

The Anatomy of Changing Male Earnings Inequality:
An Empirical Exploration of Determinants

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Working Paper No. 104

February 1994

This research has been supported by The Jerome Levy Economics Institute of Bard College.

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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, with changes in the inequality of hours worked playing little, if any, role.

This conventional wisdom has been challenged in a recent paper (Haveman and Buron [forthcoming]), in which we measure the relative contribution to changes in earnings inequality of changes in inequality of (1) Earnings Capacity (EC) and (2) the utilization of EC. Earnings capacity is an estimate the individual's earnings if the individual works full-time, year-round. The utilization of EC is the ratio of actual earnings to earnings capacity. In this analysis, EC plays the role of the wage rate--it is, in fact, the estimated full capacity wage rate of individuals--and utilization plays the role of hours worked.¹ We conclude that the utilization of earnings capacity--the allocation decisions that lead individuals to work part-year, part-time, or not at all--may play a larger role than is commonly believed.

In this paper, we present a variety of calculations that are designed to shed light on the contribution of work-time patterns to annual earnings inequality and to the increase in earnings inequality since the early 1970s. We attempt to answer the following questions:

1. Viewing wage rates and work time from a variety of perspectives, what has been the relative contribution of changed wage rate inequality and changed work time inequality to the observed increase in male earnings inequality?
2. Is our understanding of the contribution of changes in relative wage rate and work time inequality to the increase in earnings inequality altered if we view **all males** as the appropriate population for analysis as opposed to **all male workers**?
3. Within standard categories of male work patterns, what has been the profile of changes over time in wage rate and work time variability?

4. What has been the effect of changes in the structure of male work patterns--as between, say, full time-year round (FTYR) work and part time or part year work--on the changing pattern of earnings inequality?

In section II, we present a brief review of the relevant literature on the work time vs. wage rate contributions to changed earnings inequality. Subsequent sections present calculations that are addressed to the questions listed above; and Section VII concludes.

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] 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 most of our work. Table 1 summarizes the primary findings in those papers.

An important contribution among this set is Burtless's 1990 paper "Earnings Inequality over the Business and Demographic Cycles." Burtless uses a sample² of wage and salary workers from the March Current Population Survey (CPS) to document the long-term (1947-1986) trend of rising earnings inequality. In addition, Burtless finds that during the 1980s, the increase in earnings inequality accelerated, especially for 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)³ and changes in variables reflecting inequality in work time to earnings inequality. He concludes that the increased inequality of estimated wage rates accounts for the bulk of the increased inequality of earnings from 1975 to 1986.⁴

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 solely 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 falls from 1973 to 1987 (pp. 215-217).⁵

A few 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 difference in the increase in inequality in the two groups is not large.⁶ The finding that wage rate inequality is growing almost as fast among FTYR workers as among all workers and the finding that hourly and weekly wage inequality is growing as well as annual earnings inequality leads Karoly to conclude that the increase in wage rate inequality is driving the increase in earnings inequality for all workers. 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 concludes from her results and the results of other studies 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).⁷

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 all 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 .19 (Burtless [see note 4]), 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 decrease in the VLN of work time (hours per year worked; weeks per year worked), ranging from about -.03 (Burtless [see note 4]) to about -.09 (Moffitt).

III. WAGE AND WORK TIME CONTRIBUTIONS TO EARNINGS INEQUALITY: WORKERS AND ALL MALES

In this section, we employ both the EC/utilization decomposition method of our earlier paper and a direct comparison of wage rate and hours worked in exploring the sources of male earnings inequality changes since the early 1970s. We first present results for males with positive work time and earnings, and then for all males.

A. Wage Rate and Earnings Inequality: Male Workers

Table 2 presents summary results for both of the EC/utilization and wage rate/hours methods of decomposing the contribution of sources of earnings inequality into its wage and work time components.⁸ We have chosen two years that are cyclical peaks (1973, 1988) and two years that are

cyclical troughs (1975, 1991). The top bank of the table shows calculations for male workers aged 18-64.

Over the entire 1973-1991 period, inequality in earnings (measured using the variance of logs [VLN]) has increased by .19 (from 1.11 to 1.30), or 17 percent (column 1).⁹ Over the same period, inequality in imputed FTYR wage rates (EC)¹⁰ increased by a larger 27 percent (column 2).

Using imputed FTYR wage rates (EC) as the indicator of potential labor market performance, we see that the VLN of FTYR wage rates relative to that of earnings ranges from 25 to 28 percent over the period (column 3). Over time, the contribution of EC inequality to earnings inequality has drifted up, with the average of the former two years being about 24 percent and the average of the latter pair of years being about 27.5 percent.

