

Increasing Male Earnings Inequality in Canada and the U.S., 1981-1997:

The role of hours changes versus wage changes*

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Abstract

This paper looks at changes in hourly wages and hours worked per week of prime-age males in different skill-groups (measured by earnings quintile) in the U.S. and Canada from 1981 to 1997. The analysis reveals that increases in hourly wage inequality are primarily responsible for increases in weekly earnings inequality in both countries. Increases in the dispersion of hours worker per week play a more important part in explaining the increase in earnings inequality in Canada than in the U.S. High-skill workers experienced increases in earnings growth due to increases in hours and, at least for the U.S., increases in wages. In contrast, low-skill workers experienced declines in earnings growth due to decreases in wages and hours. This evidence is consistent with a skill-biased demand shock. In Canada a larger percentage of the reduction in earnings of low-skill workers is accounted for by declining hours. This evidence suggests a higher degree of downward wage rigidity in Canada than in the U.S.

JEL: J31-Wage level and structure; wage differentials by skill

Introduction

Many researchers assert that in the last twenty years the U.S. and Canadian labour markets experienced a similar skill-biased demand shock (OECD 1994; Card, Kramarz and Lemieux 1999; DiNardo and Lemieux 1997; Kuhn 2000). This shock has been linked to increasing earnings inequality (Levy and Murnane 1992; OECD 1994). The OECD Jobs Study (1994) and Picot (1996) suggest that institutional differences across countries may account for different labour market responses to this shock. Canada has more generous social programs and a higher real minimum wage than the U.S. These institutional differences may mean that wages are more downward rigid in Canada. If so, standard supply and demand theory predicts the response to a similar decrease in the demand for low-skill labour in Canada will be different from that in the U.S. In Canada a larger proportion of the reduction in earnings of low-skill workers will take the form of a reduction in hours. In the U.S. a larger proportion of the reduction in earnings of low-skill workers will occur via wage changes.

This study describes the behaviour of earnings per week, wages per hour and hours per week of prime-age males by skill group (identified by earnings quintile)ⁱ for Canada and the U.S. from 1981 to 1997. The results are interesting for at least three reasons. First, the analysis reveals the contribution of variation in wages and hours to the increase in weekly earnings inequality in Canada and the U.S. Second, labour market outcomes of high-skill and low-skill workers are compared within and between countries over time providing evidence concerning a skill-biased demand shock. Third, indirect evidence concerning relative wage flexibility in the U.S. and Canada is presented by comparing the labour market outcomes of low-skill workers across countries.

The paper is organized in the following way. Section 1 gives an overview of the labour market environment in each country and its implications for labour market outcomes. Section 2 provides a review of the literature. Section 3 describes the data and discusses the measures used to describe wage and hours adjustment in the two countries. Section 4 presents the results.

1. Labour Market Environment

In this section three issues related to the labour market environment in each country are addressed. First, labour market shocks in the U.S. and Canada are discussed. Second, institutional differences between the two countries that may affect downward wage rigidity are described. Third, the theoretical implications of the shocks for hours and wage adjustment of low-skill workers within the different institutional contexts of the two labour markets are outlined using the standard neoclassical supply and demand model.

1.1 Shocks

In order to make predictions concerning the behaviour of wages and hours for low-skill and high-skill workers in the U.S. and Canada and to justify a comparison of labour market adjustments across the two countries it is necessary to consider evidence concerning the shocks that have affected the labour market in each country.

A number of researchers agree that a similar skill-biased demand shock has affected the labour markets in both countries in the last twenty years. Studies that have compared the two labour markets either present empirical evidence to support this claim (Murphy, Riddell and Romer 1998, Card, Kramarz and Lemieux 1999, OECD 1994, DiNardo and Lemieux 1997) or assume that it is true (Kuhn and Robb 1998, Gottschalk and Joyce 1997, Kuhn 2000). Two

common explanations offered for the increase in relative demand are skill-biased technological change and globalization. Skill-biased technological change is often linked to computers and has been shown to have occurred across industries and sectors (Berman, Bound and Griliches 1994, OECD 1994, Johnson 1997, and Card, Kramarz, and Lemieux 1999). Increased openness to trade is also thought to have played a role (Freeman 1995, Richardson 1995, Wood 1995, Card, Kramarz and Lemieux 1999). Both the U.S. and Canada possess a comparative advantage in the production of skill-intensive products. Increased trade means that the North American economies increase exports of high-skill intensive goods and increase imports of low-skill intensive goods. Thus the demand for highly-skilled labour by the North American traded goods sector increases while the demand for less-skilled labour decreases. No consensus has emerged on the reason for the skill-biased increase in demand. Research continues to explore this issue (Card and DiNardo 2002).^{ii iii}

The supply side of the labour market must also be taken into account. Researchers agree there has been an increase in the relative supply of high-skilled labour in both countries in the last twenty years (Katz and Murphy 1992, Juhn, Murphy and Pierce 1993, OECD 1994). There is disagreement concerning whether the size of the increase in the relative supply of high-skill labour in Canada has been the same as in the U.S. Card, Kramarz and Lemieux (1996) present direct evidence that labour supply shocks are similar across the U.S. and Canada for different skill groups.^{iv} Kuhn and Robb (1998) present evidence that the aggregate labour supply curve for prime-age males in Canada shifted left between 1973 and 1989 however in Kuhn and Robb (1997) they find the curve was stable between 1977 and 1991. Kuhn and Robb (1998) show the U.S. supply curve is stable between 1973 and 1989. DiNardo and Lemieux (1997) find that the

supply of workers by age and education categories change at comparable rates in the U.S. and Canada during the 1980s. However the supply of workers with more than high school education has increased faster in Canada than in the U.S. Murphy, Riddell and Romer (1998) suggest that Canada, compared to the U.S., has experienced a larger increase in the relative supply of high-skill labour and this accounts for the smaller increase in wage inequality in Canada. Freeman and Needels (1993) and Bar-Or et al (1995) suggest that the education premium increased less in Canada than in the U.S. because the relative supply of university educated labour in Canada increased more than in the U.S. during the 1980s. The conflicting evidence concerning supply shocks suggests a need for caution when making a claim that there have been identical labour supply shocks in both the U.S. and Canadian economies.^v

1.2 Institutions

Differences in social programs and the minimum wage between Canada and the U.S. suggest there may be greater downward wage inflexibility in Canada.^{vi} This portion of the paper broadly reviews these differences and their implications for wage flexibility.

Unemployment insurance and social assistance programs exist in both the U.S. and Canada. Hanratty and Blank (1992) and Blank and Hanratty (1993) document the differences in social safety nets in Canada and the U.S. in the 1980s. They conclude that in terms of both coverage and level of benefits Canadian social programs are more generous than those of the U.S. In the 1990s changes have been made to social programs in both countries but Canada's programs remain more generous than those of the U.S.^{vii} The presence of social programs changes the labour-leisure choice and makes non-market alternatives to working more attractive. The more

generous programs in Canada suggest the reservation wage in Canada is higher than in the U.S. and the labour supply curve more elastic at low wages. Therefore Canadian wages are likely more downward rigid than those of the U.S.

