in the 1970s.

The absence of increased within-group inequality in Canada in the 1970s and the more modest increase in educational differentials in Canada than in the United States in the 1980s have an important implication for the overall pattern of earnings inequality among men in the two countries. They imply that from the 1970s through the 1980s inequality among male workers increased less in Canada than in the United States.

female workers

In the United States the college-high school earnings differential increased in the 1980s among female as well as among male workers. In the same period male-female earnings gaps fell within education groups. What happened to the college-high school differential among women and to female-male differentials in Canada?

To see how Canadian women workers fared we estimated log weekly and annual earnings equations for working women in the SCF and Census data sets using the same regression model that we used to analyse male earnings. For comparative purposes we estimated the same equations for females in the United States, using the relevant March CPS files. The results of this

analysis, given in panels A and B of table 4 for weekly and annual earnings respectively, tell a clear story about changes in the 1980s. Panel A reveals that there was at most a modest increase in college-high school weekly earnings differentials among women in Canada. The Census data show effectively no change in the university-high school premium (paralleling the small increase in the premium found among men in the Census), while the SCF data shows 0.5% increases per annum in the premium for both 25-64 year olds and 25-34 year olds compared to much larger rises in the university premium of 1.3% for 25-64 year old U.S. women and 1.4% for 25-34 year old U.S. women. The annual earnings differentials in panel B tell a similar story. Among 25-64 year olds, the Census shows a decline in university-high school differential in Canada from 1980 to 1985, while the SCF shows smaller increases than are found in the United States from 1979 to 1987. Among 25-34 year olds, the Census also shows a drop in differentials, but the SCF shows a rise in differentials only modestly less than that in the United States. The sharper rise in differentials in annual earnings than in weekly earnings for young women in Canada implies a large increase in the weeks worked advantage of university over high school women, relative to the change in the United States.

As a final check on the pattern of change in educational differentials in Canada, we used published and unpublished figures on the annual incomes of college graduate women and of

women with ~~some~~ high school to estimate educational differentials over the entire 1975-1987 period. The income ratios in panel B of figure 3 show that the years covered in our regression estimates do not distort the pattern in differentials and suggest that even over the longer period differentials increased less in Canada. In the mid and late 1970s educational income differentials among women were considerably greater in Canada than in the United States. The gap between the differentials narrowed, however, in the 1980s, so that by 1987 the Canadian ratio was only slightly higher than the U.S. ratio. We conclude that educational earnings differentials increased less among women in Canada than in the United States in the period under study, just as they increased less among Canadian than American men.

Table 5 records statistics on another aspect of the changing job market for women in Canada: the level and pattern of change in earnings differentials between men and women within educational groups. Columns 1 and 2 give the ratios of the mean earnings of women to men from the SCF for 1975, 1979 and 1986. Columns 3-4 give comparable differentials for the United States based on mean earnings tabulated from the March CPS tapes. In the column under university for Canada, the 0.55 for 1975 indicates that Canadian female graduates earned 55% of the earnings of male graduates in 1975 while the 61% figure for 1986 shows that women gained 61% of men and thus gained 6 percentage points or 10% relative to men. The table shows

roughly comparable gains of female university and high school graduates relative to their male peers in Canada, and more rapid gains in annual earnings differentials than in weekly earnings differentials due to a huge increase in weeks worked by Canadian women within educational groups. The comparative U.S. figures show a somewhat different pattern of increases in female pay relative to male pay by educational group. Here, females make larger gains in weekly earnings ratios among high school graduates than among university graduates. This reflects the particularly poor labor market for male high school graduates in the United States. In both countries 24-34 year old women have earnings closer to that of their male peers than women aged 25-64. The gains of the younger women are not markedly different than those of all women, measured in percentage points of the earnings ratios."

why did differentials increase less in Canada?

The question which naturally arises from our major finding is "why did educational differentials increase less in Canada than in the United States in the 1980s?" What factors moderated the growth in wage differentials between these two broadly similar economies?