The calculations reported beneath these time trends suggest the sensitivity of calculations of the contribution of the change in EC inequality to the change in earnings inequality to the initial and terminal year chosen for analysis. Beginning the analysis in 1975 indicates that growing inequality in EC accounts for about 75 percent of the increase in earnings inequality; a result consistent with the early studies. However, if the analysis is started in the peak year of 1973, the conclusion is substantially different. Irrespective of whether the terminal year is 1988 or 1991, the increase in EC variation accounts for only about 40 percent of the increase in earnings inequality; a conclusion consistent with results in Haveman and Buron (forthcoming). We conclude that at least part of the difference in the conclusion of our study relative to that of the earlier studies may be due to differences in initial and/or terminal years of the analyses.

This conclusion is even more vivid when the analysis is performed using actual wage rates of male workers (column 4) rather than imputed FTYR wage rates (EC). Compared to the increase in the VLN of earnings from 1973 to 1991 of 17 percent (and from 1975 to 1988 or 1991 of 9 percent),

the VLN of wage rates increased by 13 percent over the 1973-1988 period, by 27 percent over the 1975-1988 period, and by only 1 percent over the entire 1973-1991 period.¹¹

Beginning the analysis in 1975 suggests that the increase in wage rates accounts for at least two-thirds and perhaps as much as 100 percent of the increase in earnings inequality. However, performing the same analysis from 1973 to the end of the decade of the 1980s suggests that the increase in the VLN of wage rates could account for from virtually none of the increase in male earnings to nearly one-half of the increase. Indeed, using actual wage rates rather than imputed FTYR wage rates (EC) as the basis of analysis points out even more starkly the sensitivity of conclusions to the choice of the initial and terminal year of the analysis.

From these tabulations, we conclude that a convincing answer to the question of the contribution of the growth of wage rate inequality to the growth of earnings inequality is yet to be provided. Studies using both imputed FTYR and actual wage rates suggest that the conventional wisdom of the literature--namely, that the growth in male earnings inequality has been driven by growth in wage rate inequality and not the growth in inequality in work time (hours per year worked)--may be an artifact of the choice of the initial and terminal dates of the analyses.

B. Wage Rate and Earnings Inequality: All Males

Table 3 presents analogous estimates to those of Table 2, but in this case for all males. Virtually all prior analyses of the determinants of changes in male earnings inequality have been based on the population of those with positive work time and earnings. However, those with positive work time and earnings form a select sample of all males; more importantly, the extent of selectivity changes over the period of observation as the proportion of all males who are jobless varies over time. Of at least equal interest to the results presented in the previous section is the pattern of earnings inequality over all males of working age, irrespective of whether in any particular year they are observed to hold a job.

When the sample of nonworkers is added to those who are workers, the level of earnings inequality is greatly increased. For example, while the VLN of earnings in Table 2 ranged from 1.11 to 1.30, the range in Table 3 is from 2.82 to 3.95. As a result, for all males the VLN of FTYR wage rates (EC) is about 10 percent of the VLN of earnings, compared to values ranging from 27-36 percent for working males.¹² The VLN of wage rates is about 20 percent of the VLN of earnings for all males, compared to between one-half and two-thirds for workers.

Using all males as the population over which to measure changes in earnings inequality and its components suggests a substantially larger increase in earnings inequality. For all males, the increase in the VLN of earnings from 1973 to 1991 is 1.13, as compared to the increase of .19 for the population of working males. In percentage terms, the increase in the VLN of earnings for all males is 41 percent, compared to an increase of about 17 percent for working males.

Similarly, use of the working population suggests quite different contributions of the change in wage rate inequality to the change in earnings inequality than does use of the all male population. As the calculations at the bottom of the table indicate, the contribution of changes in wage rate inequality to the change in earnings inequality varies substantially across the two groups. Concentrating on only the changes from 1975 to 1991 (trough years) and from 1973 to 1988 (peak years), the contribution of the change in wage rate inequality to earnings inequality is much smaller in the sample of all males than the sample of male workers. For the all male sample, changes in wage rate inequality accounts for 28 percent of the increase in earnings inequality between the trough years and 13 percent of the increase between the peak years. The comparable numbers for the sample of male workers are much higher: changes in wage rate inequality explain 63 percent of the change in earnings inequality between the trough years and 45 percent between the peak years.

The sensitivity of estimates to the choice of initial and terminal years is again observed at the bottom of Table 3. When 1973 is chosen as the initial year, the increase in the VLN of the FTYR

wage rate (EC) is only about 8-10 percent of the increase in the VLN of earnings. When 1975 is taken as the initial year, the percent of the increase in earnings inequality accounted for by the increase in the inequality in EC is substantially higher--from 25 to about 100 percent. A similar pattern is observed for the comparisons based on the wage rate-hours decomposition.

