University of Wisconsin-Madison

Institute for Research on Poverty

Discussion Papers

Robert H. Haveman
Larry Buron

INEQUALITY IN MALE EARNINGS AND EARNINGS CAPACITY, 1973-1988: THE EFFECTS OF CHANGES IN "OPPORTUNITY" AND "CHOICE"

DP # 983-92

Institute for Research on Poverty
Discussion Paper no. 983-92

Inequality in Male Earnings and Earnings Capacity, 1973-1988: The Effects of Changes in "Opportunity" and "Choice"

Robert H. Haveman
Department of Economics
La Follette Institute of Public Affairs
Institute for Research on Poverty
University of Wisconsin-Madison

Larry Buron
Department of Economics
University of Wisconsin-Madison

September 1992

The authors benefited from comments by and conversations with Gary Burtless, Peter Gottschalk, Lynn Karoly, and Robert Moffitt.

Abstract

The authors confirm that earnings inequality among males has increased rapidly since the early 1970s. They demonstrate that this increase has had less to do with labor market opportunities than previous researchers have claimed, and more to do with the choices of individuals regarding jobs and wage rates than hitherto acknowledged. Along the way, they explain the concept of "earnings capacity" and present estimates of earnings capacity inequality and of inequality in the utilization of earnings capacity. They use these measures to illustrate the important role that individual choices have played in rising earnings inequality. Data are from March 1974 and 1989 Current Population Surveys.

Inequality in Male Earnings and Earnings Capacity, 1973-1988: The Effects of Changes in "Opportunity" and "Choice"

I. INTRODUCTION, AND A PREVIEW

Earnings inequality among males in the United States has increased rapidly since the early 1970s. Recent research (e.g., Burtless [1990], Karoly [1992], and Moffitt [1990]) has found that most, if not all, of the increase has been due to the rising inequality of wage rates, claiming that changes in the structure of labor market "opportunities" have accelerated the increase in earnings inequality. In this paper, we argue that labor market opportunities play a smaller role than most observers believe, and that individual "choices" in the labor market play a larger role than hitherto acknowledged.

Most economists have decomposed earnings inequality into two traditional components--wage rates and hours worked--and have concluded that wage rates are responsible for most of the increase in earnings inequality. However, as we will explain below, we believe that wage rates and hours worked are suspect measures. In their place, we use two analogous measures: (1) "earnings capacity," the amount a person would earn were he to work full-time, year-round, given his job skills, education, experience, and health--in short, all the elements that compose his human capital; and (2) utilization of earnings capacity. In our analysis, earnings capacity inequality plays a smaller role in explaining the increase in earnings inequality than does its analogous measure, wage rate inequality, in the studies by other economists. We thus conclude that the <u>utilization</u> of earnings capacity--the decisions by individuals to work part-year, part-time, or not at all, or to accept certain jobs, even if those jobs pay wages that are incommensurate with their earnings capacity--must play a role that is too large to ignore.

Before launching into our main discussion, we use microdata from the March Current Population Survey for 1974 (income year 1973) and 1989 (income year 1988) to confirm that the distribution of earnings has become more unequal among males aged eighteen to sixty-four. We study earnings, as it is the most commonly used indicator of labor market performance in studies of both average labor market performance and inequality of market outcomes; earnings reflect the actual labor market returns that accrue to individuals. We employ several measures of inequality for this comparison, all of which lead to a conclusion consistent with that found by other researchers--the distribution of earnings has become notably more unequal over this period. We also emphasize that the size of the increase in measured male earnings inequality is highly dependent on the definition of the population of working-age males that one adopts. We report results for both working-age males who work (the population analyzed in most other studies) and all working-age males, whether or not they work. The share of working-age males who report no earnings or hours worked has increased over time, such that measures of inequality based only on the working population convey an inaccurate picture of earnings inequality among males.

Second, we investigate the extent to which changes in the distribution of human capital--what we call "earnings capacity," or EC--parallel changes in the distribution of earnings. This question has not, to our knowledge, been explored in the literature. Because we are focusing on that segment of the work force that is expected to work and earn, it is of interest to understand changes in both the average level of and inequality in this capacity. Has inequality in the distribution of human capital or EC increased by as much as earnings inequality? To what extent does the increase in earnings inequality reflect increases in inequality in the distribution of EC? Again, the human capital patterns for both all male workers and all males are explored.

Third, we track the changes over time in the utilization of human capital. If, for each male, earnings equaled EC in both 1973 and 1988, the increase in earnings inequality over this period would equal the increase in EC inequality. On the other hand, if the increase in earnings inequality exceeded the increase in EC inequality, some portion of the increase in earnings inequality would be due to changes in the pattern of utilization of EC. We also explore these changes in utilization patterns, again for both workers and all males of working age.

Fourth, we measure the relative contribution to changes in earnings inequality of changes in inequality of (1) EC and (2) capacity utilization. Our findings vary from those of other researchers who have decomposed the observed change in earnings inequality into its wage rate and hours worked components. Most prior analyses of this issue find that the bulk of the observed increase in earnings inequality is attributable to increases in the inequality of wage rates (taken to be the pure price of labor). They conclude from this that it is changes in the structure of labor market "opportunities" that have driven the increase in earnings inequality. Our results suggest that the role played by opportunities has been overstated and that a second element--that of individual "choices" in the labor market involving labor supply and wage rates--plays a more important role than hitherto acknowledged.

Table 1 is a preview of some of our main findings. It presents estimates of changes in inequality in these three indicators over the 1973-1988 period, for both groups of working-age men. From these numbers, we conclude that, while all of the indicators of labor market performance show that inequality has increased substantially for both groups of workers, looking at only the working population conveys a quite different--and perhaps misleading--picture of inequality changes, relative to that conveyed by observing the entire working-age male population.

For all working-age males, the absolute and percentage increase in inequality of both earnings and the utilization of EC is substantially larger than for workers; the increase in the inequality of EC is about equal between the two groups. We note that, for workers, the absolute increase in earnings inequality (.18) is 2.5 times as large as the absolute increase in the inequality of EC or human capital (.07), and that the increase in the dispersion in the utilization of that human capital also plays a substantial role. The change patterns for the entire population of males are quite different. Reaching

TABLE 1

Variance of the Logarithm (VLN) of Earnings, Earnings Capacity, and the Utilization of Earnings Capacity, 1973 and 1988, Male Workers and All Males Aged 18-64

	1973	1988	Absolute Change	Percentage Change
Male Workers				
Earnings	1.11	1.29	.18	+16.2
Earnings capacity	.28	.35	.07	+23.3
Capacity utilization rate	.89	.99	.10	+11.2
All Males				
Earnings	2.77	3.55	.78	+28.2
Earnings capacity	.29	.35	.07	+23.0
Capacity utilization rate	2.48	3.18	.70	+23.5

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: Earnings are equal to the sum of wage and salary earnings plus self-employment income. People with zero or negative earnings were assigned earnings of $100 for calculation of variance of logs of earnings and the CUR. Capacity utilization rate equals earnings divided by earnings capacity without the variance adjustment. Earnings capacity has variance adjustment. Earnings and earnings capacity are top-coded at $99,999. Observations weighted using March supplemental weights.

conclusions regarding the source of the increases in earnings inequality-- between increases in inequality in the price of labor (the wage rate or EC) and increases in inequality in the amount of labor effort (hours worked or capacity utilization)--based on evidence only from the working male population may be quite misleading.

We also measure systematically the extent to which the observed increase in earnings inequality is due to the increase in the inequality of EC. We take an individual's EC to be a more appropriate measure of his true "pure price of labor" than his observed wage rate, as EC purges the price measure from voluntary choices regarding job characteristics and wage rates in the labor market matching process. For workers, we find that about 40 percent of the increase in earnings inequality is due to the increase in inequality in this true pure price of labor. For all males, the increase in inequality in EC accounts for only about 10 percent of the increase in earnings inequality. These results are quite different than those found elsewhere in the literature, where at least 75 percent of the increase in earnings inequality over this period is attributed to the increase in the inequality of wage rates.

II. A BRIEF LITERATURE REVIEW

In recent years, a large number of papers have attempted to document--and to sort out the causes of--changes in the distribution of earnings and income (see Levy and Murnane [1992 forthcoming] for a review). Here, we focus only on those papers that address changes in labor market inequality--wages and earnings--and in particular those that investigate inequality patterns for males. We also focus on those studies that have measured the changes in inequality using the variance in the logarithm (VLN) measure of inequality, as that is the measure which we will employ in our work. Table 2 summarizes some of the findings in these papers that relate most closely to our analysis.