There are, in our view, two potential sorts of explanatory candidates: differences in 'exogenous shocks' impacting the Canadian and American labor markets; and differences in the response of wage-setting and other market institutions to the

shocks. We consider the effect of these forces in a simple model of changes in relative wages:

$$(1) \quad RW' = u_d D' - u_s S' + v I', \text{ where}$$

RW measures the relevant wage differential;

D is the relative demand for skills;

S is the relative supply of skills;

I refers to institutional or other factors that affect differentials independently of supply and demand;

' denotes log differentials (i.e. $D' = d \log D$).

If institutional factors have no influence on wages ($v = 0$) and the market clears, and if we properly measure shifts in supply and demand, the coefficients in (1) have a ready structural interpretation: $u_d = u_s =$ the inverse of the sum of the relative demand and supply elasticities for the groups (see Blackburn, Bloom, and Freeman). Otherwise, (1) should be simply viewed as a reduced form equation assessing the response of wages to measured supply shifts, demand shifts, and institutional factors.¹² To the extent that those measured factors differ between Canada and the United States, the inter-country differences in the pattern of educational earnings differentials over time may be at least partly explained. Given available data, we focus on the following factors: the ratio of college to high school populations; the level of real national product; the trade balance as a percentage of national output; and the percentage unionised.

The ratio of college to high school workers should reduce the college-high school differential as increases in relative supply move market wages down the relative demand curve (Freeman, 1976; Katz and Revenga; Bloom, Blackburn and Freeman; Katz and Murphy). In the United States the growth of the ratio of college graduates to high school graduates decelerated among 25-64 year old men in the 1980s. Among the 25-34 year old men for whom the college-high school differential rose the most, the deceleration was so great that the ratio of college to high school graduates actually fell -- the lagged response to the decline in enrollments induced by the falling return to college of the 1970s. Data from Statistics Canada's The Labour Force show a very different pattern of change in Canada: from 1979 to 1987 the ratio of 25-64 year old male college graduates to men with high school rose by 0.18 ln points compared to a CPS-based increase in the college/high school ratio in the United States of 0.05 ln points. Unpublished SCF data show that among 25-34 year old men, the number of men with university education relative to those with just high school training increased by 0.04 ln points from 1981 to 1987 compared to a 0.16 ln point drop in the comparable ratio in the United States.¹³ Thus, we expect differences in the growth of relative supplies to help account for the smaller growth of the college-high school differential in Canada.

On the demand side, the overall state of the economy, as reflected in the national output, is likely to reduce the

educational differential because the less skilled benefit most from a rapidly expanding economy (Blackburn, Bloom, Freeman, table 7). Since GDP grew more by 2.9% per year in Canada from 1979 to 1987 compared to 2.6% for the United States, this may also help explain the smaller increase in the differential. The trade balance has been hypothesized to have contributed to the increased educational differentials in the United States because lower skilled workers are adversely affected by imports (Murphy and Welch; Blackburn, Bloom, and Freeman). The large trade surpluses in Canada in the 1980s compared to the large deficits in the United States¹⁴ suggests that the difference in the relative trade balance between the countries may help explain the slower increase in skill differentials in Canada.

Finally, on the institutional side, because trade unions generally organise less educated blue collar workers to a greater extent than more educated white collar workers, and often have a bigger effect on the wages of the former, the decline in union density has also been proposed as a cause of the increased educational earnings differentials in the United States (Freeman, 1991). U.S. union density fell in the 1970s and 1980s, while Canadian density held roughly constant. Even in manufacturing where Canadian density dropped in the 1980s (Kumar, Coates, & Arrowsmith), U.S. density fell more. The different changes in union representation might also have contributed to the differing change in educational differentials between the two countries.

We examine the effects of these factors on college-high school earnings differentials for males using U.S. and Canadian time series data. For the U.S. the CPS provides sufficiently lengthy time series data for estimating the effect of the four factors on earnings differentials (see Freeman, 1977; Blackburn, Bloom, and Freeman, 1990; Katz and Revenga, 1990). For Canada, changes in educational classifications in 1975 give us a very limited time series, but one that in conjunction with the U.S. data provides some evidence on potential determinants of change.