Comparison of the calculations in Table 3 with those in Table 2 suggests that reaching conclusions regarding both the extent of the increase in earnings inequality and the source of the increase--as between increases in inequality in the price of labor (the wage rate or EC) and increases in work time inequality--based on evidence only from the working male population may be quite misleading. Because of the increasing share of working-age males who report no earnings or hours worked (see below), measures of inequality based only on the working population may convey an inaccurate picture of the increase in earnings inequality among all males. These same changes in the extent of joblessness account for much of the difference in the contribution of increased wage rate (or EC) inequality to the increase in earnings inequality for all males as compared to workers.

It is to these changes in the allocation of males among various work time categories that we now turn.

IV. EARNINGS, WAGE RATES AND HOURS WORKED ACROSS WORK PATTERN CATEGORIES

In Table 4, we present the allocation of both all males and male workers over categories of work patterns; the top bank shows the profile for all males, the bottom bank shows the allocation of workers.¹³

Two important changes over the two decade period are revealed in the table. First, over the 1973 to 1991 period, there has been a substantial increase in joblessness among working age males--from 7.4 percent to nearly 13 percent. The increase is even larger in absolute terms; in 1973,

there were about 3.5 million jobless working age males but by 1991 the number of jobless had grown to 8.4 million.¹⁴ It is this change in work time patterns that accounts for the difference in the perception of the level and changes in earnings inequality revealed in Table 2 (workers) and Table 3 (all males), and in the relative contributions of changes in wage rate inequality to increased earnings inequality.

Second, as the bottom bank of the table reveals, there has also been a substantial increase in the prevalence of part time work, both among year round and part year workers. In 1973, about 8 percent of working males were employed part time; by 1991, this had increased to nearly 11 percent. Whereas in 1973 about 13 percent of all working age males were either not working or working part time (7.1 million persons), by 1991 22 percent of all males (14.6 million) were either jobless or working part time.

The patterns of earnings, wage rate and hours across these work pattern categories is shown in Table 5. A few of the trends in this table are noteworthy. For all males (including both employed and jobless) there is a strong downward trend in the wage rate, from over \$14 in 1973 to less than \$12 in 1991. In part, this decrease is due to the increase in both jobless and part time workers over this period. This increase in the prevalence of males with little or no attachment to the labor market also accounts for a part of the downward trend in both average earnings and average hours worked.

Excluding the jobless from the tabulation, and adjusting for the economic cycle (that is, comparing 1973 with 1988 and 1975 with 1991), the picture is somewhat changed. Mean earnings appears to be increasing slightly over the period, but all of this increase is accounted for by an apparent cyclically adjusted increase in hours worked. Comparing 1973 and 1988--the two peak years--average hours worked increased from 1928 per year to 1987 per year. Over the two trough years of 1975 and 1988, average hours worked increased from 1893 to 1944. This has occurred in

spite of the increased incidence of male workers in part time work. The cyclically adjusted wage rate for all workers fell over the period.

Insight into the source of these changes is gained by perusing the patterns within the work pattern categories. In all of the categories, but especially in the part time categories, there has been a substantial reduction in the average wage rate. For example, among part time-year round workers, the average wage rate fell from over \$10 in 1975 to less than \$9 in 1991.¹⁵ Comparing the trough year of 1975 to that of 1991 shows a reduction in the average wage rate for FTYR workers of \$.24 (1.6 percent), \$.35 for FTPY workers (3 percent), \$1.25 for PTYR workers (12.2 percent), and \$1.07 for PTPY workers (10.5 percent).

Conversely, there has been an upward trend in hours worked within all of the work pattern categories. The trough to trough comparison of 1975 to 1991 indicates an increase in average hours worked of 35 hours in the FTYR category (1.5 percent), 50 hours in the FTPY category (3.9 percent), 86 hours in the PTYR category (7.8 percent), and 39 hours in the PTPY category (7.5 percent).

In sum, over the period studied, we observe:

- a substantial increase in male joblessness
- a large trend in the prevalence of part time workers (largely at the expense of full time workers who are employed only part of the year)
- a slight erosion of cyclically adjusted earnings, accompanied by a substantial decrease in the average wage rate and a large increase in average hours worked among the declining proportion of employed males
- very large reductions in cyclically adjusted average wage rates in the part time work categories
- an increase in cyclically adjusted average hours worked in all categories, but especially in the part time work categories.

V. PROFILES AND TRENDS OF INEQUALITY IN EARNINGS, WAGE RATES AND HOURS WORKED ACROSS WORK PATTERN CATEGORIES

Table 6 summarizes several patterns and trends in inequality in earnings, wage rates and hours worked across the full and part time categories that we have identified.