TABLE 2
Comparison of the VLN and the Change of VLN of Earnings of Males from Various Studies, 1973 until Late 1980s

	Burtless[a]	Moffitt[b]	Moffitt[c]	Karoly[d]	Bluestone[e]	Juhn, Murphy, Pierce[f]	Blackburn[g]
All Earners							
1973	1.30	1.25	1.48	1.36	1.40		
1987	1.55	1.61	1.44	1.53	1.64		
Absolute change	+.25	+.36	-.04	+.17	+.24		
Percentage change	+19.2	+28.8	-2.7	+12.5	+17.1		
FTYR Earners							
1973						.50	.25
1985						.59	.32
Absolute change						+.09	+.07
Percentage change						+17.9	+29.7

[a]Wage and salary earnings plus self-employment income for males aged sixteen and over with positive wage and salary earnings greater than their self-employment income. The top 2 percent of the distribution are excluded.
Source: Estimates from graphs in Burtless (1990), p.111 .

[b]Wage and salary earnings for white males aged sixteen to sixty-one with positive earnings who report less than seventy hours of work a week.
Source: Square of standard errors reported in Table 1, p.203, in Moffitt (1990).

[c]Wage and salary earnings for black males aged sixteen to sixty-one with positive earnings who report less than seventy hours of work a week.
Source: Square of standard errors reported in Table 1, p.203, in Moffitt (1990).

[d]Wage and salary earnings for males aged sixteen and over with positive wage and salary earnings.
Source: Karoly (1988).

[e]Wage and salary earnings for males aged sixteen and over with positive wage and salary earnings.
Source: Bluestone (1989).

[f]Weekly wages of white males who worked at least thirty-five hours in each week they worked.
Source: Juhn, Murphy, and Pierce (1989).

[g]Wage and salary earnings for white males aged eighteen to sixty-five with no self-employment income who worked more than thirty-four hours a week for at least fifty weeks. Workers in agriculture, private household service, and welfare and religious services, and all other workers with earnings less than $2,080 (1984 dollars), are excluded.
Source: Blackburn (1990), Table 1, p.446.

An important paper that addresses many of the same issues studied in this paper is Burtless's 1990 paper "Earnings Inequality over the Business and Demographic Cycles." Burtless uses a sample[1] of wage and salary workers from the March CPS to document the long-term (1947-1986) trend of rising earnings inequality. He relies on a variety of inequality measures which demonstrate the robustness of this finding. Moreover, Burtless finds that during the 1980s earnings inequality accelerated, especially for full-time, year-round (FTYR) workers. Finally, he analyzes the contribution of changes in wage rate inequality (a variable obtained by dividing earnings in the year by the product of weeks worked and usual weekly hours worked)[2] and changes in variables reflecting inequality in work time to earnings inequality. He concludes that increased inequality of the estimated wage rates accounts for about three-quarters of the increased inequality of earnings from 1975 to 1987.[3]

Evidence on this latter point--the relative contributions of changes in wage rate and hours worked inequality to increasing earnings inequality--is also provided by Moffitt (1990). Using data from the March CPS, Moffitt measures the VLN of earnings for separate samples of white and black males from 1967 to 1987. Like Burtless, he finds a significant increase in earnings inequality. He concludes that the increase in earnings inequality among this group of workers rises <u>solely</u> from an increase in wage rate inequality, and not from an increase in inequality of hours worked. Indeed, for white males he finds that the variance in the distribution of the logarithm of annual hours worked <u>falls</u> from 1973 to 1987 (pp. 215-217).[4]

Five other studies should also be noted. The first, by Karoly (1988), also presents estimates of VLN of earnings for the 1973-1987 period. Using CPS data on men with positive wage and salary earnings, she calculates that the VLN of earnings rose from 1.36 to 1.53 over the 1973-1987 period--an increase of .17. Bluestone (1989) relies on a sample similar to Karoly's and covers the same fourteen-year period. He finds that the VLN of earnings rises by .24 over this period--from 1.40 to 1.64.

Karoly (1992) also presents evidence of the increases in weekly and hourly wage inequality for both all male wage and salary workers and all FTYR workers by looking at changes at select percentiles of the distribution relative to the median. While the implied increase in the inequality of the calculated wage rate for all workers exceeds that for FTYR workers, the extent of increase in inequality between the two groups does not appear to differ substantially.[5] The finding that wage rate inequality is growing almost as fast among FTYR workers as among all workers leads her to conclude that wage rate inequality is driving the increase in earnings inequality for all workers. It has this implication because the variance in hours worked among FTYR workers is small and stable over time, leaving changes in wage rate inequality as the major determinant of changes in earnings inequality among these workers. Also, studying changes in inequality patterns among FTYR workers avoids the problems of measuring annual hours worked that plagued Burtless and Moffitt (see notes 2 and 4). Although Karoly does not undertake a decomposition of the change in the VLN of annual earnings into its wage rate and hours worked components, she extrapolates from her results on both positive earners and FTYR earners and cites a number of other studies[6] in reaching her conclusion that "most of the increase in inequality in annual wage and salary income since the late 1970's is the result of an increase in inequality in hourly wages and not simply greater variance in weeks or hours worked" (p. 51).

Two other studies rely on FTYR workers to shed light on the changes in inequality of earnings. The first is by Juhn, Murphy, and Pierce (1989). They present evidence on the VLN of weekly wages of white, male, FTYR workers, a variable that is largely purged of the influence of variability in work time. Their calculations indicate that this measure of inequality rose from .50 to

.59 from 1973 to 1985, an increase of .09. The second study is by Blackburn (1990). He finds the VLN of annual earnings for working-age white males rose from .25 in 1973 to .32 in 1985.

Finally, the study by Kosters and Ross (1988) should be noted. Using the hourly wage and usual weekly wage data in the May, April, and June CPS surveys, they find very small increases in inequality of hourly wages over the period in question.[7] However, when problems in these data related to top-coding were corrected, the same upward trend in wage rates as found in other studies was observed (see Karoly and Klerman [1991]).

In sum, then, these studies indicate that over the period from the early 1970s to the late 1980s there has been:

-a substantial increase in the VLN of earnings for male workers, ranging from about .17 (Karoly) to .36 (Moffitt), depending on the sample of males and the definition of earnings.

-a sizable increase in the VLN of the wage rate of about .20 (Burtless [see note 3]), again depending on the sample and the measurement of the wage rate.

-a substantially smaller increase in the VLN of earnings or wages of FTYR workers, ranging from about .07 to about .09.

-a <u>decrease</u> in the VLN of work time (hours per year worked; weeks per year worked), ranging from about -.03 (Burtless [see note 3]) to about -.09 (Moffitt).

-some suspicion that the wage rate and hours estimates calculated from March CPS data are very weak, noisy, and precarious, and likely overstate the increase in inequality attributed to increases in wage rate dispersion.

While these research results are revealing, they leave a number of puzzles to which we will return later in the paper. These include, first, the larger increase in the VLN of the wage rate of all workers, relative to that of FTYR workers, an increase that has no obvious explanation. Could it be that lower-wage workers--either those changing jobs or entering the labor force--tend to be taking part-time and part-year jobs (see Blank [1990]) and jobs with low hourly pay rates, which leads to this result? Second, why should the reallocation of the male work force from FTYR jobs to jobs that provide employment either part-time or part-year result in a <u>decrease</u> in the VLN of hours worked for the entire group of workers? While this outcome is not an impossible one, it does seem highly implausible.

III. PATTERNS OF MALE EARNINGS INEQUALITY, 1973-1988

From the U.S. Census Bureau Current Population Survey Public Use Files of 1974 and 1989, we extracted two samples of eighteen- to sixty-four-year-old males for each year. The first sample includes all males who record positive earnings and positive weeks worked in 1973 and 1988, respectively. The second sample includes all males aged eighteen to sixty-four.

Table 3 displays the distribution of the earnings of these two samples for 1973 and 1988. Several aspects of these distributions are noteworthy. First, the real mean earnings level for both the workers and all males (in 1988 dollars) shows essentially no growth over the period, reflecting the stagnation of individual earnings over this period.

Second, for both the workers and all males, the earnings distribution in 1988 is substantially more unequal than it was in 1973. For example, the range between the twentieth and the eightieth percentiles for the worker sample extends from $11,200 to $36,300 in 1973, a range of $25,100. In 1988, the percentile cutoffs are $9,200 and $38,000, for a range of nearly $29,000. For the entire sample of working-age males, the range between the twentieth and the eightieth percentiles extends from $7,500 to $34,800 in 1973, and from $5,000 to $36,000 in 1988. The range has increased from $27,300 to $31,000.

Finally, as seen in the distributions for all males, the percentage of males who report no earnings or hours worked in the entire year--the jobless--is substantially larger in 1988 than in 1973. In 1973, 6.3 percent of working-age males (3.5 million people) were jobless; by 1988, the number of jobless increased to 6.9 million, about 9.6 percent of the working-age male population.

