

THE GROWTH OF FAMILY EARNINGS INEQUALITY IN CANADA,
1980–2005

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In this study we document recent trends in family earnings inequality using data from the Canadian Census and provide insight into the various factors that drive changes in the family earnings distribution. Over the period 1980–95 we observe substantial increases in family earnings inequality. In contrast, we find that some decrease in inequality occurred over the period 1995–2005 although the earnings of the richest 1 percent of families increased substantially. We use semi-parametric decomposition methods to show that increases in the employment rates of men and women, increases in their educational attainment, and decreases in assortative mating tended to have equalizing effects on the family earnings distribution. We also show that increases in the returns to higher education and increases in the proportion of single individuals as well as lone-parent families drove increases in family earnings inequality.

1. INTRODUCTION

Along with many OECD countries, Canada has experienced important changes in its earnings structure since the early 1980s (Gottschalk and Smeeding, 1997). Over the period 1980–2005, there has been a substantial increase in family earnings inequality in Canada. Family earnings at the bottom of the distribution have stagnated while those at the top have displayed remarkable growth. Such inequality often places greater pressure on Canada's tax and transfer system, as efforts are made to produce a socially acceptable distribution of family income while minimizing disincentives to work.

The purpose of this paper is to document recent trends in family earnings inequality using Canadian data and provide some insight into the various factors that drove changes in the family earnings distribution. Our study most closely follows the work of Fortin and Schirle (2006), who investigated various factors affecting family earnings inequality in Canada over the period 1982–97. Using data from the Survey of Consumer Finances, they found that the 90–10 differential increased by 12 log points. Using the decomposition methods of Dinardo *et al.*

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(1996) they found that the bulk of this increase could be explained by changes in the wage structure of men and women over the 1980s and 1990s. Fortin and Schirle (2006) also found that a decrease in the proportion of married couples explained an increase in the 50–10 differential, while increases in female labor force participation to some extent offset that increase. Further, increased assortative mating and an increasing proportion of families headed by unmarried women also contributed to the increase in family earnings inequality. Daly and Valetta (2006) find similar results for the United States.

Using more recent data from the Canadian Census, we re-examine these results for the 1980–2005 period. Using the Census allows us to measure changes in the tails of the income distribution more accurately than other Canadian data sources. Frenette *et al.* (2007) have made the case that important changes in the income distribution (both market income and after tax income) have been in the tails and that use of other datasets will miss some of those changes.

We find that a break in the trend in family earnings inequality occurred in the mid-1990s. Over the period 1980–95, we observe substantial increases in inequality representing large increases in income for the top half of the earnings distribution relative to the bottom end of the earnings distribution. In contrast, we find that several measures of family earnings inequality actually decreased over the period 1995–2005. Families in the bottom 10 percent of the earnings distribution made the greatest gains, while middle earnings were relatively stagnant and modest gains were made by families in the top 10 percent of the earnings distribution. Interestingly, the earnings of the richest 1 percent of families increased substantially so that inequality measures sensitive to redistribution toward the very top of the family earnings distribution actually increased substantially. Saez and Veall (2005) have also observed large growth in wages and salaries in the top percentile of the income distribution, as the income share of the top 1 percent of families soared after 1995 in both Canada and the United States. U.S. evidence from Lemieux *et al.* (2009) would suggest that a growing incidence of performance pay has driven a large part of this growth in earnings at the top of the distribution.

The break in inequality trends affords us the opportunity to verify the robustness of our methods and results in examining the factors that affect the family earnings distribution. Similar to the results of previous studies, we find that changes in family composition reflecting an increasing proportion of lone parent families and families without children drove increases in family earnings inequality. Evidence from the entire 1980–2005 period demonstrates this was one of the most important factors driving increased inequality. Over the 1980–95 period, large increases in men's returns to education were a key factor driving the large increases in family earnings inequality. In the 1995–2005 period, however, men's returns to education stagnated and continued increases in women's returns to education became a more important driving force to raise inequality. Increases in women's employment rates have had important equalizing effects as have decreases in assortative mating.

Of course, we do not attempt to claim that we fully explain all changes in inequality over the past several decades. We do not, for instance, examine the importance of changes in unionization rates which Dinardo *et al.* (1996) have shown to be an important factor in explaining increased earnings inequality over

the 1980s in the U.S. We do not examine the role of policy interventions such as taxation or regulations in the labor market. Nor do we examine the role of technological change and global outsourcing. Rather we focus our attention on some key labor market outcomes and characteristics of families.

In the next section, we describe the data used to measure Canadian family earnings over the period 1980–2005. We then describe trends in family earnings inequality over this period. We also document how changes in various factors may have affected family earnings inequality. After providing the results of our decomposition we provide some concluding remarks.

2. DATA AND MEASUREMENT

For this analysis, we use data from the Canadian Census, 1981–2006, which provides detailed information on income and work experience in the previous calendar year and demographic characteristics of Canada’s population. We are using the 20 percent sample Census files and focus on the years 1981, 1996, and 2006 (income years 1980, 1995, and 2005).¹

In this study an observation is a family. We adopt the “census family” definition used in the Canadian Census. A family refers to a married or common-law couple (of opposite sex) with or without children, or a lone parent of any marital status with at least one child living in the same dwelling. The term child refers to never-married sons or daughters who are living with their parent(s). We treat all other individuals as one-person families.²

For consistency with the previous studies in the area, we restrict our sample to families in which the head(s) of the family is (are) aged 16 to 64.³ In addition, families have to be living in private households and family heads are Canadian residents with no self-employment income.⁴ We exclude: (a) couples (with or without children) where husbands and wives both have zero earnings; (b) lone-parent families in which the mother or father has no earnings; and (c) single individuals with no earnings. Sample weights are used for all estimations.

Family earnings are defined as the sum of wage and salary earnings from all family members older than age 15. In our sample, family earnings account for 96, 96, and 88 percent of total family income before tax in 1980, 1995, and 2005, respectively. Recognizing the economies of scale in consumption that can be achieved in larger households, we adjust our earnings measure to compare families of different sizes. The method for adjustment is very straightforward and is commonly used in the literature: we generate an “equivalent” earnings measure by

¹Public use microdata files for the Canadian Census are based on samples of 2–3 percent of the population enumerated in the census.

