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# A Longitudinal Analysis of Earnings Change in Canada

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*This paper represents the views of the authors and does not necessarily reflect the opinions of Statistics Canada.*



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## **Abstract**

This paper uses tax-based longitudinal data from the last two decades to (i) examine trends in polarization and more general distributional shifts in earnings, (ii) identify year-to-year earnings mobility patterns, and (iii) extend Beaudry and Green's (2000a) synthetic cohort analysis of age-earnings profiles to actual longitudinal data. The most marked pattern of distributional change has been the rising (real) earnings of women, increased polarization of earnings among men, and a decline in the real earnings of Entry workers (age 20-24) for both men and women. The biggest changes occurred over the recessionary years, with reverses in these latter two patterns occurring since 1994. Upwards earnings mobility is substantially higher for male than for female workers, but this gap closed significantly over the period covered, although these trends have reversed with the robust economic expansion since the mid-1990s. The cohort analysis shows steady upward shifts in the earnings profiles of those who entered the labour market in the 1960's and 1970's, followed by downward shifts for the 1980s and 1990s entry cohorts, consistent with the findings of Beaudry and Green; for the most recent (1990-1994) entry cohorts, however, the profiles appear to have steepened, suggesting returns to experience have increased for these groups. Some of the implications of these findings are discussed.

**Keywords:** Polarization, earnings distribution, earnings mobility, earnings profiles

## **I. Introduction**

This paper uses tax-based longitudinal data to examine several aspects of changes in Canadian earnings over the 1982-1999 period. More specifically, it (i) examines how earnings distributions have experienced polarization and distributional shifts, (ii) identifies year-to-year earnings mobility patterns and how these have changed in terms of one-year transition matrices, and (iii) replicates and updates Beaudry and Green's (2000a) synthetic cohort analysis of age-earnings profiles with actual longitudinal cohort earnings data.

This study is based on the recently developed Longitudinal Administrative Database (LAD file) which provides new opportunities for studying income mobility issues and mapping out actual longitudinal income profiles of workers in Canada. The LAD is a ten percent representative sample of Canadian tax filers constructed by Statistics Canada from Canada Customs and Revenue Agency income tax files covering the years 1982-1999 for this study. We focus on earnings rather than total income because widening inequality and polarization and declining real incomes of some workers have been primarily attributes of labour markets, because the Beaudry-Green analysis we build from focuses on workers' earnings, and because we wish to abstract from the effects of government transfers and other sources of income.

An earlier study by Beach and Slotsve (1996) using grouped cross-sectional data identified a marked polarization in workers' earnings over the eighties and early nineties in Canada, but found it was largely associated with cyclical fluctuations in the labour market. Beach and Finnie (1998) found substantial upward and downward shifts in the Canadian earnings distribution. The current study revisits these issues of polarization and distributional shifts using the LAD as a very large micro data set over a more recent time frame.

Earnings mobility refers to changes in the relative earnings of individual workers through time. Intrinsicly, mobility of earnings is viewed as an indicator of equality of opportunity in the labour market, particularly in a life-cycle career framework where young workers may start off with relatively low earnings and, through work experience and training, move up through the earnings distribution over much of their career (Shorrocks, 1978). Recent work has linked mobility to economic well-being (Dardanoni, 1993; Beach, 2003), so it is worthwhile investigating how such mobility has changed over this period. This exploits the actual panel feature of the LAD data. Major non-Canadian studies that provide excellent treatment of the year-to-year income mobility include Atkinson, Bourguignon and Morrison (1992), Duncan, Smeeding and Rodgers (1994), OECD (1993, 1996), Buchinsky and Hunt (1996), and Burkhauser, Holtz-Eakin and Rhody (1997). The one early Canadian study we are aware of is Kennedy (1989) which uses a relatively small Canadian Pension Plan administrative file on earnings of middle-aged men over the period 1966-83. A flurry of more recent Canadian studies all use income-tax linked data and focus on incidence and duration of low-earnings spells and comparison of inequality measures when earnings are averaged over multiple years (Morrisette and Bérubé, 1996; Finnie, 1997b), persistence of low-income spells among families (Laroche and Ruggeri, 1996; Laroche, 1997; Finnie 1997a), intergenerational income mobility (Corak and Heisz, 1995, 1998, 1999; Fortin and Lefebvre, 1998), multi-year or long-run earnings dynamics (Beach and Finnie, 1998), and variance-decomposition analysis of longitudinal earnings variation

(Baker and Solon, 1999; Beach, Finnie and Gray, 2003). The present paper examines short-run or year-to-year earnings mobility for both men and women in terms of transition matrices – an issue not looked at in any of the above studies.

A recent study by Beaudry and Green (2000a) in the *Canadian Journal of Economics* examined what has happened to longitudinal age-earnings profiles by cohort in Canada in order to draw inferences as to how the economic fortunes of different cohorts have changed and whether skill premia by work experience have changed. Their analysis is based on synthetic cohorts constructed from cross-sectional Surveys of Consumer Finance over the period 1971-93. The synthetic cohort methodology is also used in Beaudry and Green (2000b) and Osberg (2001). The final part of the present study re-examines and updates Beaudry and Green (2000a) using the actual longitudinal microdata of the LAD file and finds both confirmation and an intriguing difference for cohorts of the 1990s.

## ***II. The LAD Data Set and the Analysis Sample***

The master LAD file underlying our work is a ten percent representative sample of all Canadian tax-filers since 1982.<sup>1</sup> It includes information on income by source, taxes, and various demographic characteristics derived from the underlying personal income tax forms (unfortunately, it does not include information on hours worked or education). In order to be as inclusive as possible, we look at total employment income (or “earnings”) consisting of all wage and salary income and net self-employment income.

The sample for this study consists of all earners aged 20 to 64 who were not full-time students in the income year and who received at least \$1000 in earnings (in 1999 constant dollars) as reported on their T-1 forms over the years 1982 to 1999. The intention is to approximate Statistics Canada’s concept of “All Earners” while excluding those who have only a limited attachment to the labour market. Individuals are included in the analysis for the years they meet these criteria and excluded for the years they do not. More complete details of the individual exclusion criteria and coverage of the analysis sample are found in Beach and Finnie (2000). The resulting sample varies from 1.035 million observations (608 thousand men and 427 thousand women) in 1982 to 1.270 million observations (679 thousand men and 591 thousand women) in 1999.

Women and men are divided into four age groups: Entry workers (age 20-24), Younger workers (age 25-34), Prime age workers (age 35-54), and Older workers (age 55-64). The 1999 frequency breakdown by age is:

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1. It has since been increased to a twenty percent sample.

	<u>Women</u>	<u>Men</u>
	(1000 obs.)	
Entry (20-24)	46.9 (7.9%)	56.2 (8.3%)
Younger (25-34)	145.5 (24.6%)	160.1 (23.6%)
Prime (35-54)	340.1 (57.5%)	380.3 (56.0%)
Older (55-64)	58.7 (9.9%)	82.3 (12.1%)

To construct transition matrices, the earnings distribution has to be divided into ordered earnings intervals. Following the convention in the polarization literature, the interval cut-offs are expressed in terms of median annual earnings for the earnings distribution as a whole. The following cut-offs are used: below 25% of the median (“Very low”), 25-50% of median (“Low”), 50-100% of median (“Low middle”), 100-150% of median (“High middle”), 150-200% of median (“High”), and above 200% of the median (“Very high”). These cut-off levels vary year to year with changes in the median real earnings level. However, the median actually changed relatively little over the 1982-1999 period. Its lowest value was \$25.6 thousand in 1994 and its highest values were \$27.5 thousand in 1998 and \$27.7 thousand in 1999. All figures are in constant 1999 dollars.