TABLE 3

Percentile Distribution of Total Earnings, All Males and Male Workers Aged 18-64, 1973 and 1988 (1988 dollars)

	Male Workers		All Males	
Percentile	1973	1988	1973	1988
1	$500	$400	$0	$0
5	2,500	2,000	0	0
10	5,000	4,400	1,600	0
20	11,200	9,200	7,500	5,000
30	15,400	13,500	13,200	10,000
40	19,900	18,000	17,800	14,800
50	23,300	22,000	22,100	19,800
60	26,800	26,000	25,300	24,500
70	30,100	31,000	29,800	30,000
80	36,300	38,000	34,800	36,000
90	45,500	50,000	44,700	48,000
95	57,100	62,100	56,600	60,000
99	99,400	100,000	99,400	100,000
Mean	25,400	25,500	23,600	22,900

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: Total earnings are equal to the sum of wage and salary earnings plus self-employment income. Figures reported are the minimum total earnings (rounded to nearest $100) necessary to be in a given percentile. Total earnings are top-coded at $99,999. Observations weighted using March supplemental weights.

Table 4 presents a number of aggregate indicators of the increase in inequality of earnings for both workers and all males from 1973 to 1988. While all of these indicators tell the same general story regarding the increase in earnings inequality in male earnings over the 1973-1988 period, the magnitude of the increase varies over the measures. For males with earnings, the increase in inequality ranges from about 11 percent to over 20 percent, depending on the inequality indicator used. For all males, the percentage increases are larger, ranging from about 13 percent to over 28 percent.

The percentage increase in the VLN of earnings--the measure on which we focus later in the paper--is about 16 percent for workers and over 28 percent for all males. For workers, the absolute increase in the VLN of earnings is .18, intermediate to those found in the literature. This measure, it should be noted, is more sensitive to changes in inequality at the lower end of the distribution than are the other measures.[8]

IV. PATTERNS OF EARNINGS CAPACITY INEQUALITY, 1973-1988

While a substantial increase in annual male earnings inequality over the period since 1973 seems indisputable, the importance of that change is unclear. Individual earnings are, after all, an annual report of labor market income, and hence reflect both the wage rate earned by an individual in a particular year and the amount of time worked during that period. Both the wage rate and the hours of work are, at least partially, chosen by the individual worker, and hence reflect perceived circumstances, needs, and opportunities at that time. Because both the wage rate and observed hours worked are subject to both exogenous shocks and temporary needs and opportunities, they are short-run and transitory variables.

A perhaps more fundamental question concerns the changes over time in the more permanent labor market capabilities that individuals possess--say, their human capital or their earnings

TABLE 4

Summary Measures of Earnings Inequality, Male Workers and All Males Aged 18-64, 1973 and 1988

	Male Workers			All Males		
	1973	1988	Percentage Change	1973	1988	Percentage Change
Gini coefficient	.366	.405	+10.7	.409	.464	+13.4
Variance of logs	1.11	1.29	+16.2	2.77	3.55	+28.2
Theil index	.231	.278	+20.3	.300	.381	+27.0

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: People with zero or negative earnings were assigned earnings of $100 for variance of logs and Theil calculations (zero otherwise). Total earnings are top-coded at $99,999. Observations weighted using March supplemental weights. Gini coefficient estimated using the formula for weighted individual records in Lerman and Yitzhaki (1989).

capabilities. What has happened to the level of human resources possessed by the American work force, and what has happened to the inequality in the distribution of these earnings capabilities? Focusing on this more permanent variable may offer a somewhat different, and longer-run, perspective on the problem of economic inequality in the United States.

The fact that individual annual earnings equal the product of a wage rate and the number of hours worked may provide a way of understanding the nature of the increase in earnings inequality. We interpret the wage rate as a payment per hour worked, reflecting the skills and talents that an individual brings to the labor market, the characteristics of the jobs that are made available, and the individual's choices regarding which jobs to accept. Individual worker choice, then, accounts for some of the variation in observed wage rates. Work hours also involve worker choices, as part-time or part-year work can be combined with multiple jobs to yield the desired level of working hours per year.

From this perspective, then, one possible explanation for the observed increase in annual earnings inequality would be increasing inequality in the underlying human capital possessed by the male work force. At one extreme, if the distribution of work time and the structure of jobs and wage rates were constant over time, an increase in the inequality of human capital--schooling, or work experience, or age, or other factors which are relevant to generating labor market income--would account for the entire increase in inequality in observed earnings. At the other extreme, the increase in annual earnings inequality could reflect only an increase in the inequality in the distribution of time worked, holding constant the underlying distribution of human capital characteristics and the returns to those characteristics.[9]

In this section, we explore the level and inequality in the underlying distribution of human capital or earnings capabilities. The basic questions are: In which ways has the distribution of human capital changed its level and dispersion over the 1973-1988 period? Have these changes in longer-term or "permanent" earnings capabilities paralleled the pattern of observed changes in the distribution of shorter-term observed earnings, or have they not? To what extent can the pattern of increased earnings inequality observed in Section III be explained by similar changes in the distribution of human capital or earnings capabilities?

We call the measure of "human capital" or "earnings capabilities" that we employ "earnings capacity" (EC). More specifically, we define individual EC to be the level of earnings that a person would be expected to receive if he used his skills and capabilities at their capacity (defined as full-time, year-round work).

The underlying concept of earnings capabilities that is reflected in the EC measure needs to be clearly understood. The value of EC for an individual in a particular year--that is, his human capital in that year--is the product of the individual's human capital characteristics and the implicit "price" that those characteristics would receive in the full-time, year-round labor market. In effect, our distribution of EC is the distribution of earnings that would result if every worker (or every male) would secure a full-time, year-round job that reflected his human capital characteristics.[10]

Estimating this value requires that we (1) observe the relevant labor market-human capital characteristics of individuals, (2) measure the implicit labor market returns associated with these characteristics, and (3) calculate the total reward (earnings) that an individual would receive if he used these capabilities in the labor market to their capacity.[11]

Appendix A provides a detailed description of the procedures that we have employed in calculating individual EC, and hence the distribution of EC. In short, we fit separate earnings equations for white and nonwhite FTYR workers in both 1973 and 1988. Each equation includes a selectivity correction variable calculated from a prior equation to account for the estimation of the earnings function on only workers who selected into full-time, year-round work. The independent variables in the earnings equations reflect the human capital model and include education, age, region, urbanization, marital status, and the number of children. The expected FTYR earnings of each individual in our two samples were calculated by using the coefficients from the appropriate earnings equation and the individual's characteristics. The coefficient estimates are reported in Appendices B1-B4, while the independent variables are described in Appendix C. When forming the distribution of EC for the population, we adjust the expected (or predicted) EC value for each individual to account for unobserved variables in the earnings-generation process; we refer to these estimates as "variance-adjusted EC" (see Appendix A). Following this process, we obtain a distribution of individual EC, reflecting the earnings capabilities of the population of working-age males in 1973 and 1988.

Table 5 presents the percentile distributions of EC for the sample of workers and the sample of all males for both years. In these distributions, individuals are ranked from lowest to highest in terms of their variance-adjusted EC.[12]

As is clear from Table 6, the distribution of EC is less unequally distributed than that of earnings, irrespective of the inequality measure used. For workers, the ratio of EC to earnings inequality ranges from about 25 percent to over 75 percent, depending upon the inequality indicator used.[13]

As with the distribution of earnings, the EC distribution has grown more unequal over time. This increase is shown in Table 7. By comparing Tables 4 and 7, it is clear that in percentage terms, the level of inequality of EC has increased by more than the level of inequality of earnings for workers; for all males, the percentage increase in inequality of EC is somewhat less than the increase in inequality of earnings. However, for both workers and all males, the <u>absolute</u> increase in the inequality of earnings is substantially larger than the increase in the inequality of EC. From this we conclude that the increase in the inequality of earnings capacity contributed significantly to the increase in earnings inequality, but that changes in the dispersion of hours worked, or the utilization of earnings capacity, also contributed to the increased earnings dispersion.

TABLE 5

Percentile Distribution of Earnings Capacity, All Males and Male Workers Aged 18-64, 1973 and 1988 (1988 dollars)

Percentile	Male Workers 1973	Male Workers 1988	All Males 1973	All Males 1988
1	$8,200	$6,700	$8,100	$6,600
5	12,600	10,300	12,400	10,100
10	15,600	12,900	15,400	12,700
20	20,100	16,900	19,900	16,600
30	24,100	20,500	23,800	20,200
40	27,900	24,200	27,600	23,900
50	31,800	28,200	31,500	27,900
60	36,500	32,900	36,200	32,500
70	41,900	38,600	41,600	38,200
80	49,700	46,300	49,300	45,900
90	61,700	59,800	61,300	59,400
95	73,900	74,000	73,600	73,300
99	100,000	100,000	100,000	100,000
Mean	36,000	33,100	35,700	32,700

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: Figures reported are the minimum earnings capacity (rounded to nearest $100) necessary to be in a given percentile. Earnings capacity has variance adjustment and is top-coded at $99,999. Observations weighted using March supplemental weights.