Table 6 presents our estimates of equation (1). In addition to relative supply, real GDP, the trade balance, and union density, each equation includes a linear time trend. Columns 1 and 2 give the coefficients and standard errors from our analysis of the Canadian data, with unionisation excluded from the first equation and included in the second equation. Columns 3 and 4 give the results from analysis of differentials for all men in the U.S.; column 5 presents the results of a pooled sample of data from the two countries; while columns (6) and (7) treat men aged 25-34 in the United States. Exclusive of the time trend, only one variable has a significant coefficient in all specifications: relative supplies. The log of real GNP has a substantial negative effect on the earnings differential in the U.S. equations and in column (1) for Canada but not in column (2). The trade balance has a strong effect in the U.S. data but not in the Canadian data. Unionisation

substantially reduces earnings differentials in the United States but a positive effect on differentials in Canada, which makes us uneasy about using the time series to assess the effect of unionism. In the pooled sample, we exclude unionisation and obtain strong statistical results on relative supplies and the log of real GNP.

The one solid inference from these calculations is that relative labor supplies has an important effect on relative earnings. Indeed, given the estimated coefficients in the table, the faster growth of the relative supply of university graduates in Canada accounts for two-thirds or so of the slower growth of educational earnings differentials in Canada. Specifically, from 1979 to 1987 the university-high school differential rose among 25-64 year old men by 0.04 points in Canada compared to 0.16 points in the U.S. (table 2), producing a 0.12 smaller increase in Canada. The difference in the growth of the ratio of university to high school male workers between the countries was 0.11 ln points. Multiplying 0.11 by the $-.68$ coefficient in our pooled regression (5) in table 6 yields a predicted difference of 0.07 points. Similarly, the difference in the increase in the university-high school premium between the United States and Canada among 25-34 year old men was .17 points (table 2). The difference in the growth of the ratio of university to high school men aged 25-34 between the countries was 0.20. Multiplying .20 by $-.68$ which yields a 0.14 predicted difference; multiplying .20 by the

smaller -0.33 estimated coefficient in column 6 yields a 0.07 contribution of relative supplies to the slower growth of the university premium in Canada among 25-34 year olds.

As another way to demonstrate the effect of relative supplies, we used our pooled Canadian-U.S. data to calculate differences in the university to high school earnings differentials between the countries. We regressed the difference in the differentials on a linear trend and obtained a coefficient (standard error) of $-.005$ ($.002$). When we added the difference in relative supplies to the equation, the coefficient on the trend term fell by 60%, to $-.002$ ($.001$).

The evidence that differential shifts in relative supplies of labor dominate the time series data does not, of course, mean that greater growth in the relative supply of college graduates is the reason for the slower growth of the educational differential in Canada but does reaffirm the fact that the time series evidence supports a strong role for relative supplies. Other factors -- growth of GNP, unionisation, trade balance -- may very well have also contributed to the slower growth of relative earnings in Canada, but here the time series evidence is more mixed: the U.S. data show substantial effects while the limited Canadian data do not. In addition, it is possible that shifts in demand for educated labor that we have failed to measure, say due to technological factors that alter the demand for educated workers within sectors (Mincer; Allen; Osberg, Wolff, and Baumol), may have been more extensive in the

United States than in Canada. Our evidence is silent on this point.

Summary

This study has shown that during the 1980s decade of rising educational earnings differentials in the United States, weekly and annual earnings differentials between college and high school men and women widened less sharply in Canada than in the United States. We also found growing gaps in weeks worked, employment-population ratios, and in unemployment rates between more and less educated men in Canada. As far as we can tell, the major cause of the more modest rise in educational earnings differentials in Canada, at least among men, was the greater expansion in the relative number of college educated workers, though other factors -- unionisation, trade, growth of real output, technological change -- may have also played a part in accounting for the differences between the countries.