### **III. Distributional Shifts and Polarization of Earnings**

We first look at changes in the distributions of earnings over the 1982-1999 period. Table 1 shows the distribution of male and female workers for the two end years of the sample and for peaks (1989, 1999) and troughs (1983, 1991, 1994) over the covered period. That men on average have higher earnings than women shows up in men being much more prevalent in the upper two earnings intervals, while women are more frequently found in the lower three intervals.

The most marked pattern of distributional change has been the rising (real) earnings of women relative to the median, with the proportions of female workers in the lower intervals declining and those in the upper intervals generally rising. For example, measuring the change in the top three interval percentages compared to the bottom three interval percentages,

$$\left( P_{VH} + P_H + P_{HM} \right) - \left( P_{LM} + P_L + P_{VL} \right) \quad (1)$$

over the period as a whole shows an increase of 14.7 percentage points for women as compared to a decline of 6.5 points for men. Since we are dealing with annual earnings, the increases for women incorporate both rising hours worked per year as well as higher wage rates.

Also evident from Table 1 is increased polarization of earnings among men as a whole, as more workers locate at the bottom and top ends of the distribution. For example, between 1982 and 1999, the sum of the percentages in the two extreme intervals,

$$P_{VL} + P_{VH} \tag{2}$$

increased by about 2.9 percentage points (or 10.4 percent) with a quarter of the rise coming at the bottom end of the distribution and three-quarters at the top end.

Cyclical variations of these two distributional patterns are also apparent. Between 1989 and 1994, the general distributional shift represented by (1) went up by 10.9 percentage points for women and down by 7.8 points for men. Over the subsequent 1994-99 expansion, these shifts reversed slightly. Similarly, the degree of earnings polarization represented in (2) went up by 4.4 percentage points between 1989 and 1994 for men, then attenuated by 2.4 points during the 1994-99 expansion. So cyclical changes occur most markedly during periods of economic recession, especially for men (who tend to work more in the more cyclically volatile manufacturing and primary-goods sector and who have not enjoyed the secular increases in earnings that women have).

The recent literature (e.g., Beaudry and Green, 2000a; Beach and Finnie, 1998) has found considerable differences in earnings experiences by age. Table 2 presents earnings distributions for Entry, Younger, Prime, and Older workers. Entry workers are, not surprisingly, concentrated more towards the lower end of the distribution, Prime age men towards the top.

The most dramatic changes have been for Entry workers, both male and female. Between 1982 and 1999, the percentage of Entry women in the low and very low intervals rose from 44.1 to 58.6, while their percentages in the middle two intervals declined from 54.0 to 40.1. For men, the proportion in the bottom two intervals rose from 36.9 percent in 1982 to about 53.8 percent by 1994 and then fell back to about 45.1 percent by 1999; while that in the high middle and high intervals fell from 28.6 in 1982 to 14.2 by 1994 and then moved back up to 17.75 percent by 1999. The biggest changes thus again occurred over the recessionary period, with reverse changes occurring since 1994. These results are examined in more detail in Section V below.<sup>2</sup>

Among Prime (35-54 years) and Older (55-64 years) workers, though, rather different patterns of distributional change have been experienced by men and women. For women, low and low middle interval shares have generally declined, while high and high middle shares have risen. For men, essentially the opposite pattern has occurred. Interestingly, the share of Prime workers in the very top earnings interval has declined noticeably since 1994 for women and, quite dramatically, for men. The earnings of Older workers have also become more polarized for both women and men.

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2. Part of the slippage in real earnings of Entry workers in our sample may be due to significantly rising rates of participation in post-secondary education with those going on to colleges and universities being the more productive workers, so that there is a gradual relative withdrawal of these students from our sample of workers. However, this clearly cannot be the whole story because the earnings slippage shows a major cyclical pattern and indeed reverses after 1994 and it also shows up among Younger male workers who, at ages 25-34, would include post-secondary attendees after they have entered the labour market.

## **IV. Changes in Year-to-Year Earnings Mobility**

### **1. Earnings Mobility and Transition Matrices**

We now exploit the longitudinal or panel aspect of the LAD data by examining the mobility of individual workers' earnings from one year to the next. These dynamics are, of course, an important determinant of changes in the cross-sectional distribution of workers just observed.

The principal tool of analysis in this section is the transition matrix. This is a two-dimensional array of earnings intervals with the initial year down the left-hand side and the subsequent year across the top, whose elements indicate the percentages of workers moving from earnings interval *i* in the initial year to earnings interval *j* in the subsequent year. These percentages sum to 100 across each row. Table 3 illustrates one-year earnings transition matrices for 1998-1999 separately for men and women.<sup>3</sup> In the first panel, the bottom-row figures indicate that 86.3 percent of workers who were in the very high earnings interval in 1998 stayed in that top interval in 1999, while only about 2.5 percent of the top 1998 earners fell two categories into the high middle earnings interval. Numbers (in bold) on the principal diagonal are the "staying probabilities" (expressed as percentages). Numbers to the right and above this diagonal indicate probabilities of moving up one or more earnings intervals. Numbers to the left and below the diagonal represent probabilities of moving down.

The probability of staying in the same earnings interval is the largest entry in each row and the probabilities decline as one moves further away from this cell. That is, it is much less likely for a worker's earnings to change dramatically from one year to the next than to stay in the same interval or move to an adjacent one. Recall, however, that the intervals are fairly wide — either 25 or 50 percent of the median. This leaves quite a range for year-to-year earnings variation without workers slipping out of their current earnings interval.

The probability of staying in the same earnings category generally rises with the level of earnings. That is, earnings stability is much greater at the top of the earnings distribution than elsewhere. The probability of staying in the same earnings interval is 47-49 percent in the lower two intervals versus 86 percent in the top interval (all workers). From another perspective, the probability of slipping down one or more earnings categories is only 13 percent for men and 17 percent for women at the top end of the distribution, whereas the probability of advancing up from the bottom interval is 56 percent for men and 48 percent for women. Mobility of earnings is thus much greater towards the bottom end of the earnings distribution than at the top, the converse of the greater stability of earnings at the top.

Except at the top earnings interval, the staying probabilities are higher for women than for men, most markedly so at the bottom end of the distribution. That is, women have generally less

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3. Standard errors could be calculated for the estimated transition percentages (Amemiya, 1985, Ch. 11), but the underlying sample sizes in this paper are so large it was judged not worth reporting.

earnings mobility, or greater earnings stability, from one year to the next than men.<sup>4</sup> This is consistent with women having reduced labour market opportunities and typically flatter age-earnings profile than men, as well as women being less sensitive to cyclical effects. The average probability of moving up one or more earnings intervals from 1998 to 1999 was 26.25 percent for men versus 20.3 percent for women, and the average probability of moving down was 12.7 percent for men as compared to 13.8 percent for women. So men are more likely than women to advance their earnings by one or more intervals over a year and about as likely as women to experience earnings losses of one or more intervals.