Minimum wage laws that legislate downward wage rigidity exist in both the U.S. and Canada. Coverage of the minimum wage is similar in both countries. Figure 1 plots the average real minimum wage in Canada (provincial labour force weighted average of provincial minimum wages) and the U.S. federal real minimum wage from 1981 to 1997. The plot shows that the real minimum wage in Canada has been higher than that of the U.S. over the last two decades. Figure 2 shows the proportion of the CPS and SCF sample that is at or below the minimum wage from 1981 to 1997. From the plot it is apparent that this proportion is higher in Canada than in the U.S. in most years. Since the Canadian real minimum wage is higher than the U.S. and affects a larger proportion of employed prime-age males in Canada compared to the U.S. this legislation appears to introduce a greater degree of downward wage rigidity in Canada. DiNardo and Lemieux (1997) find that minimum wages tend to prop up the lower tail of the wage distribution in Canada and that differences in real minimum wages in the U.S. and Canada account for approximately one-third of the difference in changes in the variance of log wages of males from 1981 to 1988. This evidence also suggests the Canadian minimum wage possesses more 'bite' than the U.S. minimum wage and is more likely to create a binding constraint in the low-skill labour market. A binding minimum wage operates on the demand side of the labour market and reduces the quantity of labour demanded.

1.3 Theoretical Implications

Labour markets in the U.S. and Canada are embedded in competitive market economies without centralized wage-setting institutions. They can be characterized using the standard neoclassical supply and demand model. This basic framework has been used in many other studies of the earnings distribution in these countries (see for example, Katz and Murphy 1992; Murphy, Riddell and Romer 1998; Johnson 1997; Card, Kramarz and Lemieux 1999). As discussed earlier, social programs and minimum wages introduce downward wage inflexibility to the labour market. On the supply side, more generous social programs in Canada mean the reservation wage is higher and the supply of labour is more elastic at lower wages compared to the United States. On the demand side, the minimum wage legislates downward rigidity and, when it is binding, reduces the quantity of labour demanded. Downward wage inflexibility from both these sources binds only the low-skill labour market. If Canadian wages are more rigid downward than those of the U.S., the supply and demand model predicts that a similar skill-biased demand shock will cause different adjustments in the market for low-skill labour in each country. A decrease in demand for low-skill labour puts downward pressure on both wages and hours of this group. However if wages are inflexible downward then market adjustment to the shock will occur primarily through hours of work rather than through wages. If institutional differences between the two economies result in greater downward wage rigidity in Canada than in the U.S. a greater portion of the adjustment to a similar adverse demand shock for low-skill labour will occur through a reduction in hours rather than wages in Canada and the opposite will be true in the U.S.^{viii} The market for high-skill labour is not affected by these institutional rigidities. The supply and demand framework predicts that an increase in demand for high-skill

labour will increase wages and hours for this group in both countries.

In summary, the supply and demand model predicts that a skill-biased demand shock will result in: (1) increased wages and hours of high-skill workers; and (2) decreased wages and hours for low-skill workers. In addition more downward-rigid wages in Canada would result in a larger portion of low-skill labour market adjustment through hours rather than wages compared to the U.S. In the empirical analysis in section 3 we present evidence concerning the adjustment of wages and hours in the Canadian and U.S. labour markets.

2. Earlier Studies

U.S. and Canadian studies provide evidence concerning male earnings inequality in the 1980s and 1990s. The studies use a variety of methods, data sets, sample definitions, measures of earnings and time periods. This body of research documents an increase in male earnings inequality in the 1980s and 1990s in each country. (For Canada- DiNardo and Lemieux 1997, Burbidge, Magee, Robb 1997, Beach and Slotsve 1996, Doiron and Barrett 1996, Picot 1996, Morissette 1995, 1996, Morissette, Myles and Picot 1994,. Blackburn and Bloom 1993. For the U.S. – Levy and Murnane 1992 (survey of the literature), Murphy and Welch 1993, Juhn, Murphy and Pierce 1993, Blackburn and Bloom 1993).

A number of studies shed light on the contribution of changes in the distributions of hourly wages and hours of work to increasing male earnings inequality in Canada. Morissette, Myles and Picot (1994) explore how annual earnings inequality of males is affected by hours (annual or weekly) and hourly wages. The research is based on data from the Survey of Work History (SWH), 1981 and the Labour Market Activity Survey (LMAS) 1986, 1989. They use a number of

scalar measures of inequality and descriptive statistics to capture the contribution of hours and wages to earnings inequality for full-time full-year workers and for all earners. They discover the growing polarization of hours worked per week (and in annual hours) explain most of the increase in male earnings inequality in the 1980s.

Morissette (1995, 1996) extends these results. He focuses on understanding the contributions of weekly hours and wages per hour to weekly earnings inequality for prime-age males. He uses data from SWH 1981, Survey of Union Membership (SUM) 1984, LMAS 1986-1990, Survey of Labour and Income Dynamics (SLID) 1993, and the Survey of Work Arrangements (SWA) 1995, the Labour Force Survey (LFS) 1981-1993. He compares some of the results to those that would be obtained using the Survey of Consumer Finances (SCF) 1981-1993. He uses a number of techniques to examine inequality; mean earnings, wages and hours by quintile and variance in earnings decomposition as well as descriptive statistics of the hours distribution (using data from the LFS). Comparing across years at similar points in the business cycle he finds that changes in the dispersion of hourly wages explain only a small part of the increase in weekly earnings inequality and that changes in the dispersion of hours per week are important. He also finds the increased correlation between the hourly wage and hours of work is the dominant factor – males with high wages are working longer hours, males with low wages are working shorter hours.

Picot (1996) explores the contribution of weeks worked and weekly earnings to increasing annual earnings inequality for prime-age males using the SCF (1981-1993). He also looks at changes in weekly earnings due to changes in hours per week and hourly wages using data from SWH(1981), SUM(1984), LMAS (1986, 1989) and SLID (1993). He examines the percent

change in annual earnings, weeks worked and weekly earnings by decile. He finds that changes in the inequality of weekly earnings have been very important in rising annual earnings inequality. He further decomposes the variance of ln weekly earnings to expose the contribution of hours per week and wages per hour to this growing inequality. Comparing across years at similar points in the business cycle, he finds the majority of the rise in inequality of earnings is due to increases in the inequality of hours worked per week and changes in the distribution of hourly wages have not been important.

Doiron and Barrett (1996) compare the distributions of annual earnings, annual hours and hourly wages for men and women in Canada in 1981 and 1988. They use data from SWH (1981) and LMAS (1988). They examine Lorenz Curves, perform a decomposition of the ln variance of annual earnings, and look at scalar measures of inequality (Gini Coefficient and Atkinson's Index). They find changes in the annual earnings distributions of both men and women between 1981 and 1988 are due mainly to changes in the hours distributions of men and women. They also find a positive, increasing correlation between hours and wages for both groups. Another study by Sheridan, Sunter and Diverty (1996) focuses only on the changes in weekly hours of work in Canada. They use data from the LFS from 1976 to 1995. Using descriptive statistics they find that beginning in the 1980s a smaller proportion of men are working standard hours (35-40 hours per week) and larger proportions of men are working longer hours and shorter hours. The largest shift in the distribution of hours worked has occurred since 1989 for men.