Table 1:
Real (1975 \$) and Relative Weekly Earnings and Log Changes in Weekly Earnings of Canadian Men Aged 25-64 and 25-34, by Education, 1970-87

Survey of Consumer Finances					
	levels			annual	
	1975	1979	1987	1975-79	1979-87
<u>Men 25-64</u>					
Real Earnings					
Univ Degree	382	370	367	-.008	-.001
11-13 Yrs School	271	275	252	.003	-.011
Log Earnings Differentials					
Univ Degree/11-13,	.34	.30	.38	-.010	.010
<u>Men 25-34</u>					
Real Earnings					
Univ Degree	302	306	286	.000	-.008
11-13 Yrs School	243	258	223	.015	-.018
Log Earnings Differentials					
Univ Degree/11-13	.22	.17	.25	-.013	.010
Census of Population					
	levels			annual	
	1970	1980	1985	1970-80	1980-85
<u>Men 25-64</u>					
Real Earnings					
Univ. Degree	418	395	388	-.006	-.004
11-13 Yrs School	262	283	263	.008	-.014
Log Earnings Differentials					
Univ Degree/11-13	.47	.33	.39	-.014	.012
<u>Men 25-34</u>					
Real Earnings					
Univ. Degree	291	308	292	.006	-.010
11-13 Yrs School	236	257	234	.009	-.018
Log Earnings Differentials					
Univ Degree/11-13,	.21	.18	.22	-.003	.008

 Source: Tabulated by the authors from the relevant Surveys of Consumer Finance and Censuses of Population. Note for consistency of trends over time the Census data includes persons in school while the SCF data excludes those persons.

Table 2:

Regression Estimates of University/High School Ln Weekly Earnings Differentials, 25-64 and 25-34 Year Old Men in Canada and United States, 1970-87

Group/Country/Source	1970 (1)	1975 (2)	1979/80 (3)	1985 (4)	1987 (5)	Annual Change 1979/80 to 1985/87
Men Aged 25-64						
Canada						
SCF	--	.34	.29	--	.33	.005
Census	.40	--	.32	.34	--	.004
United States						
CPS	--	.28	.23	--	.39	.020
Men Aged 25-34						
Canada						
SCF	--	.22	.16	--	.20	.005
Census	.21	--	.19	.21	--	.004
United States						
CPS	--	.14	.12	--	.33	.026

Notes:

1979/80 data refer to 1979 for SCF and U.S. CPS; 1980 for Census
 1985/87 data refer to 1985 for Census, 1986 for SCF, and 1987 for CPS
 SCF figures include persons in school. Census figures include persons in school. United States figures exclude persons in school.

Source: Canada, estimated by regression analyses from the relevant data sources, with the following control variables: 9 dummies for province, 2 dummies for married and for other marital status than single; 8 age dummies, covering five year groups. The regressions included persons with other years of schooling also. The number of observations was limited by the number of people who reported both weeks worked and earnings. They ranged from 8,729 to 13,370 for 25-64 year olds in the SCF; from 38,071 to 76,483 for 25-64 year olds in the Census; from 2,933 to 4,537 for 25-34 year olds in the SCF; from 12,037 to 24,820 for 25-34 year olds in the Census; depending on the year

United States, estimated by regression analyses from the Current Population Survey March Tapes, with the following control variables: 3 dummies for region, 2 dummies for married and for other marital status than single; 8 age dummies, covering five year groups. The regressions included persons with other years of schooling also. The number of observations was limited by the number of people who reported both weeks worked and earnings. They ranged from 21,172 to 26,144 for 25-64 year olds; and from 7317 to 9379 for 25-34 year olds; depending on the year.

Table 3:
Differentials in Log Weeks Worked and Annual Earnings Between
University and High School Graduate Men, 25-64 and 25-34:
Canada vs. United States, 1970-1987

	Estimated Differential in Log Weeks Worked					
	25-64			25-34		
	SCF	Census	US	SCF	Census	US
1970	--	-.02	--	--	-.07	--
1975	.02	--	.06	-.02	--	--
1979/80	.03	.02	.04	.01	.01	.00
1985	--	.03	--	--	.01	--
1987	.07	--	.05	.08	--	.03
Annual Changes						
1979/80 to						
1985/87	.005	.002	.001	.009	.000	.003
	Estimated Differential in Ln Annual Earnings					
	25-64			23-34		
	SCF	Census	US	SCF	Census	US
1970	--	.37	--	--	.13	--
1975	.36	--	.34	.26	--	.20
1979/80	.30	.34	.27	.17	.20	.16
1985	--	.37	--	--	.22	--
1987	.40	--	.44	.28	--	.39
Annual Changes						
1979/80 to						
1985/87	.013	.006	.021	.014	.004	.029

