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COHORT PATTERNS IN CANADIAN EARNINGS: ASSESSING THE ROLE OF SKILL PREMIA IN INEQUALITY TRENDS

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ABSTRACT

This paper documents the pattern of change in age-earnings profiles across cohorts and evaluates its implications. Using synthetic cohorts from the Survey of Consumer Finances over the period 1971 to 1993, we show that the age-earning profiles of Canadian men have been deteriorating for more recent cohorts in comparison to older cohorts. We find this pattern for both high school and university educated workers. In no case do we find evidence that the return to gaining experience has been increasing over time, nor do we find increased within-cohort dispersion of earnings. We view these findings as conflicting with the hypothesis that increased skill-premium largely explains the observed increase in dispersion of male weekly earnings in Canada. When looking at the pattern for women, we find only minor differences in the age-earning relationships across cohorts.

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1 Introduction

Changes in the distribution of earnings have become the focus of considerable interest. It is now well established that, over the last fifteen years, the dispersion of male earnings in Canada has widened considerably (see Richardson (1994) and Myles, Morissette and Picot (1996)). This observation holds for both annual and weekly earnings. One of the salient features of the increase in dispersion in Canada is its relationship to the age of workers. For example, between 1981 and 1993, the difference between the average earnings of male workers aged 45 to 55 and those aged 25 to 35 increased by 18 percentage points. There are two interpretations of such an observation. On one hand, such a pattern may indicate that experience is more valuable today and therefore current young workers should expect higher wage growth as they age than previous labour market entrants. Alternatively, the increased age differential may imply that recent labour market entrants are and will be paid less than their older counterparts throughout their lifetime. Under this interpretation, the increased age-differential reflects a deterioration in lifetime earnings opportunities for newer labour market entrants. To this point, the existing literature has almost universally assumed that the increased age differential reflects higher returns to experience. [1] As such, the increased differential is viewed as part of a general increase in returns to skills of all types. These increased skill premia are viewed, in turn, as being a reflection of an economy wide increase in demand for skills. In parts of the U.S. literature on inequality, the notion that a skill biased shift in demand is the prime force affecting wage patterns is taken as a given and effort is devoted to uncovering the source of the demand shift (e.g., Borjas and Ramey(1996),

[1] The only exceptions to this are Morissette and Berube(1997) and Burbidge et. al. (1997), both of which take a cohort based approach. Our study differs from Morissette and Berube(1997) because they use tax data, which does not permit an educational breakdown, and from Burbidge et. al.(1997) because we use the results to examine alternative theories of the causes of increased inequality.

Berman et. al. (1994)).

Our objectives in this paper are twofold. First, we want to document how the age-earnings relationship has changed across birth cohorts. In order to provide a comprehensive picture of this process, we report results for different educational categories, and for both the mean and the 90-10 decile differences. This evidence allows us to examine whether the increased age differential for males is more likely a reflection of increased returns to experience or of successively worse labour market performance for younger workers. Answering this question is of interest, in part, as an aid in setting policies such as training that have different impacts across generations. Our second objective is to use the cohort based earnings patterns as a tool for re-evaluating the relevance of the skill-biased demand shift hypothesis for Canada. In particular, we investigate whether changes in earnings inequality in Canada can reasonably be interpreted as primarily reflecting increased premia for skills of all types, as predicted by the skill-biased demand shift hypothesis.

In pursuing these objectives, it is important to note that Canadian males and females do not share the same time patterns in inequality. Support for a skill biased demand shift has been built mainly on evidence from male earnings trends. Recent work has shown, however, that females did not experience the same increases in inequality as males over the 1980s in Canada (Beach and Slotsve(1996)). [2] In attempting to assess theories involving broad demand shifts, such as shifts generated by skill biased technical change, it is important to examine wage patterns for all workers. Thus, throughout the paper, we present results for both male and female workers.

Our approach to the first objective is simple. Using data from the Survey of Consumer Finances between 1971 and 1993, we follow the age-earnings

[2]This is true when examining all workers and all earnings sources, which is essentially what we use in this paper. Burbidge et. al.(1996) show that female and male inequality trends are very similar for full-year full time, non-self-employed workers.

path of different birth cohorts in order to examine whether returns to added years of experience are changing over time. The main difficulty with the approach is that the different birth cohorts live through different business cycle episodes. Therefore, in order to document the long term trends affecting age-earning profiles, it is necessary to first purge the data of business cycle influences. Since there is no perfect way of performing this task, we provide the reader with both a graphical illustration of our treatment of the data and a statistical analysis.

In order to meet our second objective, we illustrate the effects of a skill-biased demand shift on cohort-specific age-earning profiles in the context of a simple labour demand model. We then compare the predicted effects with the observed patterns. Overall, our reading of the data is that increased skill premia contribute surprisingly little to an understanding of the changes in wage inequality in Canada (when skill is interpreted along the dimensions of education, experience and unobserved quality). Instead, we find that deteriorating labour market outcomes for younger male workers provides a more succinct characterization of the prime trends in earnings patterns. ' We do not provide a single explanation for this deterioration as an alternative to the skill biased demand shift hypothesis. We argue that, with attention shifted away from a single demand side explanation, several interesting alternative hypotheses present themselves. These alternatives deserve further investigation.

The paper is structured as follows. Section 2 describes the data. Section 3, documents how age-earnings profiles have been changing across cohorts. We begin by documenting the behaviour of the mean of cohort-specific age-earning profiles, followed by a description of the 90-10 percentile difference. Section 4 discusses the implications of our observations in terms of hypotheses that focus on increased skill premia due to biased labour demand shifts. In particular, we discuss how our approach relate to approaches emphasizing decompositions in terms of time, age and cohort effects. Finally, Section 5

offers some concluding comments.

2 Data

Our empirical work centres on following the earnings of cohorts of workers through time. We do this using data from Surveys of Consumer Finance for the years, 1971, 1973, 1975, 1977, 1979, 1981, 1982, 1984, 1986, 1988, 1990, 1992, and 1993. The data for the years before 1981 come from Census Family Files while those from 1981 on come from the Individual Files. In order to create a consistent series over time, we restrict the samples from the Individual Files to include only individuals who are heads or spouses of census households. [3]

We define an entry cohort as a group of individuals who were age 25 or 26 in an even numbered year. Thus, the 1972 entry cohort consists of individuals who turned 25 or 26 in 1972. We chose age 25 as the entry age to the mature labour market. [4] This is not meant to imply that some individuals do not work steadily before age 25. It is meant to focus attention on a period after individuals have largely ended their major educational investments and during which they become more permanently attached to the labour market. We chose this focus, in part, to ease the measurement exercise that follows since the greater flexibility exhibited by younger individuals

[3]The individual files do not include a specific variable indicating that an individual is the head or spouse of a census family. We considered an individual to be the head or spouse of a census family if at least one of the following conditions were true: 1) the individual was listed as the head of a two parent census family; 2) the individual was listed as the head of an economic family; 3) the individual was a lone parent; 4) the individual lived as a single individual with other unrelated individuals; 5) the individual lived with relatives and was listed as married or divorced. In earlier work (Beaudry and Green(1996)) we followed a smaller set of cohorts through the 1980s using only the Individual Files. The results from that exercise are very similar to those we obtain here for the 1980s following census family heads and spouses.

[4]Card and Lemieux(1996) provide evidence on a range of outcomes for younger workers over a similar sample period. Morissette(1997) also examines earnings and employment outcomes for youths using longitudinal tax files.

entails more substantial selection issues. However, we also believe that this is an interesting place to focus attention since this is the age of a crucial transition to stable work patterns, accelerating careers and family formation. If changes in the economy damage earnings patterns from this age on, this is a point of major policy concern. Alternatively, if changes in the labour market require more adjustments from youths, say in the form of increased educational investment, but they still move onto stable career paths after age 25 then such changes may not raise as much concern.

The specific set of entry cohorts we follow are those entering in 1962 and after. We chose not to examine all cohorts in all years to avoid trying to make inferences too far out of our sample. More specifically, we believe that the older cohorts observed at the start of our sample period experienced a very different labour market relative to those who entered the labour market in the 1960s and afterward. If that is true, then attempts to extrapolate backwards from our data to predictions about the earliest parts of the age-earnings profiles of these workers in order to compare their outcomes to more recent cohorts is simply misguided. We restrict our observations to individuals who are under age 56 in any given sample year in order to avoid fluctuations revolving around early retirement.

In our analysis, we divide our entry cohorts into subgroups defined by education level. In particular, we examine two education groups: 1) those with some or completed high school education; and 2) those with a university degree or more. The first group includes individuals who have some post-secondary education but have not obtained any post-secondary certificate or degree. A preliminary investigation of the data indicated that these post-secondary non-completers behave very similarly to those with a high school education.. Note that we do not present results relating either to individuals with less than a high school education or to individuals who have completed a post-secondary certificate or degree other than a university degree.

One major concern in using this set of data arises from changes in the

definitions of educational categories in data for 1990 and after. A key change in this regard was the division of the "some or completed high school" category into the "some high school but not completed" and the "completed high school" categories. This change is not a concern under our data definitions since we group together all individuals with high school or lower education levels. A change of more potential concern is the switch in assignment of post-secondary education that does not require a high school diploma from the high school to the post-secondary education categories. To the extent that individuals after 1990 enter but do not complete these programmes, they will continue to be grouped with high school educated individuals under our assignment system. However, individuals who do earn a certificate from a programme not requiring a high school diploma will be categorized as having a high school education before 1990 and a post-secondary certificate afterwards. This will not affect our university degree group but will alter the composition of our high school educated group. Given that this involves a removal of more educated individuals from the high school group, the change can be anticipated to cause a fall in average earnings for the low educated group after 1990. To assess the impact of the educational change, we reran all of our statistical specifications including a post-1990 dummy variable. For males, the inclusion of this variable did not change any of the conclusions discussed below. For females, including the post-1990 variable changed some results, and we describe those changes at the appropriate points in the paper.

