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Why Has the Natural Rate of Unemployment Increased over Time?

In 1970, when Robert Hall asked, "Why Is the Unemployment Rate So High at Full Employment?" the unemployment rate for adult men stood at 3.5 percent.[1] That rate, which had been substantially below that level throughout the late 1960s, would climb to 4.4 percent in the recession of 1971. More recently, after the longest economic expansion of the postwar period, the unemployment rate of prime-aged men in the late 1980s settled at just below 5 percent of the labor force. What changes in the American labor market led to this apparent secular increase in the natural rate of unemployment? Twenty years later, we revisit Hall's question and turn up some new answers.

This paper studies the evolution of male unemployment and nonparticipation in the U.S. labor force since 1967. In looking at these developments, we have two main goals. The first is to document the substantial

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1. Hall (1970).

and important changes in the amount of nonemployed time reported over the period. Using microdata from the Current Population Survey for more than 500,000 prime-aged men, we examine secular and cyclical changes in nonwork—including both unemployment and nonparticipation in the labor force—and the distribution of these changes among different demographic and skill-based groups. We find that secular changes in unemployment and nonparticipation are similar in terms of the overall change and its distribution. A major finding is that the significant secular increases in unemployment, nonparticipation, and nonemployment are heavily concentrated among less skilled individuals. Increases in jobless time among the less skilled largely account for the aggregate increases in these variables.

Our second goal is to suggest a unified explanation for these results. Given the long period over which these changes have occurred, we eschew traditional and neo-Keynesian theories of cyclical unemployment, which are founded on temporary wage and price inflexibility, menu costs, or other market imperfections. Neither can we find evidence to support more recent natural-rate theories of changing unemployment, which stress variation in the rates of sectoral mobility and the reallocation of workers.[2] Instead we are led to standard demand and supply factors as an explanation for the increase in nonwork. Building on evidence of sluggish real wage growth and rising wage inequality over the past 20 years, we tie observed patterns of wage growth to long-term changes in unemployment and nonparticipation. We find that rising joblessness is concentrated among groups with declining real wages; groups with constant or rising real wages show stable or declining unemployment and nonparticipation. We also find that most of the secular increase in joblessness since the early 1970s is consistent with shifts in relative labor demand among groups, coupled with flexible wages and stable labor supply.

For these reasons, we are left with little doubt that secular increases in *both* unemployment and nonparticipation are demand driven. What is more, changes in unemployment understate the effect of declining demand on male joblessness and welfare, making unemployment a poor measure of labor market performance. Our results also imply that unemployment rates are not strictly comparable over time. A rate of 5 percent

2. Lilien (1982); Davis (1987).

at the end of the 1980s means something much different from a similar rate in the 1970s. The paper contains a large number of detailed results, which can be grouped into seven main categories.

Cyclical and secular components of nonworking time. By definition, nonworking time comprises periods of unemployment and nonparticipation in the labor force. Decomposing changes in nonworking time into cyclical and secular components, we find that virtually all of the cyclical variation in nonwork is accounted for by fluctuations in unemployment. For men, participation does not vary to any important degree over the business cycle. On the contrary, both nonparticipation and unemployment contribute to a strong *secular increase* in nonworking time. Between the periods 1967–69 and 1987–89, the average annual nonworking time of prime-aged men increased by about 2.5 weeks, or by 76 percent. About half of this change was due to a secular increase in unemployment, and the rest was due to a roughly equal decline in labor force participation. This similarity of the secular increases in unemployment and nonparticipation points to a single explanation for their trends. Indeed, as a first approximation, our evidence suggests that there is little useful distinction between long-term changes in unemployment and nonparticipation in the labor market.

The importance of long jobless spells. To interpret data on the incidence and duration of unemployment and nonparticipation spells, one can speak in terms of labor market flows. The data indicate that rates of entry into unemployment increased over time, while average exit rates from unemployment declined. Each of these changes in average transition rates accounts for about half of the long-term increase in unemployment. A second way to interpret the data simply counts the spells of various lengths. In an accounting sense, most of the secular increase in nonwork and its components is the result of an increased incidence of long jobless spells. Overall, nearly 80 percent of the long-term increase in nonwork is accounted for by spells lasting more than six months. Although long unemployment spells have played a role, the most important component is a dramatic increase in the number of men who are permanently out of the labor market. This increase began in the late 1970s and continued throughout the 1980s. Permanent withdrawal from the labor market accounts for all of the secular increase in nonparticipation; temporary withdrawals from the labor force have been stable or declining over time.

The inequality of rising joblessness. Based on observable indicators of skill like experience and education, it is well known that unemployment is greater among less skilled individuals. Murphy and Topel detailed these patterns and their changes in a 1987 study, in which it was found that the timing and the size of changes in unemployment were similar across identifiable groups.[3] That study concluded that relative changes in unemployment rates were of secondary importance in explaining the trend toward rising unemployment. In this paper, we take a different approach. As in Juhn's previous work, we define skill in terms of relative productivity, as reflected by an individual's position in the overall distribution of wage offers.[4] Using this definition, we find that rising joblessness has been heavily concentrated on less skilled individuals. For persons in the lowest decile of the wage distribution, we estimate that jobless time increased by more than 16 percentage points (8 weeks) between the late 1960s and the late 1980s. By contrast, workers above the median of the wage distribution experienced virtually no change in nonworking time over this period. Comparing this inequality in secular changes with the typical cyclical pattern of joblessness, we find that the long-term increase in nonworking time is distributed much more unequally across skill groups than the cyclical increase that occurs during a typical recession. Again, this suggests that secular and cyclical changes in joblessness are conceptually distinct.

For each skill group, similar patterns emerge for both unemployment and nonparticipation. Perhaps our most surprising result is that long-term increases in unemployment and nonparticipation are about the same size within a skill group, although their changes are very different across skill categories. For example, for the least skilled decile of workers, annual unemployment increased by about 4 weeks between the periods 1967–69 and 1987–89, while nonparticipation increased by nearly 5 weeks. For the median worker, however, these changes were only a seventh as large, and for workers above the median of the wage distribution both unemployment and nonparticipation were essentially unchanged. These patterns differ greatly from what occurs in a typical cyclical contraction, during which all skill groups experience rising unemployment while nonparticipation remains unchanged. Though this is

3. Murphy and Topel (1987).
4. Juhn (1991).

evidence against aggregate demand explanations of the secular increase in jobless time, we also find that nonparticipation rates of less skilled persons react to labor demand in the long run. This discouraged-worker effect means that the unemployment rate is a poor indicator of the effect of labor demand on male joblessness in the long run.