The earnings mobility figures in Table 3 reflect a period of strong economic expansion and falling unemployment rates. Table 4 provides similar figures for the severe recessionary period 1991-1992. All the previously mentioned patterns are still present, but the probabilities of moving up are generally lower than in Table 3, the probabilities of moving down are generally higher, and at the bottom end of the distribution the probability of staying is substantially higher.

## **2. Summary Transition Patterns**

Some summary transition measures are presented in Table 5. Here “Average Mobility” is a measure of the percentage of all individuals (in all earnings categories) who move from one earnings category to another (i.e., 100 minus the average across all six earnings intervals of the staying percentages). “Avg. Prob. of Moving Up” is the average (across all earnings intervals) of the percentages of moving up one or more earnings intervals, and “Avg. Prob. of Moving Down” is the average (across all earnings intervals) of the percentages of moving down one or more intervals. The “Avg. Net Prob. of Moving Up” then is the difference between the latter two dynamics measures. The transition years covered are the two recessionary periods 1982-83 and 1991-92 and the two expansionary periods 1987-88 and 1998-99.

Average earnings mobility is seen to be substantially higher for men than for women, consistent with men having generally higher and steeper earnings profiles. However, there has been a secular decline in men’s average earnings mobility from 43.2 to 39.0 percent over the 1982-83 to 1998-99 period, while women’s average mobility has remained effectively unchanged. As a result, the average mobility gap between men and women has narrowed by half from 8.2 percentage points in 1982-83 to 4.8 points by 1998-99.

More interestingly, the decline in men’s average earnings mobility has been largely driven by a declining average probability of moving up the distribution. The early nineties with its severe recession saw a large reduction in the average probability of moving up for men, while there was essentially no change for women (as a whole). There was also a modest increase in the average probability of moving down for men versus a slight decline for women. The result is that men’s average net probability of moving up declined significantly from 13.9 percentage points in 1987-88 to 8.7 percent in 1991-92, while that for women rose from 3.0 percentage points to 4.3

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4. Since women, on average, have lower earnings than men, it would take them larger percentage changes to match typical year-to-year earnings changes for men; within *given* earnings intervals, however, this argument doesn’t hold.

percent. However, the robust economic expansion of the later nineties had all but recovered the net upward declines for men, so that by 1998-99 the average net probability of moving up was essentially where it had been in the mid-eighties. Meanwhile, the average net probability of moving up for women accelerated its increase to 6.5 percentage points by 1998-99. Evidently, changes in men's net upward earnings mobility has been largely driven by cyclical factors since the early eighties, while women's changes essentially show an on-going upward trend since the mid-eighties.

Similar summary mobility statistics are provided by age group in Table 6. In order to avoid small cell sizes for some earnings intervals among Entry and Older workers, we collapse the previous six earnings intervals into three: low, middle and high, with the earnings interval cut-offs being 50 percent and 150 percent of the median. The transition matrices underlying Table 6, are therefore, all three-by-three.

Average mobility is highest for Entry and Younger workers, and thereafter generally declines with age. The average probability of moving up is also highest among Younger workers and falls off dramatically with age, while the probability of moving down is lowest for Prime workers and greatest among Entry and Older workers. The result is that the net probability of moving up is markedly higher among Younger and Prime age workers and much lower (and indeed occasionally negative) among Entry and Older workers. This is consistent with workers having generally a concave earnings profile and with men having generally higher and more concave career earnings profiles than women, as has been frequently observed in the literature.

The marked decline in men's average earnings mobility found for men as a whole, driven largely by a decline in the average probability of moving up, is seen to hold across all four age groups, but the biggest declines in average mobility and average probability of moving up occurring among Prime workers. The pattern for women as a whole, however, does not show up across all age groups. Rather, the increasing average net probability of moving up found for all women taken together in Table 5 is seen to be driven by the experiences of only Prime and Younger workers; among Entry and Older workers it actually declined. The result is that there is a widening difference in the average net probability of moving up between the middle two age groups and the outer two age groups, so that women's earnings profiles are becoming more concave in shape, more like men's profiles.

## ***V. Beaudry-Green Cohort Analysis with Longitudinal Data***

Beaudry and Green (2000a), in a recent article in the Canadian Journal of Economics, examined the question of whether the observed widening earnings gap between prime age and young workers in Canada was due to steepening age-earnings profiles, and hence rising work experience differentials consistent with widening skill differentials emphasized in the U.S. literature on rising inequality, or was it due to a more general downward shift in the age-earnings profiles of recent cohorts of new labour market entrants. This is important to understanding the underlying factors that have been driving rising earnings inequality and other labour market outcomes in Canada (as elsewhere) over the 1980s and much of the 1990s. But it is also directly relevant to the welfare of more recent cohorts of workers in that the first explanation (i.e., steeper

profiles) suggests that the lower earnings of recent young workers will be temporary and their earnings will increase faster than for earlier cohorts as they gain more work experience, while the second explanation suggests that the observed declines are permanent, reflecting a deterioration in the lifetime earnings opportunities of more recent cohorts of young workers compared to earlier cohorts. The issue then revolves around examining what has happened to age-earnings profiles of recent cohorts versus earlier cohorts of workers. Beaudry and Green (henceforth B&G) undertake this empirical analysis by constructing synthetic cohorts of workers using repeated cross-sections of Survey of Consumer Finance data for Canada for 1971-1993. They generally find that the age-earnings profiles of different entrance cohorts of workers have essentially not steepened, and thus support the second hypothesis (i.e., permanent declines) rather than the first.

The LAD data provide an opportunity to revisit these issues by redoing the B&G empirical analysis with actual longitudinal cohort data rather than constructed synthetic cohort data and by updating the analysis to more recent years.

### **1. Identifying Age-Earning Profiles by Entry Cohort**

We follow B&G's approach in defining cohorts by the date a two-year group of workers are aged 25 or 26 (i.e., when they are viewed as entering the full-time labour market). So the 1982 entry cohort (EC82) consists of those workers in our sample who are aged 25 or 26 in 1982. We can then follow this cohort for 18 years (up to age 42 or 43 in 1999). Similarly, we can define the 1970 entry cohort (EC70) as those workers in our sample who are 25 or 26 in 1970. These workers enter our sample window in 1982 at age 37 or 38 and are followed through to 1999 when they are age 54 or 55. We thus have full 18 year coverage of cohorts EC82, EC80, EC78, ..., EC60. More recent cohorts spend less than the full 18 years in our sample. For example, the 1990 entry cohort (EC90) enters the sample (at age 25 or 26) in 1990 and spends only 10 years in the sample, attaining an age of 34 or 35 in 1999. We thus have partial sample coverage for the more recent cohorts EC84, EC86, ... EC96. Similarly, we also have only partial sample coverage for the earlier cohorts who retire out of the sample before 1999: EC58, EC56, ..., EC46.

For each year an entry cohort is in our sample, we calculate their mean earnings. These age-earnings profiles are graphed in appendix Figures A1 (for women) and A2 (for men). One can see immediately the generally positive concave slope of the profiles. They are higher for men, but the upward shifts across cohorts are more marked for women.