Having defined cohorts, our analysis consists of examining earnings measures for each cohort that is present in each of our sample years. For example, we examine the earnings of all individuals in the 1968 entry cohort in 1971, 1973, 1975, etc.. In principle, this provides us with a picture of the earnings path followed by this group of individuals over time. Since the SCFs do not form a true panel, we are not actually following the same group of individuals over time in this exercise. However, as long as the composition of the group being followed does not change over time, earnings measures such as average

earnings in each year for this "synthetic" cohort will provide an accurate picture of the average experience for individuals in the cohort. It is possible that the composition of the cohort groups changes over time as individuals acquire more education. We believe that problems of this sort are minimized by the fact that we only examine individuals over age 25.

Immigration is a further source of potential compositional changes as new members may be added to a cohort from one data year to the next. To examine the implications of immigration for our results, we recreated all the figures and tables presented below using samples of non-immigrant males. [5] Results using non-immigrant data for high-school educated males are virtually identical to those presented for the whole sample in the remainder of the paper. For university educated males, the age-earnings profiles of the pre- 1980 cohorts without immigrants are flatter and have higher intercepts than those plotted based on data including immigrants. For the post-1980 cohorts the profiles generated from the two datasets are much more similar. This fits with results in Baker and Benjamin(1994) showing that profiles of earnings with time in Canada for post 1980 immigrants are flat while those for earlier cohorts of immigrants are steeper. The steeper profiles for earlier immigrant cohorts reflects a pattern in which immigrants entered the Canadian labour market with average earnings below those of similarly skilled non-immigrants but experienced more rapid earnings growth thereafter, eventually catching up to and surpassing the earnings levels of comparable Canadian born workers. Since immigrant workers tend to enter Canada at young ages, the addition of immigrants to an age-defined cohort would depress average earnings for the cohort at young ages but also lead to a steeper age-earnings profile in successive years. This is what is found for the pre- 1980 cohorts in our data.

[5] We could not perform the same exercise for females because the pre-1981 datasets do not contain information on the immigrant status of spouses. The non-immigrant male data does not include data for 1971 since there is also a lack of information on immigrant status for males in the SCF for that year.

Regardless of the reason for the changes when university educated male immigrants are added to our data, the basic patterns observed for university educated males in the remainder of the paper, and the conclusions based upon them, do not change when immigrants are removed.

The earnings measure we examine is real weekly earnings in 1980 dollars. The conversion to real dollars is done using the Consumer Price Index for Canada for the relevant year. Weekly earnings are created for each individual in a given sample year by dividing total earnings by the number of weeks worked in the year. [6] We omit individuals with zero weeks worked and/or non-positive earnings. Once these earnings are calculated for each individual in a cohort we calculate summary measures such as the percentiles of the earnings distribution and the average weekly earnings for individuals in a given cohort in a given year.

3 Changes in Age-Earnings Profiles

The objective of this section is to document how age-earnings profiles have been changing for successive cohorts of labour market entrants. In particular, we investigate whether these profiles have been shifting up or down and whether their slopes have been changing. Since age-earnings profiles are likely to be different for different segments of the labour market, we examine changes in age-earnings profiles for four labour markets groups: high school educated males, high school educated females, university educated males, and university educated females. As mentioned in section 2), we focus on weekly earnings, and we restrict attention to workers between 25 and 56 years of age.

[6] Although our measure of total earnings represent mainly wages and salaries, it does include some self- employment earnings and rental property earnings. We use total earnings, as opposed to only wages and salaries, because we cannot divide out self-employment and rental earnings in early sample years.

3.1 A first look at the data

3.1a Males

Figures 1a and 1b plot male real average weekly earnings for several different cohorts as they age. Figure 1a relates to the high school educated sample, while Figure 1b relates to the university educated sample. We refer to any particular cohort by the year in which it enters our age window, that is, the 1964 cohort is composed of workers who turned 25 or 26 years old in 1964. Note that these figures are mainly for illustrative purposes since they do not graph the full sample of cohorts available in our data. Two facts are immediately apparent from Figures 1a and 1b. First, different cohorts experience substantially different earnings profiles as they age. Second, the university educated sample experiences much higher wage growth on average as it ages.

Summarizing the underlying pattern of change for these profiles is complicated by the erratic nature of the different profiles. For example, many of the cohorts experienced substantial decreases in real earnings followed immediately by important increases at some point in their time profile. Not surprisingly, most of these temporary swings in earnings are associated with business cycle conditions. For example, the fall in earnings experienced by the 1964 cohort as they aged from 40 to 42 occurs in the recession of the early eighties. Similarly, the fall in earnings experienced by the 1972 cohort as they aged between 34 and 35 also occurs in the early eighties.

In order to help isolate the trend changes inherent in these profiles, we plot smoothed cohort-specific profiles in Figures 2a and 2b plot. We generated the smoothed profiles by estimating a cubic age-earnings profile for each cohort while simultaneously controlling for business cycle conditions. The business cycle indicator used is the quadratically detrended unemployment rate of males 45 to 54 years of age.[7] The coefficient on this detrended unemployment

[7]In these regressions and all the regressions that follow, we instrument for the un-

variable is restricted to be the same across cohorts.[8] We experimented with other indicators for business cycle conditions, all of which gave very similar results.

From Figures 2a and 2b, it is now much easier to detect trend movements. For the university educated sample shown in Figure 2b, the most noticeable pattern is the appearance of a downward shift in cohort-specific profiles. In particular, at almost all ages in our window, the different cohorts keep a strict ordering: the older cohorts earn more and the later cohorts earn less. Moreover, the differences in magnitude across cohorts are substantial. For example, at age 32, the 1986 cohort earns approximately 20% less than the 1964 cohort.

A second important observation that emerges from Figure 2b relates to the slopes of the earnings profiles. With the possible exception of the 1972 cohort, there does not appear to be any systematic pattern suggesting that younger cohorts experience greater wage growth as they age than that experienced by older cohorts. Therefore, increased earnings differentials by experience for university educated men appear to arise from worsening outcomes for more recent cohorts rather than increasing returns to experience. We will examine this claim more systematically (using all the cohorts available in our data set) in section 3.2.

A first glance at Figure 2a indicates that the pattern of change affecting the age-earnings profiles of high school educated workers is more complicated

employment rate variable using the detrended U.S. unemployment rate and a dummy variable capturing the period after 1982 when the Canadian and U.S. rates moved apart. This is done to allow for the possibility that underlying factors driving the wage patterns we are studying also affect the unemployment rate. The U.S. detrended unemployment rate enters as a highly significant regressor in the regression of the Canadian detrended unemployment rate on the U.S. detrended rate and the post-1982 dummy variable.

[8]We also investigated specifications in which the measure of the cycle was interacted with age. Since these added interactions were neither economically substantial nor statistically significant and did not alter any of the results presented here, we chose to focus on the simpler specification.

than that for university educated workers. Nevertheless, a pattern can still be discerned. A close look indicates that, for the 1964 cohort through to the 1978 cohort, there is a rotation in cohort-specific age-profiles. More precisely, entry level wages successively improve for these cohorts while wage growth as they age declines. This pattern appears to stop with the 1978 cohort. Then, from the 1978 cohort on, the cohort profiles successively shift down with no discernable pattern of change in the slope. The size of this latter decline is quite substantial, being of the order of 20% in just 12 years. The observed pattern is consistent with improving labour market conditions for the high school educated in the 1970s creating both increased wage growth for older workers in those years and higher entry level wages for newer workers.

3.1b Females

Figures 3a and 3b contain the raw age-earnings profiles for high school and university educated women, respectively. As for the males, one notices higher earnings growth with age for university educated versus high school educated workers. For females, however, university educated workers also have entry level earnings that are considerably higher than those for the high school educated. Comparing Figures 1 and 3, a key difference between males and females is the much lower weekly earnings levels for females with comparable education and age (note that the vertical axes in the male and female figures cover the same earnings difference but the female axis is set at a lower level). Also, the slopes of the earnings profiles are much greater for men than women. This is particularly true for the university educated and for the high school educated in cohorts that entered before 1978. Finally, there is much less evidence of a cohort pattern in the female data versus the male data.

Figures 4a and 4b present the smoothed plots for females.[9] In these

[9]The smoothing and removal of cycle effects are performed in the same way as for the male data discussed in section 3.1a.

plots it is even more apparent that, in contrast to the male data, there is no evidence of a strong cohort pattern.[10] For high school educated females, all the cohort profiles are essentially flat and lie in approximately a 50 dollar range. For university educated females, the profiles have a positive slope and, with the exception of the 1964 entry cohort, the profiles for all the different cohorts lie very close to one another. It is important to keep in mind that the period covered by this data is one of extremely large movements of females into the labour market. Thus, the patterns in these figures likely reflect significant selection effects along with whatever influences affect male average earnings levels. We return to this point in section 4.

3.2 Statistical Analysis for Average Weekly Earnings

We now turn to a statistical and more systematic examination of our data. The objective remains to characterize the major trends affecting cohort specific age-earnings profiles.