 Source: Estimated by regression analysis, as described in the source to table 3, with dependent variables ln weeks worked and ln annual earnings. Sample sizes are larger than in table 2 because some persons reported weeks worked and not annual earnings, while others reported annual earnings but not weeks worked

Table 4:

Differentials in Earnings Between University and High School Graduate
Women, 25-64 and 25-34; Canada vs. United States, 1975-1987

	Estimated Differential in Log Weekly Earnings					
	25-64			25-34		
	SCF	Census	US	SCF	Census	US
1975	.43	--	.35	.40	--	.37
1979/80	.49	.50	.38	.46	.45	.41
1985	--	.50	--	--	.45	--
1987	.53	--	.48	.50	--	.52
Annual Changes						
1979/80 to						
1985/87	.005	.000	.013	.005	.000	.014
	Estimated Differential in Ln Annual Earnings					
	25-64			25-34		
	SCF	Census	US	SCF	Census	US
1975	.53	--	.40	.51	--	.48
1979/80	.61	.56	.42	.58	.52	.51
1985	--	.52	--	--	.47	--
1987	.66	--	.55	.67	--	.62
Annual Changes						
1979/80 to						
1985/87	.006	-.008	.016	.011	-.004	.014

 Source: Canada, estimated by regression analyses from the relevant data sources, using the same control variables as in table 2. The number of observations ranged from 4453 to 7774 for 25-64 year olds in the SCF; from 16917 to 54019 for 25-64 year olds in the Census; from 1793 to 3112 for 25-34 year olds in the SCF; from 35809 to 70277 for 25-34 year olds in the Census.

United States, estimated by regression analyses from the March CPS files, using the same control variables as in table 2. The number of observations ranged from 15184 to 23168 for 25-64 year olds; and from 5246 to 8616 for 25-34 year olds.

Table 5
Female-Male Earnings Ratios, by Education and Age Group,
Canada and the United States

	CANADA		UNITED STATES	
	Univ	11-13	Univ	HS
A. Women 25-64				
Annual Earnings				
1975	.45	.37	.49	.44
1979	.52	.39	.51	.44
1986	.54	.46	.57	.53
Δ	.09	.09	.08	.09
Weekly Earnings				
1975	.55	.48	.55	.48
1979	.59	.47	.56	.48
1986	.61	.52	.60	.55
Δ	.06	.04	.05	.07
B. Women 25-34				
Annual Earnings				
1975	.53	.37	.59	.46
1979	.58	.38	.61	.47
1986	.66	.48	.67	.57
Δ	.13	.11	.08	.11
Weekly Earnings				
1975	.65	.53	.65	.51
1979	.66	.47	.68	.52
1986	.70	.56	.70	.61
Δ	.05	.03	.05	.10

Note: Years used for Canada were 1986, for the United States, 1987.

Sources: Canada - tabulated by authors from Survey of Consumer Finances tapes.
 U.S. - tabulated by authors from March Current Population Survey tapes.

Table 6
Estimates of Supply and Demand Effects on University-High School Earnings
Differentials of Men, Canada, 1975-87 and United States, 1967-87

	CANADA		ALL MEN		MEN AGED 25-34		
	(1)	(2)	U.S.	(4)	Pooled	U.S.	(7)
intercept	3.55	-3.36	-1.84	.33	-.31	-1.02	.05
log rel supply	-.53 (.38)	-.99 (.34)	-.59 (.12)	-.35 (.08)	-.68 (.14)	-.33 (.04)	-.25 (.08)
log real GDP	-.97 (.46)	-.10 (.49)	-.67 (.26)	-.52 (.14)	-.53 (.24)	-.62 (.25)	-.63 (.25)
trend	.051 (.021)	.030 (.018)	.036 (.009)	.012 (.006)	.037 (.009)	.024 (.007)	.025 (.010)
trade balance/GDP (in %)	-.006 (.011)	-.001 (.009)	-.008 (.004)	-.008 (.002)	-.001 (.004)	-.006 (.004)	-.008 (.004)
% Union		.030 (.011)		-.016 (.003)			-.021 (.008)
Canada dummy					3.96 (1.89)		
# observations	13	13	21	21	34	21	21
R ²	.50	.74	.79	.94	.90	.86	.88