In order to control for macro conditions and to smooth out the year-to-year variation in earnings, we also follow B&G in fitting smoothing regressions to the mean earnings figures for each cohort. The regressors in each cohort regression are a cubic in age plus a trend-adjusted unemployment rate.<sup>5</sup> The resulting smoothed or predicted age-earnings profiles are graphed by cohort in Figures 1 and 2.

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5. The unemployment rate is that for males aged 25-54, and the trend adjustment was done by running a regression of this unemployment rate on a quadratic in the time trend and using the residuals from this regression as the trend-adjusted unemployment rate. All regressions, as well as the underlying raw means, are available upon request from the authors.

## **2. Longitudinal Cohort Age-Earnings Profile Results**

These graphs may be compared to the findings of B&G (in their Figures 1 and 2). One should keep in mind some differences between the two studies. B&G's estimation sample consists of earners who are heads or spouses of census households. Their measure of earnings is real weekly earnings where earnings includes wage and salary income, self-employment income and rental property earnings. B&G also subdivide their sample by education level into completed high school and university educated groups. We include all earners and not just household heads or spouses; our measure of earnings is annual wage, salary, and net self-employment income; and we do not break the profiles down by education level because that information is not available on the LAD.

Nonetheless, our results in Figures 1 and 2 are strongly consistent with B&G's major findings, but with one intriguing qualification or difference. One can see the large upward shifts in the earnings profiles of entry cohorts from the 1960s and 1970s and the much reduced shifts in earnings profiles among men in the 1980s and 1990s entry cohorts. So entering the labour market in (indeed being born into) different cohorts has led to quite different earnings experiences.

The changes in earnings cohort profiles are most noticeable for women in Figure 1. For the middle and earlier cohorts, earnings profiles have generally shifted upward over time, but with little change in slope. Particularly large upward shifts occurred for EC66, EC70, EC72, and EC76.<sup>6</sup> These entry cohorts have essentially experienced a lifetime of higher earnings opportunities. More recent cohorts, however, have faced a different experience. Beginning around EC82 or EC84, the earnings of young workers, say age 20-28, have no longer been rising steadily across cohorts. This is especially true from the raw means in appendix Figure A1 which show that the entry cohorts for the 1990s have actually experienced discretely lowered earnings figures (and quite distinctly so for EC96).

For men, the age-earnings profiles in Figure 2 are more clustered together, but distinct cohort patterns can still be identified. Among earlier cohorts, there has again been a clear upward shift in earnings profiles from the 1960s entry cohorts through those of the 1970s. But the slopes have changed quite irregularly, likely due to changing early retirement patterns and possible discouraged worker effects over the early to mid-1990s. Among the middle cohorts, there has been remarkably little shift in earnings profiles, although there was a general upward shift from EC80 to EC86 over ages 36-40, but with again no real change in profile slopes. At ages 33-34, however, a cross-over occurs and entry cohorts after about EC80 have experienced downward shifts in their earnings profiles. At ages 22-27, there was little change in average earnings over the 1980s entry cohorts, but a noticeable slippage since 1990 — see also the raw data in appendix

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6. B&G find a “lack of a strong cohort pattern in the female data” (p. 916) whereas we observe very strong cohort patterns for women. One explanation may be that B&G analyze weekly earnings whereas we look at annual earnings with perhaps a clearer definition of earnings and a broader estimation sample, so our patterns are going to pick up changes in hours worked along with wage rates.

Figure A2 — which is again very distinct for EC96. For example, at age 25, men’s average earnings declined from EC90 to EC96 by about \$2,800 or by 10.4 percent. For women, there was a decline of about \$1,900 or by 9.3 percent. The slippage over a longer period between EC82 and EC96 at age 25 was about \$4,100 (or 14.6 percent) for men and about \$2,200 (or 10.6 percent) for women. Recent cohorts of young workers have thus experienced clear downward shifts in their earnings profiles compared to earlier cohorts. This is also consistent with B&G’s findings (as well as what we have reported earlier in this paper) of earnings slippage among young workers.

There is, however, one intriguing difference in our findings from those of B&G. They conclude: “In no case do we find evidence that the return to gaining experience has been increasing over time” (p. 907). Inspection of our Figures 1 and 2 suggests that, for the entry cohorts of the 1990s, the profiles have in fact been steepening. Using the estimated profile regressions to calculate the returns to work experience yields the following:

	<u>Women (%)</u>		<u>Men (%)</u>	
	<u>Age 25</u>	<u>Age 28</u>	<u>Age 25</u>	<u>Age 28</u>
EC90	5.00	2.71	5.19	5.16
EC92	4.81	2.86	7.23	6.15
EC94	8.81	3.86	12.69	7.32

Regressions could not be run for EC96 due to a paucity of observations. Over the three above cohorts, however, the returns to experience are estimated to be increasing, and this shows up as well in the raw data of Figures A1 and A2. So for the entrants of the first half of the 1990s, their initial low earnings levels have been at least partly offset by their catching up to the previous decade’s entry cohorts over time. This distinctive result is obviously based on limited recent data; it remains to be seen if this new pattern continues, is a compositional effect,<sup>7</sup> or is some kind of short-term aberration. In the meantime, it might temper any extrapolations regarding earnings trends based on earlier data.

## **VI. Conclusions**

This study has used income tax-based longitudinal data over the period 1982-1999 to look at three aspects of change in the Canadian earnings distribution. It has examined polarization and distributional shifts in the Canadian earnings distribution as a whole, the year-to-year mobility of earnings in terms of transition matrices, and shifts in cohort-specific age-earnings profiles similar

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7. One possibility suggested to us by Garth Fraser is that more recent entry cohorts have acquired more education (and possibly more labour market experience through part-time and casual paid work) which helps them advance faster once they enter the full-time labour market. But since the LAD does not include an education variable, we cannot test for this. One does observe, though, that the calculated returns to experience have risen faster for men than for women, whereas women’s level of education has been rising faster than that of men’s.

to what Beaudry-Green (2000a) did with synthetic cohorts. Three general sets of results have been found corresponding to these three pieces of empirical analysis.

First, the most marked pattern of distributional change has been the rising (real) earnings of women relative to the median as the proportions of women workers in the lower earnings intervals have been declining and those in the upper intervals have been generally rising. Also evident are increased polarization of earnings among men as a whole and a marked slippage in the real earnings of Entry workers (age 20-24) for both men and women. The biggest changes occurred over the recessionary years, with reverses in these latter two patterns occurring since 1994.

Second, upwards earnings mobility has been shown to be substantially higher for male than for female workers. But there has been a general decline in men's mobility over the 1982-83 to 1998-99 period, while women's mobility has continued to increase. As a result, the average "mobility gap" between men and women has narrowed significantly. The decline in men's average earnings mobility has been largely driven by a declining average probability of moving up the distribution. These changes are quite cyclically sensitive and indeed have reversed with the robust economic expansion since the mid-1990s. The decline in men's average earnings mobility is very broad and shows up across all four age groups. The increased upward mobility of women, however, is localized only to Younger and Prime workers.

Third, the cohort analysis shows steady upward shifts in the earnings profiles of those who entered the labour market in the 1960s and 1970s, and followed by downward shifts for the 1980s and 1990s entry cohorts. These results confirm the Beaudry and Green (2000a) finding that the earnings of recent cohorts of young workers have slipped considerably (e.g., by 10-15 percent between EC96 and EC82 at age 25). Most cohort profile shifts have been largely parallel suggesting that the returns to work experience have essentially not changed. For entry cohorts between 1990 and 1994, however, and later than the period covered by B&G, the profiles appear to have steepened, suggesting returns to experience have increased for these groups.