3.2a Males

Tables 1 and 2 report regression results associated with parameterizing changes in age-earnings profiles for high school and university educated males, respectively. In each case, the dependent variable is the logarithm of the average wage for a given cohort-education group in a given year. The different columns in the tables correspond to different regression specifications. The specification in the first column corresponds to the estimates associated with regressing the log average real weekly earnings of an age-education-year cell on a quadratic in the cohort entry year, a cubic in age, an interaction of the linear age and cohort terms, and the detrended unemployment rate for males age 45 to 54. We again include the latter variable to control for

[10] Burbidge et. al.(1997) present results showing that this lack of a cohort pattern for females is true primarily for the post 1960 entry cohorts. For pre-1960 cohorts, successive cohorts experienced substantial shifts upward in their age-earnings profiles.

variation over the business cycle and instrument using the detrended U.S. unemployment rate. The standard errors are corrected for the form of heteroscedasticity associated with observations that are themselves averages of other data.[11]

Focussing on the cohort variables, Column 1 of Table 1 indicates a pattern very similar to that suggested by the visual inspection of Figure 2a. In particular, the cohort and cohort-squared variables indicate that the age-earning profiles moved up for the early cohorts but eventually shift back down. The cohort-age interaction variable indicates that age-earnings profiles have been getting flatter–not steeper– for more recent cohorts. Moreover, the specification in the second column, in which the age-cohort interaction is replaced with an age-year interaction, shows that age profiles in general have been getting flatter in recent years. Note that this latter effect is highly significant and therefore places in doubt the view that the increasing age-earning differentials observed in cross-sectional data for males in Canada reflect increased returns to experience.[12]

The combination of the shifting and flattening of cohort-profiles can best

[11]In particular, we assume that the variance-covariance matrix of the disturbance terms equals a scalar, sigma, times a diagonal matrix with elements equal to the number of individual observations used to construct average earnings for each cohort-age-sex-education cell. The latter matrix is normalized so that its trace equals 148 (the number of observations used in our regressions). In forming the standard errors, we use the squared standard error of the relevant regression as an estimate of sigma and multiply this by the normalized, diagonal matrix just described. We experimented with a weighted least squares estimation approach but found our estimates resulting from that approach to be very unstable. In the weighted least squares approach, the aggregated data set observations are weighted by the number of observations used to calculate average wages for a given cohort-age-sex-education cell. We believe that the instability of our estimates could be related to the potential endogeneity of the number of individuals in each cell (the number of individuals meeting the cell's defining characteristics who are also employed at least one week in the year). Rather than trying to instrument for the number of individuals in each cell, we chose to follow the route of estimating by OLS but correcting the standard errors.

[12]Morissette and Berube(1996)'s findings with true longitudinal data that more recent cohorts of labour market entrants face longer spells of low earnings than earlier cohorts fits with our results on returns to experience.

be seen by plotting fitted cohort-specific age-earnings profiles. Figure 5a plots fitted age-earning profiles calculated from the estimates presented in Column 1 of Table 1.[13] The figure provides a striking depiction of the flattening of the age-earnings profiles. Moreover, there is a clear pattern of shifts up in the cohort-specific profiles until the 1978 entry cohort followed by accelerating shifts down for more recent cohorts as the cohort squared term in the specification begins to dominate. The solid line in the figure shows the cross-sectional age-earnings profile for the year 1990. Note that this cross-sectional profile is much steeper than any of the cohort-specific age-earning profiles. Thus, for this sample period, the cross-sectional profile does not reflect the actual wage progression with age for any cohort of individuals and so does not provide a useful basis for predicting future outcomes for recent labour market entrants. Closer examination of the figures reveals that for an earlier year, when the cohort profiles are not as spread out, the cross-sectional profile would be flatter. This, combined with the flattening of the cohort specific profiles, reinforces the point that the observed increase in experience differentials across successive cross-sectional datasets is due to changes in earnings outcomes across cohorts rather than a steepening of the age-earnings profile within cohorts.

Column 3 of Table 1 contains results from a regression in which the quadratic specification for cohort is replaced by a fully flexible profile with a cohort dummy for each cohort. The omitted category is the 1962 cohort. Instead of reporting the values of all 15 cohort dummies, we report only the values for the 1978 and 1992 cohorts since this summarizes well the overall pattern. As was suggested by the quadratic specification, the cohort-dummy variable specification indicates improving cohort performance up until 1978 and then deteriorating performance afterwards. Moreover, the cohort-age interaction term is again significantly negative, indicating that more recent

[13]For these fitted profiles, the detrended unemployment rate is held constant at zero.

cohorts experience less wage growth as they age than previous cohorts.

Overall, Figures 2a, Table 1 and Figure 5a offer a consistent picture of the changes in age-earning profiles for high school educated men over the last two decades. The evidence clearly suggests that labour market entrants since 1978 have been performing poorly in comparison to previous cohorts. In particular, recent cohorts appear to start at lower wages than earlier cohorts and experience slower wage growth as they age. A simple projection of these trends suggests that more recent cohorts are unlikely to catch up to the wages of older cohorts unless there is a major reversal in the underlying forces driving labour market trends.

For university educated men, the estimated cohort terms in Column 1 of Table 2 indicate that starting wages for successive cohorts have been falling continuously over the entire 1971 to 1993 period. Moreover, the cohort-age interaction variable does not indicate that age-earnings profiles have been steepening across cohorts. The age-year interaction term in the second column also shows no appreciable change in the age slope over time. Again, there is no evidence of increasing returns to experience. The quantitative implications of these estimates are seen in the fitted cohort-specific age-earnings profiles plotted in Figure 5b. The pattern observed in Figure 5b is simpler than that of Figure 5a, but the overall message is similar: there is no indication that recent cohorts, who are starting at lower entry level wages, should be expected to experience higher wage growth as they age than that experienced by older workers, and thus no basis to predict that they will attain similar wage levels. Once again, the 1990 cross-sectional profile is substantially steeper than the age-earnings progression actually experienced by any cohort. Given the linear downward trend in cohort earnings experiences, however, there is no suggestion that the cross-sectional profiles are getting steeper with time. This, in fact, is what is found in the cross-sectional literature, which indicates that experience differentials increased substantially in the 1980s and early 1990s for less educated workers but showed at most

mild increases for university educated workers.

Columns 3 and 4 in Table 2 explore the robustness of the pattern reported in Column 1. Since the estimates on Cohort and Cohort squared in Column 1 are not individually significantly different form zero (although they are jointly significant with a p-value less than .001), we drop the cohort squared term in Column 3 in order to verify the robustness of the observation that cohorts are successively starting at lower wages and are not experiencing higher wage growth. This is indeed supported by the results in Column 3.

Column 4 of Table 2 corresponds to a specification in which the quadratic cohort term is replaced by a full set of cohort-dummies. As in Table 1, we report only two of the fifteen cohort dummies since that is all that is needed to represent the overall pattern. Both the 1978 and 1992 cohort dummies reported in the Table indicate once again the general pattern of deteriorating labour market performance for successive waves of labour market entrants. The point estimates indicate that the 1992 cohort earns approximately 20% less than their counterpart 20 years earlier.

3.2b Females

Table 3 contains regression results for high school educated female workers. The specification and econometric approach are identical to those described for males. At first glance, the cohort variable results in Column 1 appear to indicate that less educated females are experiencing similar cross-cohort patterns to less educated males. The plots of the cohort specific age profiles derived from the column 1 estimates presented in figure 6, however, indicate very little similarity. In contrast to their male counterparts, less educated females show little in the way of differences across cohorts in our sample period. This occurs because the cohort and cohort squared term presented in Table 3 offset each other. The table and the figure also indicate that there is little variation in the age profile of any cohort with age and that the age profiles have not been steepening in recent years.

For the university female results in Table 4, one again sees evidence of cohort patterns that are similar to those presented for males. As with the more educated males, the specification that excludes the cohort squared term indicates statistically significant falls across cohorts. The plots in figure 6b, however, indicate that the drops in the intercepts of the age profiles across cohorts do not at all rival the falls for comparable males. Moreover, in contrast to the males, the declines in the intercept are offset by increases in the slopes of the age profiles over time. University educated females are the one group for whom one could argue there has been an increase in the return to experience in recent years.[14] This shows up in the figure in the form of very large age slopes for the most recent cohorts. Since the high earnings levels predicted for the most recent cohorts later in life correspond to age ranges that are well out of sample, such extrapolation should be interpreted with caution.

3.3 Changes in Distribution

The previous two sections documented changes in the age-profiles for mean earnings across cohorts. While tracking cohort means may provide insight into overall earnings trends, it yields only a partial picture for evaluating changes in inequality. In particular, in many cross-section based studies of male earnings inequality, changes in inequality for workers in the same observable skill group have been found to contribute substantially to the overall inequality growth. Since we want to examine this issue after controlling for differences across cohort, the appropriate concept in our context is to follow earnings inequality over time for specific cohort-education groups. We

[14]In specifications including a post-1990 dummy variable to control for level shifts created by changes in education category definitions, the female results are more similar to those for males. In particular, for high school educated females, the cohort and cohort squared coefficients are larger in absolute value and the cohort-age interaction term becomes negative and significant. For university educated females, the cohort-age interaction term ceases to be statistically signficantly different from zero.

choose to follow changes in the shape of the earnings distribution for specific cohorts using the 90-10 percentile differential: the difference between between the weekly earnings observation at the 90th percentile of the distribution minus the observation at the 10th percentile. We calculate this statistic for each of our age-education-year cells.

3.3a Males

Figures 7a and 7b plot the age-profile of the 90-10 differential for several cohorts of males. For brevity, we present only the smoothed profiles.[15] The smoothed profiles are obtained as in the average earnings figures by regressing the 90-10 differentials on the detrended unemployment rate and a cohort-specific cubic in age. It is clear from figures 4a and 4b that the 90-10 differential tends to increase with age. This a well known fact that has been studied extensively in the search-matching literature. It also fits with Mincer(1974)'s derivations from the human capital model.[16]

The somewhat surprising observation from Figures 7a and 7b is the rather stable pattern of the smoothed 90-10 profiles. Close inspection of the Figures nevertheless reveals a pattern in which the 90-10 differential increased rapidly with age at young ages for the earliest cohorts. The age- earnings differential slope becomes much flatter across successive cohorts up to the 1978 entry cohort and remains remarkably stable for successive cohorts. This pattern is particularly evident for the high school educated workers. Inspection of figures for the 10th and 90th percentiles separately (not presented here) show that the main difference between earlier and later cohorts is found in the behaviour of the 90th percentile with age. The 90th and 10th percentiles were closer at age 25 for earlier cohorts and the 90th percentile grew faster with age for those cohorts. For later cohorts, the 90th percentile is relatively

[15]The raw profile plots are available upon request.