As indicated in columns 5 and 6, inequality in male earnings--both all males and working males--has increased persistently over the period. The VLN of earnings of workers increased from .96 in 1973 to 1.15 in 1991, an increase of nearly 20 percent; that for all males increased from 2.90 to 4.01, or 38 percent. The larger increase for the entire population of males is, in part, due to the continuous growth in joblessness among this group (Table 5). Interestingly, the growth in earnings inequality for both all males and workers has continued beyond the late-1980s, into 1991.

Focusing on the tabulations for workers based on consistent definitions of wage rates and hours (those from 1975 on), we observe in column 5 an increase in the VLN of wage rates of workers from .42 to .50, while the VLN of hours worked has remained constant at .43. This pattern suggests an important role of increasing inequality of wage rates (as compared to work time) in accounting for the increase in earnings inequality. Importantly, the covariance term (not reported in table) has increased from .18 to .22 (and from 17 to 20 percent of the total) from 1975 to 1991, indicating an increase in the correlation of low wage workers with low hours jobs over time, which pattern has also contributed importantly to the increase in earnings inequality.

The pattern among all males (column 6) is substantially different. While the VLN of wage rates has increased from 1975 to 1991 from .94 to 1.06 (13 percent), the VLN of hours worked increased from 5.56 to 6.51 (17 percent). As a share of VLN of earnings, the VLN of wage rates has fallen from 27 percent to 26 percent, while the VLN of hours has increased from 158 percent to 162 percent. For all males, then, the increase in the inequality of work time has accounted for a

substantial share of the increased inequality of earnings, while the contribution of increasing inequality of wage rates has been small.¹⁶

It is worth noting that, for workers, inequality in hours worked accounts for about the same share of earnings inequality as does inequality in wage rates; from 1975 to 1991, VLN of hours worked accounts for from 35 to 42 percent of the VLN of earnings, while the VLN of wage rates accounts for from 41 to 44 percent of the VLN of earnings. For all males, the inequality in work hours accounts for a much larger share of earnings inequality over the period than does inequality in wage rates.

A variety of interesting patterns are in evidence among the four work pattern categories. First, as expected, the VLN of wage rates accounts for the bulk of earnings inequality among FTYR workers--at least 90 percent.

Second, and more importantly, among the work pattern categories the largest growth in earnings inequality has occurred among FTYR workers; and this category contains the largest share of workers. The 33 percent increase in earnings inequality within this group dwarfs the increases in any of the other groups; indeed from 1975 to 1991, only the PTPY category has shown any substantial increase in earnings inequality (the PTYR category has experienced a decrease).

Third, the growth in the VLN of earnings in the FTYR category has been accompanied by a nearly equivalent increase in the VLN of wage rates. While the inequality in hours worked in this category appears to have increased a small amount, the clear force driving the increase in FTYR earnings inequality has been the growth in wage rate inequality within this category of workers.

Fourth, the level of earnings inequality within the FTYR category is very small (VLN equal to about .3 to .4) relative to the level of earnings inequality in the other work pattern categories. The part year categories have very high levels of earnings variation, with the VLN ranging above 1 in all cases, with values nearing 2 observed for the PTPY category.

Fifth, the contribution of wage rate and hours inequality to earnings inequality varies substantially over the non-FTYR categories. In the FTYR category, the VLN of wage rates and hours each account for about the same share--40 to 50 percent--of the overall level of earnings inequality. Surprisingly, in the PTYR category, the VLN of hours is a small share of earnings inequality--about 20 to 30 percent--while the VLN of wage rates accounts for at least 80 percent of the VLN of earnings. For the PTPY category, the reverse is true; the VLN of hours accounts for about two-thirds of aggregate earnings inequality in this category.

In sum, then:

- Among the work pattern categories, the growth in earnings inequality has been concentrated within the FTYR category, and within that category it has been the increase in wage rate inequality that has accounted for the bulk of the growth in earnings inequality.
- The level of earnings inequality is substantially larger within the non-FTYR work pattern categories than within the FTYR category, and (with the exception of the PTYR category) it is inequality in hours that accounts for much of the variance in earnings within these categories. There has not been substantial growth in earnings inequality among these non-FTYR categories.
- Earnings inequality has grown for both the all male and all worker categories, with larger growth observed for the all male category.
- For workers, increased variability in wages have contributed more to the growth in overall earnings inequality than has increased variability in hours worked. but the opposite is the case for all males.
- From this, it follows that the increasing contribution of rising wage rate inequality to the growth in earnings inequality among workers is attributable, in part, to the shift of males from work to joblessness: the conventional wisdom regarding the dominance of growing wage rate inequality to the growth of male earnings inequality is an artifact of the worker-only sample of observations on which this conclusion rests.