Several conclusions or observations follow from these results. The cyclical sensitivity of the results, particularly for men, highlights the distributional importance of a strong labour market and the employment and earnings benefits it provides. With declining unemployment rates and rising employment rates, the last half of the 1990s has seen a remarkable reversal of some distributional concerns. Second, the downward shift in age-earnings profiles of recent young entrants (relative to earlier cohorts) in the early to mid 1990s coincides with high immigration rates over a strong recession. It would be useful to analyze to what extent, if at all, keeping the immigration tap on over this period influenced this cohort effect among young entrants since both groups represent essentially new entrants to the Canadian labour market and hence the margin that would likely be severely hit by recessions. Finally, the loss of real earnings among recent young cohorts draws attention to this group who are at an important stage of early career development in the labour market and of family formation in the household sector.

TABLE 1

Distribution of Workers across Earnings Intervals for Men and Women.

Selected Years, 1982 – 1999

(Percentages)

	<u>Very Low</u>	<u>Low</u>	<u>Low Middle</u>	<u>High Middle</u>	<u>High</u>	<u>Very High</u>
1. All Workers						
1982						
1983	11.34	13.38	25.29	22.04	14.84	13.11
1989	12.05	13.82	24.12	21.26	14.82	13.92
1991	11.11	13.44	25.46	22.02	14.21	13.77
1994	12.19	13.86	23.95	21.27	14.00	14.73
1999	12.25	14.57	23.18	20.15	13.61	16.24
	11.17	13.69	25.14	21.51	13.20	15.28
2. Men						
1982	7.50	9.65	19.73	23.06	19.97	20.09
1983	8.31	10.50	19.03	21.18	19.64	21.35
1989	7.03	9.74	20.09	22.76	18.99	21.39
1991	8.91	10.81	19.55	20.92	17.71	22.10
1994	9.16	11.87	19.74	19.11	16.45	23.68
1999	8.19	10.69	21.26	21.53	16.07	22.26
3. Women						
1982	16.80	18.68	33.21	20.59	7.54	3.18
1983	17.31	18.49	31.24	21.38	8.07	3.52
1989	16.18	18.03	32.12	21.09	8.28	4.30
1991	16.15	17.54	29.26	21.70	9.52	5.83
1994	15.90	17.75	27.25	21.37	10.27	7.46
1999	14.58	17.14	29.61	21.49	9.91	7.27

**TABLE 2**  
**Distribution of Workers across Earnings Intervals by Age.**  
**Selected Years, 1982 – 1999 (Percentages)**

a) Men

	<u>Very Low</u>	<u>Low</u>	<u>Low Middle</u>	<u>High Middle</u>	<u>High</u>	<u>Very High</u>
Entry:						
1982	17.38	19.53	32.69	20.65	7.92	1.84
1989	18.03	20.82	35.92	18.83	5.24	1.15
1994	25.26	28.50	31.05	11.19	3.00	1.09
1999	20.82	24.32	36.01	14.05	3.70	1.09
Younger:						
1982	6.66	9.03	19.86	26.06	22.59	15.80
1989	6.50	9.70	22.81	27.74	20.10	13.16
1994	8.71	12.00	23.62	23.96	17.51	14.20
1999	7.66	10.84	25.85	26.50	15.97	13.18
Prime:						
1982	4.51	6.84	15.32	21.33	22.37	29.64
1989	4.37	6.99	14.71	20.66	21.78	31.49
1994	5.74	8.26	15.36	18.22	18.95	33.47
1999	5.79	8.22	17.48	21.15	18.44	28.91
Older:						
1982	7.99	9.05	18.96	24.16	19.56	20.28
1989	8.94	10.62	19.66	21.22	17.45	22.10
1994	10.78	12.39	19.19	18.27	14.92	24.46
1999	11.73	12.47	19.70	18.66	13.73	23.70

b) Women

	<u>Very Low</u>	<u>Low</u>	<u>Low Middle</u>	<u>High Middle</u>	<u>High</u>	<u>Very High</u>
Entry:						
1982	21.92	22.16	39.70	14.29	1.80	0.13
1989	26.25	24.63	36.88	10.74	1.31	0.19
1994	32.92	31.69	27.37	6.97	0.89	0.17
1999	28.96	29.62	32.44	7.70	1.05	0.23
Younger:						
1982	16.26	16.39	31.35	23.74	9.61	2.65
1989	16.24	17.28	32.89	23.01	7.90	2.67
1994	15.62	17.42	29.76	22.74	10.16	4.31
1999	14.77	17.60	32.36	22.49	8.58	4.19
Prime:						
1982	14.79	18.63	31.90	20.95	8.75	4.99
1989	13.18	16.42	30.53	22.68	10.63	6.56
1994	12.08	14.63	25.79	23.84	12.75	10.91
1999	11.81	14.93	28.27	23.31	12.02	9.66
Older:						
1982	16.88	20.14	32.33	20.52	6.60	3.54
1989	18.08	20.39	31.12	19.50	6.75	4.17
1994	17.35	19.26	27.31	20.89	8.07	7.13
1999	18.67	18.84	28.28	19.47	8.11	6.64

TABLE 3

One-Year Transition Matrices for Men and Women, 1998 – 1999

(Percentages)

a) All Workers

<u>1998/1999</u>	<u>VL</u>	<u>L</u>	<u>LM</u>	<u>HM</u>	<u>H</u>	<u>VH</u>
Very Low	<b>48.98</b>	31.76	16.03	2.51	0.48	0.24
Low	15.82	<b>47.67</b>	31.04	4.43	0.71	0.33
Low Middle	4.12	10.50	<b>65.56</b>	17.21	1.98	0.62
High Middle	1.19	2.09	12.45	<b>68.80</b>	13.43	2.04
High	0.60	0.87	3.18	13.72	<b>66.11</b>	15.51
Very High	0.33	0.47	1.17	2.54	9.21	<b>86.28</b>

b) Men

<u>1998/1999</u>	<u>VL</u>	<u>L</u>	<u>LM</u>	<u>HM</u>	<u>H</u>	<u>VH</u>
Very Low	<b>43.56</b>	30.82	20.34	3.96	0.86	0.46
Low	15.24	<b>43.22</b>	33.43	6.29	1.22	0.61
Low Middle	4.25	10.51	<b>61.13</b>	20.32	2.81	0.99
High Middle	1.28	2.11	12.11	<b>66.18</b>	15.70	2.61
High	0.63	0.90	2.96	13.37	<b>65.03</b>	17.10
Very High	0.33	0.47	1.07	2.29	8.72	<b>87.12</b>

c) Women

<u>1998/1999</u>	<u>VL</u>	<u>L</u>	<u>LM</u>	<u>HM</u>	<u>H</u>	<u>VH</u>
Very Low	<b>52.34</b>	32.34	13.36	1.61	0.24	0.11
Low	16.22	<b>50.73</b>	29.42	3.15	0.35	0.14
Low Middle	4.03	10.49	<b>69.12</b>	14.72	1.31	0.35
High Middle	1.10	2.07	12.83	<b>71.78</b>	10.85	1.38
High	0.56	0.82	3.63	14.39	<b>68.11</b>	12.49
Very High	0.33	0.49	1.52	3.48	10.98	<b>83.20</b>