In contrast to the Canadian studies, U.S. studies attribute almost all the increase in earnings inequality to changes in the wage distribution rather than to changes in the hours distribution (Levy and Murnane 1992). Burtless (1990) examines annual earnings inequality using data from

the Current Population Survey (CPS) from 1975 to 1987. He decomposes the variance of ln earnings and discovers that increases in the dispersion of wages has been the most important factor in the rising inequality of male earnings. The next most important factor was the covariance between wages and hours – workers with low wages are more likely to work short hours and those with high wages are more likely to work long hours. He finds almost no influence of changes in the dispersion of hours on earnings inequality.

One study directly compares U.S. to Canadian hours and wage adjustment from 1981 to 1988. DiNardo and Lemieux (1997) use data from the CPS and LFS and examine the distribution of earnings under different counterfactual scenarios. They show that hourly wage inequality grew more slowly than weekly earnings inequality in Canada compared to the U.S. This suggests that weekly hours of work have become more unequal over time in Canada and have played a larger role in increasing inequality than in the U.S.

Picot (1996) notes the very different contribution of changes in the distribution of hours to rising earnings inequality in the U.S. and Canada. He suggests that in the face of similar shocks to the labour market in the U.S. and Canada institutional differences (unionization, more generous social programs) between the two countries may have resulted in larger adjustments in wages in the U.S. and larger adjustments to hours in Canada.

Antecol, Kuhn and Trejo (2003) examine the contributions of wages and employment to immigrant earning growth in Australia, Canada and the U.S. They find employment gains explain all earnings assimilation of immigrants to Australia. They find that wage assimilation is an important source of immigrant earnings growth in Canada and the U.S. but the magnitude of wage assimilation is much higher in the U.S. They suggest that international differences in

labour market institutions (wage-setting institutions and income support programs) account for the different labour market adjustments of immigrant earnings growth across the countries. This evidence suggests that wages are most flexible in the U.S. followed by Canada and then Australia.

Our paper builds on this earlier literature. We present comparable evidence concerning the behaviour of wages and hours for different skill groups (as measured by earnings quintile) for the U.S. and Canada. We use data from the CPS and SCF that allow us to examine the period from 1981 to 1997. The results reveal the relative importance in each country of changes in hours and changes in wages to growing earnings inequality. The results also provide indirect evidence concerning relative downward wage rigidity in the Canadian and U.S. labour markets and the existence of a skill-biased demand shock.

3. Data and Methodology

A number of descriptive measures are used to summarize the behaviour of hours and wages in the U.S. and Canadian economies for different skill-groups over the period from 1981 to 1997.^{ix} The measures use comparable microdata from the March Current Population Survey (CPS) for the U.S. and the Survey of Consumer Finances (SCF) for Canada. All calculations use the weights from the relevant survey. This section describes the data and methodology.

3.1 Data

The March CPS and the SCF are built on labour force surveys that ask very similar questions about an individual's labour market experience. Responses to the questions in these surveys provide information on criteria for sample selection and data that allow the construction

of measures of weekly earnings, hours worked per week, and the hourly wage.

Samples are constructed for each country so they are as similar as possible. The sample is defined as men^x, ages 24 to 60^{xi}, who are not self-employed, have positive weeks worked in the reference year and positive hours worked in the survey week. Self-employment earnings are not included because they represent a combination of returns to both human and physical capital. Annual wage and salary earnings are deflated using the Consumer Price Index (1993=100) for each country. The real hourly wage is calculated as: ((real annual wage and salary earnings in the previous year)/(weeks worked in the previous year) X (hours worked in the survey week)).

Two problems exist in these data. First, in the SCF the question concerning usual hours worked per week refers to usual hours worked per week in the reference month (the month of the survey) while the earnings question refers to the previous year. This problem has led other researchers who have examined the behaviour of hours per week and hourly wages to use data from different surveys over different years (Doiron and Barrett 1996, Picot 1996, Morissette 1996,1995, Morissette, Myles and Picot 1994). Combining data from different surveys raises issues concerning comparability and consistency over time. The SCF is the only Canadian data source to provide consistent information on earnings over a long period of time. Samples can be constructed for both the SCF and CPS that are comparable. The CPS asks questions about both the hours worked last week and the usual hours worked per week on the job last year, the earnings question refers to the previous year. The results presented in this paper use hours last week for both countries.^{xiii} The second problem is that the income variable in the CPS is topcoded and the topcoding changes over the period: 1981-1983 the topcode is \$75,000; 1984 to 1987 it is \$99,999; 1988 to 1994 it is \$199,998. From 1995 to 1997 high income individuals are

grouped by age, sex, and worker status and the mean income is assigned to all members of the group. Top coding means that results for the top quintile with respect to earnings and wages do not truly reflect the experience of that group and comparison across the two countries is difficult. In the analysis that follows mean earnings by quintile are used for comparison because they can be decomposed.^{xiii}

3.2 Methodology

The empirical work presents the facts concerning the adjustment of real hourly wages and hours per week for different skill groups in Canada and the U.S. The descriptive statistics used are: (1) plots of mean ln weekly earnings, mean ln hours per week and mean ln wages by quintile from 1981 to 1997 for each country and (2) a comparison of percentage changes in these same variables between years when the U.S. and Canada are at similar points in their business cycles.

First, workers are split into quintiles based on ln real weekly earnings. Low-skill workers are identified as those in the bottom quintile. Note that for each worker (i):

$$(1) \quad \ln(\text{weekly earnings}_i) = \ln(\text{hourly wage}_i) + \ln(\text{hours per week}_i)$$

Taking within-(earnings)quintile (q) means of both sides of (1) preserves the relationship.

$$(2) \quad \text{Mean}(\ln(\text{weekly earnings}))_q = \text{Mean}(\ln(\text{hourly wage}))_q + \text{Mean}(\ln(\text{hours}))_q$$

The means are normalized to zero in 1981. The normalized means for each variable are then

plotted by quintile from 1981 to 1997 for each country.

Percent changes in earnings, hours and wages provide a more precise measurement of the changes that have occurred. Differencing equation (2) preserves the identity. This allows the growth in mean earnings to be calculated and decomposed into the growth in wages and the growth in hours by quintile. Since macroeconomic conditions affect the demand for labour it is necessary to compare periods that are at similar points in the business cycle. It is preferable to look at 'peak-to-peak' changes because at this point in the cycle labour supply constraints are likely binding. Analysts^{xiv} identify 1981 as a peak in both countries. In 1981 both countries experienced a weak recovery only to head directly into another recession in 1982. 1988 or 1989 is considered to be a peak in Canada. Employment indicators - the unemployment rate and the employment- to- population ratio reach minimums and maximums respectively in 1989 therefore this year will be used for the analysis. 1990 is considered to be a peak year in the U.S. In 1997 both countries had been on an expansion path for a number of years. In order to examine changes in wages and hours at similar points in the business cycle in each country the results presented in this paper focus on three comparisons : (1) 1981 to 1997 in Canada and the U.S.; (2) 1981 to 1989 in Canada and 1981 to 1990 in the U.S.; (3) 1989 to 1997 in Canada and 1990 to 1997 in the U.S. The decompositions of the growth in mean real earnings are found in Tables 1 through 3.