²Basically, we adopt the “census family” definition used in the pre-2001 Canadian Censuses. We split a same sex partner family into two one-person families, or the reference person as a lone parent if they have children. There are about 4 percent of such families in our sample in 2005.

³Similar to the definition in Karoly and Burtless (1995), we treat both husband/male partner and wife/female partner as heads of a family, and label them as the “male head” and “female head.” As such there are two heads in coupled families and one head for lone-parent families or single individuals.

⁴Canadian residents include all Canadian citizens and those with permanent resident status living in Canada. This would exclude, for example, individuals living in Canada temporarily with tourist, student, or temporary work visas.

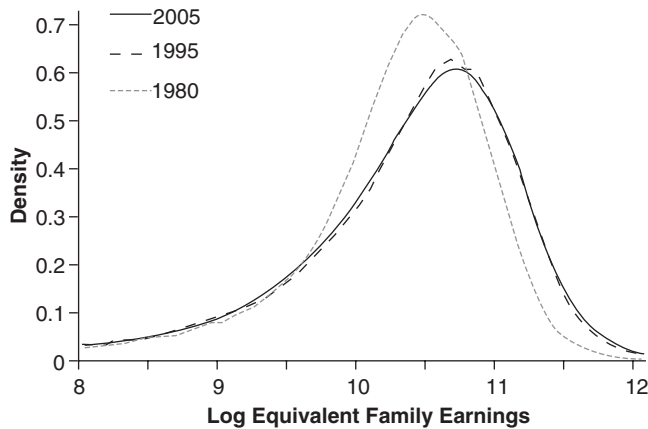


Figure 1. Densities of Log Equivalent Family Earnings, 1980, 1995, and 2005

Notes: Kernel density estimates based on the Canadian Census (20% sample). See text for sample description.

dividing family earnings by the square root of the family size.⁵ All the earnings measures are converted to 2002 Canadian dollars.

Finally, we define a family head as participating “in the labor market” if he/she has positive wages and salaries. We only include in our sample those families with at least one family head in the labor market. The family head is defined as “working full-time” if his or her usual working hours per week are 30 hours or more.⁶

3. TRENDS IN FAMILY EARNINGS INEQUALITY, 1980–2005

To summarize the changes in the equivalent family earnings distribution, Figure 1 provides the 1980, 1995, and 2005 densities of log equivalent family earnings. Measures of equivalent family earnings and earnings inequality can be found in Table 1.

In the early 1980s and early 1990s, family earnings inequality rose by all measures. The Gini coefficient increased by 15 percent from 1980 to 1995. The log of the ratio of the 90th percentile to the 10th percentile (the 90–10 differential) increased from 1.793 in 1980 to 2.205 in 1995, an increase of 23 percent. The 50–10 differential, which captures movements in the lower half of the family earnings distribution, largely drove this increase in inequality as it increased by 28 percent. The 90–50 differential also increased as the earnings of the richest families increased faster than the earnings of middle income families, but not to the same extent. The 90–50 differential increased by 13 percent. Similar trends in family earnings inequality for this period are found in Fortin and Schirle (2006), and

⁵For example, see Fortin and Schirle (2006), Daly and Valetta (2006), and Karoly and Burtless (1995).

⁶This indicator is based on a variable for the “full time weeks or part time weeks worked in previous year” so that this variable represents the hours worked in the same year for which earnings are reported.

TABLE 1
DISTRIBUTION STATISTICS, EQUIVALENT FAMILY EARNINGS

	1980	1995	2005
Mean	32,787	37,792	39,896
Percentiles			
99th	94,817	126,151	140,638
90th	56,818	69,448	72,175
50th	30,180	33,801	34,443
10th	9,485	7,653	9,217
Standard deviation	21,817	31,237	42,194
log 99/50	1.145	1.317	1.407
log 90/50	0.633	0.720	0.740
log 90/10	1.793	2.205	2.058
log 50/10	1.160	1.485	1.318
Standard deviation of log earnings	0.852	1.071	0.951
Gini coefficient	0.328	0.378	0.384

Notes: Authors' tabulations from the Canadian Census (20% sample). See text for sample description. All amounts are in 2002 Canadian dollars.

similar trends in family market income are found in Frenette *et al.* (2007). These trends can also be seen in Figure 1. From 1980 to 1995, the distribution of log equivalent family earnings shows a substantial widening of the distribution as the middle and upper end of the distribution have shifted out.

After 1995, the distribution of family earnings moved very differently. The Gini coefficient increased slightly over this period, by only 2 percent. We actually observe a fairly substantial reduction in the 90–10 differential due to a narrowing of the bottom half of the distribution. The 50–10 differential fell by 11 percent between 1995 and 2005 as median earnings stagnated, while the lowest earnings (at the 10th percentile) saw some modest increase. Family earnings at the top end of the distribution, however, continued to increase, resulting in a modest increase in the 90–50 differential. It is the incomes at the very top of the distribution, however, that have shown the most movement, resulting in a 7 percent increase in the 99–50 differential.

What has been driving these more recent changes in the family earnings distribution? In the following sections, our goal is to determine what factors underlie the changes in the income distribution in each of these two periods.

4. TRENDS IN LABOR MARKET OUTCOMES AND FAMILY CHARACTERISTICS

One of the most interesting developments in the labor market over the past several decades that we would expect to affect the family earnings distribution has been the substantial increase in women's employment rates. In our sample, women's employment rates have climbed steadily from 72 percent in 1980 to 84 percent in 1995 and 90 percent in 2005 (Table 2).⁷ The largest increases were

⁷Employment in our sample, by construction, is higher than in the general population. In 1980, 79.7 percent of men and 52.6 percent of women age 15 to 64 were employed. In 2005, 76.7 percent of men and 68.3 percent of women age 15 to 64 were employed (CANSIM II series V2461483 and V2461693).