TABLE 6

Comparison of Inequality of Distributions of Earnings and Earnings Capacity, Male Workers and All Males Aged 18-64, 1973 and 1988, Various Indicators

	Earnings		Earnings Capacity		Ratio of VLN of EC to Earnings	
	1973	1988	1973	1988	1973	1988
Male Workers						
Gini coefficient	.366	.405	.285	.317	.779	.783
Variance of logs	1.11	1.29	.283	.349	.255	.271
Theil index	.231	.278	.129	.161	.558	.579
All Males						
Gini coefficient	.409	.464	.287	.319	.702	.688
Variance of logs	2.77	3.55	.287	.353	.104	.099
Theil index	.300	.381	.131	.163	.437	.428

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: People with zero or negative earnings were assigned earnings of $100 for variance of logs and Theil calculations (zero otherwise). Earnings and earnings capacity are top-coded at $99,999. Earnings capacity has variance adjustment. Observations weighted using March supplemental weights. Gini coefficient estimated using the formula for weighted individual records in Lerman and Yitzhaki (1989).

TABLE 7

Summary Measures of Earnings Capacity Inequality, Male Workers and All Males Aged 18-64, 1973 and 1988

	Male Workers			All Males		
	1973	1988	Percentage Change	1973	1988	Percentage Change
Gini coefficient	.285	.317	+11.2	.287	.319	+11.1
Variance of logs	.283	.349	+23.3	.287	.353	+23.0
Theil index	.129	.161	+24.8	.131	.163	+24.4

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: Earnings capacity has variance adjustment and is top-coded at $99,999. Observations weighted using March supplemental weights. Gini coefficient estimated using the formula for weighted individual records in Lerman and Yitzhaki (1989). People with zero or negative earnings were assigned earnings of $100 for variance of logs and Theil calculations (zero otherwise).

V. PATTERNS OF EARNINGS CAPACITY UTILIZATION, 1973-1988

From the procedures described in Sections III and IV, we have an estimate for each observation of both earnings and EC in 1973 and 1988. Using these values for any year, we create an indicator of the extent to which individuals utilize their EC by forming a ratio of earnings to EC. We call this indicator a capacity utilization ratio (CUR).

In Table 8, we present the distribution of CURs for both workers and all males, for 1973 and 1988. Individual observations in these distributions are ranked by their predicted EC (that is, EC without the variance adjustment). The CURs displayed in the table are obtained by forming the ratio of observed earnings and the predicted level of EC for each individual.[14]

For all males, the pattern of capacity utilization is similar in both years. Individuals with low EC tend to utilize far less of their human capital than do men with higher levels of earnings potential. While the mean CUR is about two-thirds in both years (increasing slightly from .64 to .66 from 1973 to 1988), the CUR at low levels of EC is generally less than .5.

Moreover, at very low levels of EC, the CUR has fallen substantially over the 1973-1988 period. The mean CUR of individuals in the bottom quintile of the distribution was .53 in 1973; by 1988 it had fallen to .47.

Table 9 presents aggregate indicators of the inequality of CUR for both samples and for both 1973 and 1988. As seen there, the dispersion in capacity utilization has increased substantially from 1973 to 1988. Using the VLN as an indicator and observing the distribution of the CUR without the variance adjustment, there has been an 11 percent increase in the dispersion of the CUR among workers, and a 28 percent increase in CUR inequality among all males.

TABLE 8

Distribution of Capacity Utilization Rates, Male Workers and All Males Aged 18-64, 1973 and 1988

	Male Workers		All Males	
Percentile	1973	1988	1973	1988
Bottom 1	.54	.52	.44	.36
Bottom 5	.69	.50	.55	.39
< 10	.68	.51	.59	.42
10-20	.52	.62	.47	.53
20-30	.57	.69	.53	.61
30-40	.66	.74	.61	.66
40-50	.69	.75	.65	.68
50-60	.71	.78	.67	.70
60-70	.71	.79	.67	.72
70-80	.74	.80	.70	.72
80-90	.76	.82	.72	.77
90-100	.82	.84	.79	.79
Top 5	.82	.83	.79	.78
Top 1	.82	.76	.79	.72
Mean	.69	.73	.64	.66

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: Individuals are ranked by their place in the distribution of earnings capacity without variance adjustment. Capacity utilization rate is equal to total labor earnings divided by earnings capacity without the variance adjustment. The number reported for each decile or other percentile grouping is the mean of the individual capacity utilization rates for the individuals in that group. Earnings and earnings capacity are top-coded at $99,999. Observations weighted using March supplemental weights.

TABLE 9

Summary Measures of Inequality in Capacity Utilization Rates without Variance Adjustment, Male Workers and All Males Aged 18-64, 1973 and 1988

	Male Workers			All Males		
	1973	1988	Percentage Change	1973	1988	Percentage Change
Gini coefficient	.314	.338	+7.6	.362	.404	+11.6
Variance of logs	.89	.99	+11.2	2.48	3.18	+28.2
Theil index	.174	.197	+13.2	.243	.300	+23.5

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: People with zero or negative earnings were assigned earnings of $100 for variance of logs and Theil calculations (zero otherwise). CUR is equal to total labor earnings divided by earnings capacity without the variance adjustment. Earnings and earnings capacity are top-coded at $99,999. Observations weighted using March supplemental weights. Gini coefficient estimated using the formula for weighted individual records in Lerman and Yitzhaki (1989).

VI. SOURCES OF INCREASED EARNINGS INEQUALITY, 1973-1988

From Tables 3 and 4, it is clear that there has been a substantial increase in earnings inequality among working-age males from 1973 to 1988, irrespective of the measure of inequality used. Moreover, the increase in earnings inequality among all males is substantially greater than among males who work. The question that immediately rises is why? What is the source of the increased inequality?

Essentially two sorts of analyses have been undertaken in attempts to answer this question. The first attempts to decompose the change into components related to supply (e.g., demographic characteristics of the work force) or demand (e.g., industrial structure of the labor market) characteristics in the labor market. A second approach is to ask whether the increased inequality in earnings is due primarily to increased wage rate dispersion or to changes in the pattern of hours worked. In Section II, we briefly surveyed the literature employing this approach.

In this section, we pursue a variant of the second of these approaches. A commonly used technique for decomposing changes in earnings inequality into changes in the wage rate and changes in work time is based on an accounting property of the VLN measure of inequality. Relying on this property, an accounting definition of the components of the VLN of earnings (var(e)) is:

$$\mathrm{var}(e) = \mathrm{var}(h) + \mathrm{var}(w) + 2\mathrm{cov}(h,w),$$

where w is the wage rate and h is the annual hours of work per year.

In our case, annual earnings is, by definition, equal to the product of EC and the capacity utilization rate. Therefore, a direct analog of this property is:

$$\mathrm{var}(e) = \mathrm{var}(ec) + \mathrm{var}(cur) + 2\mathrm{cov}(ec,cur).$$

From the estimates we have discussed above, we have a value of earnings and an estimated value of EC for each individual in our two samples. Hence, we have values for two of the four terms in the above equation. By aggregating the final two terms in the equation (var(cur) and 2cov(ec,cur)) into a single term, we can decompose the increase in inequality in earnings into two parts. They are (1) the increase in inequality in EC and (2) the change in the sum of var(cur) and 2cov(ec,cur).

Table 10 presents the results of this decomposition. The numbers in the first column serve as the basis for those in Table 1, and indicate the level of the VLN of earnings in both 1973 and 1988 for working-age males with positive earnings. The level of the VLN of earnings increased by .18 between these two years, an increase of 16.2 percent.

We have shown the two components of this change--the change in the VLN of EC and the change in the sum of the combined VLNs of the two remaining terms in the equation.[15] The VLN of EC increased from .28 to .35 (see Table 7), an absolute increase of .07, or 23.3 percent. A larger absolute change, however, is recorded for the sum of the VLNs of the two remaining terms, shown in column 3. This sum of VLNs increased by .11 (13.7 percent). The sum of the second two items in the change row totals .18, the value of the absolute change in the VLN of earnings, shown as the first item.