4. Results

4.1 The Plots of Mean Ln Weekly Earnings, Mean Ln Hours and Mean Ln Wages by Quintile from 1981 to 1997

Figures 3, 4 and 5 plot mean ln weekly earnings, mean ln hours per week and mean ln wages per hour for each country from 1981 to 1997. It is instructive to examine these figures because they provide an overview of the behaviour of these variables in each country over time. Since the sample sizes are so large statistical significance is not an issue in the analysis.

Figure 3 plots the normalized mean ln earnings by quintile from 1981 to 1997 for Canada and the U.S. In each country normalized mean ln earnings ‘fans out’ over time indicating that earnings inequality increased in both countries. These results conform to the large body of evidence, discussed earlier, that shows increasing male earnings inequality over the 1980s and 1990s. The bottom three quintiles in the U.S. and Canada experienced declining earnings over the entire period. The fourth quintile in both countries experienced some positive growth in earnings in the late 1980s but has not fared as well in the 1990s. Only the top quintile in Canada and the U.S. experienced increases in earnings throughout the period.^{xv} There is some evidence of cyclical behaviour. This is most pronounced for the bottom quintile in the U.S. and Canada and the top quintile in the U.S.^{xvi}

Figure 4 presents the behaviour of mean ln weekly hours by quintile. From 1981 to 1997 hours dispersion increased in both the U.S. and Canada. The dispersion is larger in Canada than in the U.S. Prime-age males in the fourth and fifth quintiles in both countries appear to be working longer hours; those in the second and third quintiles appear to work about the same hours as in 1981. In both countries the bottom quintile experienced a decline in hours. The

decline is particularly striking for Canada. Again, there is evidence of cyclical behaviour that is most noticeable for the bottom quintile.

Figure 5 plots the mean ln hourly wage by quintile. In Canada and the U.S. only the top quintile experienced increases in real wages over the period. The wage increases for this group in the U.S. are larger. In the U.S. the real wage for the other quintiles falls. This is also true for Canada however the declines of the bottom two quintiles in Canada exhibit considerably more variability than in the U.S. Cyclical fluctuation is evident particularly for the bottom quintile in the U.S. and Canada and the top quintile in the U.S.

A comparison of the plots of normalized mean hourly wages (Figure 5) to the plots of mean hours per week (Figure 4) shows that for both countries increases in inequality in hourly wages is the more important factor in increases in inequality of weekly earnings. However increases in inequality of hours per week has played a larger role in increasing earnings inequality in Canada than in the U.S.

Overall these figures present a rather dismal picture of labour market outcomes for prime-age males in Canada and the U.S. from 1981 to 1997. In the context of increasing inequality, it appears that most prime-age males in the U.S. and Canada have experienced declining real earnings in the last twenty years. Changes in hours and wages across quintiles in Canada and the U.S. are roughly consistent with a skill-biased demand shock affecting the labour markets: high-skill workers in the top quintile of the earnings distribution experienced increases in wages and hours; low-skill workers at the bottom of the distribution experienced decreases in wages and hours. Workers in the top quintile in Canada have increased their earnings primarily by

increasing hours worked rather than through wage increases.^{xvii} In the U.S., workers in the top quintile are earning higher wages and working longer hours. Workers in the middle quintiles in Canada and the U.S. have seen their earnings stagnate or fall over this period even for quintiles that are working longer hours because the decline in wages has been larger than the increase in hours. Low-skill workers in the bottom quintile in both countries have been hit hardest by changes in the labour market and are most vulnerable to swings in the business cycle. In Canada and the U.S. this group has seen both wages and hours fall throughout most of the period and as a consequence earnings have plummeted. The plots show that the decrease in hours has played a larger role in the decline in earnings of low-skill workers in Canada and that a decrease in wages has played a larger role in the decline of earnings of low-skill workers in the U.S. Therefore there is some evidence to support the theoretical prediction that for low-skill labour when a negative demand shock reduces earnings a larger portion of the adjustment is through hours in Canada, where institutions create downward wage rigidity, and a larger portion of the adjustment is through wages in the U.S., where the wage is more flexible.

4.2 Decompositions of the Growth in Weekly Earnings

Tables 1 through 3 present the decomposition of the growth in real weekly earnings for the U.S. and Canada over peak years. Each table shows results for the U.S. and Canada for periods that are closely comparable in time frame and economic conditions. The analysis below summarizes trends that are present across all the tables.

First, some general observations. Widening earnings inequality is readily apparent: only the top quintile consistently shows positive growth; the other quintiles experience negative

growth in earnings and the declines are larger for lower quintiles. Most workers, except the low-skill workers in the bottom quintile, are working longer hours: the top four quintiles typically show positive growth in hours and; the bottom quintile consistently shows negative growth in hours worked per week. Real hourly wages have fallen for all workers except those in the top quintile - real wage growth for the bottom four quintiles is always negative and the decline is generally larger for lower quintiles. It is interesting that the trends in labour market outcomes are similar across the two countries. Not surprisingly these conclusions confirm the observations based on the plots.

Is the evidence consistent with the predictions of the standard model of supply and demand? First, theory predicts that an increase in the demand for high-skill labour raises wages and hours (and hence earnings) for this group. The Tables show that wages, hours and earnings increase for the top quintile in each country. Second, theory predicts that a reduction in the demand for low-skill workers causes wages and hours (and hence earnings) to fall for this group of workers. The Tables show that growth in real wages, hours and earnings is typically negative for the bottom quintile in both the U.S. and Canada. Third, theory suggests that institutional differences between Canada and the U.S. mean that adjustment in the market for low-skill workers will occur differently in each country. In Canada a larger portion of the decline in earnings will occur through hours while in the U.S. a larger portion will occur through wages. Each table shows the percent of the decline in earnings of the bottom quintile due to wage and hours adjustment. In Canada changes in wages account for between 18 and 70 percent of the total change in earnings of low-skill workers. In contrast in the U.S. changes in wages account for 89

to 122 percent^{xviii} of the total change in earnings of low-skill workers. This evidence suggests that wages are more flexible downward in the U.S. and that a larger portion of the change in earnings of low-skill workers in Canada occurs through hours. In sum, it appears that the evidence from the decompositions generally is consistent with the predictions of the theory.^{xix}

These results are broadly consistent with those of earlier studies. The results confirm increasing income inequality for males in Canada and the U.S. in the 1980s and 1990s. They show that changes in the dispersion of hours have played a larger role in increasing earnings inequality in Canada compared to the U.S. They support earlier evidence of the important contribution of the increasing correlation between hours and wages over time in both countries to earnings inequality. However, these results show that the increase in hourly wage inequality over time in Canada has made a more important contribution to increasing earnings inequality than earlier studies would suggest. This different result may be due to the use of the SCF data rather than a compendium of different surveys for the Canadian analysis.