TABLE 4

One-Year Transition Matrices for Men and Women, 1991 – 1992

(Percentages)

a) All Workers

<u>1991/1992</u>	<u>VL</u>	<u>L</u>	<u>LM</u>	<u>HM</u>	<u>H</u>	<u>VH</u>
Very Low	<b>52.13</b>	29.33	15.30	2.56	0.47	0.21
Low	20.05	<b>46.77</b>	27.68	4.49	0.74	0.27
Low Middle	6.29	13.01	<b>61.62</b>	16.50	2.00	0.58
High Middle	1.81	3.09	13.79	<b>66.25</b>	13.40	1.64
High	0.79	1.24	4.21	13.07	<b>65.89</b>	14.81
Very High	0.40	0.61	1.67	2.98	9.11	<b>85.23</b>

b) Men

<u>1991/1992</u>	<u>VL</u>	<u>L</u>	<u>LM</u>	<u>HM</u>	<u>H</u>	<u>VH</u>
Very Low	<b>46.27</b>	29.49	19.03	3.97	0.83	0.40
Low	19.71	<b>42.51</b>	29.81	6.18	1.29	0.49
Low Middle	7.11	14.11	<b>56.46</b>	18.53	2.86	0.94
High Middle	2.16	3.47	14.26	<b>62.05</b>	15.95	2.12
High	0.86	1.35	4.11	13.17	<b>65.35</b>	15.16
Very High	0.41	0.62	1.66	2.86	8.94	<b>85.51</b>

c) Women

<u>1991/1992</u>	<u>VL</u>	<u>L</u>	<u>LM</u>	<u>HM</u>	<u>H</u>	<u>VH</u>
Very Low	<b>55.86</b>	29.24	12.93	1.66	0.22	0.08
Low	20.28	<b>49.73</b>	26.19	3.32	0.37	0.11
Low Middle	5.67	12.17	<b>65.54</b>	14.95	1.36	0.31
High Middle	1.42	2.67	13.27	<b>71.04</b>	10.51	1.09
High	0.61	0.98	4.45	12.83	<b>67.10</b>	14.02
Very High	0.34	0.54	1.68	3.56	9.90	<b>83.99</b>

TABLE 5

Average Summary Transition Probabilities for Men and Women.  
Selected Years, 1982 – 1999  
 (Percentages)

	<u>All Workers</u>	<u>Men</u>	<u>Women</u>
Average Mobility:			
1982 - 83	38.51	43.19	34.99
1987 - 88	38.39	42.40	36.08
1991 - 92	37.02	40.31	34.46
1998 - 99	36.10	38.96	34.12
Avg. Prob. of Moving Up:			
1982 - 83	23.95	28.41	19.47
1987 - 88	23.49	28.14	19.55
1991 - 92	21.66	24.51	19.39
1998 - 99	23.05	26.25	20.30
Avg. Prob. of Moving Down:			
1982 - 83	14.56	14.77	15.52
1987 - 88	14.90	14.25	16.53
1991 - 92	15.35	15.80	15.06
1998 - 99	13.04	12.71	13.82
Avg. Net Prob. of Moving Up:			
1982 - 83	9.39	13.64	3.95
1987 - 88	8.59	13.89	3.02
1991 - 92	6.31	8.71	4.33
1998 - 99	10.01	13.54	6.48

TABLE 6

Average Summary Transition Probabilities by Age for Men and Women.  
Selected Years, 1982 – 1999  
 (Percentages)

a) Men

	<u>Entry</u>	<u>Younger</u>	<u>Prime</u>	<u>Older</u>
Average Mobility:				
1982 - 83	26.59	27.14	25.17	22.33
1987 - 88	26.61	26.56	24.69	22.62
1991 - 92	24.73	24.64	22.73	21.97
1998 - 99	24.12	24.18	21.32	20.19
Avg. Prob. of Moving Up:				
1982 - 83	15.17	19.47	18.27	12.19
1987 - 88	16.27	19.53	18.27	11.55
1991 - 92	12.09	16.50	15.33	9.74
1998 - 99	14.32	18.11	15.66	10.13
Avg. Prob. of Moving Down:				
1982 - 83	11.42	7.67	6.89	10.14
1987 - 88	10.35	6.99	6.42	11.07
1991 - 92	12.64	8.14	7.39	12.22
1998 - 99	9.80	6.07	5.66	10.06
Avg. Net Prob. of Moving Up:				
1982 - 83	3.75	11.80	11.38	2.05
1987 - 88	5.92	12.54	11.85	0.48
1991 - 92	-0.55	8.36	7.94	-2.48
1998 - 99	4.52	12.04	10.00	0.07

TABLE 6 (continued)

Average Summary Transition Probabilities by Age for Men and Women.  
Selected Years, 1982 – 1999  
 (Percentages)

b) Women

	<u>Entry</u>	<u>Younger</u>	<u>Prime</u>	<u>Older</u>
Average Mobility:				
1982 - 83	22.41	22.28	16.30	15.55
1987 - 88	24.56	23.14	18.02	17.55
1991 - 92	21.41	22.85	16.37	16.54
1998 - 99	22.25	23.39	16.52	16.96
Avg. Prob. of Moving Up:				
1982 - 83	10.81	11.74	8.94	5.20
1987 - 88	11.16	11.85	10.09	5.30
1991 - 92	8.85	11.94	9.40	5.00
1998 - 99	10.33	13.12	10.10	5.35
Avg. Prob. of Moving Down:				
1982 - 83	11.59	10.54	7.36	10.35
1987 - 88	13.40	11.29	7.93	12.25
1991 - 92	12.56	10.91	6.96	11.54
1998 - 99	11.93	10.26	6.42	11.62
Avg. Net Prob. of Moving Up:				
1982 - 83	-0.78	1.20	1.58	-5.15
1987 - 88	-2.24	0.56	2.16	-6.95
1991 - 92	-3.71	1.03	2.44	-6.54
1998 - 99	-1.60	2.86	3.68	-6.27