VI. TO WHAT EXTENT HAVE CHANGES IN WORK PATTERNS ACCOUNTED FOR INCREASED EARNINGS INEQUALITY?

In this section, we examine the contribution of changing work patterns to the increase in earnings inequality from 1975 to 1991. We ask the question: How much would earnings inequality

have increased if the distribution of earnings within the work pattern categories remained at 1975 levels, but the proportion of the population in these work-time categories reflected the 1991 distribution? To do this, we assume mean income and inequality within work-time groups remains constant and **only** the share of workers in each work pattern category changes. That is, we decompose the change in inequality into a component due to changes in work patterns and to a component that reflects changes in mean incomes across groups and changes in inequality within groups. We use both the VLN and Gini measures of inequality.¹⁷

While the decompositions reported in Tables 7 and 8 fail to reflect changes in mean income or inequality within groups that are due to changes in the composition of these groups they do provide relevant information and tell a consistent story. In general, we find that changing work patterns account for from one-third (VLN) to one-half (Gini) of the increase in inequality among workers, and from two-thirds (Gini) to all (VLN) of the increase in inequality for the sample of all working-aged males.

For the sample of males with positive earnings, the decomposition of the increase in inequality into the component due to the changing share of workers in FTYR, FTPY, PTYR, and PTPY work categories and the component due to changes in mean earnings and inequality within work time categories is reported in Table 7. The upper half of column 1 shows the actual VLN of earnings increased from 1.03 to 1.16 from 1975 to 1991. Column 2 shows that if group means and inequality are held at the 1975 levels, but the share of workers in each group is allowed to change to reflect actual changes, then the VLN of earnings would only have increased from 1.03 to 1.07. Column 3 shows that if group means and inequality are held constant at 1991 levels, the VLN of earnings would have been 1.12 in 1975 and 1.16 in 1991. In both cases, 31 percent of the increase in inequality is attributed to changes in the share of workers across work-time categories.

The bottom half of Table 7 does the same decomposition with the Gini index. The actual Gini index increased from .373 to .047. Decomposing the increase in the Gini index, we find that between 45 and 55 percent of the increase is accounted for by changes in the share of workers across work-time categories.

Table 8 shows the VLN and Gini decomposition for the sample of all males. The VLN of earnings increased from 3.52 to 4.01 from 1975 to 1991. About 95 percent of this change is attributed to the changing distribution of workers across work-time categories. The Gini index increased from .439 to .492, of which 68 to 75 percent is accounted for by changes in the distribution of workers across work-time categories. Changing patterns of work explain more of the increase in inequality for all males than for male workers due to increasing prominence of non-workers. Non-workers increased from 10.5 percent of the male population in 1975 to 12.7 percent in 1991.

VII. IN SUM

We have presented a variety of calculations focused on the issue of whether it was changed wage rate or changed work time inequality that has accounted for the increase in earnings inequality over the past two decades. Our main conclusions can be simply stated.

First, the conventional wisdom regarding the overwhelming contribution of increasing wage rate inequality to the increase in earnings inequality appears sensitive to the years over which the comparison is made. Data comparability and macroeconomic conditions are both relevant considerations.

Second, the patterns of wage rate and earnings inequality increases vary substantially across samples of workers and all males. Conclusions regarding the determinants of increased earnings inequality based on only calculations made using only FTYR workers or those who worked at all may be misleading in understanding the growth of aggregate male earnings inequality.

Third, changes in male earnings, wages and work time across work pattern categories reveal a variety of interesting underlying inequality developments that are camouflaged in more aggregate calculations.

Finally, changes in the allocation of males across the work pattern categories have contributed substantially to the increase in male earnings inequality. These changes have increased the share of the population in work categories with very high or very low levels of mean earnings, thus increasing the size of the between group variance. These shifts have resulted in an increased concentration of males in the high variation part time work categories. The result of these shifts solves a part of the puzzle of the work time/wage rate contribution to increased earnings inequality. This puzzle is surely more complex than the conventional wisdom would have us believe.

Endnotes

¹We take an individual's EC to be an appropriate measure of his true "pure price of labor." Hence, EC purges the price measure from at least some 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 from 1973 to 1988 is due to the increase in inequality in this 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.

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

³Bound 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).

⁴Burtless attributes about 75 percent of the increase in the VLN of earnings (about .19 of the .25) to an increase in the VLN of the wage rate. About -.025 of the increase is attributed to a decrease in the VLN of weeks worked, about -.003 is attributed to a decrease in the VLN 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.

⁵Like Burtless, Moffitt uses March CPS data and is constrained to working with 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 of relative changes in wages and hours inequality.

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.

⁶For 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 observed 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.

⁷Two 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 FTYR working-age white males rose from .25 in 1973 to .32 in 1985.