Sectoral mobility and unemployment. The natural rate of unemployment results from the costly reallocation of workers as relative demand or productivity changes.[5] While formal developments of the theory generate a constant natural rate,[6] it is plausible that in a dynamic economy some periods require more reallocation than others. Then, the natural rate may vary, with periods of high unemployment corresponding to periods of unusually high worker mobility and reallocation.[7] Yet Murphy and Topel found that mobility is strongly procyclical, and that rising unemployment has been associated with a long-term decline in sectoral mobility.[8] Their evidence casts doubt on sectoral mobility theories of a changing natural rate.

We extend those previous findings in light of our results on the inequality of rising unemployment. Contrary to the predictions of reallocation models, we find that groups with rising unemployment do not account for an increasing portion of total mobility. Less skilled workers are both more mobile and more likely to be unemployed, but relative mobility rates among skill groups have been constant over time while relative unemployment rates have changed dramatically. Neither do we find any evidence that "movers" account for an increasing share of total unemployment, even in the skill categories in which unemployment has increased the most. In light of these results, we are unable to attribute any of the apparent increase in the natural rate of unemployment to changes in the pace of labor reallocation in the U.S. economy.

Labor supply and household income. An alternative explanation for rising joblessness is that labor supply has declined. For example, the dramatic increase in female labor force participation and female wages since the 1960s may have reduced male labor supply through wealth and substitution effects within households. Yet we find that the largest increases in women's participation and income occurred in the house-

5. Friedman (1968); Phelps (1970).
6. Lucas and Prescott (1974); Hall (1979).
7. Black (1982); Lilien (1982).
8. Murphy and Topel (1987).

holds of high-wage men, who exhibit stable employment patterns over time. Still, real household incomes of low-wage men have risen slightly; thus the sharp decline in their earnings was offset by increasing income from other sources.

Jobless men, especially those with long spells of nonwork, are much more likely to be single and to rely on extended family for support. These patterns have remained stable and are common to both the unemployed and those who have left the labor force. Interestingly, while the number of jobless men has increased and the wages they can command have fallen, real household incomes of jobless men have been roughly constant. By this measure, the absolute welfare of nonworkers has not deteriorated. But since household incomes rose in the population of working men, the relative welfare of male nonworkers has declined.

Flexible wages and stable labor supply. Our evidence shows that employment and labor force participation declined most among groups with declining wages. We formalize this connection by estimating labor supply responses for various skill groups from two independent sources of information. First, we use the cross-sectional relationship between wages and time worked.[9] Our evidence shows that this "labor supply" relationship is positive—high-wage persons work more—and it is remarkably stable within the period when aggregate wages and time worked have fallen. We estimate that labor supply elasticities are largest among low-wage men, for whom wages and employment fell the most. Using this approach, a simple model that posits stable long-run labor supply, combined with declining demand for less skilled workers, can account for virtually all of the secular increase in joblessness since 1970. Moreover, this model is remarkably accurate in predicting the distribution of rising joblessness across different skill groups.

A second, independent source of information is based on time series changes in relative economic performance across regional labor markets. Assuming these changes to be demand driven, we estimate labor supply elasticities for different skill groups from relative changes in wages and employment rates across regions. The resulting estimates of labor supply responses are nearly identical to those derived from cross-sectional data. Again, the model is remarkably accurate in accounting for both rising joblessness and its distribution across skill groups.

9. Juhn (1991) uses this technique.

A stable labor supply model is less successful in predicting the division of nonemployment between unemployment and nonparticipation. The procedures we employ tend to overestimate the long-run increase in unemployment and to underestimate the long-run increase in nonparticipation. We provide evidence suggesting that discouraged-worker effects play a role here. Shocks to labor demand generate rising unemployment, some of which is translated into increased nonparticipation in the long run.

The magnitude of wage flexibility. We close with a comparison of various methods of calculating the extent of wage flexibility that is relevant for generating employment fluctuations. Macroeconomists typically confine their analysis to the behavior of aggregate wages, calculated as aggregate real earnings divided by aggregate hours worked. We show that this measure understates the extent of wage flexibility that occurred during this period because it gives disproportionate weight both to workers with high wages and high employment rates, for whom wage changes were proportionally the smallest, and to workers whose labor supply is relatively insensitive to changes in wages. Correcting for these biases in microdata, we find that the wage index that is relevant for determining changes in aggregate unemployment and labor force participation has declined sharply. Between 1977 and 1989, our corrected wage index declined by nearly 15 percent. Macroeconomic analyses based on aggregate data cannot detect this decline. They therefore understate the importance of long-term wage flexibility in affecting aggregate labor supply and changes in employment.

Changes in Unemployment and Participation, 1967–89

Our data are drawn from the Annual Demographic Files of the Current Population Survey (CPS) for the years 1968 through 1990. These surveys are random samples of about 50,000 U.S. households and contain an array of personal, demographic, and economic information on individual household members. The files record information on each respondent's labor market status and living arrangements during the survey week—usually the third week in March—as well as retrospective data on aspects of labor market activity during the previous calendar year. The retrospective data include annual earnings and weeks of em-

ployment and unemployment, as well as the industry of the longest-held job of the year and the occupation associated with that job. Most of what follows is based on the retrospective data; our estimates therefore refer to the calendar years 1967 through 1989.

Adjustments to Data

We focus on men who were out of school for the entire year, who were not self-employed, and who had 1 to 30 years of potential labor market experience. For high school graduates this restriction yields an age range from 18 to 48 years old; for college graduates it includes those in their early fifties. We ignore the activities of older men, for whom participation has fallen sharply, and of women, who entered the labor market in record numbers during the period we study. We do, however, provide evidence on how women's labor market activities have affected male unemployment and participation. We place no other restrictions on the sample. Persons included in the data for any one year may have participated in the labor market for any amount of time or not at all.