TABLE 2
MALE AND FEMALE CHARACTERISTICS 1980, 1995, AND 2005

	1980	1995	2005
<i>Male head</i>			
Average age	38.6	40.6	42.5
Education (%)			
Less than high school	37.5	24.4	14.9
High school	23.0	25.7	24.0
Some post-secondary	27.0	32.6	39.8
University +	12.5	17.4	21.2
Employment rate ¹ (%)	98.7	96.4	97.0
Couple, without children	97.3	92.8	93.8
Couple, with children	98.7	96.3	96.9
Working full-time ² (%)	94.3	89.8	91.2
Median annual earnings ³	41,091	42,602	40,969
Immigrants (%)	21.0	20.4	21.1
<i>Female head</i>			
Average age	37.0	39.3	41.3
Education (%)			
Less than high school	40.3	21.6	12.0
High school	25.9	28.1	26.4
Some post-secondary	25.8	34.2	38.6
University +	8.0	16.1	23.0
Employment rate ¹ (%)	71.9	84.4	89.8
Couple, without children	76.0	82.8	86.0
Couple, with children	59.4	77.4	84.7
Working full-time ² (%)	53.2	62.3	70.8
Median annual earnings ³	20,455	25,547	26,681
Immigrants (%)	19.8	19.9	21.2

Notes: Authors' tabulations from the Canadian Census (20% sample). See text for sample description. Employment rates and median annual earnings refer to the years 1980, 1995, and 2005, while age and education statistics refer to May/June of 1981, 1996, and 2006.

¹A person is employed if she worked positive weeks and had positive wage and salaries in the reference year.

²A person who worked 30 or more hours per week is defined as working full-time.

³2002 constant dollars, conditional on having positive wages and weeks worked.

observed among married women with children. In 1980, only 59 percent of these women were working. In 2005, 85 percent of these women were working. Of all family types, couples with children represent the largest portion of families. This trend in women's employment should then have important impacts on the family earnings distribution, particularly if the increases in employment rates have not occurred evenly across the distribution. In contrast, men in our sample became slightly less likely to be employed over time, with employment rates at 99 percent in our 1980 sample and 97 percent in our 2005 sample.

Not only were women more likely to be working, they were also more likely to work full time. In 1980, 53 percent of women in our sample worked full time. The corresponding percentage rose to 71 percent in 2005. These trends in part reflect the falling elasticity of women's labor supply with respect to their own wages and their husbands' wages on the intensive and extensive margins since the

early 1980s (see Blau and Kahn, 2007; Morissette and Hou, 2008). Again, men experienced quite different patterns. In 1980, 94 percent of them worked full time. Their full-time employment rate fell to 90 percent in 1995 and has remained steady at 91 percent over 1995–2005. The results of Fortin and Schirle (2006) suggest that increases in women’s participation had an equalizing effect on the family earnings distribution over the 1980s and 1990s. As women’s cross-wage labor supply elasticities fall, however, we might expect changes in their labor supply to offset disequalizing effects of changes in the male earnings structure to a lesser extent than they did in the past.

The earnings of women have also climbed steadily over this period. In our sample of families, median earnings of women rose by 25 percent from 1980 to 1995 and then rose an additional 4 percent from 1995 to 2005. This increase reflects in part the increase in educational attainment of women. In 1980, 40 percent of women in our sample had not completed high school and only 8 percent had completed university. By 1995, only 22 percent had not completed high school and this rate fell to only 12 percent in 2005. At the same time, 16 percent of women in 1995 and 23 percent of women in 2005 had completed university.

The earnings structure of women also changed over this period. Returns to education are one of the most important components of the earnings structure. Boudarbat *et al.* (2006) have suggested that returns to university education for women increased modestly over the period 1980–2000. Fortin and Schirle (2006) suggest the changes in female earnings structure explained a large portion (nearly one third) of the increase in family earnings inequality over the 1980s and early 1990s. Estimates within our sample of women support these earlier findings. Presented in Table 3, the results of earnings regressions show that returns to university education (measured relative to high school drop-outs) increased substantially for women over the 1980–2005 period. We also find an increase in the earnings differential for recent immigrant women as compared to Canadian-born women over the 1980–2005 period. These trends in the earnings structure of women are expected to have a disequalizing effect.

Men, on the other hand, experienced a slight decline in real earnings over this period.⁸ Median annual earnings of men rose 4 percent between 1980 and 1995 but subsequently fell below their 1980 level in 2005. Although men also enjoyed increases in educational attainment over the period 1980–2005, the changes are not quite as stark as they were for women. For example, the portion of men that do not complete high school fell from just under 38 percent in 1980 to 15 percent in 2005, a 23 percentage point drop, which is less than the 28 percent percentage point drop among women.

Changes in men’s earnings structure would explain the observed decline in median earnings. Boudarbat *et al.* (2006) have provided Canadian evidence of substantial increases in the returns to university education in the late 1990s. However, there were only modest increases in the returns to post-secondary education and no increase in the return to high school completion. Fortin and Schirle

⁸The declines in men’s earnings explain only a small portion of the reduced unconditional gender earnings differential. In our sample, women’s median earnings in 1980 were only 50 percent of men’s. By 1995, women earned 60 percent of men’s earnings and this ratio increased further to 65 percent in 2005.