Conclusions

The empirical evidence presented in this paper shows that men's weekly earnings inequality increased from 1981 to 1997 in both the U.S. and in Canada. In both countries, we find that changes in hourly wages played a larger role than changes in hours worked in accounting for this increase in earnings inequality. However, the role played by changes in hours worked is substantially greater in Canada than in the U.S. Finally, the above trends occurred in a context where the *level* of median real weekly earnings was declining.

Taken together, we argue that all the above trends are consistent with a simple neoclassical model of the labour market in which (a) both countries experienced a decline in demand for unskilled labour, and (b) Canadian labour market institutions, by limiting downward wage flexibility, caused a larger share of the adjustment to this demand shock to take the form of hours reductions (quantity changes) rather than wage declines (price changes). While these trends may also be consistent with other models, this neoclassical model strikes us as a compelling and parsimonious way to interpret the trends that have occurred.

Given the above changes, it is of course natural to ask which form of adjustment to these types of demand shocks is “best”. Clearly, one advantage of the “Canadian” method of adjustment is that --at least for those workers who still have jobs— total well-being, or utility is better maintained in the face of a demand shock: wages do not fall so much, and leisure is actually increased. A disadvantage of the Canadian model is that downward-rigid wages may cause a larger increase in unemployment --an outcome not studied in this paper, since we restrict our attention to those with jobs.^{xx} In addition, the low hours worked by unskilled Canadian workers may have negative consequences for their future wages, perhaps as a result of diminished skill maintenance or acquisition.^{xxi}

Conversely, a disadvantage of the U.S. model is of course the larger decline in the utility of employed, unskilled workers, though this larger decline may give U.S. workers a greater incentive to retrain in response to the negative demand shock. On the other hand, Canadian low-skill workers --who are working fewer hours-- may have the *time* to acquire formal training that U.S. low-skill workers do not.

In sum, while labor market institutions clearly affect the way in which an economy adjusts to a negative demand shock for unskilled labour, there are important costs and benefits to both the “Canadian” and “American” adjustment methods. What is clear, however, is that less-skilled workers in both the U.S. and Canada are especially vulnerable to cyclical fluctuations and are also hurt most by recent labor demand shocks. This is true regardless of the degree of labour market flexibility. Therefore our results do not imply that reducing the minimum wage or restricting the generosity of social programs would address this problem in Canada. Rather, our results suggest that it is important to develop policies that encourage individuals to acquire and retain skills that equip them to perform well in the labour market and provide some protection from labour market fluctuations. Such policies should be directed at those individuals who, without policy intervention, have the highest risk of remaining at the bottom of the skill distribution in the long-run.

Notes

* We would like to thank John Burbidge and Michael Veall for helpful comments and suggestions. This research is funded by the Social Sciences and Humanities Research Council of Canada and the Canadian International Labour Network.

¹Earnings quintiles are used to identify low-skill and high-skill workers. Workers in the bottom quintile are low-skill. Workers in the top quintile are high-skill. It is possible to use more direct measures of skill, such as age and education, to identify low or high skill workers. Earnings provide a good summary of these direct measures of skill as well as unobserved measures of skill, such as ability and motivation. Whichever method is used the ranking of workers into skill groups is approximately the same.

²The assumption of a common skill-biased demand shock, while common, has been criticized. First, it has been found that a significant portion of the increase in earnings inequality both in Canada and the U.S. occurs within skill groups rather than between skill groups (Juhn, Murphy and Pierce 1993; DiNardo and Lemieux 1997). This means that either unobserved skills play an important role or other factor(s) are affecting the wage structure. Second, researchers have failed to provide convincing empirical evidence to explain the source of this skill-biased shock. Timing is an issue with the exogenous technology shock hypothesis. Acemoglu (2001) argues that technological change may be an endogenous response to the increase in the supply of educated labour. Wasmer (2001) suggests that supply side factors explain most of the changes in wage structure in the U.S.

ⁱⁱⁱAggregate demand conditions also affect the labour market. In order to control for this factor in the analysis that follows labour markets are compared at peaks in the business cycle. This is discussed later in the paper.

^{iv} Card, Kramarz and Lemieux (1996) provide an overview of the relative supply of labour by skill group. They present two types of data: (1) the change fraction of the adult population that was highly educated (16 years of schooling in U.S. or a university degree in Canada), the percentage change in this group and the percentage change in the share and; (2) a skill-index that captures the change in the relative supply of different education and age groups. After examining these data they conclude that “relative supply shifts were not too dissimilar in the three countries during the 1980s”(p. 9). (The third country is France.) In addition in their regression results the supply index variable is often insignificant or of the wrong sign.

^vJohnson and Kuhn (2003) present results for regional samples for the U.S. and Canada. The samples choose provinces and states that have a large portion of manufacturing. It is thought that similar labour market shocks will have affected the markets in these smaller more comparable samples. The results for the regional samples provide evidence that supports the conclusions based on the national samples.

^{vi} Unions also introduce a degree of inflexibility to labour markets. From 1981 to 1997 the percentage of the labour force that are union members is about 15 percentage points higher in Canada than in the United States. Therefore there is likely more inertia in Canadian labour markets due to unionization compared to the U.S. However this inflexibility can affect either

wages, hours or both thus the higher unionization of Canadian labour markets offers no clear prediction concerning the adjustment of wages and hours in Canada compared to the U.S.

DiNardo and Lemieux (1997), in a study that compares the impact of unions on the hourly wage distribution in the U.S. and Canada, show that unions raise wages of lower middle income groups but have no impact on the lower or upper tail of the wage distribution. The focus of this study is on adjustments of wages and hours for the bottom and top quintiles therefore the impact of unions on labour market flexibility is not emphasized in the analysis.

^{vii}Unemployment insurance is available in both countries for a limited time to those who lose their jobs and meet eligibility requirements. In Canada the eligibility requirements are less strict and the replacement rate is approximately twice that of the U.S. (OECD 1994). Assistance is also available in both countries for non-workers. In Canada means-tested programs provide cash assistance to low income families and individuals. In the U.S. food stamps are the only form of support generally available to able-bodied workers. In the U.S. some assistance has been available on a very limited basis to single mothers below a certain income level through Aid for Families with Dependent Children (AFDC) until 1996 and more recently through Temporary Assistance for Needy Families (TANF) and there is a federal welfare program that provides minimal cash assistance to households and individuals regardless of household composition.

^{viii}The adjustment to the skill-biased demand shock may also occur through the number of people hired or laid off. The analysis presented in this paper focuses only on those who are employed. High-skill and low-skill workers are identified by earnings quintile and such data are

not directly available for those who are unemployed.

^{ix}No data are available from the SCF for 1983. The SCF for incomes in 1983 focused on assets and debts and wage data comparable to other years are not available. Therefore the SCF covers 1981-1982 and 1984-1997. The CPS covers 1981 to 1997.