Each respondent in the CPS is asked a set of questions about weeks of unemployment, employment, and nonparticipation during the previous calendar year. By design, respondents' weeks of employment, unemployment, and nonparticipation in the labor market are constrained to 52. We measure time spent unemployed (U), out of the labor force (O), and nonemployed ($N = U + O$) as the percentage of the year spent in each state.[10] This differs from the usual method of measuring unemployment by dividing weeks unemployed by weeks in the labor force. Our approach better summarizes the allocation of time among employment, unemployment, and nonparticipation.

For the most part, the structure of the March CPS is consistent over time so that data from different years are comparable. However, two important changes occurred in 1976 that affect our analysis. First, before 1976, information on weeks worked and weeks unemployed in the previous calendar year were recorded in intervals. To adjust for this, we use

10. A person out of the labor force is also referred to as a nonparticipant. Published unemployment data are based on labor force status during the survey week. Murphy and Topel (1987) and Akerlof and Yellen (1985) compare unemployment rates calculated from retrospective and survey-week data.

information on continuously recorded weeks of employment and unemployment from the 1976 and later surveys to impute within-cell averages for the pre-1976 years. We then apply these averages to the later years as well, in order to ensure that calculations based on these data are consistent over time.[11]

Second, pre-1976 surveys do not record usual weekly hours. We have calculated a respondent's average hourly wage as the ratio of annual earnings to annual hours worked. In turn, annual hours are the product of annual weeks worked and usual weekly hours. Thus, to make earlier survey data consistent, we impute the missing information from observed relationships in the 1976 and later surveys, using information on hours worked in the survey week, weeks worked last year, part-time status, and demographic characteristics.[12]

Changing Rates of Joblessness

Figure 1 displays the evolution of aggregate unemployment, nonparticipation, and nonemployment rates among adult men since 1967. Since the base for calculating these rates is 52 weeks for each individual in the data, these estimates can also be thought of as the percentage of the male population's potential labor market weeks spent in each state. For example, in 1982 unemployed weeks accounted for 9.3 percent of potential male labor supply, while weeks of nonparticipation accounted for 6.2 percent. Thus nonwork accounted for 15.5 percent of potential male labor supply in that year.

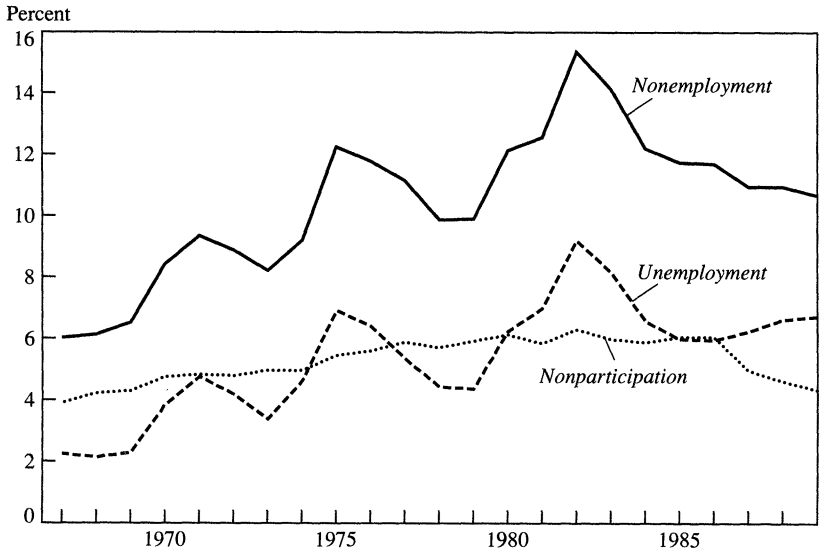
There are two points of interest about the figure. First, fluctuations in unemployment account for virtually all of the high-frequency (cyclical) variations in employment. High-frequency variations in participation are simply not important among adult men.[13] Put differently, short-run changes in labor demand move workers one-for-one between employ-

11. The same approach was used in Murphy and Topel (1987). Details of this procedure are described in an appendix available from the authors.

12. Details of this procedure are also described in the appendix available from the authors.

13. This finding is implicit in the results of Clark and Summers (1981), who emphasize the importance of fluctuations in labor market participation over the business cycle. Virtually all of the cyclical variation in labor market participation is accounted for by teenaged men, men over 65, and young women.

Figure 1. Nonemployment, Unemployment, and Nonparticipation Rates of Prime-aged Men, 1967–89



Source: Authors' calculations from annual March Current Population Survey (CPS). Nonemployment is the sum of unemployment and nonparticipation. The rates shown in the figure are averages of individual rates for the indicated years.

ment and unemployment; there are no important discouraged-worker or other effects on participation decisions.

Figure 1 also suggests the opposite interpretation for low-frequency (secular) changes in unemployment and participation. While unemployment is clearly more volatile than nonparticipation, both have increased at a similar rate. For example, after the longest continual decline in unemployment in postwar history, the adult male unemployment rate settled at about 4.5 percent in 1989. This cyclical low is above the cyclical *peak* that occurred in the 1971 recession (see table 1). Between 1969 and 1989, both years near the end of prolonged economic expansions, the secular increases in unemployment and nonparticipation for prime-aged men are 2.3 and 2.4 percentage points, respectively. Thus, the full-employment, or natural, rates of both unemployment and nonparticipation appear to have risen over time.