⁸The commonly used technique for decomposing changes in earnings inequality into changes in wage rate inequality and changes in work time inequality rest 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 ($\text{var}(e)$) is:

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

Annual earnings is, by definition, also equal to the product of EC and the capacity utilization rate. Therefore, a direct analog of this property is:

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

From estimates of earnings and EC for each individual in our sample, we can construct estimates of the VLN of the distributions of two of the four terms in the above equation. By aggregating the final two terms in the equation ($\text{var}(cur)$ and $2\text{cov}(ec,cur)$) 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 $\text{var}(cur)$ and $2\text{cov}(ec,cur)$.

⁹This change is consistent with the changes estimated in earlier studies (Table 1).

¹⁰We 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 the earnings of individuals with like characteristics who work FTYR).

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 and the prices of these characteristics.

Estimating this value requires that we (1) observe the relevant labor market-human capital characteristics of individuals, (2) measure the implicit full-time, year-round 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.

Haveman and Buron (forthcoming) 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. We relied on the microdata from the March 1974 and 1989 CPS surveys. 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 is calculated by using the coefficients from the appropriate earnings equation and the individual's characteristics. 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". Following this process, we obtain a distribution of individual EC, reflecting both the human capital characteristics of the population of working-age males in 1973 and 1988, and the implicit "prices" attached to these characteristics in each year.

¹¹Because of the noisy character of the wage rate calculation for 1973 relative to the later years, the comparison involving 1973 as an initial year should be treated with caution.

¹²The level of earnings assigned to nonworkers to enable the calculation of the VLN of earnings is \$100. The overall results are not sensitive to this assumption.

¹³The sample for remainder of the paper excludes self-employed workers. In addition, wages are topcoded at \$66 per hour and earnings are topcoded at \$66 per hour times hours worked.

¹⁴Clearly, a part of this increase is attributable to the fact that 1973 was a peak year, while 1991 was a trough. The movements from peak to peak and from trough to trough are equally revealing, however.

¹⁵The comparisons here, and in later discussions, emphasize the 1975 to 1991 change; see footnote 11.

¹⁶In terms of the VLN decomposition formula, the change in the VLN of earnings for all males over the 1975 to 1991 period was .49. The increase in the VLN of wage rates was .12, the increase in the VLN of hours worked was .95, and the change in the covariance term was -.58. Clearly, the increase in the inequality of work time dominated the increase in the inequality of wage rates in accounting for the increase in earnings inequality.

¹⁷The vln decomposition is based on the formula in Allison (1978), while the Gini decomposition is based on the formula in Yitzhaki and Lerman (1991).

References

- Allison, Paul D. 1978. "Measures of Inequality." American Sociological Review, 43(6), pp. 865-880.
- Blackburn, McKinley. 1990. "What Can Explain the Increase in Earnings Inequality among Males?" Industrial Relations, 29(3), Fall, pp. 441-456.
- 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.
- Haveman, Robert and Lawrence Buron. forthcoming. "The Growth in Male Earnings Inequality, 1973-1988: The Role of Earnings Capacity and Utilization." in J.H. Bergstrand, T.F. Cosimano, J.W. Houck, and R.G. Sheehan, eds., The Changing Distribution of Income in an Open U.S. Economy, Amsterdam: North-Holland Publishing Co.
- Juhn, Chinhui. 1992. "Decline of Male Labor Market Participation: The Role of Declining Market Opportunities." Quarterly Journal of Labor Economics, 107(1), pp. 79-121.
- 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.
- Lerman, Robert I. and Shlomo Yitzaki. 1989. "Improving the Accuracy of Gini Estimates." Journal of Econometrics, v42, pp. 43-47.
- Levy, Frank, and Richard J. Murnane. 1992. "U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations." Journal of Economic Literature, 30(3), 1333-1381.

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.

Yitzhaki, Shlomo, and Robert I. Lerman. 1991. "Income Stratification and Income Inequality." Review of Income and Wealth, v37(3), pp. 313-329.

TABLE 1
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
<u>All Earners</u>							
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		
<u>FTYR Earners</u>							
1973						.50	.25
1985						.59	.32
Absolute change						+.09	+.07
Percentage change						+17.9	+29.7

^aWage 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 .

^bWage 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).

^cWage 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).

^dWage and salary earnings for males aged sixteen and over with positive wage and salary earnings.

Source: Karoly (1988).

^eWage and salary earnings for males aged sixteen and over with positive wage and salary earnings.

Source: Bluestone (1989).

^fWeekly wages of white males who worked at least thirty-five hours in each week they worked.

Source: Juhn, Murphy, and Pierce (1989).

^gWage 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.