TABLE 3
REGRESSION RESULTS

	Male Log Weekly Earnings			Female Log Weekly Earnings		
	1980	1995	2005	1980	1995	2005
<i>Education (high school graduates omitted)</i>						
<High school	-0.131 (0.002)	-0.130 (0.002)	-0.125 (0.002)	-0.159 (0.002)	-0.181 (0.003)	-0.225 (0.003)
Some post-secondary	0.063 (0.002)	0.103 (0.002)	0.136 (0.002)	0.150 (0.002)	0.186 (0.002)	0.170 (0.002)
University +	0.270 (0.002)	0.364 (0.002)	0.399 (0.002)	0.441 (0.003)	0.514 (0.003)	0.525 (0.002)
Age	0.078 (0.0004)	0.089 (0.0005)	0.087 (0.0005)	0.046 (0.0005)	0.077 (0.001)	0.071 (0.0005)
Age squared	-0.0008 (0.0000)	-0.0009 (0.0000)	-0.0009 (0.0000)	-0.0005 (0.0000)	-0.0008 (0.0000)	-0.0007 (0.0000)
<i>Years since immigration (Canadian born omitted)</i>						
Immigrated <6 yrs	-0.255 (0.004)	-0.493 (0.004)	-0.507 (0.004)	-0.206 (0.005)	-0.374 (0.005)	-0.432 (0.004)
Immigrated 6–10 yrs	-0.159 (0.003)	-0.308 (0.005)	-0.313 (0.004)	-0.090 (0.004)	-0.208 (0.006)	-0.254 (0.004)
Immigrated 11–15 yrs	-0.068 (0.003)	-0.209 (0.006)	-0.271 (0.004)	-0.024 (0.004)	-0.152 (0.006)	-0.188 (0.004)
Immigrated 16–20 yrs	-0.050 (0.005)	-0.138 (0.005)	-0.192 (0.005)	-0.020 (0.006)	-0.093 (0.006)	-0.126 (0.005)
Immigrated >20 yrs	-0.075 (0.004)	-0.108 (0.006)	-0.152 (0.006)	-0.036 (0.006)	-0.248 (0.007)	-0.271 (0.006)
Working full-time	0.511 (0.003)	0.773 (0.003)	0.894 (0.003)	0.640 (0.002)	0.671 (0.002)	0.702 (0.002)
<i>Province dummies also included in regressions (Ontario omitted)</i>						
Constant	4.583 (0.008)	3.966 (0.011)	3.873 (0.009)	4.636 (0.009)	4.002 (0.011)	4.028 (0.009)

Notes: Estimates based on the Canadian Census (20% sample). See text for sample description. The regression results used in the decompositions may use revised weights. The resulting coefficients are not substantially different. Standard errors reported in parentheses.

(2006) found that the changes in men's earnings structure that led to the decline in men's earnings in the 1980s explained a large portion of the increase in family earnings inequality. Within our sample of men, we find education returns comparable to Boudarbat *et al.* (2006). The return to a university education (measured relative to high school drop-outs) rose from 1980 to 1995 and then stagnated. Also interesting to note from the results in Table 3, the immigrant-Canadian-born earnings differential for men became large over the 1980–95 period and then did not change much over the more recent decade. While we might expect these changes in men's earnings to impact inequality measures, such disequalizing effects would be moderated by the increasing share of family earnings earned by women. At the same time, any effects of changes to women's earnings structure will be strengthened as women's earnings form a larger share of family earnings.

The relative importance of changes to men's and women's earnings for explaining family earnings inequality depends on the nature of family formation and the extent to which that has changed over time. Consider that couples (with and without children) represent the largest share of families in Canada. Over time

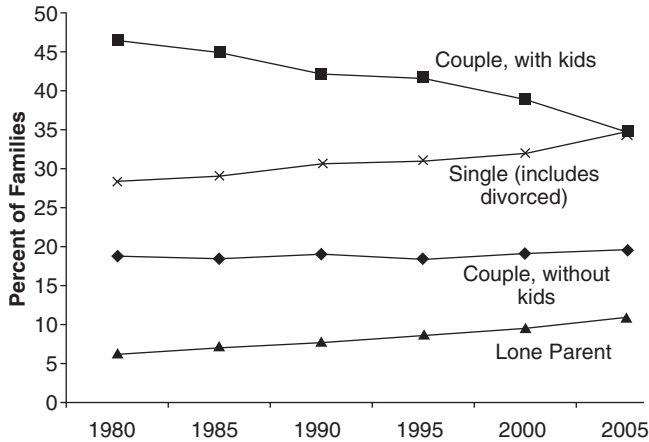


Figure 2. Family Composition, 1980–2005 (percent of families in each category)

Notes: Authors' tabulations from the Canadian Census (20% sample). See text for sample description.

there has been in our sample a trend to reduced assortative mating as highly educated women have become more likely to “marry down”. In 1980, 48.3 percent of married couples had completed the same level of education. In 1995 this was slightly lower as 48.2 percent of couples had completed the same level of education and this change was only observed among couples with children. By 2005, however, only 46.5 percent of couples had the same level of education. The interesting trend is that more educated women have become more likely to marry men with less education. In 1980, only 2.9 percent of women with a Bachelor's degree (or higher level of education) were married to men with lower levels of education (including post-secondary training, high school completion, or high school drop-outs). In 1995, 7.1 percent of women with Bachelor's degrees were married to men with lower education, and by 2005, 11.2 percent of these women were married to men with lower education.⁹

Other general trends in family composition may also be important. There has been a steady increase in the portion of families represented by lone parents, from just over 6 percent in 1980 to 11 percent in 2005 (see Figure 2). We would expect this to increase family earnings inequality over time as these families tend to be dominated by women at the lower end of the earnings distribution. We also see a marked increase in the percentage of single individuals (which includes those divorced) and a slight increase in the relative importance of couples without children. Relative to those with children, couples without children are less constrained in terms of their choices in the labor market and may represent households in the upper end of the earnings distribution. Conversely, single individuals

⁹We have chosen to describe assortative mating by education as this would best represent potential earning power. We have previously used earnings deciles to describe assortative mating. However, this is problematic, as, for example, many women take time away from the labor market for childcare purposes, resulting in zero earnings for that time period. Results based on earnings deciles are available from the authors upon request.

tend to have relatively low earnings. Hence, the growing importance of both groups is expected to further increase inequality.¹⁰

In the following sections we examine these changes in labor market outcomes and family characteristics to determine the extent to which they can account for changes in the family earnings distribution. Given the different trends over the two periods (1980–95 and 1995–2005), we examine these two periods separately. In the next section, we summarize the decomposition methods used and subsequently discuss our results.