Most empirical treatments of the natural rate are mechanical exercises that assume a constant natural rate among workers with fixed char-

Table 1. Nonemployment Measures for Adult Men, 1967–89
Percent

Period	*Un-employment*	*Non-participation*	*Non-employment*
1967–69	2.14	4.03	6.18
1970–71	4.16	4.71	8.87
1972–73	3.74	4.84	8.58
1975–76	6.68	5.39	12.07
1977–78	4.83	5.72	10.55
1982–83	8.81	6.04	14.84
1987–89	4.47	6.42	10.89

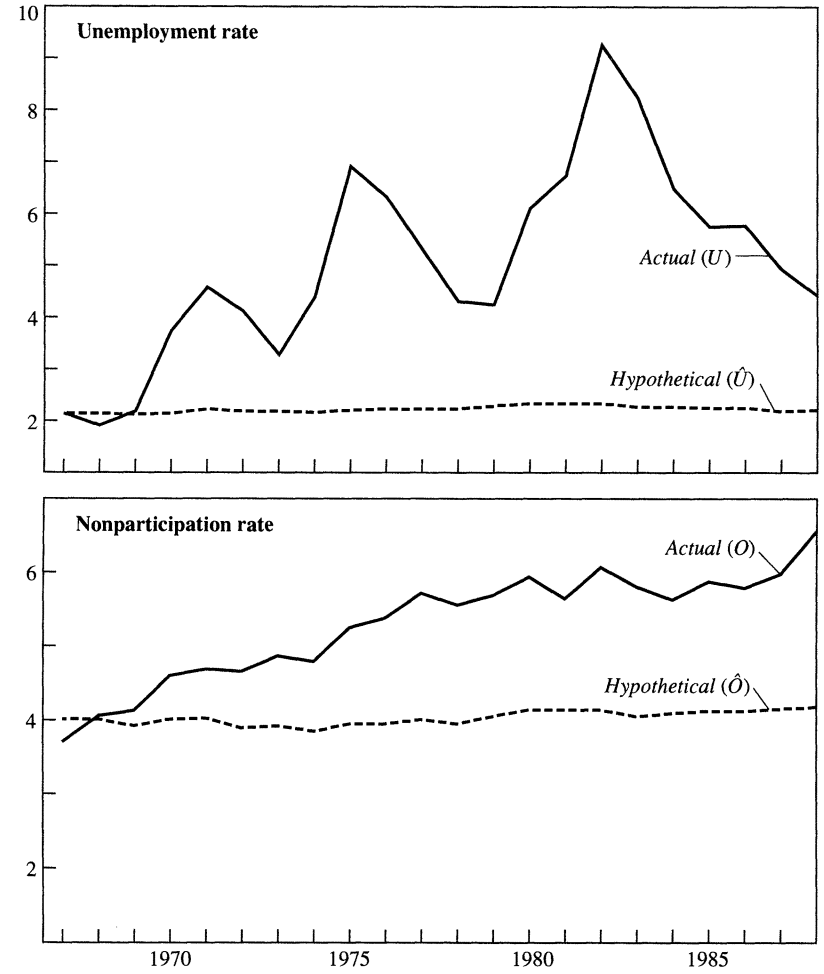
Source: Authors' calculations from annual March Current Population Survey (CPS). The estimates represent the average percentage of the year spent in each category and are based on retrospective CPS data for each calendar year.

acteristics.[14] As such, changes in the natural rate can occur only through changes in the labor force shares of different demographic groups: for example, an increase in the share of young workers would increase the natural rate because unemployment is higher among the young. By extension, larger shares of groups with high rates of nonparticipation would increase the natural rate of nonparticipation in the labor force. But such changes do not explain the trends in figure 1. We broke the sample into 96 cells representing six categories of experience, four of education, two of race, and two of marital status. We fixed the within-cell unemployment and nonparticipation rates at their average values for the 1967–69 period but allowed the shares of each group to vary over time. The resulting series, called $\hat{U}$ and $\hat{O}$ in figure 2, show how aggregate unemployment and nonparticipation would have behaved if the within-cell rates had remained constant at their 1967–69 levels. The obvious point is that both cyclical and secular changes in the rates of joblessness were generated by changes *within* labor force groups not by changes across labor force groups. The effects of changing demographics are hardly discernible.[15]

14. The discussions in Hall and Taylor (1986), Dornbusch and Fischer (1990), Barro (1990), and Gordon (1990) are representative.

15. As pointed out in Murphy and Topel (1987), the share of highly educated workers increased through time, which would lead to lower unemployment because more educated workers are less likely to be unemployed. At the same time, marriage rates have declined, which would raise unemployment because unemployment is higher among single men. These effects cancel out in $\hat{U}$ and $\hat{O}$ in figure 2, so the predicted series are flat.

Figure 2. The Effect of Labor Force Demographics on Unemployment and Nonparticipation Rates, 1967–88



Source: Authors' calculations from annual March CPS. The hypothetical unemployment and nonparticipation rates ($\hat{U}$ and $\hat{O}$) are calculated by holding the underlying rates of 96 different groups (based on six categories of experience, four of education, two of race, and two of marital status) constant at their 1967–69 levels and allowing only the share of each labor force group to change over time. The changes in the hypothetical rates over time therefore result only from changes in labor force composition.

The Keynesian interpretation of cyclical differences in unemployment relies on short-run inflexibility of wages and prices. Thus, shocks to the demand for labor generate short-run quantity adjustments in the form of unemployment. Whether or not that view is accurate in the short run, it is surely strained in the longer run, over which wages and prices are presumably flexible and labor is mobile among activities. In terms of figure 2, it is difficult to argue that the rise in actual unemployment between the late 1960s and late 1980s was generated by deficient aggregate demand or by a sustained failure of markets to clear. Contrary to many interpretations of traditional macroeconomic theories,[16] our view of the secular rise in unemployment suggests that the full-employment rates of unemployment and nonparticipation are not intertemporal constants toward which the economy tends to gravitate over time. Instead, as pointed out by Edmund Phelps,[17] the natural rate may change with changes in the structure of labor demands or with changes in the returns to nonwork. But which factors have changed? The similarity of the secular increases in unemployment and nonparticipation is a major clue. It motivates much of what follows.

Our skepticism about explanations based on aggregate demand and disequilibrium does not mean that we think demand factors are unimportant. As we argue below, we think that declining labor demand is the main explanation for the long-term decline in men's working time. Some initial support for this is offered in table 2. The CPS inquires about the main reason for nonemployment among persons who did not work a full year. We tabulate these responses for four different groups during three nonrecessionary periods. Annual nonworkers are respondents who reported no work during the year, and weekly nonworkers are respondents with some nonworking weeks during the year. We also distinguish nonparticipants from other nonworkers. We learn from the data that in each category the response "could not find work" increases in importance over time. This finding suggests a role for a long-run discouraged-worker effect that causes some jobless men to categorize themselves as nonparticipants rather than as unemployed.