For all workers, then, the bulk of the increase in earnings inequality (as measured by the VLN of earnings)--about 63 percent--is attributable to the increase in dispersion of the CUR (plus the covariance term); only about 37 percent is attributable to the increase in inequality of EC. The latter of these two terms--the changing inequality in EC--is properly interpreted as the increased dispersion in the distribution of human capital, or earnings capabilities, among workers. The effect of changes in inequality in human capital is dominated by the increase in the dispersion--or inequality--in the extent to which earnings capabilities are used.[16]

In sum, then, well over one-half of the observed increase in earnings inequality among working males is attributable to increases in inequality in the exploitation of earnings capabilities; about 40 percent is attributable to increases in inequality in the holdings of earnings potential.

TABLE 10

Source of Change in the Variance of Log Earnings, Male Workers and All Males Aged 18-64, 1973 and 1988

	Variance of Log Earnings		Variance of Log Earnings Capacity		Sum of Variances of Log of CUR and Covariance Term
Male Workers					
1973	1.110	=	.283	+	.826
1988	1.289	=	.349	+	.939
Absolute change	.179	=	.066	+	.113
Percentage of row total	100	=	36.9	+	63.1
All Males					
1973	2.771	=	.288	+	2.484
1988	3.555	=	.353	+	3.203
Absolute change	.784	=	.065	+	.719
Percentage of row total	100	=	8.3	+	91.7

Source: Authors' calculations using March 1974 and 1989 CPS.

Notes: People with zero or negative earnings were assigned earnings of $100 for variance of logs of earnings and CUR calculations (zero otherwise). Earnings capacity has variance adjustment. Observations weighted using March supplemental weights. Numbers may not add exactly across columns due to rounding.

The second panel of Table 10 presents the same calculation for all males, a group that includes those without earnings or work time. Not unexpectedly, the result here is even more extreme. Because of the growth in the number of nonworkers (the jobless) over the 1973-1988 period (from 6.3 percent of the working-age population in 1973 to 9.6 percent of the population in 1988), together with the rapid falloff in the utilization of EC by those with low levels of EC (see Table 8), an increased role for the sum of the VLN of the CUR and the covariance term is to be expected. Table 10 confirms this expectation. Over 90 percent of the increased earnings inequality (of 28.2 percent) among all males is accounted for by increases in the sum of the VLN of the CUR and covariance term; less than 10 percent is attributable to the increase in inequality of human capital--EC.[17]

VII. A SUMMARY OF MAIN CONCLUSIONS

Our first main conclusion concerns the substantial difference in measured labor market performance between men who work and all working-age males. In our study, we have measured the changes in labor market performance for male workers and for all males of working age. We find that the increase in inequality in both earnings and the utilization of earnings capacity over the 1973-1988 period is substantially larger for the entire population of working-age males than it is for workers. This result is not surprising when the rapid absolute and relative increases over this period in the number of working-age males who report neither working nor earning are considered. However, it does cast doubt on the legitimacy of relying only on samples of males who work to reach conclusions regarding the level of and changes in earnings inequality among working-age males.

Second, we have presented estimates of the level of and changes in the inequality in the holding of human capital. These estimates are analogous to estimates of changes in the inequality in holdings of financial and nonfinancial wealth. In developing estimates of inequality in wealth found in the literature, the first step is to distinguish several instruments of wealth holdings, ranging from stocks and bonds to housing to consumer durables. Then, the quantity of each of these instruments held by an individual are valued at their market price, and aggregated to yield an estimate of his or her wealth holdings in a particular year. Individuals are then arrayed by their wealth holdings to yield an estimate of the inequality in financial and nonfinancial wealth.

Our estimates of individual EC, and of the inequality in EC, follows much the same procedure. In our earnings functions, we have identified the primary components of human capital (such as education and age) and have valued the services of each of them at the price that they would yield, if they were sold in the full-time, year-round labor market.

For workers, the level of inequality in earnings is substantially larger than inequality in EC. Using the VLN measure of inequality, the level of EC inequality was 26 percent of the inequality of earnings in 1973; by 1988, the percentage had increased slightly to 27 percent, suggesting that inequality in the holding of human capital had increased in relative terms by more than the increase in earnings. For all males, the ratio of the VLN of EC to that of earnings is substantially smaller than it is for workers. Moreover, the relative increase in earnings inequality from 1973 to 1988 for this group exceeded the increase in EC, the opposite of the pattern observed for workers. The difference in these patterns is attributable to the rapid increase in the number and share of the working-age male population reporting zero earnings over this period.

Finally, we have presented a decomposition of the increase in earnings inequality over the 1973-1988 period, analogous to decompositions found elsewhere in the literature (Burtless, 1990; Moffitt, 1990). The purpose of these decompositions is, most basically, to roughly allocate the increase in earnings inequality to (1) changes in "opportunities"--taken to mean the structure of jobs available, measured in terms of the pure price of labor which is attached to them--and (2) changes in "choices"--taken to mean the quantity of labor supplied to the market by individuals.

In the studies found in the literature, changes in inequality in the observed wage rate of workers are taken as the measure of changes in inequality in the pure price of labor, or of "opportunities"; changes in inequality in hours worked per year are taken as the measure of changes in inequality in the quantity of labor supplied, or of "choices."[18] These studies have concluded that over the past two decades, the increase in inequality in the pure price of labor (or the increase in the inequality of opportunities) has driven the increase in earnings inequality for working-age males, accounting for about 75 percent of this increase.[19]

Our results presented in Section VI vary from these findings. They suggest that the change in the inequality of EC--an analog to the wage rate in prior studies--plays a far smaller role in explaining the increase in earnings inequality than does the change in the measured wage rate. If inequality in EC is a proxy for inequality in the distribution of "opportunities" which are offered workers by the labor market, our results suggest that growing inequality in opportunities have contributed less to the growth in earnings inequality than has been suggested by prior research. For workers, we conclude that the increase in the inequality of EC accounts for about 40 percent of the increase in earnings inequality, about one-half the amount attributed to increased wage rate inequality in prior studies.[20] For all males, the increase in the inequality of EC accounts for only about 10 percent of the increase in earnings inequality.

What accounts for this difference? The primary source of the divergence of our results from those of prior studies stems from a difference in the role assigned to individual "choice" in the determination of the observed wage rate. In the prior studies, an individual's <u>observed</u> wage rate is taken to be an indicator of his market productivity--the value of his marginal product, or the pure price of his labor. It is interpreted as reflecting his productivity in a job with the characteristics of that in which he is observed, and hence reflecting the characteristics of the job opportunities that are available to him; individual choice is permitted no role in the determination of this price.[21]

Our analysis, however, adopts a somewhat different point of view. Implicit in our approach is the judgment that individuals engage in labor market search prior to accepting employment, and that in this search they trade off the characteristics of the jobs offered by employers against the wage rates that they pay. Hence, the observed wage rate of any individual reflects not only his inherent skills and productivity--his human capital--but also an element of choice; it reflects his tastes for jobs with varying degrees of difficulty, unpleasantness, and time demands, as well as the structure of jobs that employers make available.[22] The prevalence of part-time, part-year, and part-time/part-year employment, we suggest, indicates this element of choice, and the rapid increase in this prevalence suggests that individual tastes may be playing an increasing role in the labor market process.

In our estimates, then, we attempt to secure a measure of the "true" pure price of individual labor services which is purged from its dependence on individual tastes and choice. Our estimate of EC is such a measure; it reflects the wage rate that an individual would earn if he made the services of his characteristics available in the full-time, year-round labor market.[23] Reliance on the full-time, year-round labor market as a norm is deliberate. We judge that in this market there is far less scope for individual choice of wage rate associated with the number of hours per year worked.[24]

Hence, in our decomposition analysis of Section VI, we interpret the share of the increase in earnings inequality associated with the increase in the inequality of EC as the effect of increases in the inequality of the true pure price of labor--the full-time, year-round wage rate, purged of individual tastes and choices. We interpret the share that is associated with the change in inequality in the remaining, combined term as the sum of the effect of changes in inequality of (1) annual hours worked choices (labor supply), (2) individual wage rate-work time-job characteristic choices, and (3) the covariance of EC with these components of this combined term.

While the results of previous work implied that it is the change in "opportunities" that have accounted for most, if not all, of the increase in earnings inequality since the early 1970s, our research suggests a substantially smaller role for changed opportunities. By implication, we suggest a larger role for increases in inequality in individual worker "choices"--choices involving both wage rates and hours worked.[25]

APPENDIX A

Procedure for Calculating Earnings Capacity with and without the Variance Adjustment

To estimate the earnings capacities of eighteen- to sixty-four-year-old males, we fit identical two-equation models for whites and nonwhites in 1973 and 1988. Whites include those who reported their race as white and who are not of Hispanic ethnic origin. We relied on the microdata from the March 1974 and 1989 CPS surveys.