5. DECOMPOSITION METHODS

We use the decomposition methods developed by Dinardo *et al.* (1996), closely following the work of Fortin and Schirle (2006). The methods used here allow us to separately identify the contribution of each factor we consider to observed changes in the family earnings distribution and inequality measures. We are considering changes to: (i) men’s likelihood of employment; (ii) men’s wage structure; (iii) women’s likelihood of employment; (iv) women’s wage structure; (v) assortative mating; (vi) family composition; and (vii) family characteristics (such as educational attainment). A thorough description of the methodology used can be found in Fortin and Schirle (2006). In this section, we provide only a summary of the methods and their intuitive interpretation.¹¹

In the first decomposition we construct a series of counterfactual densities that represent the density of log equivalent family earnings that would have prevailed in 1995 had each of the explanatory factors remained as in 1980. The decomposition is sequential in that once the 1995 density has been adjusted for a factor, that factor remains adjusted in the remaining stages of the decomposition.

The estimation of the counterfactual densities that would have prevailed in 1995 had our first factor—men’s likelihood of employment—not changed since 1980, ultimately requires adjusting the weights placed on each family so that the likelihood of employment in the adjusted sample is the same as the likelihood of male employment in the 1980 sample. The first counterfactual density and all inequality statistics describing the counterfactual density are estimated using these new sample weights.

In the second stage of the decomposition we create a counterfactual density that would have prevailed in 1995 had men’s likelihood of employment and their earnings structure not changed since 1980. To do this, we estimate men’s log weekly earnings (y_M) in each year t (1980 and 1995) using a simple linear model represented by:

$$(1) \quad y_{Mt} = X_t \beta_t + \varepsilon_t.$$

¹⁰In 2005, equivalent earnings of single men (women) averaged \$36,927 (\$30,776), compared to \$44,386 for couples with children, \$50,507 for couples without children, and \$22,338 (\$34,284) for lone mothers (fathers). The corresponding numbers for 1980 were \$32,928, \$25,483, \$32,781, \$41,519, \$18,515, and \$32,692.

¹¹Details of the procedures are described in a technical appendix available from the authors upon request.

The vector of characteristics (X_i) includes a quadratic in age, and dummy variables indicating education (with the categories less than high school graduation, high school graduate, some post-secondary education less than a university degree, and university degree completed), years since immigration, province of residence, and full-time work status. Men's 1995 log weekly earnings are adjusted by applying the 1980 parameter estimates (β_{80}) to men's 1995 characteristics and adding the residuals from the 1995 earnings regression. That is,

$$(2) \quad Y_{MX95\beta80} = X_{95}\beta_{80} + \varepsilon_{95}.$$

These estimates are then used to adjust the family earnings of all families with a male head that is employed by replacing the male head's contribution to family earnings in 1995 with the counterfactual earnings amount represented by (2). This revised family earnings and the previously revised weights are then used to estimate the counterfactual density representing the density that would have prevailed had men's earnings structure not changed after 1980.

The remaining stages of the decomposition are similar in nature. In the third stage, we estimate a counterfactual density that would have prevailed in 1995 had female employment rates (and the previously adjusted factors) not changed since 1980. In the fourth stage we further adjust for changes in the female earnings structure in a manner corresponding to our adjustment in men's wage structure. In the fifth stage we adjust for changes in assortative mating, then family composition, and then finally family characteristics.

The primary order decomposition outlined above is repeated to decompose the changes in the log equivalent family earnings distribution between 1995 and 2005. Each stage is examined the same way, beginning with the 2005 density and estimating the counterfactual 2005 density that would have prevailed had men's employment rates not changed since 1995.

As the decomposition results may be sensitive to the order in which factors are adjusted, we repeat the decomposition, taking each factor into account in the reverse order. That is, in the first stage we estimate a counterfactual density that would have prevailed in 1995 had the family characteristics not changed since 1980. We then adjust for family composition, assortative mating, female earnings structure, female employment, male earnings structure, and male employment.

6. RESULTS

In this section we present the results of the decomposition, focusing on the primary order decompositions for 1980–95 and 1995–2005. We then briefly discuss the reverse order decomposition results, the results based on a more restricted sample (age 25–54), and the decomposition results for 1980–2005.

6.1. Primary Order Decomposition Results

The results of the 1980–95 decomposition are provided in Panel B of Table 4. Over the period 1980–95 we observe a large increase in inequality by all measures. The reduction in men's employment rates over the 1980–95 period explains only a

TABLE 4
DECOMPOSITION RESULTS 1980–95: CHANGES IN INEQUALITY MEASURES

	90–10	50–10	90–50	99–50	Std. Dev.	Gini
<i>A. Initial estimates</i>						
1980	1.793	1.160	0.633	1.145	0.852	0.328
1995	2.205	1.485	0.720	1.317	1.071	0.378
Total change	0.412	0.325	0.087	0.172	0.219	0.050
<i>B. Primary order decomposition</i>						
Male employment	0.025 (6.1)	0.016 (5.0)	0.009 (10.1)	0.013 (7.6)	0.011 (5.2)	0.003 (6.6)
Male earnings structure	0.089 (21.6)	0.057 (17.6)	0.032 (36.5)	0.053 (30.7)	0.023 (10.3)	0.011 (22.1)
Female employment	-0.035 (8.4)	-0.020 (6.3)	-0.014 (16.2)	-0.027 (15.8)	-0.008 (3.7)	-0.005 (9.5)
Female earnings structure	0.046 (11.2)	0.034 (10.6)	0.012 (13.4)	0.013 (7.4)	0.014 (6.2)	0.004 (8.6)
Assortative mating	-0.016 (3.9)	-0.015 (4.5)	-0.001 (1.6)	0.001 (0.3)	-0.008 (3.5)	-0.001 (2.0)
Family composition	0.074 (17.9)	0.062 (19.1)	0.012 (13.7)	0.010 (5.8)	0.025 (11.3)	0.006 (12.8)
Family characteristics	-0.214 (51.8)	-0.178 (54.9)	-0.035 (40.3)	-0.012 (7.2)	-0.070 (31.8)	-0.017 (34.1)
Unexplained	0.442 (107.3)	0.368 (113.4)	0.074 (84.5)	0.122 (71.0)	0.232 (106.1)	0.047 (95.4)
<i>C. Reverse order decomposition</i>						
Family characteristics	-0.220 (53.5)	-0.180 (55.5)	-0.040 (46.0)	-0.006 (3.5)	-0.072 (33.0)	-0.016 (33.1)
Family composition	0.054 (13.0)	0.048 (14.6)	0.006 (6.9)	0.002 (1.3)	0.013 (5.9)	0.002 (4.9)
Assortative mating	-0.049 (11.9)	-0.040 (12.3)	-0.009 (10.3)	0.001 (0.8)	-0.008 (3.7)	-0.002 (4.2)
Female earnings structure	0.049 (11.9)	0.030 (9.3)	0.019 (21.5)	0.024 (13.8)	0.012 (5.5)	0.005 (9.8)
Female employment	-0.073 (17.8)	-0.061 (18.8)	-0.012 (14.0)	-0.011 (6.2)	-0.017 (7.6)	-0.005 (10.6)
Male earnings structure	0.067 (16.3)	0.038 (11.8)	0.029 (32.9)	0.040 (23.1)	0.018 (8.4)	0.009 (18.3)
Male employment	0.009 (2.1)	0.006 (2.0)	0.002 (2.6)	0.003 (1.7)	0.003 (1.2)	0.001 (1.8)
Unexplained	0.576 (139.9)	0.484 (148.8)	0.093 (106.4)	0.119 (69.1)	0.270 (123.3)	0.056 (113.1)