16. Blanchard and Summers (1986).
17. Phelps (1974).

Table 2. Reasons for Not Working, Selected Intervals, 1967–87
Percent

Worker's reason	*1967–69*	*1977–78*	*1986–87*
Annual nonworkers			
Could not find work	7.6	19.8	27.1
Ill	74.1	58.2	52.7
Retired or other	18.3	21.9	20.2
Annual nonparticipants			
Could not find work	3.8	9.5	16.5
Ill	77.3	66.1	60.5
Retired or other	18.9	24.4	23.0
Weekly nonworkers			
Could not find work	35.9	48.3	54.0
Ill	39.8	26.9	28.4
Retired or other	24.4	24.7	17.6
Weekly nonparticipants			
Could not find work	4.3	5.0	11.6
Ill	59.7	49.5	54.5
Retired or other	36.0	45.5	33.9

Source: Authors' calculations from March CPS. Annual nonworkers are persons who worked no weeks in the previous year. Annual nonparticipants are those for whom most nonworking weeks were spent out of the labor force. Weekly nonworkers weight individual responses by weeks of nonwork, so the responses are for a "representative" week. Survey years 1989 and 1990 are not comparable with earlier years because of changes in the CPS questionnaire. We therefore report results only through survey year 1988 (calendar year 1987).

The Importance of Long Jobless Spells

Unemployment and nonparticipation rates at any point in time depend on the flow of individuals to and from each of these states. We use the incidence of each state (positive weeks in the state) in year t to calculate hazard rates.[18] (The hazard rate is defined as the probability of moving from one state to another over a short time interval divided by the length of the interval.) For example, if h_{Ut} is the entry hazard rate for unemployment in year t, then the percentage of individuals reporting positive unemployed weeks in year t, I_{Ut}, is

$$I_{Ut} = 1 - (1 - u_t^*)\, e^{-h_{Ut}},$$

where u_t^* is the unemployment rate at the beginning of year t. Then the average annual entry rate to unemployment is simply

$$h_{Ut} = -\log[(1 - I_{Ut})/(1 - u_t^*)]. \tag{1}$$

18. This procedure follows the one used by Murphy and Topel (1987).

Similar calculations for nonparticipation yield

$$h_{Ot} = -\log[(1 - I_{Ot})/(1 - o_t^*)], \tag{2}$$

where o_t^* is the nonparticipation rate at the beginning of year t. Given equations 1 and 2, the changes in unemployment and nonparticipation from year t to year $t + 1$ are determined by inflows and outflows:

$$u_{t+1}^* - u_t^* = (1 - u_t)h_{Ut} - u_t h'_{Ut}, \tag{3}$$

$$o_{t+1}^* - o_t^* = (1 - o_t)h_{Ot} - o_t h'_{Ot}, \tag{4}$$

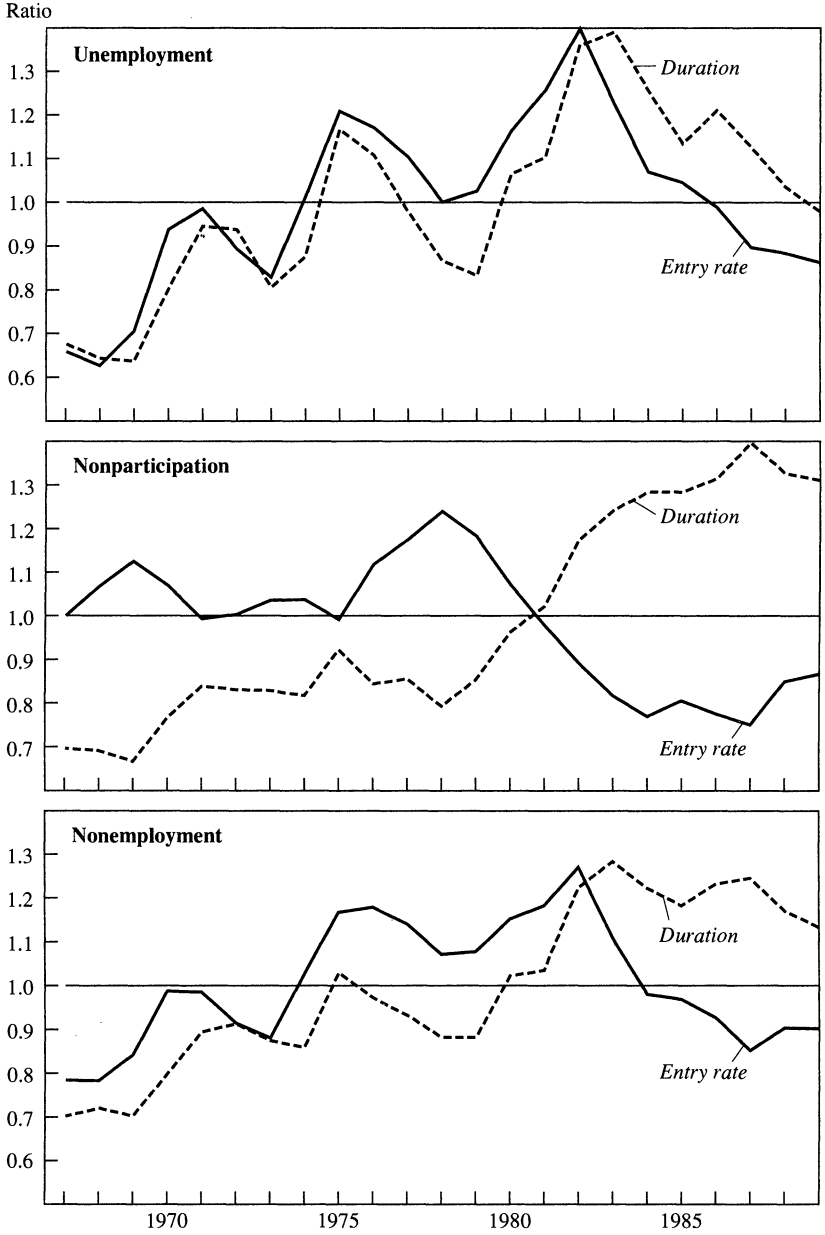
where h'_{it} is the exit hazard rate from state i (U or O) in year t, and u_t and o_t are the average unemployment and nonparticipation rates in year t. These exit rates can be calculated from equations 3 and 4 given previous estimates of h_{Ut} and h_{Ot}. In empirical analysis of equations 1–4 we replace u_t^* by u_t.[19]