Figure 1 -- Predicted Earnings, Women

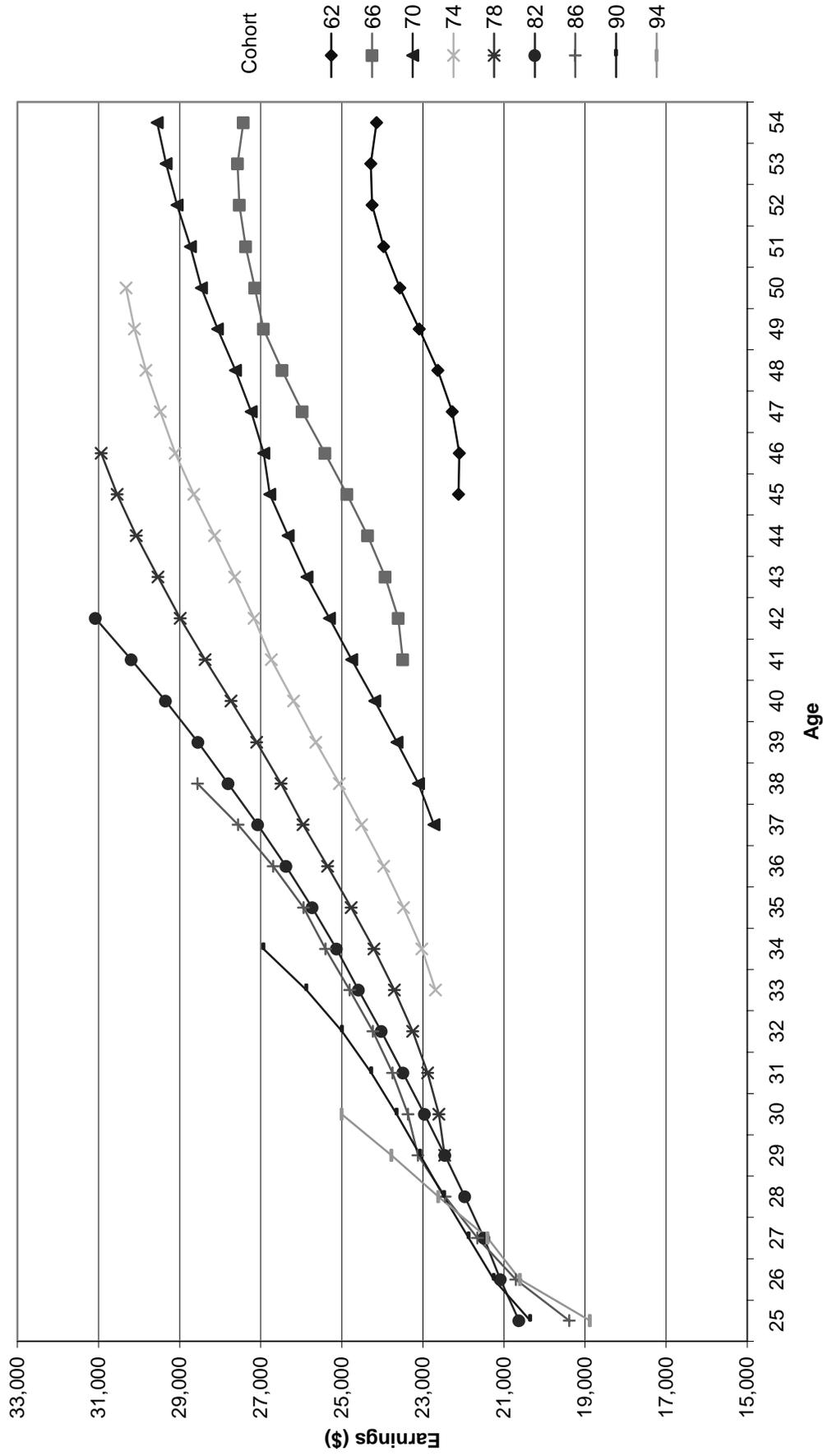


Figure 2 -- Predicted Earnings, Men

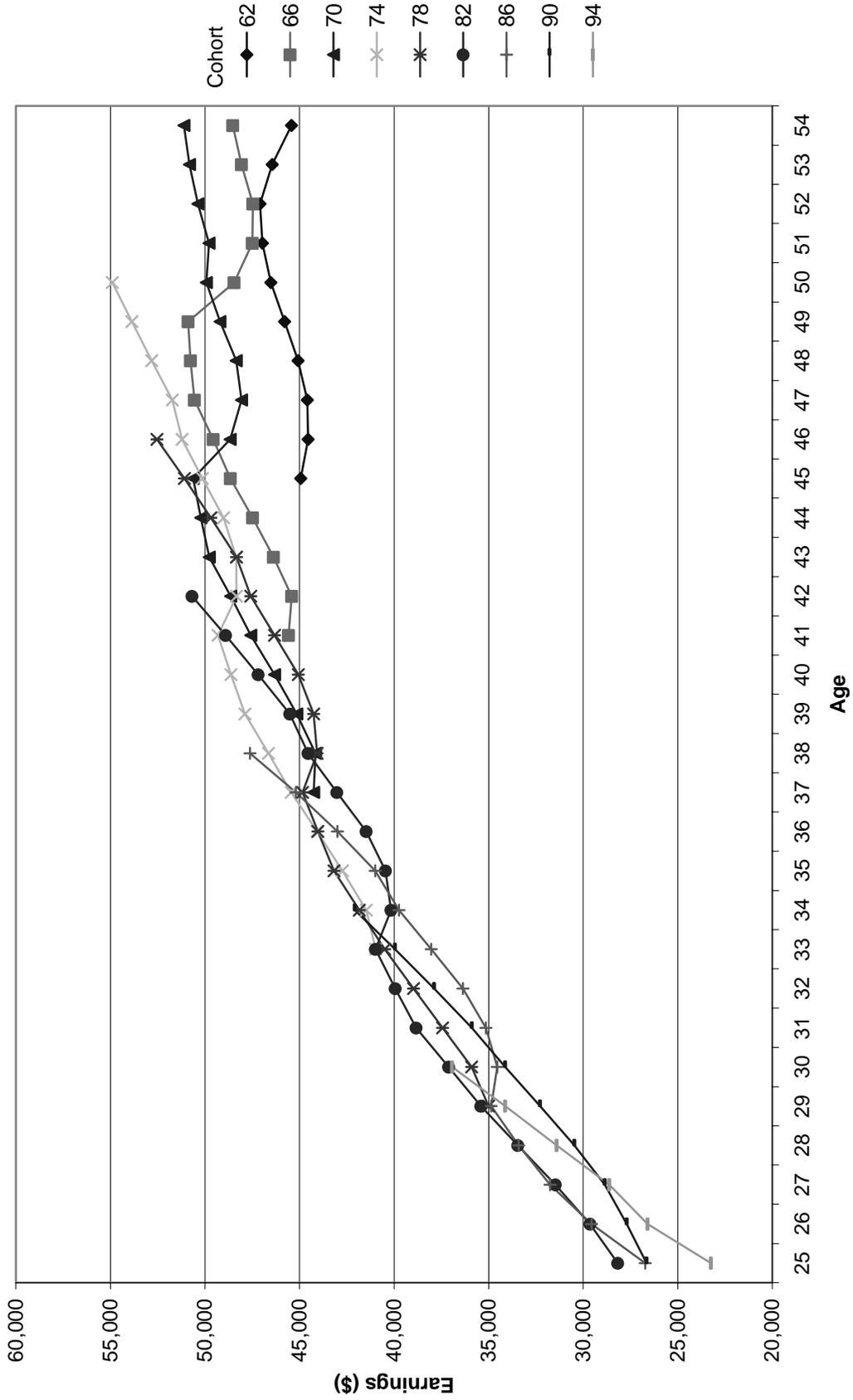


Figure A1 -- Actual Age-Earnings Profiles, Women