[16]Dooley and Gottschalk(1984) examine the empirical implications of Mincer's statements using cohort data for the U.S.

larger at age 25 and the gap does not increase substantially with age.[17]

The pattern in Figures 7a and 7b is important because it indicates that increases in male inequality in the 1980s in Canada did not occur because of increases in inequality within cohort groups. Put in other terms, this result indicates that the declining outcomes of successive cohorts reflected in the mean earnings results were shared by all members of the cohorts: the earnings distributions shift down but maintain a constant spread.

In order to describe the movements in the 90-10 differentials more systematically, Table 5 reports regression results associated with parameterizing those movements. The first two columns of Table 5 correspond to results for the high school educated group while the last two columns correspond to results for the university educated group. In all cases the 90-10 differential is regressed on a full set of cohort dummies, a cubic in age, a linear-cohort-age interaction term and detrended unemployment.[18] The dependent variable in Columns 1 and 3 is the 90-10 differential measured in levels while Columns 2 and 4 use the difference in the logs of the 90th and 10th percentiles. The latter results are included to provide an easier match to the existing cross-sectional literature, most of which uses percentile differences in log earnings as a measure.

As the inspection of Figures 7a and 7b suggested, Columns 1 and 3 of Table 5 indicate that within cohort-inequality increases substantially across successive cohorts up to the 1978 cohort and then virtually stops. For the high school educated workers, the results in logs in Column 2 indicate that the rise in inequality continued after 1978. The difference between the pattern

[17]Riddell and Sweetman(1997) show that later cohorts of workers officially classified as high school educated are more likely to have acquired extra educational certificates. These extra signals could make it easier for employers to differentiate among high school educated workers at time of hiring. This, in turn, could account for larger differentials at younger ages for more recent cohorts.

[18]We again instrument for the detrended unemployment rate using the detrended U.S. unemployment rate and a post-1982 dummy variable. The standard errors are corrected as described in footnote 8.

suggested by Columns 1 and 2 is easily reconciled once it is recalled that the mean earnings for newer cohorts of high school educated men fell rapidly after 1979. The constant dispersion in levels combined with a falling mean results in increasing relative dispersion, which is what is captured by the difference in logs. Therefore, the continual increased widening of the within-cohort distribution suggested by Column 2 can be viewed as driven entirely by the fact the mean cohort-specific earnings were falling and not by an expanding distribution around the mean.[19] A similar, though somewhat weaker, pattern is evident for the university educated. It should also be noted that, even for the 90-10 differential in log earnings, the increase after the 1978 cohort occurs at a much slower rate than that observed for cohorts prior to 1978.

3.3b Females

The smoothed 90-10 differential profiles for females are presented in figures 8a and 8b. For high school educated females, the profiles are noticeably lower and flatter than for their male counterparts. For university educated females, levels of inequality are similar at young ages to those for males but do not rise as quickly with age. As with males, there is little clear evidence of changes in the level of inequality at any age across cohorts.

Table 6 provides a more systematic evaluation of changes in the 90-10 differential for females. As with high school educated males, the cohort effects for less educated females in column 1 contain a rising trend until 1978 and thereafter are flat or declining. The size of the inequality changes are much smaller than for the comparable male group, however. The results for university educated females in column 3 show no discernable trends after the 1970 entry cohort and no cohort differences that are statistically significant at conventional levels. In contrast to the males, the log differential results in columns 2 and 4 do not display sharply different patterns relative to the

[19] MaCurdy and Mroz (1995) make a similar observation for the US.

results based on differentials in levels. This is because there is no strong trend up or down in average earnings across cohorts for females.

3.4 Summary

For high school educated men, examining the weekly earnings outcomes of labour market entry cohorts over the period 1971 to 1993 reveals that successive cohorts up to the 1978 cohort experienced higher entry wages, more within cohort earnings dispersion and flattening age-earnings profiles. For more recent cohorts, the pattern has changed substantially. Successive waves of new entrants since 1978 have received lower entry wages, age-earnings profiles that are either flattening further or not changing and no discernable change in the distribution of earnings around the cohort-specific mean at a given age. For university educated men, there has been a gradual but continuous deterioration in the labour market performance of newer cohorts. This deterioration in performance was accompanied by increasing within-cohort inequality up to approximately the 1978 cohort. Thereafter, within cohort dispersion has been relatively constant across cohorts for any given age. Moreover, for both groups of workers, there is no evidence to suggest the observed increases in earnings differentials across age group observable in cross-sectional data reflect an increased return to gaining experience, and therefore this increased differential should not be taken as indication of likely faster wage growth in the future for currently young workers. Together, these results raise grave concerns about inter-generational equity among males in the labour market. Recent male labour market entrants, regardless of their education, are earnings drammatically less than their predecessors at the same age and there is little reason, based on current trends, to expect them to catch up.

For female workers, the patterns are very different. In contrast to the males, neither high school or university educated females experienced substantial differences in average weekly earnings across cohorts. As with males,

there is no evidence of increased dispersion in earnings across cohorts at any age. The university educated females are the only group who experience increasing age profiles of average earnings. For this group, it may therefore be the case that there has been an increase in the returns to experience. However, it must be noted that the relationship between age and work experience has been changing substantially as women have become more attached to the labour market.

4 Interpretation and Implications

4.1 Changes in Age-Earnings Profiles and Skilled-Biased Demand Shift Hypotheses

As discussed in the introduction, the source of increased male earnings inequality over time both in Canada and other countries has been the focus of considerable study. There appear to be at least three main contenders for explaining the trends: 1) technical change favouring skilled workers at the expense of less skilled workers; 2) increased trade with lower skilled countries, effectively increasing competition for low skilled workers; and 3) an erosion of labour market institutions such as minimum wages and unions that support the lower tail of the earnings distribution. Evidence for the skill biased technical change hypothesis has been built mostly on US data in a series of articles, including Juhn, Murphy and Pierce(1993) and Bound and Johnson(1993). The former argues that increased educational and experience differentials over time in the U.S. point to a skill biased increase in demand. Further, increases in relative dispersion within skill groups is interpreted as reflecting increased demand for unobservable skills over time. Together these results are taken as evidence that changes in the male earnings structure over

the 1980s were generated by a general increase in skill premia, as induced by a skill-biased demand shift.

The skill biased demand shift hypothesis has also been advanced to explain increased male inequality in Canada. Not all the Canadian evidence lines up as neatly as that presented for the U.S. by Juhn, Murphy and Pierce (1993), however. For example, the educational differential has not been found to have increased substantially in Canada in the 1980s (see Bar-Or et al. (1995)). Nonetheless, proponents of the skill biased demand shift hypothesis point to increased experience-age differentials over time and increased within skill group dispersion as evidence in favour of their position.[20] Our objective in this section to interpret the results of the previous section in light of the debate regarding the importance of increased skill premia as explaining movements in relative wages.

4.2 Structural Interpretations and Cohort, Time and Age Decompositions

When analyzing cohort data, it is common in the literature to provide a breakdown in terms of time, cohort and age effects (with no interaction between these terms).[21] It is well known that providing such a decomposition involves solving a basic identification problem (see, Heckman and Robb(1985)). The identification problem arises because if we know any two of a person's age in the data year, the data year, and the year of cohort entry into the labour force, we can exactly determine the third. Thus, separating

[20]The lack of an increase in educational differentials is explained as arising from offsetting increases in supply.

[21]Age effects are defined as changes in earnings as individuals age that are common across entry cohorts and independent of aggregate shifts in the economy. The effects of aggregate shifts, assumed to affect workers of all cohorts and all ages in the same way, are termed time effects. Finally, cohort effects are defined as permanent differences in earnings differentials across entry cohorts that exist regardless of the age at which we observe the cohort or the size of the common time effect.

out the three effects is not possible without incorporating extra information in the form of restrictions.

It is important to note that the results presented in the previous sections are not meant to offer a decomposition in terms of time, age and cohort effects. Instead, the empirical evidence presented in Section 3) should be viewed as offering a reduced form representation of trend movements in the cohort-earnings data. Our approach, in both our regression specifications and smoothed data plots, has been only to remove common temporary (cyclical) effects and smooth out the trend effects. This procedure does not imply, however, that we we have eliminated all time effects or separated them out from cohort and age effects.[22] For example, the deterioration in earnings across cohorts documented in Section 3) could equally well be generated by a downward trend affecting members of all cohorts (i.e., a time effect) that is disguised for older cohorts by offsetting age effects or by real (structurally meaningful) cohort effects.[23] At this point, we want to remain agnostic to the split of these observed trends into age, time and cohort effects. Instead, we want to argue that this reduced form evidence can be used directly to evaluate a particular hypothesis regarding the cause of increased dispersion in male weekly earnings, without the need to identify separate time, age and cohort effects.[24]

[22]The exercise of removing the cyclical effects might make some readers uncomfortable since it involves imposing restrictions that are difficult to see directly. While we do not mean to imply that such concern is unreasonable, we have three responses. First, the raw data plots are presented to allow the reader to see the main trends without restrictions imposed. Second, smoothed plots without cyclical effects removed are very similar to the smoothed plots seen in section 3 (these results are available upon request). Third, we tried different means of removing cyclical effects, including regressions containing year effects that were constrained to be equal at cyclically similar points, and these provided virtually identical results to those in the paper.