Figure 3 summarizes the behavior of entry rates and durations of spells of unemployment, nonparticipation, and nonemployment over the 1967–89 period. The estimates are scaled relative to their mean values over the full period of the data. Durations are measured as $1/h'_{it}$, which is the average duration of spells when the exit rate is constant. Changes in average entry rates and average durations together account for changes in jobless rates over time. For unemployment, entry rates and durations move together at both cyclical and secular frequencies, though the entry rate declined much more rapidly than did durations after the recession of 1982. For example, the entry rate to unemployment in 1987 was close to the rate in 1973, but the average unemployment rate was 1.6 percentage points lower in 1973 than in 1987. The difference in unemployment rates between these years is accounted for by a change in the duration of unemployment—spells lasted about 25 percent longer in the late 1980s than in the early 1970s. In fact, durations of unemployment in the late 1980s are not far from their cyclical peak in the *recession* of 1975.

The data are even more striking for nonparticipation. After the entry rate peaked in 1978, the flow of workers out of the labor force declined dramatically. In the late 1980s, average flows out of the labor force were

19. To check the validity of this substitution, we replaced u_t^* by weighted averages of u_t and u_{t-1} and by the unemployment rate in the survey week of year t. The substitution did not materially affect the results.

Figure 3. Entry Rates and Duration of Spells of Unemployment, Nonparticipation, and Nonemployment, Relative to Mean, 1967–89



Source: Authors' calculations from March CPS. Entry and exit rates are calculated from retrospective CPS data as described in the text and summarized by equations 1–4. Duration is the inverse exit hazard rate from unemployment, nonparticipation, or nonemployment. All estimates are indexed to their respective means over the sample period.

about 25 percent lower than the corresponding flows in the late 1960s. Taken alone, this decline would have caused nonparticipation to fall throughout the 1980s, but the decline in entry rates was offset by an even larger proportional increase in the average duration of nonparticipation. Thus, the nonparticipation rate actually increased. Putting these trends together with those for the unemployment flows, we show in the bottom panel of the figure the entry rates and durations of nonemployment. These entry rates and durations were roughly coincident until the recession of 1982. Since then, flows out of employment declined sharply, but the durations of joblessness remained high. The result is that the substantially greater stability of employment after 1982 was not matched by higher rates of finding or accepting jobs.

These calculations may even understate the importance of long spells in contributing to rising joblessness. In studying unemployment only, Murphy and Topel found in an earlier study that the frequency of short spells (less than 15 weeks) remained nearly constant through time, but the increased incidence of spells lasting more than six months accounted for about two-thirds of the long-term increase in total unemployment.[20] We confirm that finding here and also find that the rising incidence of very long spells is even more important in accounting for the rising rate of nonparticipation. These points are documented in table 3.

The table decomposes the average number of weeks of nonemployment, unemployment, and nonparticipation into contributions made by spells of various lengths. For expository purposes, we have divided the sample period into representative subperiods during which market conditions were roughly similar. For example, the table shows that in the 1972–73 period the average number of unemployed weeks per person was 1.946. Also, persons who were unemployed for 1–13 weeks accounted for 20.9 percent of the unemployment, whereas persons with long spells of joblessness, more than six months, accounted for 39.5 percent. These tabulations indicate that between 1972–73 and 1987–89, the 36 percent increase in these long spells accounted for 73 percent of the overall increase in unemployed weeks.

Long spells are even more important in accounting for rising nonparticipation. The relative importance of temporary spells of nonparticipation (less than 52 weeks) has declined sharply over the full period, while

20. Murphy and Topel (1987).

Table 3. Rising Nonemployment and the Role of Long Spells, 1967–89
Distribution in percent

Employment status and period	*Average weeks per year*	*Distribution by spell duration in weeks*						
		1–13	*14–26*	*27–39*	*40–51*	*52*	*1–26*	*27–52*
Nonemployment								
1967–69	3.211	19.8	19.3	18.1	14.5	28.2	39.1	60.9
1970–71	4.613	14.7	19.3	21.3	15.5	29.2	34.0	66.0
1972–73	4.463	14.3	17.5	21.6	15.0	31.5	31.9	68.1
1975–76	6.277	14.2	22.0	17.4	14.0	32.4	36.2	63.8
1977–78	5.485	16.6	22.8	15.5	12.6	32.6	39.3	60.7
1982–83	7.718	10.5	19.8	15.9	16.1	37.7	30.3	69.7
1987–89	5.658	12.5	18.9	13.5	13.3	41.8	31.4	68.6
Unemployment								
1967–69	1.114	30.5	42.4	14.7	8.8	3.6	72.9	27.1
1970–71	2.168	20.8	41.0	21.2	10.6	6.4	61.8	38.2
1972–73	1.946	20.9	39.7	21.1	10.2	8.2	60.5	39.5
1975–76	3.481	18.0	31.4	22.6	15.4	12.6	49.4	50.6
1977–78	2.514	24.0	35.0	19.9	12.7	8.4	59.0	41.0
1982–83	4.586	13.8	29.2	21.8	19.2	16.1	43.0	57.0
1987–89	2.324	21.4	33.7	19.4	16.0	9.5	55.1	44.9
Nonparticipation								
1967–69	2.097	18.6	14.4	14.2	13.6	39.2	33.0	67.0
1970–71	2.444	15.1	13.9	14.0	12.8	44.3	28.9	71.1
1972–73	2.516	14.3	13.1	14.5	12.7	45.4	27.4	72.6
1975–76	2.797	15.0	14.1	10.2	9.7	51.1	29.1	70.9
1977–78	2.968	16.0	14.8	10.7	11.4	47.2	30.7	69.3
1982–83	3.138	11.1	10.9	7.8	11.1	59.1	22.0	78.0
1987–89	3.337	10.3	11.1	8.6	10.9	59.1	21.4	78.6