TABLE 2

**Variance of Logarithm (VLN) of Earnings, Earnings Capacity, and
Wage Rates, 1973-1991, Male Workers Aged 18-64**

	(1) VLN Earnings	(2) VLN EC	(3) [(2)÷(1)]·100	(4) VLN Wage Rates	(5) [(4)÷(1)]·100
1973 (peak)	1.11	.28	25	(.70)	(63)
1975 (trough)	1.18	.27	23	.62	54
1988 (peak)	1.29	.35	27	.78	60
1991 (trough)	1.30	.36	28	.70	55
		<u>Δ VLN EC/Δ VLN Earnings</u>		<u>Δ VLN Wage Rates/Δ VLN Earnings</u>	
1973-1988		+37%		(+45%)	
1973-1991		+41%		(+5%)	
1975-1988		+74%		+109%	
1975-1991		+77%		+63%	

Notes: Wages are equal to: (annual earnings) / (weeks worked * usual hours worked per week). For 1973, weeks worked are the midpoint of the categorical weeks worked variable, and hours worked per week are taken from information on survey week (for the people who did not work in survey week, full-time workers are assigned 40 hours and part-time workers 20 hours). Sample includes all civilian males aged 18 to 64 with positive total earnings. Data are from March CPS surveys from 1974, 1976, 1989, and 1992. Earnings and EC topcoded at \$99,999 in 1991 dollars. Estimates in parentheses indicate lack of comparable hours and weeks worked variables.

TABLE 3

**Variance of Logarithm (VLN) of Earnings, Earnings Capacity, and
Wage Rates, 1973-1991, All Males Aged 18-64**

	(1) VLN Earnings	(2) VLN EC	(3) [(2)÷(1)]·100	(4) VLN Wage Rates	(5) [(4)÷(1)]·100
1973 (peak)	2.82	.28	10	(1.01)	(36)
1975 (trough)	3.55	.27	8	.98	28
1988 (peak)	3.63	.35	10	1.11	31
1991 (trough)	3.95	.37	9	1.09	28
		<u>Δ VLN EC/Δ VLN Earnings</u>		<u>Δ VLN Wage Rates/Δ VLN Earnings</u>	
1973-1988		+9%		(+13%)	
1973-1991		+8%		(+7%)	
1975-1988		+100%		+163%	
1975-1991		+25%		+28%	

Notes: Wages are equal to: (annual earnings) / (weeks worked * usual hours worked per week). For 1973, weeks worked are the midpoint of the categorical weeks worked variable, and hours worked per week are taken from information on survey week (for the people who did not work in survey week, full-time workers are assigned 40 hours and part-time workers 20 hours). Sample includes all civilian males aged 18 to 64. Data are from March CPS surveys from 1974, 1976, 1989, and 1992. People with zero earnings are assigned \$100 in earnings for VLN of earnings calculations and \$1 for VLN of wage rate calculations. Earnings and EC topcoded at \$99,999 in 1991 dollars. Estimates in parentheses indicate lack of comparable hours and weeks worked variables. See note, Table 2.

TABLE 4

**Percent Allocation of All Males and Workers Aged 18-64
Across Work Pattern Categories, 1973-1991**

	All Males					Total
	FTYR	FTPY	PTYR	PTPY	No Work	
<u>All Males</u>						
1973 (peak)	66.8	18.4	2.7	4.7	7.4	100.0
1975 (trough)	59.9	22.2	2.7	4.7	10.5	100.0
1988 (peak)	64.7	15.8	3.1	5.4	11.0	100.0
1991 (trough)	60.5	17.5	3.6	5.7	12.7	100.0
	Workers					Total
	FTYR	FTPY	PTYR	PTPY		
1973 (peak)	72.3	19.9	2.8	5.1	100.0	
1975 (trough)	67.0	24.8	3.0	5.3	100.0	
1988 (peak)	72.7	17.7	3.5	6.0	100.0	
1991 (trough)	69.3	20.1	4.1	6.6	100.0	

Note: Self-employed workers excluded from this sample.

FTYR = Full time, year round

FTPY = Full time, part year

PTYR = Part time, year round

PTPY = Part time, part year

TABLE 5

**Mean Earnings, Wage Rates, and Hours Worked of All Males
and Workers Aged 18-64, by Work Pattern Categories, 1973-1991**