[23]A structurally meaningful cohort effect is a permanent effect that is determined before a specific cohort enters the labour market and determines earnings levels regardless of the economic times the cohort lives through. Differences in school quality across cohorts could generate this type of cohort effect.

[24]This reduced form evidence can also be seen as a useful basis for short term prediction.

In order to make the discussion completely transparent, it is helpful to derive explicitly the implications of a general skill biased labour demand shift for cohort-profiles in the context of a simple model. In this model, we allow there to be two skill classes and we allow productivity to depend on age (experience). Aggregate production, Y_t, is given by

$$Y_t = F(L_{1,t}, L_{2,t}, t)$$

where $L_{i,t}$ is the quantity of effective labour of skill class i in period t. The explicit dependence of the production function on time t captures the possibility of technological change and/or changes in the relative prices of domestic versus foreign produced goods. The quantity of effective labour for a particular skill class is in turn given by

$$L_{i,t} = \sum_{j \in J} g^i(a_{j,t}, t) l_{i,j,t}$$

where j indexes cohorts, $a_{j,t}$ is the age of cohort j at time t, $l_{i,j,t}$ is the level of employment in skill class i of cohort j at t and $g^i(a,t)$ is the effective units of labour of a worker of age a in skill class i at time t. The explicit dependence of $g(\cdot)$ on time is meant to capture the possibility that the productivity value of experience may change over time.

Under the assumption that workers are paid their marginal products, and denoting the derivative of $F(\cdot)$ with respect to its ith argument by $F^i(\cdot)$, the log wage at t of a worker of skill class i and cohort j is

$$lnw_{i,j,t} = ln(F^i(L_{1,t}, L_{2,t}, t)) + ln(g_i(a_{j,t}, t))$$

The above specification implies that log wages of skill class i can be decomposed in a time effect ($ln(F^i(L_{1,t}, L_{2,t}, t))$) and a time-varying age effect

For example, a projection of current trends does not lead one to expect that recent male labour force entrants should expect to attain comparable earnings to older cohorts of males.

$(ln(g_i(a_{j,t}, t)))$, where each of these effects can have a pattern that differs across skill groups.

Within the above framework, if $i = 1$ represents the low skill group and $i = 2$ represents the high skill, the skill-biased demand shift hypothesis implies that over time (1) $F^1(\cdot)$ will decrease and $F^2(\cdot)$ will increase, and (2) $g_i^a(\cdot)$ will increase. In other words, over time a skill biased demand shift will simultaneously increase the value of marginal product of skilled workers, decrease that of unskilled workers and increase the return to age(experience). In order to see what such a change implies in terms of changes in cohort-specific age-earning profiles, it is best to consider a simple parameterization of the induced time effects and the time-varying age effects derived above. The following parameterization captures these two effects in its simplest form.

$$lnw_{i,j,t} = \alpha_{i,0} + \alpha_{i,1} * t + \alpha_{i,2} a_{j,t} + \alpha_{i,3} a_{j,t}^2 + \alpha_{i,4} a_{j,t} * t$$

In the above parameterization, the skilled-biased demand shift hypothesis can be interpreted as implying[25] that $\alpha_{1,1} < 0$ (decrease in the value of low skill) $\alpha_{2,1} > 0$ (increase in the value of high skill) and $\alpha_{i,4} > 0$ (increase in the value of experience).

Noting that since calendar time t can be expressed as the sum of cohort time and age, i.e. $t = (j + a_{j,t})$, the above expression can rewritten to emphasize its implications for cohort-specific age-earning profiles as follows

$$lnw_{i,j,t} = \alpha_{i,0} + \alpha_{i,1} * j + (\alpha_{i,2} + \alpha_{i,1}) a_{j,t} + (\alpha_{i,3} + \alpha_{i,4}) a_{j,t}^2 + \alpha_{i,4} a_{j,t} * j$$

The above equation captures the main implications of the skill biased demand shift hypothesis for cohort-specific age-earning profiles. In particular, it suggests that for the low skill group, the age earning profiles should be

[25] We are disregarding for now possible supply effects which could off set the effects of the skill-biased demand shift.

rotating upward since the intercept is falling across cohorts while the slope of the age profile is increasing. In contrast, for the more skilled group, the age earning profiles should be increasing over time and fanning out since the intercept and the slope are increasing. The evidence on male earnings presented in Section 3) is almost exactly the opposite of this implied pattern if we interpret the high school educated group as the low skill group and the university educated as the high skill group. In this sense, the skill-biased demand shift hypothesis appears to be at odds with the Canadian experience.

The above discussion emphasizes how observed movements in cohort-specific age-earnings profiles are inconsistent with that implied by the skill-biased demand shift hypothesis. We now want to argue further that our observations regarding within-cohort dispersion are also inconsistent with this hypothesis. If increased relative demand for skills of all kinds were occurring, one would expect to see evidence of it in the form of the wages of the workers at the top of the earnings distribution (those with the most unobserved skills) being bid up over time. This should result in increased dispersion across successive cohorts at a given age. Instead, we observe age-dispersion profiles that are remarkably stable across cohorts for all gender/education groups. Put more precisely, we find increases in dispersion with age that are identical across cohorts for specific gender/education groups but we do not find evidence of increasingly rapid rises in within-cohort dispersion with time. This is particularly true after 1980.If one examines the data in logs, there is some evidence of increased dispersion in the 1980s for males but at a much slower rate that in the 70s. Recall however that this slight increased dispersion only occurs because of a combination of a constant absolute dispersion and falling means. Thus, it appears to us that emphasis should be placed on explaining the declining average performance of successive cohorts of males rather than on explaining increased within group dispersion and returns to experience.

In summary, the previous literature has argued in favour of a skill biased demand shift as the prime explanation to the changing earnings patterns

in Canada. Such a shift is hypothesized to cause increased educational differentials, returns to experience and earnings dispersion within skill groups. The first of these three effects, increased educational differentials, is not very strong in Canada, as has been shown by other researchers. We have shown that there have not been any systematic increase in returns to experience or increases in absolute earnings dispersion within education-cohort groups over time in Canada. Thus, none of the three main facts in support of this hypothesis appear to exist for Canada.

It is worth emphasizing that these results do not imply a complete absence of a role for shifts in relative labour demand. The fact that the education differential has changed little in the face of substantial increases in the relative supply of university educated workers over the last 15 years in Canada suggests that there might have been some offsetting relative demand shift for workers of different education levels at the same time. The results do indicate that focussing on a single shift in relative demand toward workers with skills of all types is potentially misleading.

5 Conclusion

In this paper, we present new evidence on earnings inequality trends in Canada by following cohorts of labour market entrants across successive datasets. This contrasts with the previous literature on the topic which has concentrated on examinations of earnings differentials within cross-sectional datasets at two or more points in time. The earlier literature established that, for males, earnings differentials by experience level have increased over the last 15 years. This is often interpreted as reflecting an increase in returns to experience over time. We find, instead, that the increased differential stems from much poorer earnings outcomes for more recent male labour market entrants relative to those who entered the labour market in the 1960s and

1970s. More specifically, we find that cohort specific age-earnings profiles have shifted down for successive cohorts since the 1978 entry cohort for high school educated males and from an even earlier point for university educated males. Further, there is no evidence that these shifts down have been offset by increased returns to gaining experience for recent cohorts. This raises grave concerns about inter-generational equity among males in the labour market. Finally, we find that the absolute dispersion of earnings within cohorts has not increased in recent years. For women, we find no substantial changes in earnings experiences across cohorts, either in the mean weekly earnings level at a given age or in the dispersion about that mean. We argue that these observations viewed together place in doubt the relevance of the hypothesis that increased skill premia (induced by a skilled biased demand shift) largely explains the movements in earnings inequality observed in Canada. Other explanations for movements in inequality, including institutional changes (e.g., changes in unionization among the young), supply effects (caused by dramatic increases in post-secondary school enrolment and female labour force participation) and selection effects (induced by these same changes in supply), should hence be explored.

Table 1: High School Educated Men

	1	2	3
Cohort	.040	.040	.
	(.008)	(.008)	
Cohort Sq.	-.0028	-.0028	.
	(.0004)	(.004)	
1978-Cohort	.	.	.157
			(.045)
1992-Cohort	.	.	-.011
			(.061)
Cohort*Age	-.0021	.	-.0020
	(.0004)		(.0004)
Age*Year	.	-.0011	.
		(.0002)	
Age	.040	.032	.042
	(.005)	(.004)	(.005)
Age square	-.0015	-.0005	-.0016
	(.0003)	(.0003)	(.0003)
Age cube	.00002	.00002	.00002
	(.000008)	(.000008)	(.000007)
U. Rate	-1.42	-1.42	-1.69
	(.55)	(.55)	(.41)
Intercept	5.81	5.81	5.79
	(.038)	(.038)	(.043)
Adj-R2	.807	.790	.795

Standard errors are in parentheses.
Dependent Variable: Log of Real Avg. Weekly Earnings
148 Observations

Table 2: University Educated Men

	1	2	3	4
Cohort	-.012	-.012	-.014	.
	(.01)	(.01)	(.003)	.
Cohort Sq.	-.0001	-.0001	.	.
	(.0006)	(.0006)		
1978-Cohort	.	.	.	-.117
				(.056)
1992-Cohort	.	.	.	-.215
				(.076)
Cohort*Age	-.0004	.	-.0003	-.0003
	(.0006)		(.0003)	(.0005)
Age*Year	.	-.0002	.	.
		(.0003)		
Age	.065	.063	.064	.063
	(.007)	(.005)	(.005)	(.006)
Age square	-.0027	-.0025	-.0030	-.0026
	(.0004)	(.0004)	(.0004)	(.0004)
Age cube	.00003	.00003	.00003	.00003
	(.000009)	(.00001)	(.000009)	(.000009)
U. Rate	-1.66	-1.66	-1.74	-2.46
	(.686)	(.686)	(.682)	(.665)
Intercept	6.14	6.14	6.15	6.14
	(.056)	(.056)	(.028)	(.059)
Adj-R2	.924	.924	.924	.923