In the first equation, the correlates of full-time, year-round labor force participation are estimated for 1973 and 1988 using a reduced-form probit specification. Individuals are assigned a value of 1 if they worked more than thirty-four hours a week for at least fifty weeks in the year; 0 otherwise. The independent variables include variables that affect the expected market wage (e.g., education and age), the incentive to work (e.g., nonlabor income and AFDC benefits), labor market conditions (e.g., unemployment rate), and health status. Estimates from the first-stage probit equations are used to construct the Heckman selectivity correction term (λ) for each individual. The selectivity correction term is used in a second-stage earnings equation to correct for the bias in estimating an earnings equation using data only on individuals who have selected into the full-time, year-round work force. The coefficient estimates from the first stage are reported in Appendices B1 and B2. Detailed variable descriptions are in Appendix C.

The second-stage earnings equation is fit over those individuals who worked full-time, year-round, and the dependent variable is defined as the logarithm of observed earnings (LOGEARN). The log earnings equation is of the form:

$$\text{LOGEARN} = X\beta + c\lambda + \epsilon$$

where X is composed of the independent variables that affect earnings, λ is the selectivity correction term from the work force participation equation, and ϵ is assumed to be a randomly distributed residual term distributed $N(0,\sigma^2)$.

The independent variables in this equation were chosen using the human capital model as a guide, and include education, age, region of the country, rural-suburban-urban location, marital status, number of children, and the estimated λ term. The coefficient estimates from the second stage are reported in Appendices B3 and B4. Detailed variable descriptions are in Appendix C.

The earnings residual (ϵ) contains both earnings due to unmeasured individual-specific human capital stock (δ) and random fluctuations in earnings (ν). That is

$$\epsilon_{i,t} = \delta_i + \nu_{i,t}$$

where i is a subscript for the individual and t is a time subscript. Both δ and ν are assumed to be independently and normally distributed with a zero expected value and constant variance; they are also assumed to be independent of each other. With cross-sectional data, it is not possible to distinguish between δ_i and $\nu_{i,t}$. See Lillard and Willis (1978) for a discussion of the error component structure and some empirical estimates of the transitory and permanent components of the residual term.

To obtain the estimated earnings capacity (EC) for a person, we employ coefficients from the appropriate LOGEARN equation and information on the person's family and individual characteristics. We do not use the selectivity correction term to calculate earnings capacity. The reason we do this is that the CPS weights are not based on a person's labor supply decision. Therefore, since we want unconditional predicted earnings at full-time, year-round work--that is, predicted earnings for a person who we do not know if they have selected into the full-time, year-round labor force--we use the unconditional value of lambda, zero.

The coefficient estimates are for annual earnings of full-time, year-round workers; EC is an estimate of a person's earnings if they were to work full-time, year-round. By adopting this procedure, each individual with the same set of characteristics is assigned the same earnings capacity. If we do not make an adjustment to add back variance, we are implicitly assuming that the entire residual is made up of transitory shocks to earnings (i.e., $\epsilon_{i,t} = \nu_{i,t}$). We call this earnings capacity without the variance adjustment.

If we assigned the same expected earnings capacity to each individual with the same set of independent variables, we would be neglecting the role of unobserved human capital characteristics, unmeasured labor demand circumstances, and "luck" in the earnings determination process. As a result, the distribution of predicted EC for the entire population is artificially compressed. The preferred method we adopt in most of the paper is to assume the entire residual represents permanent differences in individual-specific human capital stock (i.e., $\epsilon_{i,t} = \delta_i$). We call this earnings capacity with the variance adjustment.

We estimate an EC value for each individual which accounts for earnings variation within each racial group by distributing individual observations within a cell randomly about the cell mean. The random number generator technique employed assumes that the distribution of observations within cells is normal, with a standard deviation equal to the standard error of the estimated full-time, year-round equation.

APPENDIX B1

Probit Estimates of Determinants of Full-Time, Year-Round Labor Force Participation[a] in 1973

Variable	White Males (n=30,137) Coefficient	White Males (n=30,137) |T-Ratio|	Nonwhite Males (n=5,082) Coefficient	Nonwhite Males (n=5,082) |T-Ratio|
Constant	-2.843	14.59	-2.376	6.14
Education	0.108	5.87	0.070	2.22
Education^2	-0.004	6.83	-0.001	1.23
Age	0.096	16.53	0.110	8.12
Age^2	-0.001	19.80	-0.001	8.80
Age x Ed	0.013[b]	0.58	-0.043[b]	0.93
Northeast	0.054	2.03	-0.020	0.26
South	-0.017	0.66	-0.048	0.78
West	-0.262	7.27	-0.146	1.49
Suburban	0.284	15.22	0.160	2.61
City	0.295	13.92	0.105	1.93
Married	0.417	18.70	0.357	7.42
Num. Kids	-0.023	3.24	0.001	0.09
Veteran	0.188	10.76	0.245	5.33
Health	-0.691	24.05	-1.102	14.84
Non-Labor Inc	-0.004	7.86	-0.002	1.47
School	-1.666	26.79	-1.968	11.82
Welfare Gen	0.025[b]	3.21	0.026[b]	1.25
Unemployment	0.015	1.13	-0.073	2.00
Hispanic	--	--	0.155	3.19
Other Race[c]	--	--	0.017	0.21

Source: Estimates based on data from March 1974 CPS.
[a]Dependent variable equals 1 if person worked fifty to fifty-two weeks for thirty-five or more hours per week and had positive wage and salary earnings and no self-employment income.
[b]Coefficient has been multiplied by 100.
[c]Other race includes people who did not report themselves as black, Hispanic, or white.

APPENDIX B2

Probit Estimates of Determinants of Full-Time, Year-Round Labor Force Participation[a] in 1988

Variable	White Males (n=32,604) Coefficient	White Males (n=32,604) |T-Ratio|	Nonwhite Males (n=8,582) Coefficient	Nonwhite Males (n=8,582) |T-Ratio|
Constant	-3.385	16.60	-1.953	6.90
Education	0.160	7.57	-0.011	0.49
Education^2	-0.004	5.76	0.002	2.27
Age	0.132	25.13	0.108	11.10
Age^2	-0.002	29.80	-0.001	12.85
Age x Ed	-0.050[b]	2.17	0.028[b]	0.82
Northeast	0.133	5.42	-0.001	0.02
South	-0.004	0.16	0.033	0.64
West	-0.181	7.41	-0.046	0.78
Suburban	0.252	12.56	0.144	2.74
City	0.133	5.60	0.054	1.09
Not ID	0.192	8.05	0.002	0.04
Married	0.298	14.95	0.380	10.06
Num. Kids	-0.061	6.94	-0.050	3.22
Veteran	0.089	4.75	0.142	3.33
Health	-0.929	26.61	-1.230	16.89
Non-Labor Inc	-0.003	7.80	-0.001	1.77
School	-1.663	29.80	-1.663	15.43
Welfare Gen	-0.002[b]	0.22	0.004[b]	0.31
Unemployment	-0.020	3.46	-0.050	4.09
Hispanic	--	--	0.132	3.64
Asian	--	--	-0.013	0.23
Other Race[c]	--	--	-0.176	1.95

Source: Estimates based on data from March 1989 CPS.

[a]Dependent variable equals 1 if person worked fifty to fifty-two weeks for thirty-five or more hours per week and had positive wage and salary earnings and no self-employment income.

[b]Coefficient has been multiplied by 100.

[c]Other race includes people who did not report themselves as Asian, black, Hispanic, or white.

APPENDIX B3

Selectivity Corrected Least Squares Estimates of Log Annual Earnings for Full-Time, Year-Round Workers[a] in 1973

	White Males (n=17,202)		Nonwhite Males (n=2,746)	
Variable	Coefficient	|T-Ratio|	Coefficient	|T-Ratio|
Constant	9.211	70.21	8.170	28.25
Education	-0.017	-1.72	0.009	0.60
Education²	0.002	6.33	0.002	4.90
Age	0.037	10.20	0.050	5.44
Age²	-0.041[b]	9.85	-0.049[b]	4.88
Age x Ed	0.049[b]	4.30	-0.025[b]	1.14
Northeast	-0.051	5.21	-0.020	0.83
South	-0.048	4.73	-0.089	3.99
West	0.030	2.55	0.048	1.59
Suburban	0.116	11.09	0.236	8.56
City	0.056	4.75	0.218	9.04
Married	0.107	7.29	0.165	5.64
Num. Kids	0.022	6.61	0.015	2.47
Veteran	-0.028	3.10	0.082	3.70
Health	0.092	4.37	--	--
Hispanic	--	--	0.025	1.15
Other Race[c]	--	--	0.059	1.70
Selectivity correction term	-0.453	13.18	-0.077	-.80

Source: Estimates based on data from March 1974 CPS.
[a]A full-time, year-round worker is defined as a person who worked fifty to fifty-two weeks for thirty-five or more hours per week and had positive wage and salary earnings and no self-employment income.
[b]Coefficient has been multiplied by 100.
[c]Other race includes people who did not report themselves as black, Hispanic, or white.