^x Women have more variable labour supply than men. They are more likely to work part-time and to be engaged in non-standard forms of employment. Therefore women need to be examined separately from men. We have focused on men in this study.

^{xi} Older and younger men are not included in the sample because changes in early retirement and time spent acquiring education that may have influenced hours or wages over the period studied.

^{xii} Johnson and Kuhn (2003) present results for the U.S. using the 'hours last year' variable. There is no substantive difference between the two sets of U.S. results. This suggests that, at least for examining long-run trends, in hours and wages the SCF data are adequate.

^{xiii} Johnson and Kuhn (2003) present results using median earnings. Median earnings cannot be decomposed but is not as sensitive to topcoding as mean earnings. When the results concerning median earnings of the top quintile are compared to the results using mean earnings the trends are the same.

^{xiv}Identifying business cycles is as much art as science. It requires that a large number of factors be considered. Information on business cycle peaks in the U.S. come from the NBER website (<http://www.nber.org/cycles/html>). Information on Canadian business cycles are from an article by Cross in the Canadian Economic Observer, February, 1996, pp. 3.1 to 3.39. (The article actually identifies recessions but the peaks can be inferred from the analysis.)

^{xv}Growth of the top quintile in the U.S. appears to have been much higher than in Canada. Changes in the top-coding of income in the CPS, discussed earlier, mean that such comparison must be made with care. However when normalized median ln earnings are plotted a similar pattern is observed (see Johnson and Kuhn 2003).

^{xvi}An examination of median ln earnings for the U.S. also shows that the top quintile is quite sensitive to the business cycle (Johnson and Kuhn 2003).

^{xvii}An institutional difference may help explain this result. In Canada payroll tax contributions by employers are capped. Therefore, in the case of high-skill workers, an employer may choose to have the existing labour force work longer hours rather than hire more workers in order to minimize costs. This also saves on training and hiring costs.

^{xviii}In the U.S. in the 1990s the wage decrease is larger than the hours increase.

^{xix} The descriptive analysis presented in this section assumes that a similar skill-biased demand shock has dominated the labour market in each country and that supply side factors have not been very important. This assumption has been made by a number of other researchers (for

example Card, Kramarz and Lemieux 1999 and Kuhn 2000). In which case wage inflexibility is consistent with larger hours adjustments in Canada. However the results are also consistent with an explanation where a similar skill-biased demand shock has affected the labour markets in both countries and the supply of low-skill labour has fallen in Canada relative to the U.S. and there is no difference in wage flexibility between the two countries.

^{xx} Several other studies, already discussed, have considered the role of labour market institutions in the Canada-U.S. unemployment gap.

^{xxi} Bell and Freeman (2001) show that past work hours are an important predictor of current wages.

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TABLE 1: Decomposition of the Growth in Mean Weekly Earnings
United States and Canada 1981 to 1997

Table 1(a) United States 1981 to 1997			
Quintile	Change in Ln Weekly Earnings	Change in Ln Hours per Week	Change in Ln Hourly Wage
1	-.155	-.007 (5%)	-.148 (95%)
2	-.111	.009	-.120
3	-.073	.018	-.091
4	-.009	.041	-.049
5	.172	.039	.133
All Workers	-.035	.020	-.055

Table 1(b) Canada 1981 to 1997			
Quintile	Change in Ln Weekly Earnings	Change in Ln Hours per Week	Change in Ln Hourly Wage
1	-.220	-.102 (46%)	-.117 (53%)
2	-.147	-.008	-.138
3	-.068	.005	-.073
4	-.021	.009	-.030
5	.043	.020	.024
All Workers	-.083	-.015	-.067

*The numbers in brackets provide information on the percentage of the change in earnings of the bottom quintile that is due to hours per week or hourly wages.

TABLE 2: Decomposition of the Growth in Mean Weekly Earnings
 United States: 1981 to 1990
 Canada: 1981 to 1989

Table 2(a) United States 1981 to 1990			
Quintile	Change in Ln Weekly Earnings	Change in Ln Hours per Week	Change in Ln Hourly Wage
1	-.123	-.014 (11%)	-.109 (89%)
2	-.080	.009	-.089
3	-.043	.014	-.057
4	-.001	.030	-.031
5	.059	.030	.029
All Workers	-.038	.014	-.051

Table 2(b) Canada 1981 to 1989			
Quintile	Change in Ln Weekly Earnings	Change in Ln Hours per Week	Change in Ln Hourly Wage
1	-.151	-.046 (30%)	-.105 (70%)
2	-.070	.003	-.073
3	-.031	.010	-.042
4	-.007	.029	-.036
5	.028	.027	.001
All Workers	-.046	.005	-.051

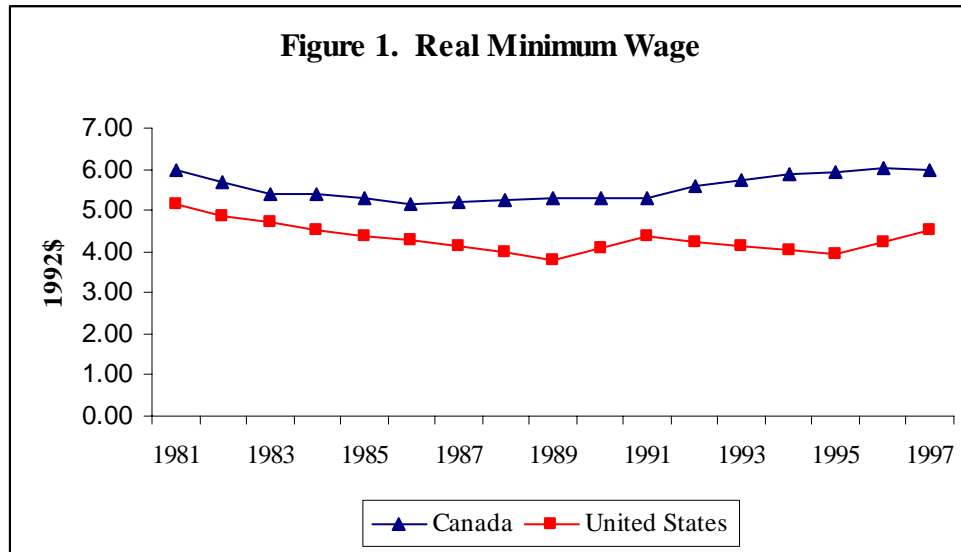
*The numbers in brackets provide information on the percentage of the change in earnings of the bottom quintile that is due to hours per week or hourly wages.