 Source: Estimated from time series data. U.S., data as reported in Blackburn, Bloom, and Freeman. Canada, relative incomes, from published and unpublished Survey of Consumer Finance data; relative supply, from Statistics Canada, The Labour Force; real GDP, from OECD, National Accounts; Trade balance, from International Financial Statistics Yearbook 1990; %Union, from Kumar, Coates, and Arrowsmith.

Figure 1: Unemployment Rates for Men, by education, Canada vs. U.S., 1974-1988

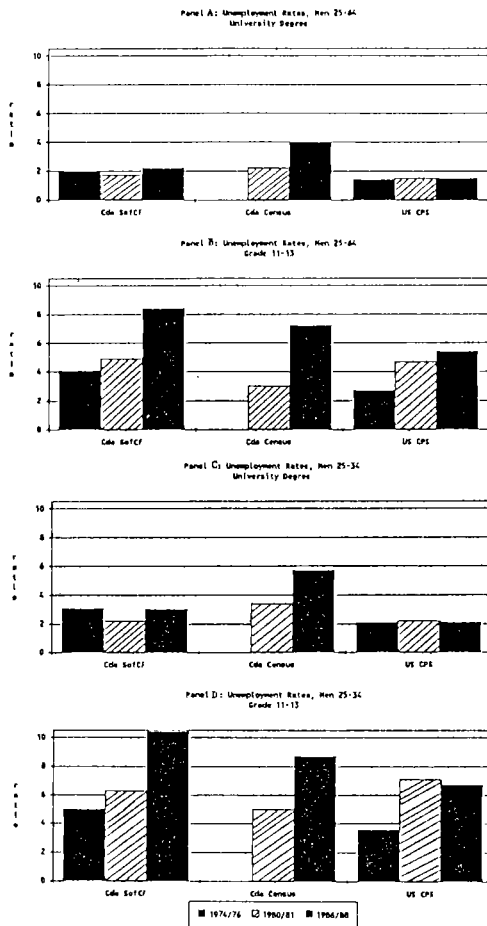


Figure 2: Employment-Population Rates for Men, by Education, Canada vs. U.S., 1974-1988