APPENDIX B4

Selectivity Corrected Least Squares Estimates of Log Annual Earnings for Full-Time, Year-Round Workers[a] in 1988

	White Males (n=18,561)		Nonwhite Males (n=4,418)	
Variable	Coefficient	|T-Ratio|	Coefficient	|T-Ratio|
Constant	8.460	55.61	8.153	36.93
Education	-0.008	0.65	-0.003	0.25
Education^2	0.002	5.73	0.003	7.34
Age	0.050	12.37	0.062	8.19
Age^2	-0.050[b]	10.42	-0.063[b]	6.94
Age x Ed	0.045[b]	3.73	-0.004[b]	0.19
Northeast	0.036	3.46	-0.041	1.46
South	-0.037	4.00	-0.193	7.94
West	0.028	2.47	-0.025	0.95
Suburban	0.206	19.32	0.194	6.85
City	0.142	11.91	0.066	2.49
Not ID	0.096	7.98	0.075	2.34
Married	0.117	10.59	0.143	5.56
Num. Kids	0.027	6.64	-0.004	0.01
Veteran	-0.020	2.23	0.063	2.92
Health	0.015	0.48	0.211	2.37
Hispanic	--	--	-0.052	2.67
Asian	--	--	-0.010	0.36
Other Race[c]	--	--	0.027	0.53
Selectivity correction term	-0.253	7.01	-0.165	2.11

Source: Estimates based on data from March 1989 CPS.
[a]A full-time, year-round worker is defined as a person who worked fifty to fifty-two weeks for thirty-five or more hours per week and had positive wage and salary earnings and no self-employment income.
[b]Coefficient has been multiplied by 100.
[c]Other race includes people who did not report themselves as Asian, black, Hispanic, or white.

APPENDIX C
Alphabetical Listing of Variable Definitions

Age	-	Age in single years.
Age^2	-	Age squared.
Age x Ed	-	Product of age and number of years of schooling.
Asian	-	Dummy variable equal to 1 if race is Asian.
City	-	Dummy variable equal to 1 if from central city.
Constant	-	Dummy variable equal to 1 for everyone.
Education	-	Number of years of schooling completed.
$Education^2$	-	Number of years of schooling completed, squared.
Health	-	Dummy variable equal to 1 if person participates in disability program. Program participation: 1. Receives social security or railroad retirement benefits and a. is not in school, is aged nineteen to twenty-two, and is not widowed, divorced, or separated with dependent children; or b. is aged twenty-three to fifty-nine, and is not widowed, divorced, or separated with dependent children. 2. For 1988, receives SSI. For 1973, receives welfare/public assistance and is not unemployed and not separated, divorced, or widowed with dependent children. 3. Receives Workers' Compensation. 4. Receives veteran disability benefits, is a veteran, and is not in school.
Hispanic	-	Dummy variable equal to 1 if Hispanic ethnic origin.
Married	-	Dummy variable equal to 1 if married and spouse is present.
Non-Labor Inc	-	Non-labor income equals family income minus individual's earnings minus family income dependent on individual's labor supply decision (in thousands of 1988 dollars).
Northeast	-	Dummy variable equal to 1 if individual from northeast region of the country.
Not ID	-	Dummy variable equal to 1 if for confidentiality reasons survey doesn't identify whether person is from city, suburb, or rural area.
Num. Kids	-	The number of own, never-married children younger than age eighteen.
Other Race	-	Dummy variable equal to 1 if individual did not report themself as being Asian, black, Hispanic, or white.
School	-	Dummy variable equal to 1 if school was major activity last week.
South	-	Dummy variable equal to 1 if from southern region of country.
Suburban	-	Dummy variable equal to 1 if lived in SMSA, but not a central city.
Unemployment	-	State unemployment rate. For 1973, individuals are only identified as being from one of twenty-three groups of states. The UE rate reported for them is a weighted average (by population) of the group's UE rates.
Veteran	-	Dummy variable equal to 1 if person had served in armed forces.
Welfare Gen	-	Maximum state AFDC payment for a family of four. For 1973, individuals are only identified as being from one of twenty-three groups of states. The AFDC benefits reported for them are a weighted average (by population) of the group's AFDC benefits.
West	-	Dummy variable equal to 1 if from western region of country.

Notes

[1]Details of Burtless's sample, and the samples used in other studies discussed in this section, can be found in Table 2.

[2]Bound et al. (1989) find that the measurement error for hourly wages from the CPS is much greater than measurement error for annual earnings. Burtless acknowledges the weakness of the hourly wage data, and indicates that the awkward procedures necessary to calculate this variable "may cause serious errors in estimating the variance of wage rates." He notes that because of this measurement procedure "some of the variability in annual earnings that ought properly to be attributed to hours will be attributed to wage rates instead" (Burtless [1990], p. 110).

[3]Using estimates from both tables and graphs in his paper, we calculate that Burtless finds the VLN of earnings in his sample of males to have risen from about 1.30 in 1973 to about 1.55 in 1987, an increase of about .250. He attributes about 75 percent of this increase--or about .190 of the .250--to an increase in the variance of the logarithm of the wage rate. About -.025 of the increase is attributed to a decrease in the variance of the logarithm of weeks worked, about -.003 is attributed to a decrease in the variance of the logarithm of hours worked, and about .090 is attributed to an increase in the variance of the combination of covariance terms. The sum of those values--+.190, -.025, -.003, and +.090--about equals the increase in the VLN of earnings of +.250.

[4]Like Burtless, Moffitt uses March CPS data and is constrained to working with very noisy measures of hours worked. Annual hours were estimated by the product of survey work hours and the estimate of weeks worked in the prior year. The weeks worked variable is, in turn, estimated by the midpoint of the weeks worked category in 1973 and an equivalent midpoint assignment from the continuous weeks worked variable in 1987. Annual reported earnings, then, are divided by the hours worked variable, so estimated, in calculating the wage rate. Hence, the distribution of the wage rate and the hours worked variables is affected by the precarious procedure for estimating the annual hours

variable. Moffitt tries other measures of annual hours worked for the post-1975 period, for which better data are available, but finds the same general pattern for wages and hours.

The data that Moffitt presents allow a rough decomposition of the measured increase in earnings inequality among his sample of white men from 1973 to 1987. From his Table 1 (p. 203), the VLN of earnings increases from 1.116 to 1.267, an increase of .151. From his Table 7 (p. 216), the VLN of his estimate of hourly wages increases from .700 in 1973 to .910 in 1987, an increase of .210. The same table reveals that the VLN of estimated hours worked changes from .619 to .544, a decrease of .075. These values suggest the unlikely conclusion that the increase in inequality of hourly wage rates from 1973 to 1987 was about 140 percent of the increase in inequality of earnings. They also suggest that, in spite of the substantial increase in the incidence of part-time and part-year work over this period (see Blank [1990]), inequality in work time (annual hours of work) actually fell.

[5]For the sample of all workers, those at the tenth percentile had hourly wages relative to the median in 1987 which were about 92 percent of the relative value in 1975; those at the ninetieth percentile had hourly wages relative to the median in 1987 equal to about 112 percent of the relative value in 1975. For full-time, year-round workers, the relative values for those at the tenth and ninetieth percentiles were about 95 and 110 percent, respectively. This comparison suggests that from 1975 to 1987, inequality of the calculated wage rate of all workers increased somewhat more than that of full-time, year-round workers, but that the difference in the increase in inequality between the two measures is not enormous.

[6]Tilly, Bluestone, and Harrison (1986), Blackburn and Bloom (1987), and Hilley (1988), in addition to Burtless (1990).

[7]The CPS data used by Kosters and Ross, however, have problems with a declining value of the top-coded real earnings over time, among other things. See Burtless (1990 [comment on Kosters])

for additional detail regarding the shortcomings of these data. Offsetting this, however, is the less precarious measure of hourly wage data relative to that constructed from the March CPS.

[8]The pattern of increased earnings inequality among males as measured by the other indicators is also consistent with that found in other studies. For example, Burtless (1990) reports that for males aged sixteen years and older with positive earnings, the increase in the Gini coefficient of earnings was from .370 to .405 from 1973 to 1987, an increase of 9.5 percent. Over the same period, he finds that the Theil index increased from .238 to .276, an increase of 16 percent.

[9]Alternatively, increases in the inequality of the distribution of hours worked and wage rates could, together, account for the observed increase in earnings inequality. Or, increases in inequality of one of the variables could be offset by decreases in inequality of another, and (after accounting for covariances), on net, yield an increase in earnings inequality.