TABLE 3: Decomposition of the Growth in Mean Weekly Earnings
 United States: 1990 to 1997
 Canada: 1989 to 1997

Table 3(a) United States 1990 to 1997			
Quintile	Change in Ln Weekly Earnings	Change in Ln Hours per Week	Change in Ln Hourly Wage
1	-.032	.007 (+ 22%)	-.039 (-122%)
2	-.031	.000	-.031
3	-.029	.005	-.034
4	-.008	.011	-.018
5	.113	.009	.105
All Workers	.003	.006	-.004

Table 3(b) Canada 1989 to 1997			
Quintile	Change in Ln Weekly Earnings	Change in Ln Hours per Week	Change in Ln Hourly Wage
1	-.069	-.057 (83%)	-.013 (18%)
2	-.077	-.011	-.066
3	-.036	-.005	-.031
4	-.013	-.02	.007
5	.015	-.007	.022
All Workers	-.037	-.020	-.018

*The numbers in brackets provide information on the percentage of the change in earnings of the bottom quintile that is due to hours per week or hourly wages.



Data Sources and Notes:

Canada - Provincial Minimum Wages (nominal)

Source: HRDC-Employment Standards Legislation in Canada – Database on Minimum Wages

www.hrdc-drhc.gc.ca/psait_spi.../salaire_minwage/report2

Notes: 1. When more than one minimum wage is in effect over a year a weighted average is used.

2. Employment Standards legislation is in the jurisdiction of the provinces. To get a measure of the Minimum wage for Canada a weighted average of the provincial minimum wages is used. The share of the province's labour force in the total labour force of Canada is the weight.

3. Labour Force data are from Statistics Canada – CANSIM –Labour Force Annual Averages
 D987677(BC); D987395 (Alberta); D987113(Saskatchewan); D986831(Manitoba);
 D986549(Ontario);D986267(Quebec);D985985(New Brunswick); D985703(Nova Scotia);
 D985421(PEI);D985139(Newfoundland).

4. The nominal minimum wage is adjusted using the CPI-all items (1992=100).

United States Federal Minimum Wage (nominal)

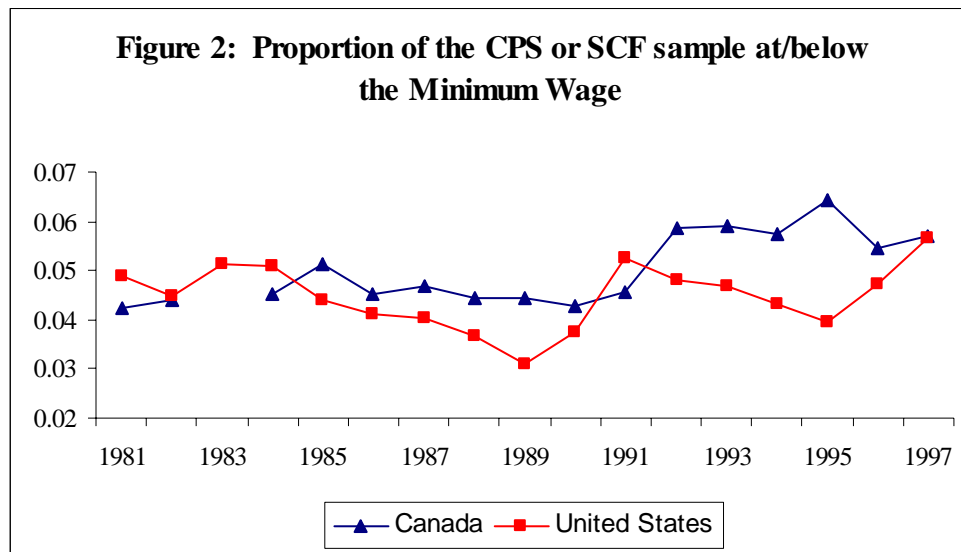
Source: U.S. Department of Labor-Wages and Hours Division – www.dol.gov/esa

History of Federal Minimum Wage under the Fair Labor Standards Act 1983-1997

Notes: 1. When more than one minimum wage is in effect over a year a weighted average is used.

2. States also have minimum wage legislation. 40 of the U.S. states are bound by the federal minimum wage (only ten states have set minimum wages that are higher than the federal minimum).

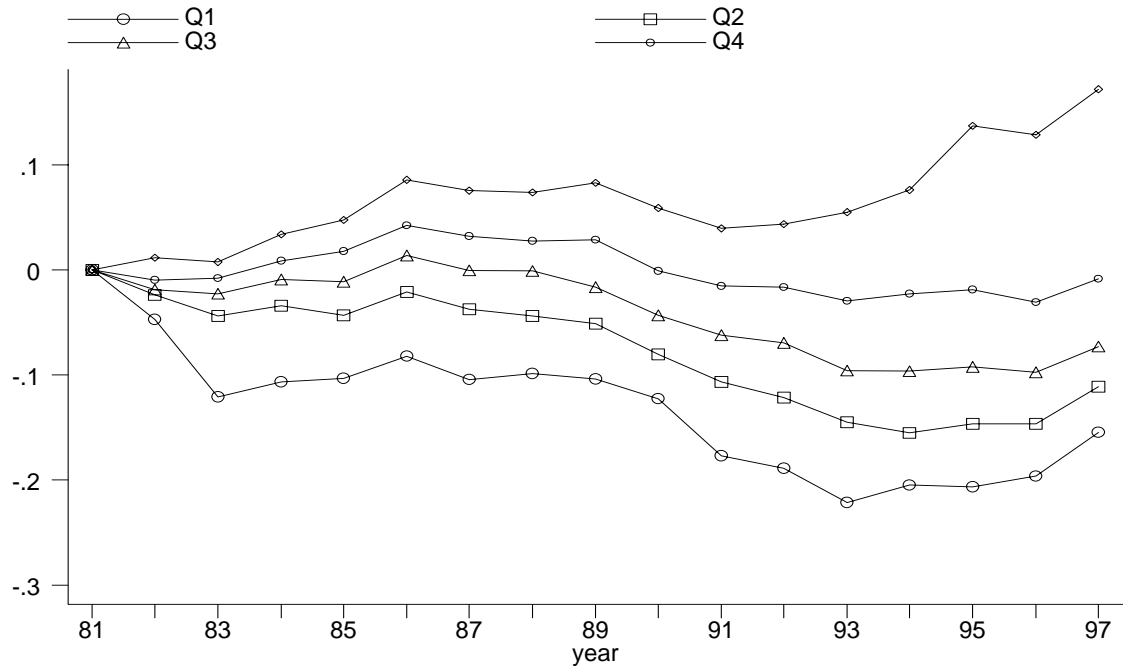
3. The nominal minimum wage is adjusted using the CPI-all items (1992=100).