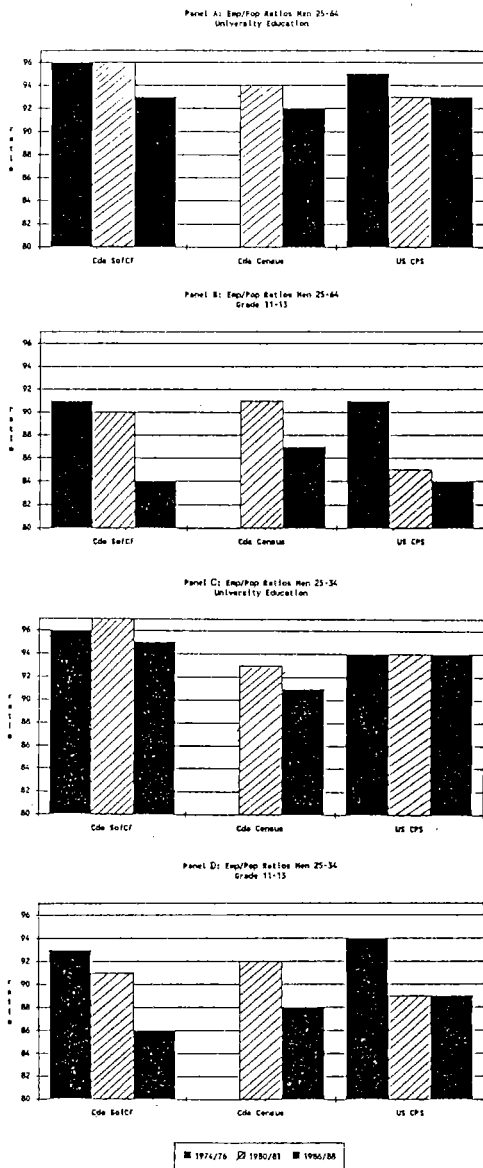


Figure 3a: Mean Income Ratios, Univ/Some HS
Canada vs U.S., Men 1975-1987

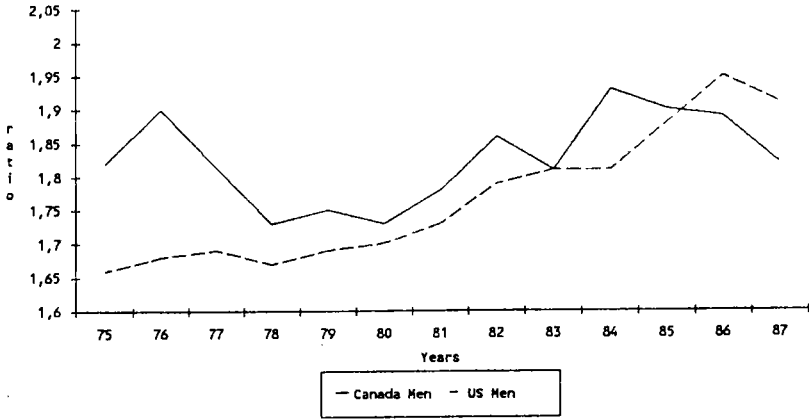
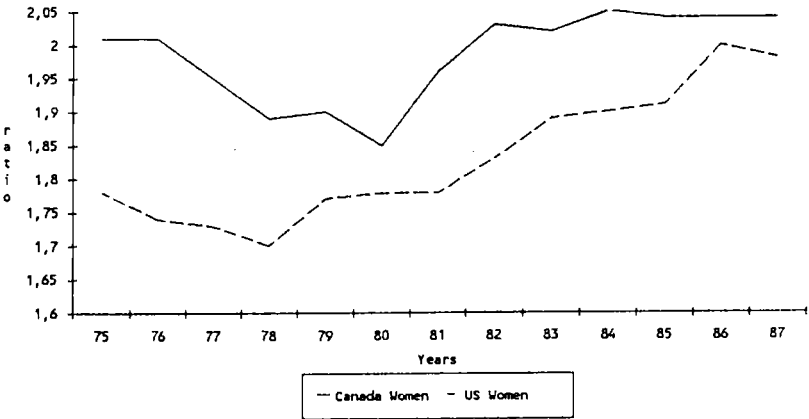