Notes: Calculated using the Canadian Census (20% sample). In Panels B and C, the effect of each explanatory factor indicates how much of the total change is attributed to that factor. Percent of the total change is in parentheses. “Unexplained” is the residual not accounted for by all other factors.

small portion (representing no more than 10 percent) of increase in inequality.¹² The important changes in the male earnings structure (particularly the increase in returns to education and the increases in earnings differentials for immigrant males) had a large disequalizing effect. If, in 1995, the earnings structure had been

¹²It is important to qualify the interpretation of this result as our sample excludes zero earner families. Since all single individuals and lone parents are working in this sample, the effect of lower employment rates captures only the reduction in family earnings that occurs when couples move from a dual-earner status to a single-earner status. Unfortunately data limitations do not allow us to include all zero-earner families and properly account for self-selection into the labor force. Nevertheless, the relative importance of changes in male employment rates shown in Table 4 is, in general, fairly similar to that found in a sample that includes zero-earner families where the head(s) is (are) aged 25–54.

as it was in 1980, the 90–10 differential would have been lower—by 0.025 log points. As such, changes in the male earnings structure explain 6.1 percent of the change in the 90–10 differential over this period.

The increases we observed in female employment had important equalizing effects. By 1995 the 90–10 differential would have been 0.035 log points higher had women's employment rates not changed after 1980. The results suggest that this effect was most important for the middle of the income distribution as we can see the largest equalizing effects in the 90–50 and 99–50 differentials. Changes to women's earnings structure played a smaller role than the changes to men's earnings structure did, but are nonetheless an important factor. The changes we observed over the 1980–95 period explain 11.2 percent of the increase in the 90–10 differential and 13.4 percent of the 90–50 differential.

Changes in assortative mating over this period had an equalizing effect. The results suggest that this mattered most for those families in the bottom of the income distribution as the equalizing effect is largest for the 90–10 differential and the 50–10 differential. If the degree of assortative mating had not decreased over this period, all measures of inequality would have been even higher than observed in 1995.

The results of the next stage of the decomposition demonstrate the importance of family composition for the distribution of family earnings. The effect of changes in family composition is roughly the same as changes in the male earnings structure, explaining roughly 20 percent of the 90–10 and 50–10 differentials. The disequalizing effect is not as large, however, for the 90–50 and 99–50 differentials, suggesting that this has mostly affected the bottom of the income distribution. Hence, the steady increase in single individuals and in lone parent families has played an important role in increasing family earnings inequality.

Finally, changes in family characteristics over the 1980–95 period have had important equalizing effects. For example, the 90–10 differential would have been 0.214 log points higher had the characteristics of the family not changed after 1980. This equalizing effect appears important whether looking at the 90–10, 90–50, or 50–10 differential. The large increases in men's and women's education, the increasing likelihood of women to work full time, and the aging of the population worked to increase earnings generally, with the largest effects on the bottom half of the earnings distribution.

Repeating the decomposition for the 1995–2005 period allows us the opportunity to verify the extent to which these factors matter for changes in the earnings distribution. Results are presented in Table 5. Over the period 1995–2005, the 90–10 and 50–10 differentials decreased slightly as earnings at the bottom of the distribution increased. The 99–50 and 90–50 differentials increased slightly as median earnings stagnated relative to earnings at the top of the distribution.

The results confirm that increases in men's employment had an equalizing effect as nearly 10 percent of the decrease in the 90–10 is explained by changes in men's employment over the 1995–2005 period. The 90–50 differential would have been 0.004 log points larger had men's employment rates not increased. As changes in the male earnings structure were negligible, these changes had almost no effect on measures of inequality over this period.