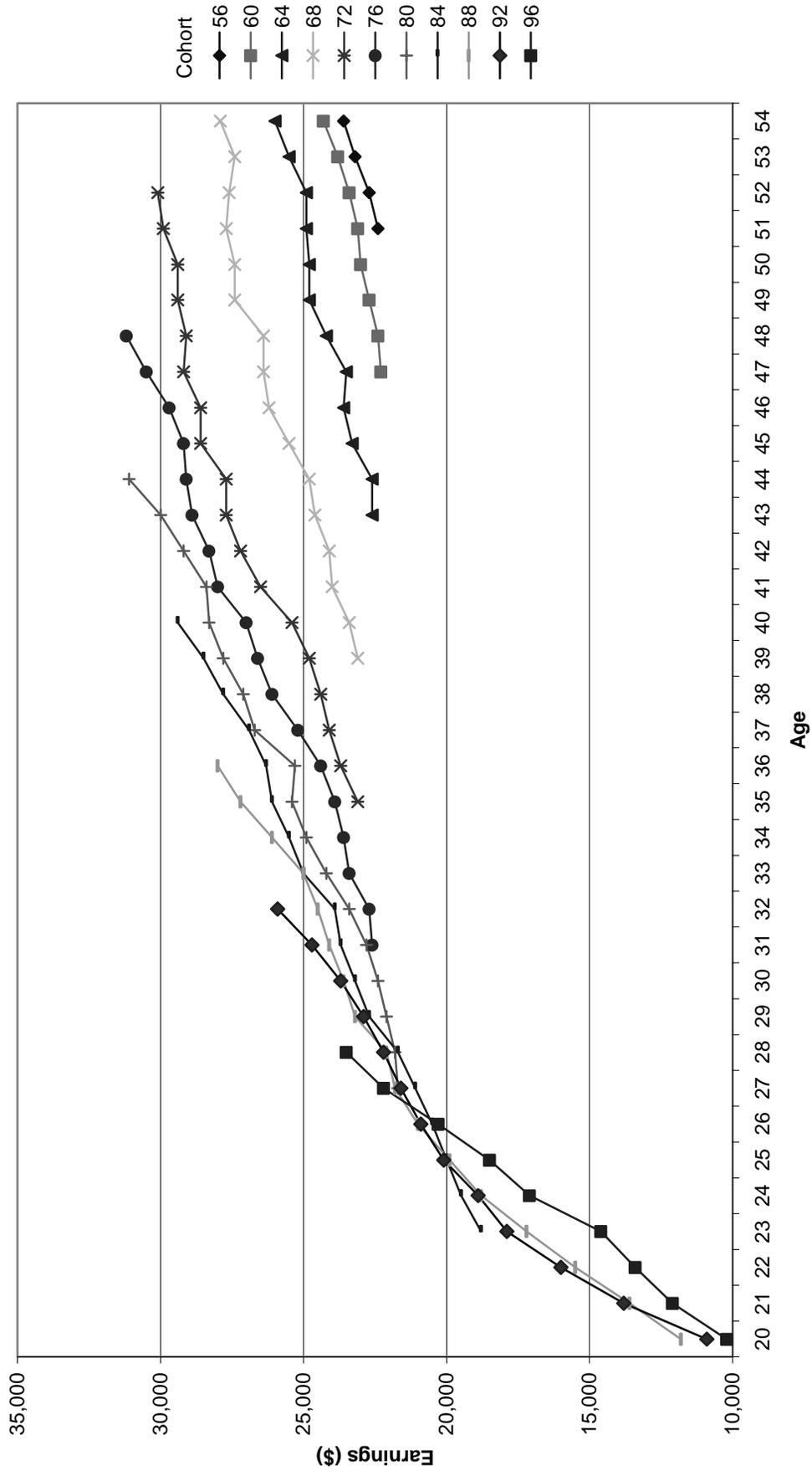
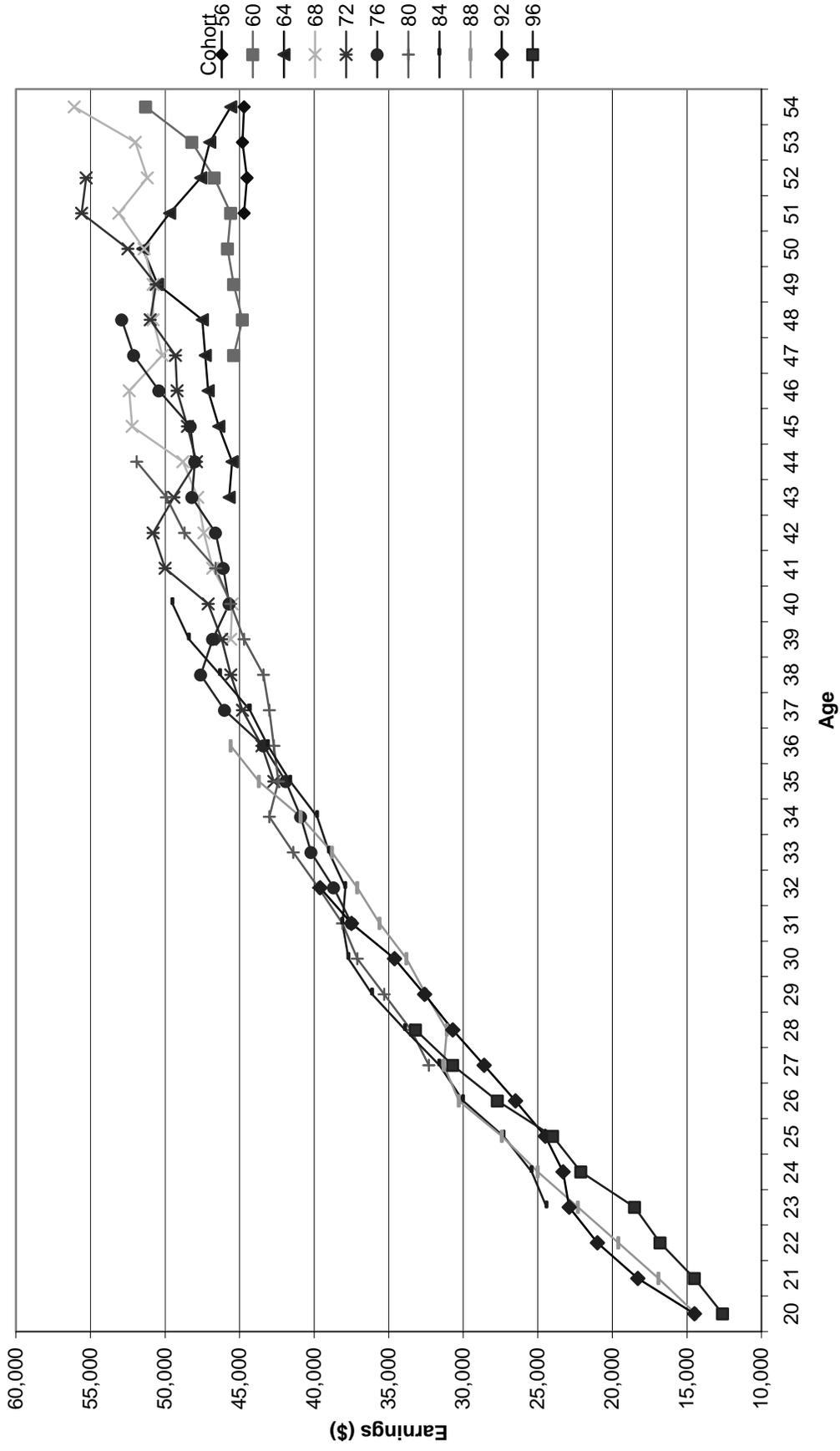


Figure A2 -- Actual Age-Earnings Profiles, Men



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