Source: Authors' calculations from retrospective CPS data on individuals' weeks in each employment state during the indicated calendar years.

the frequency of permanent withdrawal from the labor force (52 weeks of nonwork) has more than doubled. In fact, the percentage of all workers with some time spent out of the labor force was roughly the same in the late 1980s as it was in the 1960s. In the 1967–69 period, roughly 10 percent of all men had some weeks of nonparticipation, compared with 9.5 percent in the late 1980s.[21] Yet in the 1960s only 1.6 percent of men were out of the labor force for a full 52 weeks. The corresponding figure for the late 1980s is 3.8 percent. This shift toward complete labor force withdrawal accounts for all of the secular increase in the nonparticipa-

21. These percentages refer to the average fraction of men who had positive weeks of nonparticipation during a year over the periods 1967–69 and 1987–89.

tion rate of prime-aged men.[22] The shift implies that average transition rates inadequately describe the factors that underlie rising nonparticipation. It is not simply that average exit rates from nonparticipation have declined; rather, an increasing number of men have permanently left the labor force.

Changes in the Skill Distribution of Joblessness

It is well known that at any point in time less skilled individuals are more likely to be unemployed than higher skilled workers. Usual methods of indexing skills rely on observable characteristics of workers, such as education, marital status, occupation, and experience. We take a different approach, categorizing individuals based on their percentile position in the distribution of average hourly wages for each year. Persons from different years who have the same rank in the wage distribution are considered to have the same *relative* level of marketable skills, as indexed by earning power. Thus, if the wages of workers in the first decile of the distribution fall, we infer that the price of their skills has fallen as well.

One interpretation of this way of ranking individuals is that relative skill is a fixed individual characteristic. Thus, a change in the relative prices of skills changes the distribution of wages for persons with different talents. This interpretation is unnecessarily restrictive, however. Nothing in our approach precludes mobility of individuals within the wage distribution; those who were in the lowest wage decile in 1989 may have had higher relative wages in other years. Whether this kind of mobility is significant could be answered with panel data, but that issue is beyond the scope of this paper. It also has little bearing on the following results.

Imputing Wages to Nonworkers

A drawback of our wage-based approach is that it's easier said than done. We regressed log hourly wages on a quartic in experience and then

22. Average weeks of nonparticipation increased by 1.24 weeks (3.34 − 2.10) between 1967–69 and 1987–89. Of this, 1.15 weeks are accounted for by an increase in the proportion of men who are out of the labor force for the full year.

Table 4. Wages, Completed Schooling, and Living Arrangements by Annual Number of Weeks Worked, 1982–89

Percent

Weeks worked last year	*Mean deviation of log wage*	*Years of completed schooling*				*Living arrangement*	
		Fewer than 12	*12*	*13–15*	*16*	*With spouse*	*With other family*
0	−0.43	43.6	37.4	11.4	7.5	40.1	42.7
1–13	−0.43	38.5	42.5	11.7	7.3	46.0	37.6
14–26	−0.30	31.1	45.3	14.4	9.2	53.8	29.1
27–39	−0.22	26.1	46.1	15.7	12.2	60.7	21.7
40–47	−0.14	20.8	44.4	18.7	16.1	63.3	17.7
48–49	−0.11	19.1	43.8	18.6	18.5	67.4	15.2
50–52	0.04	11.6	37.7	20.5	30.2	73.7	11.2

Source: Wage data are survey-week hourly wages from the outgoing rotation groups of the March CPS. The reported mean deviation of the log wage is the average value of the residual from a regression of log hourly wages on a quartic in experience. For example, men who worked 40–47 weeks during a calendar year had wages that were about 14 percent lower than the average wage for all workers with comparable years of labor market experience. Other data are from the full March surveys for those years. Other family refers to adult family members other than a spouse.

ranked individuals based on their percentile position in the distribution of the residuals.[23] Complications arise because many individuals did not work and therefore do not have any earnings; their wages must be imputed. To do this, we considered information on the wages, completed schooling, and living arrangements of persons with various amounts of time worked during a calendar year (see table 4). Wage data for this table are drawn from the outgoing rotation groups of the March CPS for the years 1982–90.[24] These records include information beyond what is recorded in the usual monthly survey, including the *current* hourly wage for persons who worked during the survey week. By using the subsample of persons who worked during the survey week but who had no earnings during the previous calendar year, we can partially gauge the earning power of nonworkers.

23. We first projected on experience because of considerations of life-cycle labor supply and human capital investment. Since the true returns to work include the wage *and* the present value of human capital accumulated through on-the-job training, we were wary of treating, say, a 20-year-old and a 40-year-old with the same wage as having identical returns to work. By projecting out a positively inclined experience profile, we treat young and old workers with identical wages *relative to their cohorts* as having the same work incentives. There is no guarantee that this is the appropriate method. But results based on raw wages, without removing experience effects, are not much different.

24. Comparable data for other years are not available. The CPS samples households on a rotating basis.

The table shows that those with higher wages typically work more. Persons who work more also have more schooling. They are also more likely to be married and less likely to live with other adult family members. Most important, earnings and other observable characteristics are similar for those who did no work in the previous year and those who worked 1 to 13 weeks. Their average log wages are identical and well below the wages of any other group. Nonworkers have slightly less schooling than those who work only a small amount, are less likely to be married than any other group, and are more likely to live with other family members. Given these patterns, we think the most reasonable assumption is that the distribution of wages that nonworkers could expect to earn resembles the observed distribution among men who worked 1 to 13 weeks during a year.[25]

We therefore imputed wages to nonworkers from the full distribution of wages among those who worked 1 to 13 weeks in the relevant year. Each nonworker was assigned a vector of ten probabilities, corresponding to the relative frequency in each decile of the wage distribution of persons working 1 to 13 weeks. Each probability has a corresponding mean log wage for individuals in that decile. In effect, each nonworker contributes ten observations, each with a weight corresponding to the probability that a person is drawn from a particular decile.