Increases in female employment over the 1995–2005 period continued to have an equalizing effect. Also similar to the earlier period, changes in the female

TABLE 5
DECOMPOSITION RESULTS 1995–2005: CHANGES IN INEQUALITY MEASURES

	90–10	50–10	90–50	99–50	Std. Dev.	Gini
<i>A. Initial estimates</i>						
1995	2.205	1.485	0.720	1.317	1.071	0.378
2005	2.058	1.318	0.740	1.407	0.951	0.384
Total change	-0.147	-0.167	0.020	0.090	-0.121	0.006
<i>B. Primary order decomposition</i>						
Male employment	-0.014 (9.6)	-0.010 (6.2)	-0.004 (18.8)	-0.004 (4.1)	-0.005 (4.2)	-0.002 (25.1)
Male wage structure	-0.003 (1.8)	-0.003 (1.9)	0.000 (2.4)	-0.002 (2.1)	0.001 (0.5)	0.000 (6.0)
Female employment	-0.010 (7.1)	-0.003 (1.8)	-0.007 (37.4)	-0.015 (17.0)	-0.006 (4.7)	-0.003 (50.3)
Female wage structure	0.019 (13.2)	0.015 (8.7)	0.005 (24.5)	0.009 (10.4)	0.008 (6.4)	0.003 (44.7)
Assortative mating	-0.002 (1.1)	0.000 (0.0)	-0.002 (8.0)	-0.001 (1.6)	0.000 (0.3)	0.000 (3.7)
Family composition	0.046 (31.1)	0.035 (20.8)	0.011 (56.2)	0.008 (8.5)	0.019 (15.7)	0.004 (74.7)
Family characteristics	-0.044 (29.7)	-0.034 (20.3)	-0.010 (49.3)	0.017 (18.7)	-0.015 (12.3)	-0.001 (25.0)
Unexplained	-0.140 (95.2)	-0.166 (99.3)	0.026 (130.5)	0.079 (87.3)	-0.122 (101.1)	0.005 (90.6)
<i>C. Reverse order decomposition</i>						
Family characteristics	-0.046 (31.3)	-0.031 (18.7)	-0.015 (74.6)	0.011 (11.9)	-0.012 (10.2)	-0.002 (41.2)
Family composition	0.005 (3.5)	0.004 (2.1)	0.002 (7.7)	-0.004 (4.3)	0.001 (0.8)	0.000 (3.2)
Assortative mating	-0.017 (11.3)	-0.013 (7.8)	-0.004 (18.1)	-0.002 (2.4)	-0.005 (4.4)	-0.001 (24.1)
Female wage structure	0.010 (6.7)	0.007 (3.9)	0.003 (16.6)	0.008 (8.6)	0.003 (2.5)	0.002 (25.5)
Female employment	-0.016 (10.9)	-0.012 (7.0)	-0.004 (22.3)	-0.006 (6.2)	-0.005 (4.5)	-0.002 (28.0)
Male wage structure	-0.012 (8.3)	-0.007 (4.0)	-0.006 (28.6)	-0.010 (11.5)	-0.004 (3.7)	-0.002 (38.0)
Male employment	-0.002 (1.5)	-0.001 (0.9)	-0.001 (3.4)	-0.001 (0.9)	-0.001 (0.6)	0.000 (4.4)
Unexplained	-0.069 (46.9)	-0.113 (67.7)	0.044 (222.9)	0.095 (104.8)	-0.096 (79.8)	0.013 (213.4)

Notes: Calculated using the Canadian Census (20% sample). In Panels B and C, the effect of each explanatory factor indicates how much of the total change is attributed to that factor. Percent of the total change is in parentheses. “Unexplained” is the residual not accounted for by all other factors.

earnings structure had a disequalizing effect in the 1995–2005 period as women’s returns to higher education and immigrant–Canadian-born earnings differences continued to increase.

Relative to the earlier 1980–95 period, assortative mating has a very small, even negligible equalizing effect. This is surprising as our measure of assortative mating showed a relatively large decrease in assortative mating as more women were likely to marry men with less education than themselves.¹³

¹³The effect of assortative mating is also small when male and female earnings deciles are used to measure assortative mating.

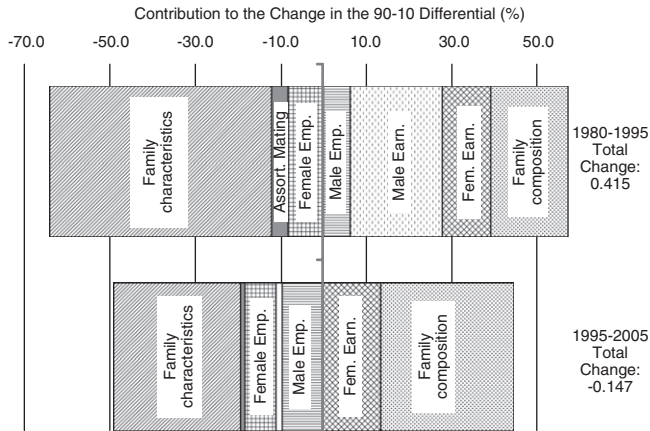


Figure 3. Relative Contribution of Changes in Each Factor to Changes in the 90–10 Differential

Notes: This is a graphical representation of information presented in the first column of Panel B in Tables 4 and 5. A negative contribution implies that changes in the factor reduced the 90–10 differential while a positive contribution implies changes in the factor increased the 90–10 differential.

Changes to family composition continued to have large disequalizing effect in the 1995–2005 period. If family composition had not changed after 1995, the 90–10 differential would have been 0.045 log points lower and the 50–10 differential would have been 0.034 log points lower. The changes in family composition had the largest impact on relative position of the top of the distribution as these changes explain 56 percent of the (relatively small) increase in the 90–50 differential over this period. Except for the 99–50 differential, changes to family characteristics also continued to be an important equalizing factor in the 1995–2005 period, though having a smaller relative impact in the later period.

In Figure 3 we have summarized the relative contribution of each of these factors to changes in family earnings inequality by focusing on their contribution to changes in the 90–10 differential in each period. Since 1980, the changes observed in family composition (reflecting an increase in single individuals and lone parent families and the reduction in families with children) have been the most important factor driving increases in family earnings inequality. Changes to women’s earnings structure are relatively important as they have also driven increases in inequality in both periods. Changes to men’s earnings structure in the 1980–95 period also drove large increases in inequality. Offsetting these changes, family characteristics have been the most important equalizing factor in both periods, as increases in education, the likelihood to work full time, and an aging population have driven increases in earnings in the bottom half of the family earnings distribution. Female employment then follows as an important equalizing factor.