	FTYR	FTPY	PTYR	PTPY	Total Workers	Total Males
<u>1973</u>						
Mean Earnings (000,\$ 1991)	34.5	16.2	9.1	5.5	28.7	26.5
Mean Wage Rate (\$ 1991)	16.05	14.32	14.32	12.06	15.32	14.15
Mean Hours	2236	1225	1225	562	1928	1781
<u>1975</u>						
Mean Earnings (000,\$ 1991)	33.7	14.9	10.1	4.9	26.9	24.0
Mean Wage Rate (\$ 1991)	15.05	11.45	10.22	10.16	13.76	12.31
Mean Hours	2263	1281	1105	518	1893	1694
<u>1988</u>						
Mean Earnings (000,\$ 1991)	35.5	15.5	11.0	4.8	29.3	26.0
Mean Wage Rate (\$ 1991)	15.44	11.18	9.54	9.38	14.11	12.55
Mean Hours	2303	1343	1192	535	1987	1767
<u>1991</u>						
Mean Earnings (000,\$ 1991)	34.1	14.9	10.3	4.7	27.3	23.9
Mean Wage Rate (\$ 1991)	14.81	11.10	8.97	9.09	13.45	11.75
Mean Hours	2297	1331	1191	557	1944	1697

Notes: Self-employed workers excluded from this sample. Wages are topcoded at \$66 per hour and earnings are topcoded at \$66 per hour times hours worked.

FTYR = Full time, year round

FTPY = Full time, part year

PTYR = Part time, year round

PTPY = Part time, part year

TABLE 6
Variance of Logarithm (VLN) of Earnings, Wage Rates, and Hours, 1973-1991,
All Males and Workers Aged 18-64, Across Work Pattern Categories, 1973-1991

	(1)	(2)	(3)	(4)	(5)	(6)
	FTYR	FTPY	PTYR	PTPY	Total Workers	Total Males
<u>1973^a</u>						
VLN Earnings	.36	1.15	1.36	1.64	.96	2.90
VLN Wage Rates	(.35)	(.61)	(.88)	(1.08)	(.48)	(.90)
VLN Hours	(.12)	(.48)	(1.87)	(1.20)	(.48)	(4.29)

VLN Wage Rate/VLN Earnings	--	--	--	--	(.50)	(.31)
VLN Hours/VLN Earnings	--	--	--	--	(.50)	(1.48)
<u>1975</u>						
VLN Earnings	.30	1.05	.76	1.52	1.03	3.52
VLN Wage Rates	.30	.47	.67	.67	.42	.94
VLN Hours	.02	.48	.20	1.09	.43	5.56

VLN Wage Rate/VLN Earnings	--	--	--	--	.41	.27
VLN Hours/VLN Earnings	--	--	--	--	.42	1.58
<u>1988</u>						
VLN Earnings	.40	1.16	.89	1.68	1.13	3.76
VLN Wage Rates	.37	.57	.79	.77	.50	1.02
VLN Hours	.05	.45	.18	1.02	.40	5.85

VLN Wage Rate/VLN Earnings	--	--	--	--	.44	.27
VLN Hours/VLN Earnings	--	--	--	--	.35	1.56
<u>1991</u>						
VLN Earnings	.40	1.08	.69	1.72	1.15	4.01
VLN Wage Rates	.37	.56	.62	.69	.50	1.06
VLN Hours	.02	.42	.15	1.16	.43	6.51

VLN Wage Rate/VLN Earnings	--	--	--	--	.43	.26
VLN Hours/VLN Earnings	--	--	--	--	.37	1.62

Note: Self-employed workers are excluded from this sample.

^a Estimates in parentheses for 1973 due to lack of comparable hours and weeks worked variables. See note, Table 2.

TABLE 7

**Change in Inequality from 1975 to 1991 Accounted for by Changes
in Work Pattern Categories, Civilian, Male, Wage & Salary Workers Aged 18 to 64**

	Actual	1975 Group Means and Group Inequality	1991 Group Means and Group Inequality
<u>Variance of log earnings (VLN)</u>			
1975	1.03	1.03	1.12
1991	1.16	1.07	1.16
Absolute change	.13	.04	.04
% of actual change accounted for by change in work pattern categories	--	31	31
<u>Gini Index</u>			
1975	.3729	.3729	.3941
1991	.4197	.3934	.4197
Absolute change	.0468	.0205	.0256
% of actual change accounted for by change in work pattern categories	--	44	55

Note: Self-employed workers are excluded from this sample.

TABLE 8

Change in Inequality from 1975 to 1991 Accounted for by Changes in Work Pattern
Categories, Civilian Males Aged 18 to 64.

	Actual	1975 Group Means and Group Inequality	1991 Group Means and Group Inequality
<u>Variance of log earnings (VLN)</u>			
1975	3.52	3.52	3.55
1991	4.01	3.99	4.01
Absolute change	.49	.47	.46
% of actual change accounted for by change in work pattern categories	--	96	94
<u>Gini Index</u>			
1975	.4389	.4389	.4563
1991	.4933	.4797	.4933
Absolute change	.0544	.0408	.0370
% of actual change accounted for by change in work pattern categories	--	75	68

Note: Self-employed workers are excluded from this sample. Non-workers assigned \$100 for VLN calculations.