Standard errors are in parentheses.
Dependent Variable: Log of Real Avg. Weekly Earnings
148 Observations

Table 3: High School Educated Women

	1	2	3
Cohort	.032	.032	.
	(.012)	(.012)	
Cohort Sq.	-.0019	-.0019	.
	(.0007)	(.0007)	
1978-Cohort	.	.	.173
			(.067)
1992-Cohort	.	.	.081
			(.083)
Cohort*Age	-.0008	.	-.0009
	(.0006)		(.0006)
Age*Year	.	-.0004	.
		(.0003)	
Age	.010	.007	.012
	(.007)	(.005)	(.007)
Age square	-.00008	.0003	-.0002
	(.0004)	(.0004)	(.0004)
Age cube	-.000002	-.000003	-.000001
	(.00001)	(.00001)	(.00001)
U. Rate	-2.18	-2.18	-2.23
	(.75)	(.75)	(.77)
Intercept	5.33	5.33	5.31
	(.057)	(.057)	(.043)
Adj-R2	.179	.179	.144

Standard errors are in parentheses.
Dependent Variable: Log of Real Avg. Weekly Earnings
148 Observations

Table 4: University Educated Women

	1	2	3	4
Cohort	-.024	-.024	-.009	.
	(.019)	(.020)	(.004)	.
Cohort Sq.	.0008	.0008	.	.
	(.0009)	(.0009)		
1978-Cohort	.	.	.	-.102
				(.100)
1992-Cohort	.	.	.	-.145
				(.105)
Cohort*Age	.0021	.	.0015	.0018
	(.0008)		(.0003)	(.0008)
Age*Year	.	.0011	.	.
		(.0004)		
Age	.004	.014	.064	.007
	(.009)	(.006)	(.005)	(.009)
Age square	.00009	-.0009	-.0001	-.00009
	(.0005)	(.0005)	(.0004)	(.0005)
Age cube	-.000005	-.000005	-.000003	-.000001
	(.00001)	(.00001)	(.00001)	(.00001)
U. Rate	-1.237	-1.237	-1.179	-1.214
	(.895)	(.895)	(.890)	(.873)
Intercept	5.95	5.95	5.89	5.92
	(.092)	.092)	(.039)	(.097)
Adj-R2	.619	.619	.618	.644

Standard errors are in parentheses.
Dependent Variable: Log of Real Avg. Weekly Earnings
148 Observations

Table 5: 90-10 Percentile Differences: Males

	HS Level 1	HS Log 2	UNIV Level 3	UNIV Log 4.
1964-Cohort	34.2	.08	-7.0	.01
	(8.7)	(.04)	(24.3)	(.08)
1968-Cohort	80.4	.21	3.8	.09
	(11.1)	(.05)	(32.3)	(.09)
1972-Cohort	112.4	.29	43.1	.26
	(13.5)	(.06)	(40.5)	(.13)
1976-Cohort	136.1	.40	78.5	.41
	(15.2)	(.07)	(46.3)	(.14)
1980-Cohort	151.7	.47	98.4	.49
	(16.1)	(.07)	(50.1)	(.16)
1984-Cohort	156.9	.55	97.2	.56
	(17.0)	(.07)	(53.3)	(.17)
1988-Cohort	137.8	.52	107.5	.60
	(17.6)	(.08)	(53.9)	(.17)
1992-Cohort	138.4	.66	84.9	.54
	(21.1)	(.09)	(59.5)	(.19)
Cohort*Age	-1.27	-.002	-1.11	-.003
	(.15)	(.0006)	(.43)	(.0013)
Age	21.3	.038	31.7	.039
	(1.8)	(.008)	(5.1)	(.016)
Age square	-.54	-.0003	-1.07	-.0013
	(.12)	(.0005)	(.30)	(.001)
Age cube	.004	.0000001	.016	.00004
	(.003)	(.00001)	(.007)	(.00002)
U. Rate	252.9	1.42	269.3	.23
	(197.5)	(.87)	(521.5)	(1.62)
Intercept	150.5	.59	226.3	.54
	(14.7)	(.06)	(46.4)	(.14)
Adj-R2	.842	.718	.783	.435

Standard errors are in parentheses.
148 Observations

Table 6: 90-10 Percentile Differences: Females

	HS Level 1	HS Log 2	UNIV Level 3	UNIV Log 4.
1964-Cohort	7.9	.04	7.8	.20
	(6.9)	(.06)	(24.0)	(.16)
1968-Cohort	30.8	.26	35.3	.17
	(9.0)	(.08)	(32.7)	(.21)
1972-Cohort	45.1	.32	32.7	.40
	(11.3)	(.10)	(42.0)	(.28)
1976-Cohort	52.1	.37	47.4	.52
	(12.7)	(.11)	(47.7)	(.31)
1980-Cohort	53.1	.41	45.6	.60
	(13.5)	(.12)	(51.1)	(.34)
1984-Cohort	58.0	.49	33.7	.65
	(14.1)	(.13)	(53.1)	(.35)
1988-Cohort	38.5	.38	13.5	.37
	(14.4)	(.13)	(52.6)	(.34)
1992-Cohort	41.1	.52	48.5	.60
	(16.3)	(.15)	(51.8)	(.34)
Cohort*Age	-.39	-.005	-.32	-.005
	(.12)	(.0011)	(.41)	(.0027)
Age	8.1	.089	27.2	.18
	(1.4)	(.013)	(4.5)	(.030)
Age square	-.34	-.0005	-1.32	-.011
	(.09)	(.0008)	(.24)	(.002)
Age cube	.005	.00008	.021	.0002
	(.002)	(.00002)	(.006)	(.00004)
U. Rate	-96.5	-.65	-149.9	-2.54
	(151.5)	(1.4)	(431.5)	(2.83)
Intercept	164.4	1.05	262.0	.73
	(12.5)	(.11)	(48.4)	(.32)
Adj-R2	.392	.260	.729	.383

Standard errors are in parentheses.
147 Observations

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Figure 1a
Real Weekly Earnings by Cohort
Males, Some or Completed High School Education