Figure 3b: Mean Income Ratios, Univ/Some HS
Canada vs U.S., Women, 1975-1987

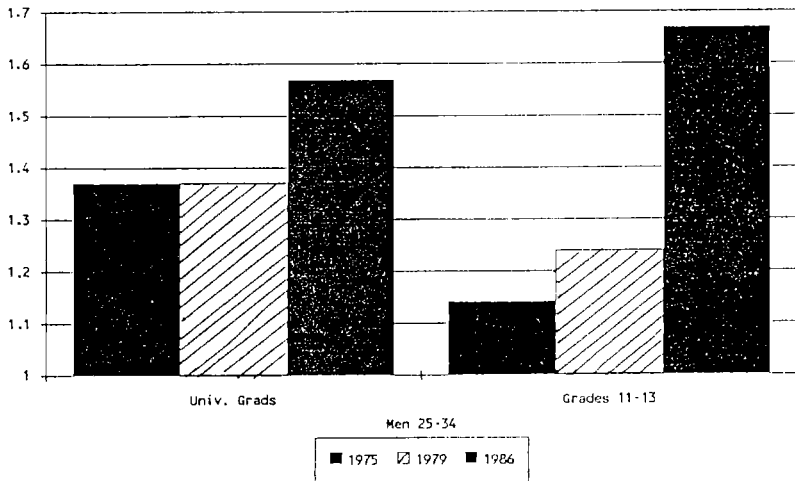
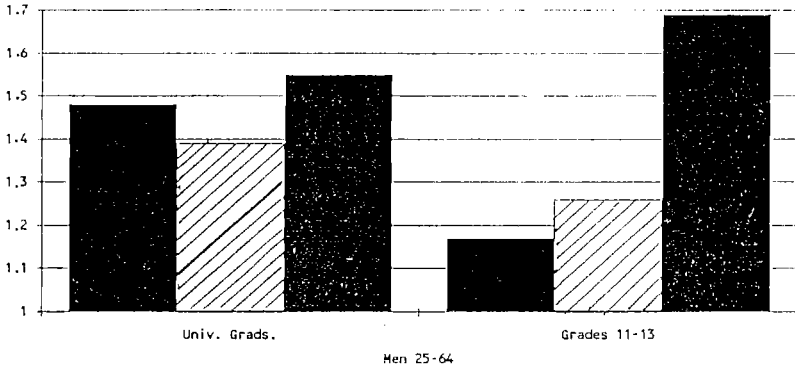


Sources:

Canada - authors' calculations from Statistics Canada, Income Distribution by Size in Canada, Table: "Percentage Distribution of Individuals by Income Groups, Education and Sex", various years.

United States - authors' calculations from Current Population Reports, Series P-60, Table: "Education and age - Persons 25 yrs. old and over by total money income, by race and sex", various years.

Fig 4: Ln High/Low Decile Annual
Earnings Differential, Canada (SCF)



Endnotes

1. See Methodology of the Canadian Labor Force Survey, 1976, catalogue 71-526 and Guide to Labor Force Survey Data, catalogue 71-528.
2. The SCF does not provide information to tell if a person graduated school. The 1981 and 1986 Censuses do provide such information, and we make use of it in determining education status. The education groups for which data are provided are: 0-8 years; 9-10 years; 11-13 years; some post secondary with no certificate, degree, or diploma; some post secondary with a certificate, degree or diploma; university degree received.
3. In the SCF we used the categories in the survey. For the Census, we followed a more complex procedure, using questions on degrees completed as well as years of schooling. We also examined workers with 0-8 years of schooling, but pay little attention to their earnings in this paper.
4. Because most variation in annual hours worked is due to variation in weeks worked rather to variation in hours per week, weekly earnings are a good measure of rates of pay.
5. Kumar, Coates, and Arrowsmith, pp 668, 679
6. OECD, p 90.
7. The difference between the two data sets does not appear to be due to differences in the groups covered (inclusion of persons in school in the Census figures); to definitions of the education groups; to the precise earnings variables used; nor to the slight differences in years covered.
8. There are slight differences in sample sizes in the three sets of regressions because different numbers of people did not answer the annual earnings and weeks worked questions.
9. The year to year variation in the Canadian college to high school differential shown in figure 2 does little to explain the difference between the 1980-1985 Census contrasts and the 1979-1986 SCF contrasts. The relevant income ratios fall from 1979 to 1980, but also from 1985 to 1986, roughly balancing out any difference due to the SCF covering 1979-86 and the Census covering 1980-85.
10. This is partly due to the worsened weeks worked of high school men in the period, and is likely to be much less pronounced with weekly earnings.
11. The question of whether the gains are greater for 25-34 year olds hinges on the metric used to measure the gains. If we use a metric of percentage declines in the difference between the female/male ratio and equality in earnings, the gains are greater

for 25-34 year olds. If we use a metric of percentage changes in the ratios, the gains are greater for all women in most of the data in the table.

12. The specification is not completely innocuous. It makes institutional factors orthogonal to market forces -- a crude simplifying assumption but one consistent with traditional studies of union and other wage differentials.

13. We record 1981-1987 changes because these are the best data we have on the numbers of workers by age and education from unpublished Statistics Canada sources.

14. In 1979-87 Canada had an average trade surplus of 2.2% of GNP while the U.S. had an average deficit of 2.0% of GNP (OECD).

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