[10]We assume that the implicit price paid to human capital characteristics would remain the same if everyone worked full-time, year-round.

[11]The process that we follow in calculating the distribution of human capital across workers is analogous to the procedure followed in estimating the wealth holdings of a household and the distribution of these holdings across households.

[12]We believe the variance-adjusted EC comes closest to representing the aggregate distribution of earnings capabilities. Our variance adjustment [see Appendix A] adds back the residual variance from our earnings equation. For this paper, we have assumed that the residual variance reflects permanent, but unobserved, human capital characteristics.

[13]Table 6 also indicates that inequality in EC as a proportion of earnings inequality has increased between 1973 and 1988, suggesting that the contribution of the <u>increase</u> in earnings capacity inequality to the increase in earnings inequality over this period exceeds the average contribution of earnings capacity inequality to earnings inequality. The same result is present in estimates provided

by Moffitt (1990). For white males, Moffitt reports that the VLN of wages in 1973 was 62 percent of the VLN of earnings, and that this percentage had risen to 72 by 1987. For blacks, however, the VLN of the wage rate as a percentage of the VLN of earnings had fallen from 62 percent to 56 percent over this period.

[14]In calculating the CUR, we use the predicted value of EC without the variance adjustment. As noted in note 12, we judge that the variance-adjusted EC accurately describes the aggregate distribution of EC. However, when we match an individual's earnings capacity to his observed earnings, we use EC without the variance adjustment. The reason for this is that although we know that people with the same observed human capital characteristics have varying amounts of unobserved human capital, and we hypothesize that the unobserved human capital is normally distributed in the population, we are unable to identify which individuals possess what amounts of unobserved human capital. In calculating the CUR, unlike aggregate calculations using only EC, it matters to which observationally equivalent people unobserved human capital is assigned.

[15]It should be noted that the value of the CUR is derived directly from the observed value of earnings and the estimated value of EC, and hence is not an independent value. As a result, the covariance term fails to have an unambiguous interpretation in this decomposition, and hence the CUR and covariance term are treated as one in the results reported below.

[16]The contribution of the increase in EC inequality to the increase in inequality of earnings over this period of 37 percent exceeds the 1973 value of the VLN of EC as a percentage of the VLN of earnings of 26 percent, suggesting that the marginal contribution of EC to earnings inequality over the 1973-1988 period exceeded its average value at the beginning of the period.

[17]The calculations for the all-male sample replace zero earnings for the jobless observations with a value of $100. The overall results are not sensitive to this assumption. Were $1 used in place of $100, only about 3 percent of the increase in the inequality of earnings among all males would be

attributed to the increase in EC inequality. Substituting $300 for $100 yields an estimate of about 12 percent.

[18]More accurately, that literature decomposes the increased inequality in earnings into its algebraic components--the change in inequality in observed wage rates, the change in inequality of hours worked, and the change in twice the covariance of these variables.

[19]As we noted above, however (see note 13), for white males the VLN of the wage rate was about 62 percent of the VLN of earnings in 1973 (see Moffitt [1990]). Hence, the 75 percent marginal estimate must be interpreted relative to its average value of about 62 percent.

[20]Combining our results for working males with those of Burtless implies that perhaps as much as one-half of the 75 percent of the increase in earnings inequality that he attributes to the increased inequality in the observed wage rate--and which he interprets as an increase in the inequality of the pure price of labor, or "opportunities"--may be due to an increase in inequality in individual choices among wage rates, work times, and job characteristics.

[21]Another source of the difference concerns the precarious and noisy estimate of the observed wage rate employed by other researchers. See note 2.

[22]Stated alternatively, in our view, the structure of observed wage rates is the market outcome resulting from the interaction of the demand for labor (reflecting technology, workplace organization, and macroeconomic conditions, among other things) and the supply of labor (reflecting workers' tastes for jobs of various characteristics, including the work hours per year associated with various jobs.)

[23]Recall that in our estimation, individuals are offered no choice in either the extent to which they work--they are assumed to work full-time, year-round--or in the choice of a wage rate--they are assumed to work at a job that pays them the full-time, year-round implicit "price" on their human capital characteristics.

[24]As a result of this specification, our estimate of capacity utilization--the ratio of observed earnings and EC--captures individual choices regarding both the amount of time worked and wage rate-work time-job characteristic trade-offs.

[25]In our interpretation of the contribution of changes in "opportunities" and "choice" to the change in earnings inequality, we have adopted a conservative definition of the concept of "opportunity." We assume that, at any point in time--say, 1973--individuals both choose their labor supply and exercise some choice in determining the wage rate at which they are observed to work. They may choose a wage rate that deviates from their pure price of labor because of the need to trade off job characteristics and job-related time demands. Hence, our estimate of EC excludes this second component of choice, a component that is reflected in estimates of the observed wage rate. As a result, in our procedure, both of these components of choice are impounded in the sum of the rate of capacity utilization and the covariance term. For any given year, then, our estimate of the inequality in earnings due to disparities in "opportunity" (or EC) is less than that provided by relying on observed wage rates as a proxy for the pure price of labor.

Our estimate of the contribution of changes in the inequality of EC to the increase in earnings inequality over time is not, however, a conservative estimate of the impact of changing opportunities: a conservative estimate of the level of the contribution of opportunity to earnings inequality does not translate into a conservative estimate of the effect of changing opportunities to changing earnings inequality over time.

References

Blackburn, McKinley. 1990. "What Can Explain the Increase in Earnings Inequality among Males?" Industrial Relations, 29(3), Fall, pp. 441-456.

Blackburn, McKinley and David Bloom. 1987. "Earnings and Income Inequality in the United States." Population and Development Review, 13(4), 575-609.

Blank, Rebecca M. 1990. "Are Part-Time Jobs Bad Jobs?" In A Future of Lousy Jobs, ed. Gary Burtless. Washington, D.C.: Brookings.

Bluestone, Barry. 1989. "The Changing Nature of Employment and Earnings in the U.S. Economy: 1963-1987." Paper prepared for the conference on "Job Creation in America" at the University of North Carolina at Chapel Hill, April 10, 1989.

Bound, John, Charles Brown, Greg J. Duncan, and Willard L. Rodgers. 1989. "Measurement Error in Cross-Sectional and Longitudinal Labor Market Surveys: Results from Two Validation Studies." National Bureau of Economic Research Working Paper #2884.

Burtless, Gary. 1990. "Earnings Inequality over the Business and Demographic Cycles." In A Future of Lousy Jobs, ed. Gary Burtless. Washington, D.C.: Brookings.

Hilley, John. 1988. "Wages of American Workers in the 1980s." Study prepared by the staff of the Committee on the Budget, U.S. Senate (September).

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. 1989. "Wage Inequality and the Rise in Returns to Skill." Paper presented at the Universities Research Conference "Labor Markets in the 1990s," November 13, 1989.

Karoly, Lynn A. 1988. "A Study of the Distribution of Individual Earnings in the United States from 1967 to 1986." Doctoral dissertation submitted to the Yale Department of Economics, New Haven, Connecticut.

Karoly, Lynn A. 1992. "The Trend in Inequality among Families, Individuals, and Workers in the U.S.: A Twenty-Five-Year Perspective." Rand Corporation # R-4206-rc.

Karoly, Lynn A. and Jacob A. Klerman. 1991. "Regional Differences in Increasing Inequality." Paper presented at the 1991 annual meetings of the Population Association of America.

Kosters, Marvin H. and Murray N. Ross. 1988. "The Quality of Jobs: Evidence from the Distribution of Annual Earnings and Hourly Wages." AEI occasional papers (July).

Lerman, Robert I. and Shlomo Yitzhaki. 1989. "Improving the Accuracy of Estimates of Gini Coefficients." Journal of Econometrics, 42, 43-47.

Levy, Frank, and Richard J. Murnane. 1992 forthcoming. "U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations." Journal of Economic Literature.

Lillard, Lee A. and Robert Willis. 1978. "Dynamic Aspects of Earnings Mobility." Econometrica, 46, 985-1012.

Maddala, G.S. 1983. Limited Dependent Variables in Econometrics. Cambridge: Cambridge University Press. Ch.8.

Moffitt, Robert A. 1990. "The Distribution of Earnings and the Welfare State." In A Future of Lousy Jobs, ed. Gary Burtless. Washington, D.C.: Brookings.

Plotnick, Robert J. 1982. "Trends in Male Earnings." Southern Economic Journal, 48(3), 724-732.

Tilly, Chris, Barry Bluestone, and Bennett Harrison. 1986. "What Is Making American Wages More Unequal?" In Proceedings of Thirty-Ninth Annual Meeting of the Industrial Relations Research Association, pp. 338-348.