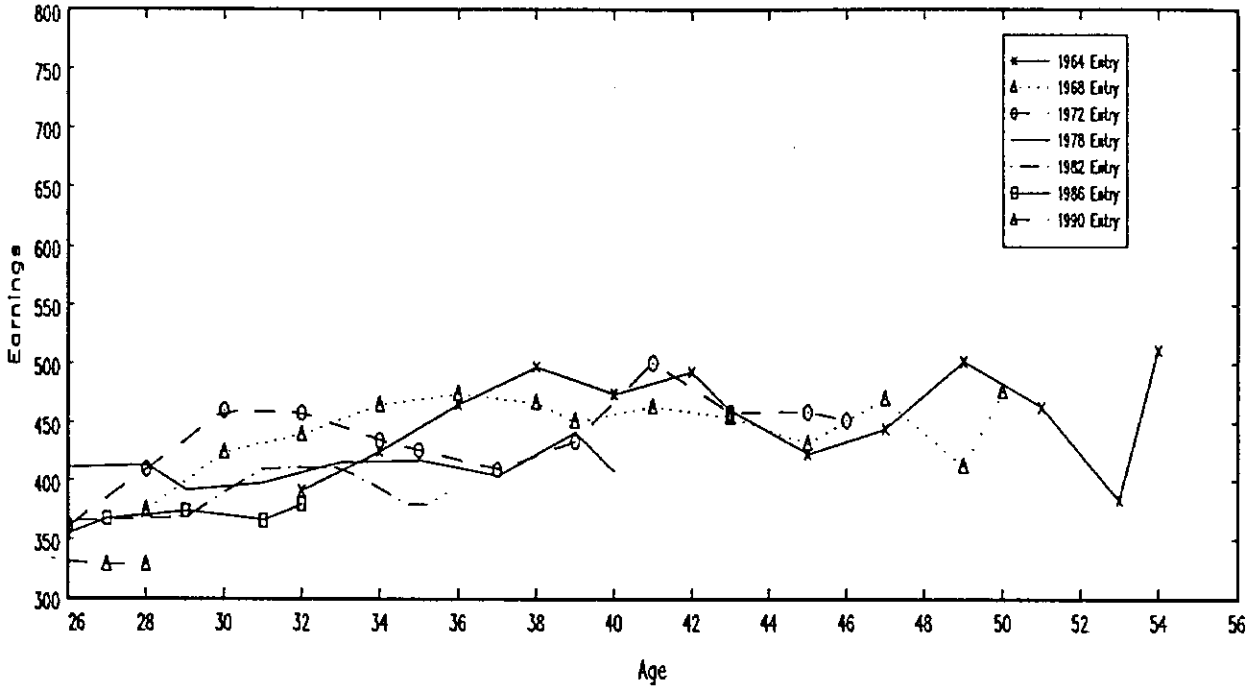


Figure 1b
Real Weekly Earnings by Cohort
Males, University Education

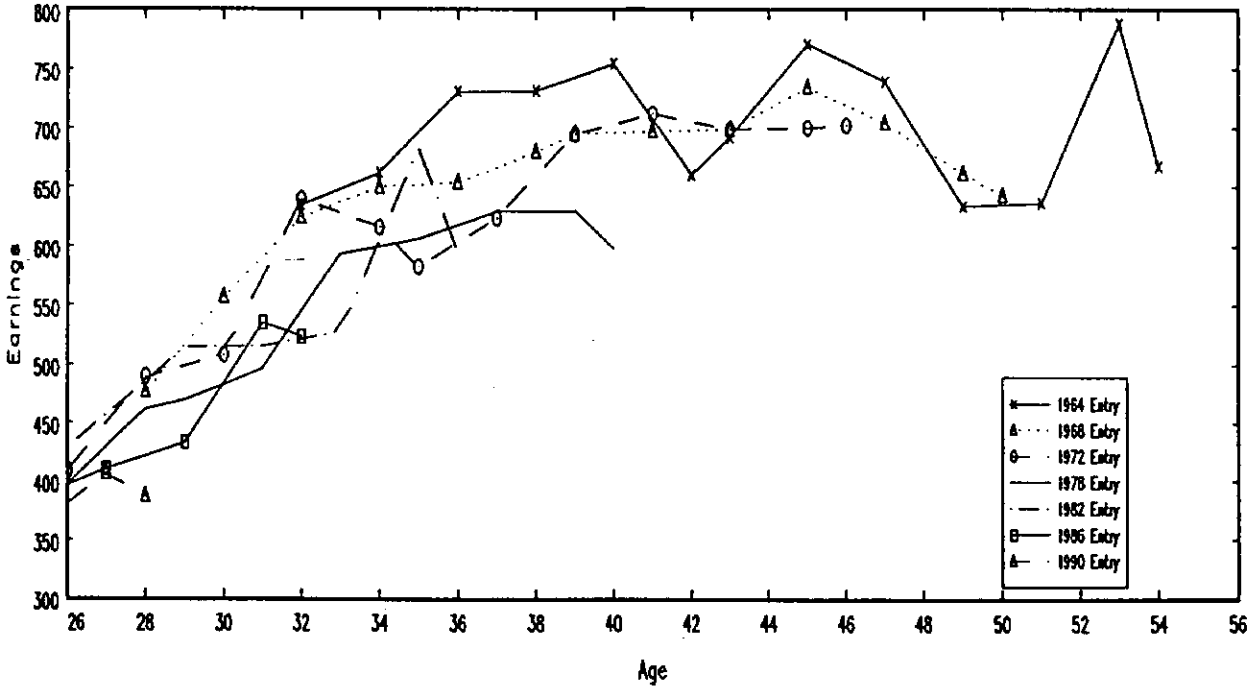


Figure 2a
Real Weekly Earnings by Cohort, Smoothed and Cycle Effects Removed
Males, Some or Completed High School Education

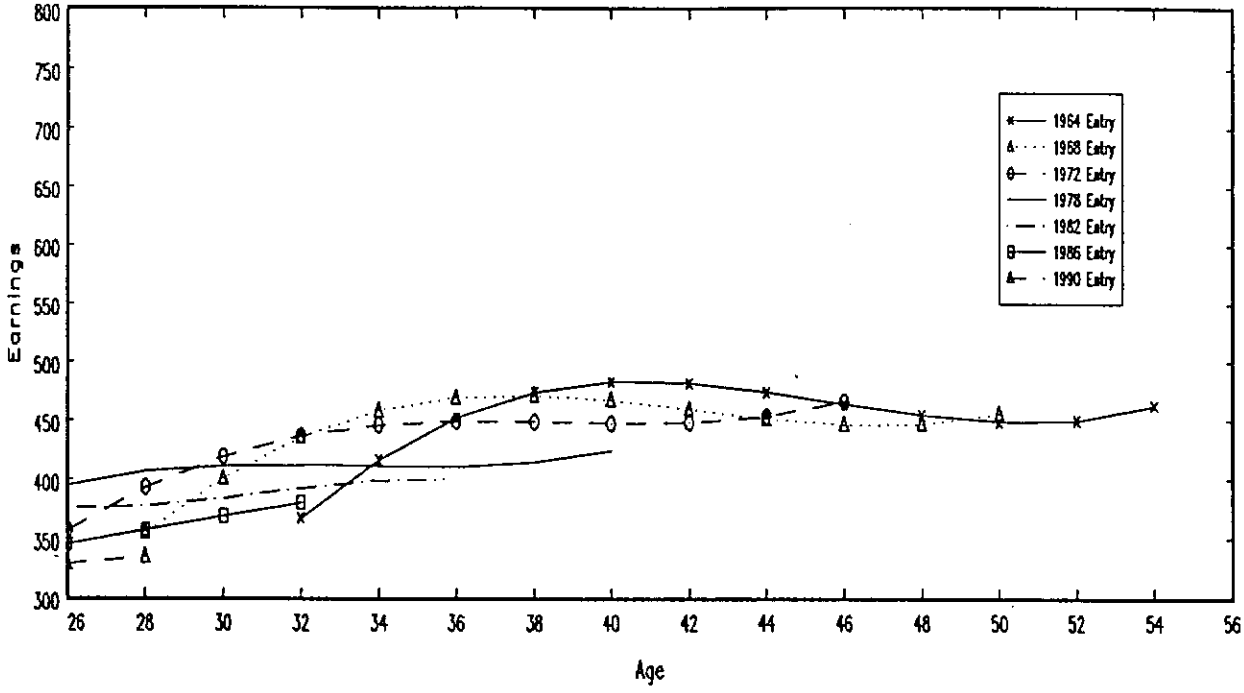


Figure 2bm
Real Weekly Earnings by Cohort, Smoothed and Cycle Effects Removed
Males, University Education

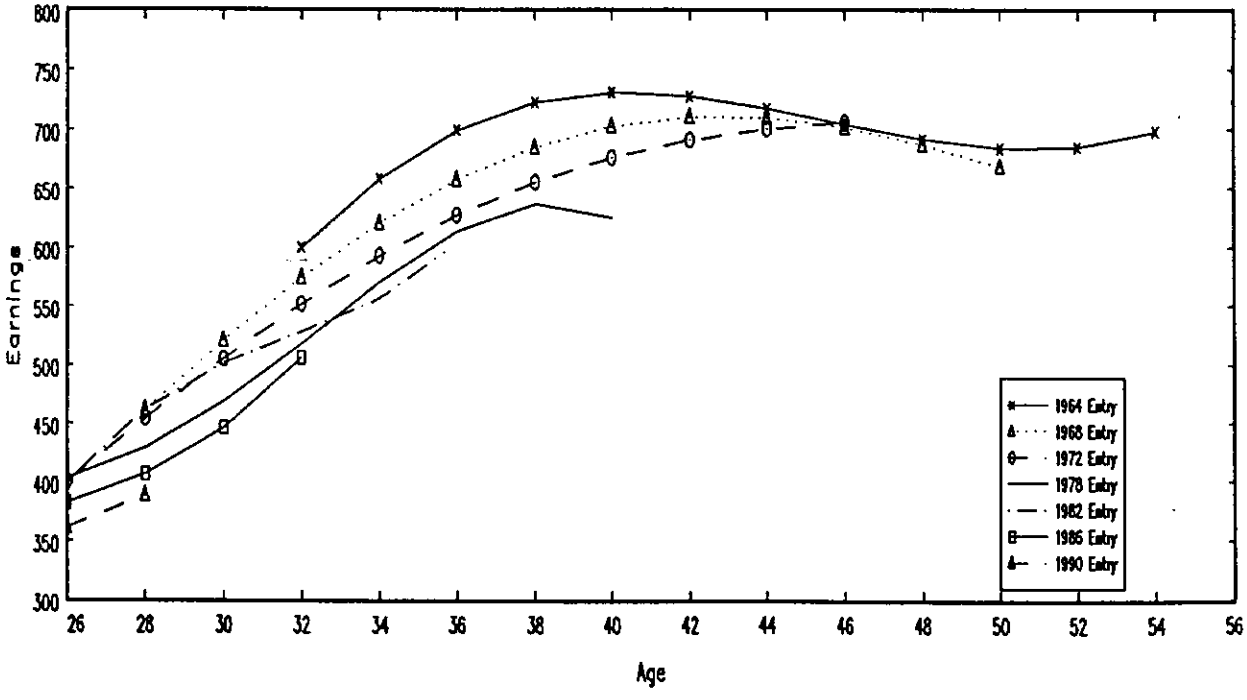


Figure 3a
Real Weekly Earnings by Cohort
Females, Some or Completed High School Education