6.2. Robustness of the Results

The results of the reverse order decomposition are fairly similar to the results of the primary order decomposition. The 1980–95 results show that changes in

family composition explained a large portion (13 percent) of the increase in the 90–10 differential over this period and that family characteristics had important equalizing effects that are similar in magnitude to the primary order decomposition results. In the 1995–2005 period, however, the reverse order decomposition results suggest a relatively small disequalizing impact for changes in family composition, amounting to only 3.5 percent of the change in the 90–10 differential. The discrepancy between primary and reverse order results in the later period reflects the notion that individuals’ decisions for family formation and human capital investment are not independent of each other. Rather, such decisions are made simultaneously.¹⁴

Though not presented here, we have repeated the decomposition for the 1980–2005 period to verify the importance of key factors.¹⁵ The results are very similar to the results for the 1980–95 period, with changes in the earnings structure and family composition having large disequalizing effects offsetting the effects of changes in family characteristics.¹⁶ We also repeated the decomposition using a more restricted sample, only including those families whose heads are between ages 25 and 54. The results are very similar, confirming that changes in university enrolments or retirements are not driving any results.

7. CONCLUDING REMARKS

Between 1980 and 2005, family earnings inequality rose substantially in Canada. While family earnings at the 10th percentile were no higher in 2005 than they were in 1980, those at the 90th percentile grew by roughly 25 percent while those at the 99th percentile increased by a remarkable 48 percent.

In this paper, we examined the degree to which changes in the wage structure, changes in employment rates, changes in patterns of family formation, as well as changes in family characteristics account for this increase. We find that, along with changes in the earnings structure, changes in family composition have been a key factor underlying the growth in family earnings inequality since the early 1980s. Substantial changes in family characteristics have had the most important equalizing effects. Continued increases in women’s employment rates over this period have also had important equalizing effects.

As Canada—like many OECD countries—is experiencing an economic slow-down, one important and difficult question is whether the growth in family earnings inequality will continue in subsequent years or will come to a halt. Several factors could fuel the growth in family earnings inequality or, conversely, restrict it. It is conceivable that the growth in the relative importance of single individuals and lone-parent families might slow down in the years to come. Likewise, young well educated women, who have outnumbered young well educated men in recent

¹⁴It is useful to consider that the nature of human capital and family formation decisions have changed substantially over time, particularly for women. Goldin (2006) reviews how women’s identity and labor force decisions have changed over the course of several decades.

¹⁵These results are available from the authors upon request.

¹⁶Changes in the earnings structure and family composition accounted for between 54 percent (reverse order decomposition) and 80 percent (primary order decomposition) of the growth in the 90–10 differential over the period 1980–2005. Changes in family characteristics reduced inequality by an amount that corresponds to between 68 percent and 73 percent of the change in the 90–10 differential.

years in Canada, could continue to “marry down,” i.e. marry less educated male partners.¹⁷ Both factors might plausibly restrict the growth of family earnings inequality.

Conversely, increases in the worldwide supply of low skilled workers partly associated with China’s and India’s economic growth could widen the wage gap between low skilled workers and high skilled workers in subsequent years (Fehr *et al.*, 2008). Finally, the current economic slowdown could partly erase the earnings growth that blue collar workers enjoyed in recent years in Canada as a result of booming employment in sectors such as construction, mining, and oil and gas extraction. This could also contribute to increasing family earnings dispersion.

REFERENCES

- Blau, F. and L. Kahn, “Changes in the Labour Supply Behaviour of Married Women: 1980–2000,” *Journal of Labor Economics*, 25(3), 393–438, 2007.
- Boudarbat, B., T. Lemieux, and C. Riddell, “Recent Trends in Wage Inequality and the Wage Structure in Canada,” in D. A. Green and J. R. Kesselman (eds), *Dimensions of Inequality in Canada*, UBC Press, Vancouver, 273–306, 2006.
- Daly, M. C. and R. G. Valetta, “Inequality and Poverty in United States: The Effects of Rising Dispersion of Men’s Earnings and Changing Family Behaviour,” *Economica*, 73(289), 75–98, 2006.
- Dinardo, J., N. M. Fortin, and T. Lemieux, “Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach,” *Econometrica*, 64(5), 1001–44, 1996.
- Fehr, H., S. Jokisch, and L. J. Kotlikoff, “Dynamic Globalization and its Potentially Alarming Prospects for Low-Wage Workers,” NBER Working Paper No. 14527, 2008.
- Fortin, N. and T. Schirle, “Gender Dimensions of Changes in Earnings Inequality in Canada,” in D. A. Green and J. R. Kesselman (eds), *Dimensions of Inequality in Canada*, UBC Press, Vancouver, 307–46, 2006.
- Frenette, M., D. Green, and K. Milligan, “The Tale of the Tails: Canadian Income Inequality in the 1980s and 1990s,” *Canadian Journal of Economics*, 40(3), 734–64, 2007.
- Goldin, C., “The Quiet Revolution that Transformed Women’s Employment, Education, and Family,” *American Economic Review*, 96(2), 1–21, 2006.
- Gottschalk, P. and T. Smeeding, “Cross-National Comparison of Earnings and Income Inequality,” *Journal of Economic Literature*, 35(2), 633–87, 1997.
- Karoly, L. A. and G. Burtless, “Demographic Change, Rising Earnings Inequality, and the Distribution of Personal Well-Being, 1959–1989,” *Demography*, 32(3), 379–405, 1995.
- Lemieux, T., W. B. Macleod, and D. Parent, “Performance Pay and Wage Inequality,” *Quarterly Journal of Economics*, 124(1), 1–49, 2009.
- Morissette, R. and F. Hou, “Does the Labour Supply of Wives Respond to Husbands’ Wages? Canadian Evidence from Micro Data and Grouped Data,” *Canadian Journal of Economics*, 41(4), 1185–210, 2008.
- Saez, E. and M. R. Veall, “The Evolution of High Incomes in North America: Lessons from Canadian Evidence,” *American Economic Review*, 95(3), 831–49, 2005.

¹⁷In 1992, just over 56 percent of university degrees were granted to women. In 2002, just under 60 percent of university degrees were granted to women and that rate has remained steady since 2002 (sased on authors’ tabulations from CANSIM II series V31212549 AND V31212550).