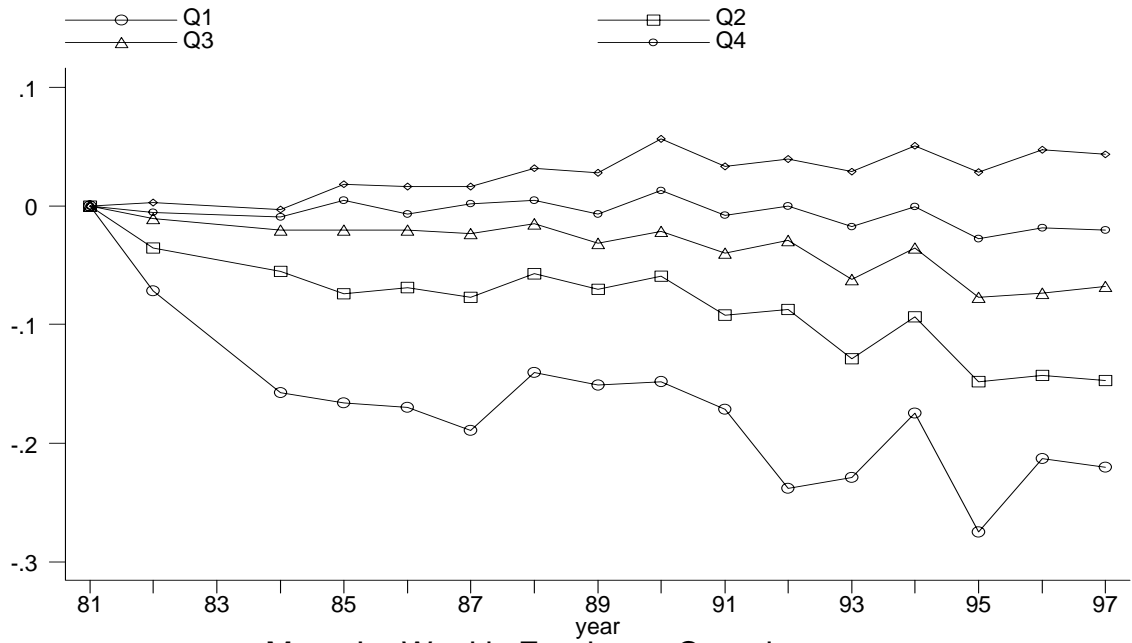
Data Sources and Notes

The sources of the minimum wage data and the construction of the each minimum wage series is described in the notes for Figure 1. The sample is defined as males, age 24 to 60 who are not self-employed who have positive weeks worked in the reference year and positive hours worked in the survey week.

Figure 3. Normalized Mean Ln Weekly Earnings 1981-1997



Mean Ln Weekly Earnings - USA



Mean Ln Weekly Earnings - Canada

Figure 4. Normalized Mean Ln Hours per Week 1981-1997

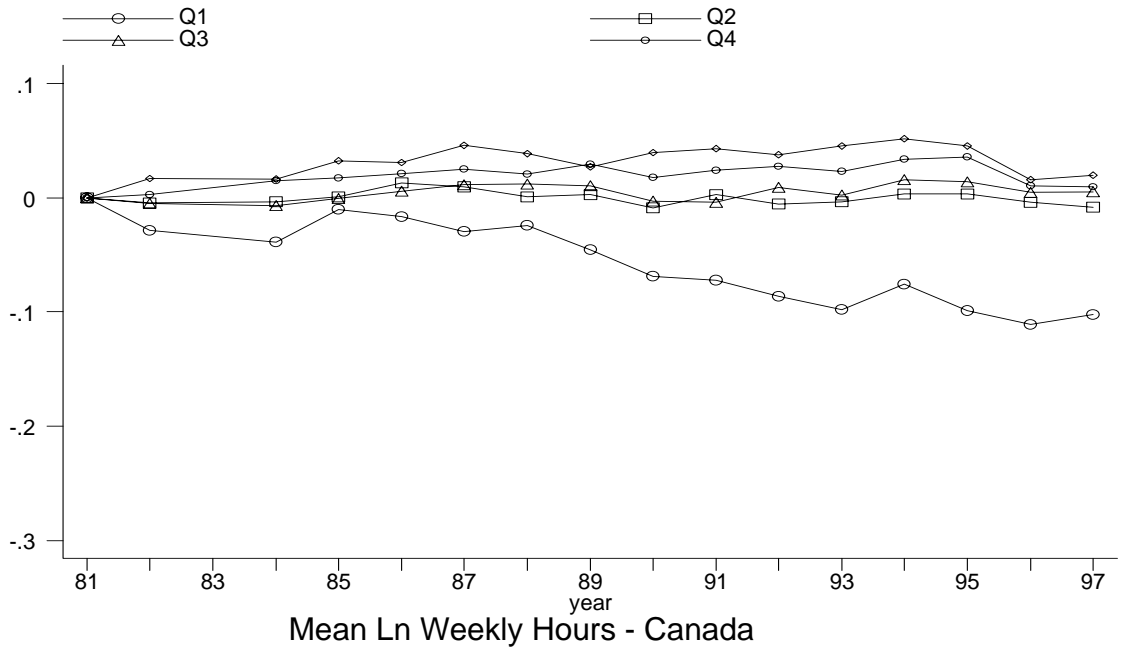
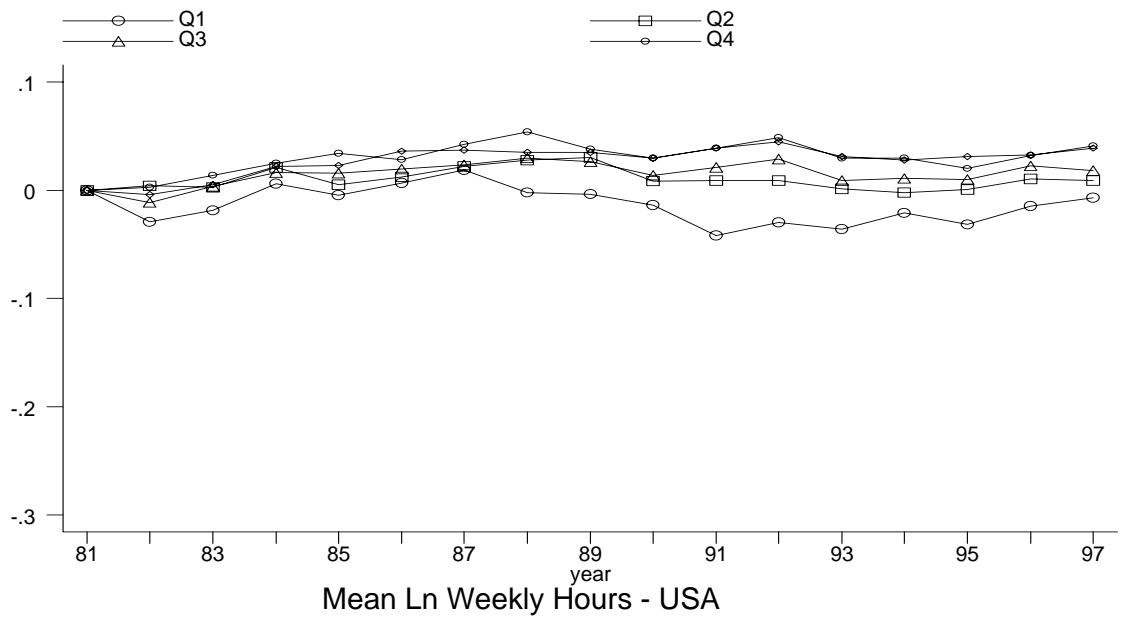


Figure 5. Normalized Mean Hourly Wage 1981-1997