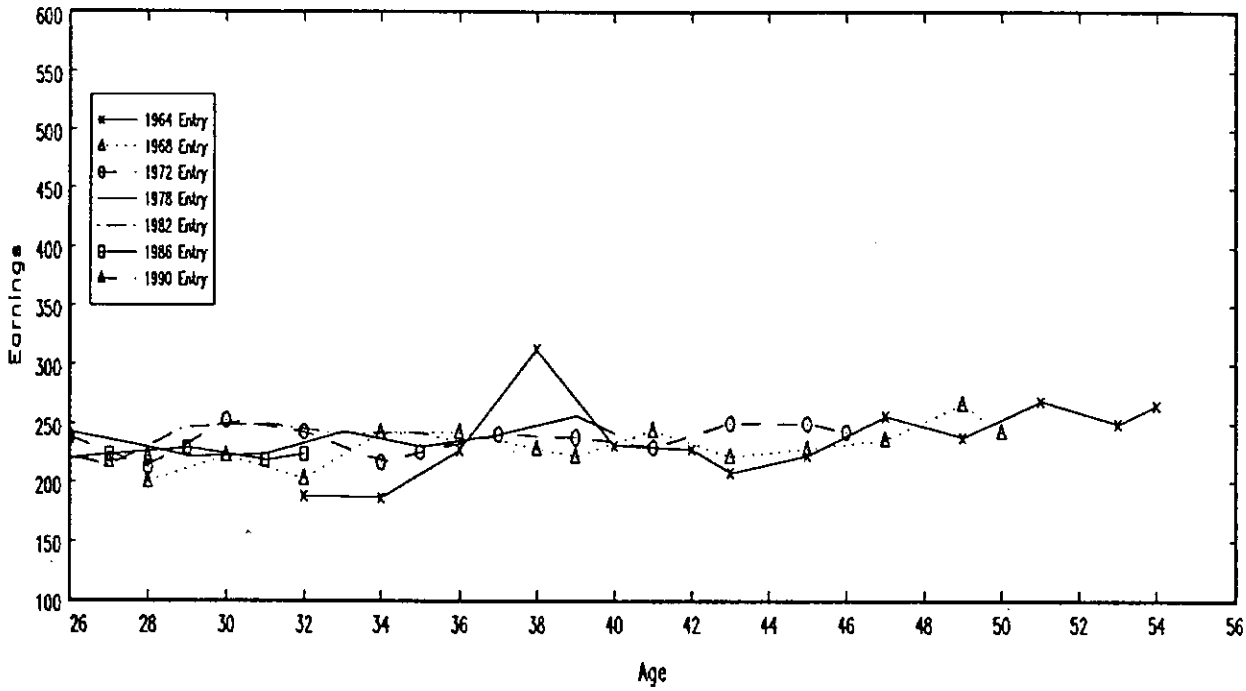
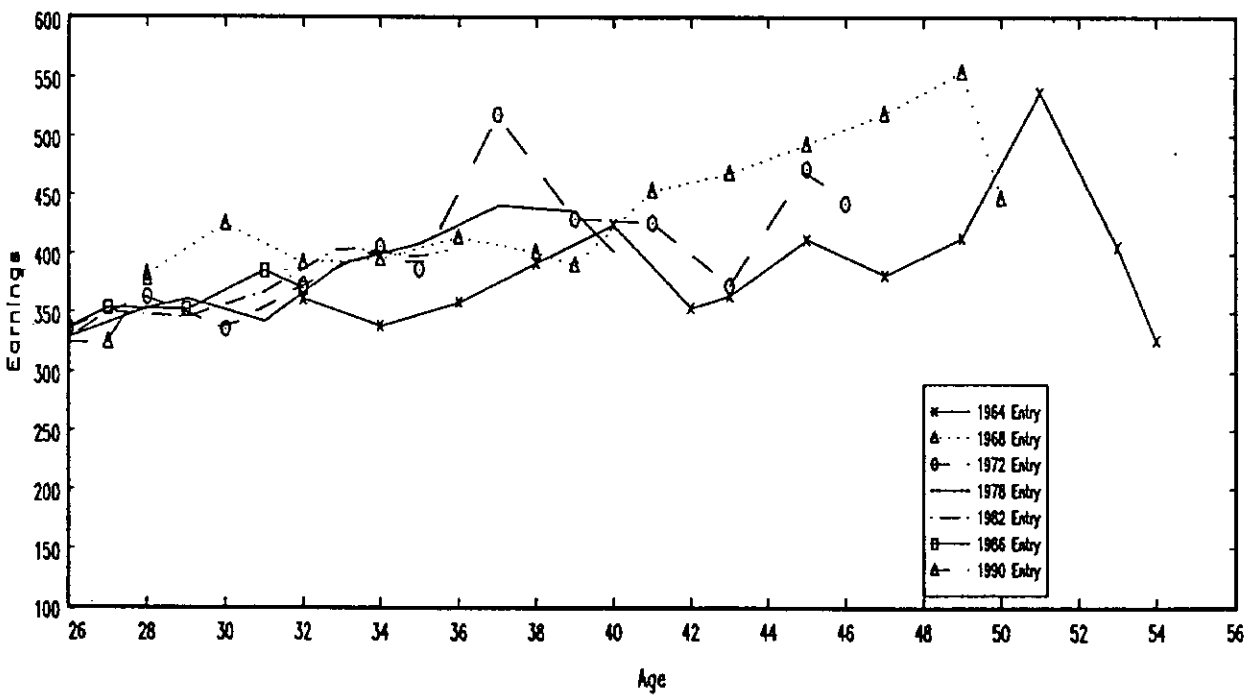
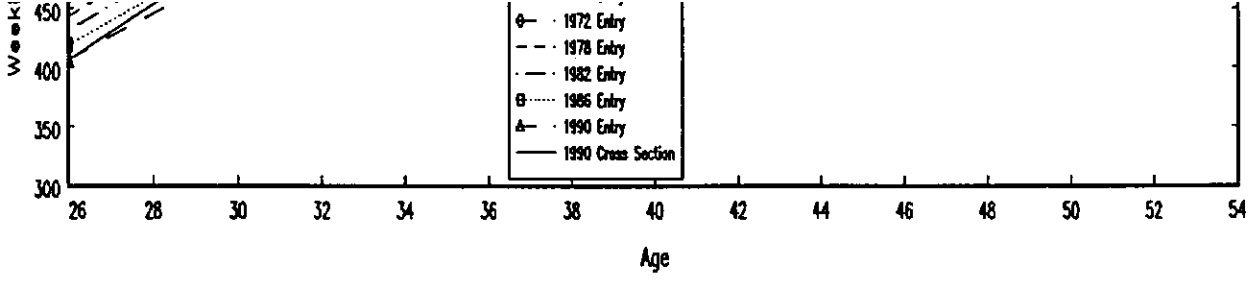
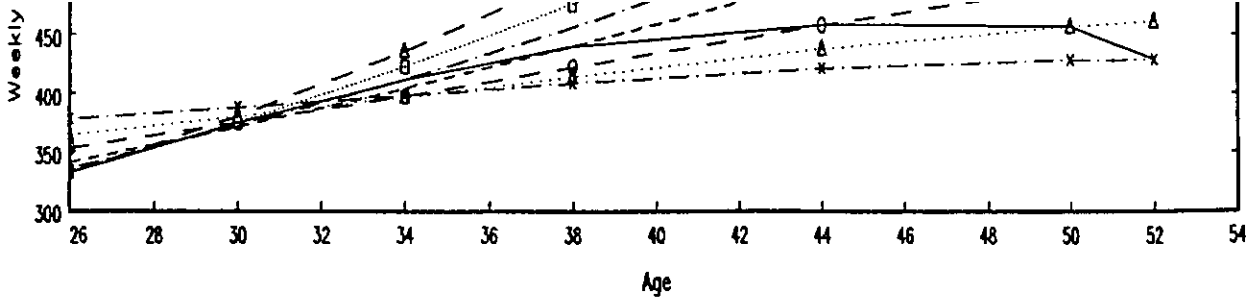


Figure 3b
Real Weekly Earnings by Cohort
Females, University Education




Weekly
450
400
350
300
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
Age
1972 Entry
1978 Entry
1982 Entry
1986 Entry
1990 Entry
1990 Cross Section


Weekly
450
400
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26
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34
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38
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Age

Figure 7a

90-10 Differential for Real Weekly Earnings by Cohort, Smoothed and Cycle Removed

Males, Some or Completed High School Education

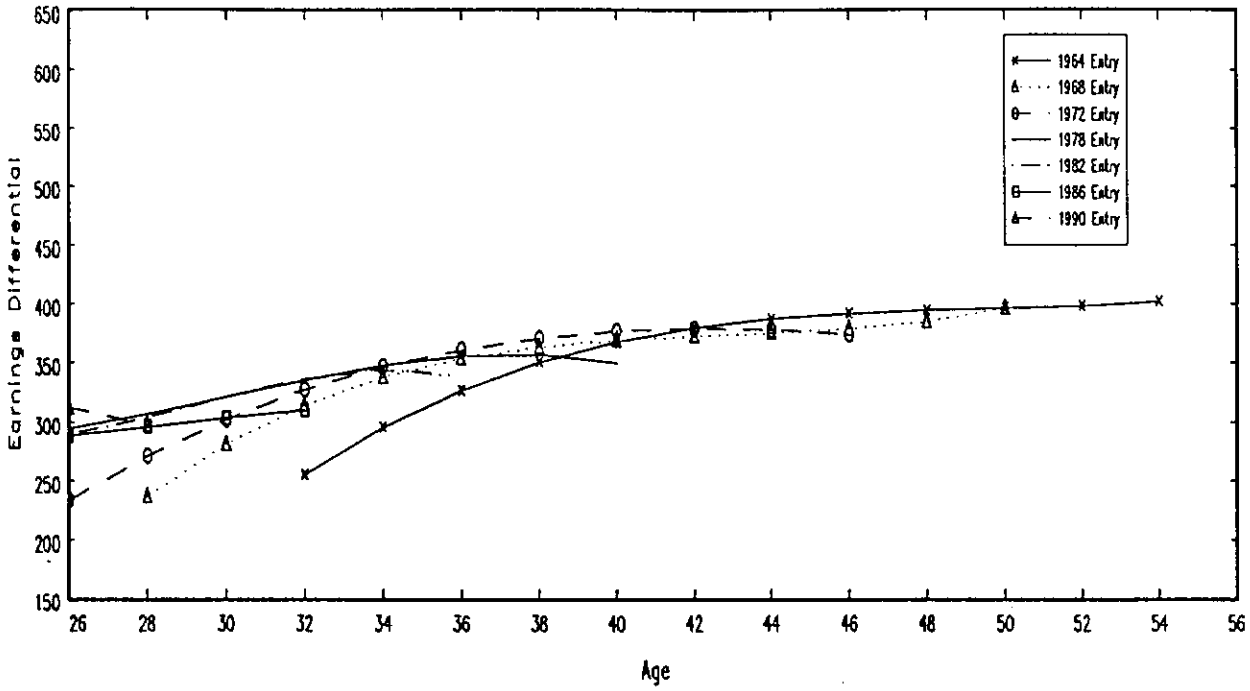

Figure 7b

90-10 Differential for Real Weekly Earnings by Cohort, Smoothed and Cycle Removed

Males, University Education