Measurement Error in Average Hourly Wages

Our subsequent analysis will seek to explain changes in jobless time from changes in the distribution of wages. For the usual errors-in-variables reasons, this means that measurement error in calculated wages can be an important concern. This is especially true if the source of mismeasurement is errors in recorded weeks worked, since this would force a negative covariance between errors in wages and errors in weeks worked. We examined this possibility by comparing the distributions of calculated and reported hourly wages for the outgoing rotation groups from the 1982–90 March CPS. This comparison yields two important

25. Years of schooling and marriage are normally associated with higher wages. Thus the figures in table 4 indicate that nonworkers have somewhat lower average skills than those with positive weeks. This suggests that our procedure may overestimate the wage offers of nonworkers. It is therefore conservative.

conclusions. First, the distribution of reported survey-week wages has substantially less dispersion than the distribution of calculated wages, suggesting that measurement error is important. Second, the relative importance of measurement error declines with the number of weeks worked.

The consequence of this type of measurement error is illustrated in figure 4. Using the outgoing groups, the upper panel of the figure plots average weeks worked in the past year against average hourly wages for each decile of the wage distribution. The curve labeled reported wage uses the reported hourly wage from the survey week, and the curve labeled calculated wage uses the wage calculated from retrospective data. It is hard to ignore the similarity between these curves and the labor supply schedules that are drawn in the classroom. Specifically, notice that the curve based on calculated wages bends back at high wages, a feature usually attributed to wealth effects in labor supply. By contrast, the relationship between average weeks worked and reported wages is monotonically positive. This suggests to us that the backward-bending portion of the curve based on calculated wages is attributable to measurement error: since measurement error declines with weeks worked, individuals who work few weeks are most often miscategorized as having high wages.

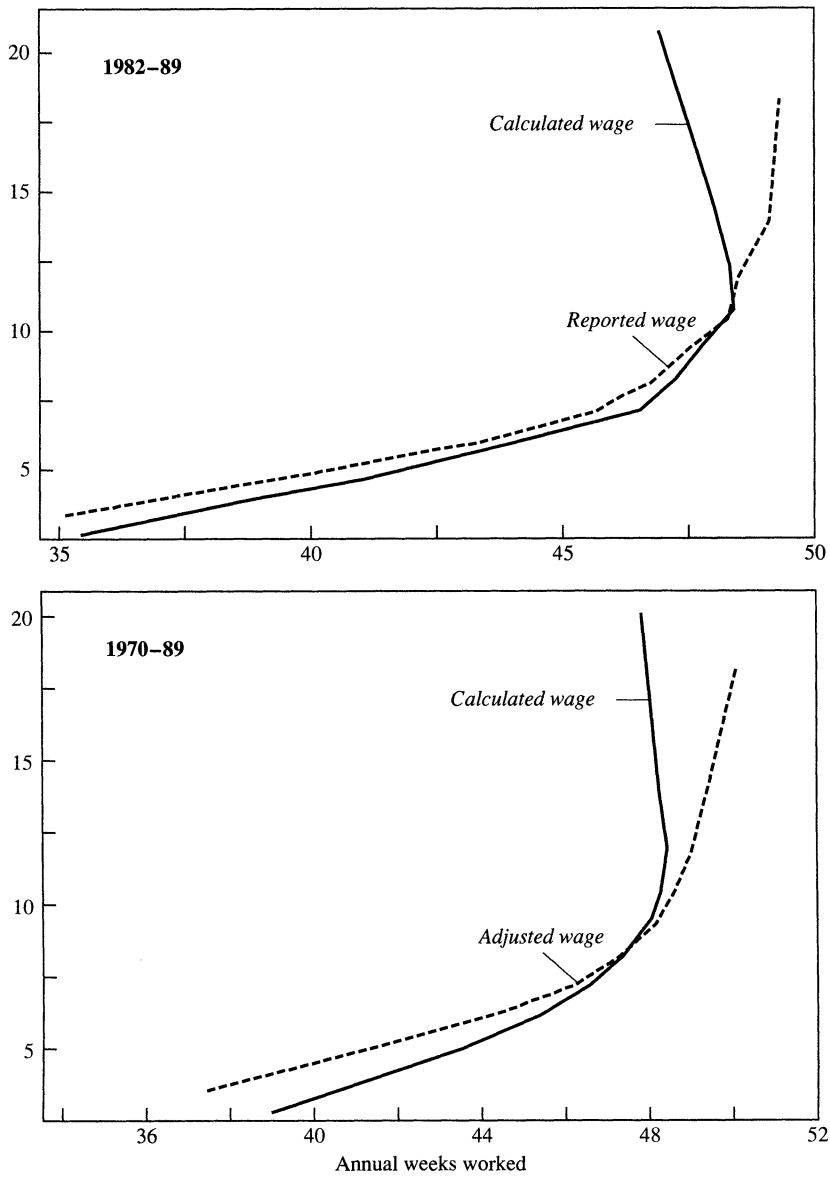
We dealt with this problem by adjusting the distribution of calculated wages in each year.[26] We assume that the difference between the distributions of calculated and reported wages in the outgoing groups is due to measurement error. For each percentile of the wage distribution, we calculated the wage adjustment that would make the two distributions equal. We then applied this adjustment to the retrospective wage data for each year from 1967 to 1989, effectively compressing the wage distribution in each year by the amount attributed to measurement error.[27] The results of this adjustment are also illustrated in figure 4. As expected, the adjustment increases the relationship between wages and weeks worked and eliminates the backward-bending portion of the curve.[28]

26. The appendix available from the authors describes the exact methods.

27. This method ignores measurement error in reported wages. To the extent that these errors are also important, the correction described in the text is conservative.

28. Figure 4 plots the relationship between wages and work in the period after 1970. We show below that this relationship was substantially different in the 1960s.

Figure 4. Empirical Relationship between Time Worked and Alternative Measures of Wages



Sources: Reported wages are reported hourly wages from the detailed outgoing rotations of the March CPS and are only available from 1982 to 1990. Calculated wages are annual earnings divided by the product of weeks worked and usual weekly hours. They are from the retrospective survey data in the CPS. Adjusted wages are calculated wages adjusted to correct for measurement error as described in the text. The figure plots the average hours worked in the previous year against the average wage measure for each decile of the wage distribution.

Wages, Unemployment, and Nonparticipation

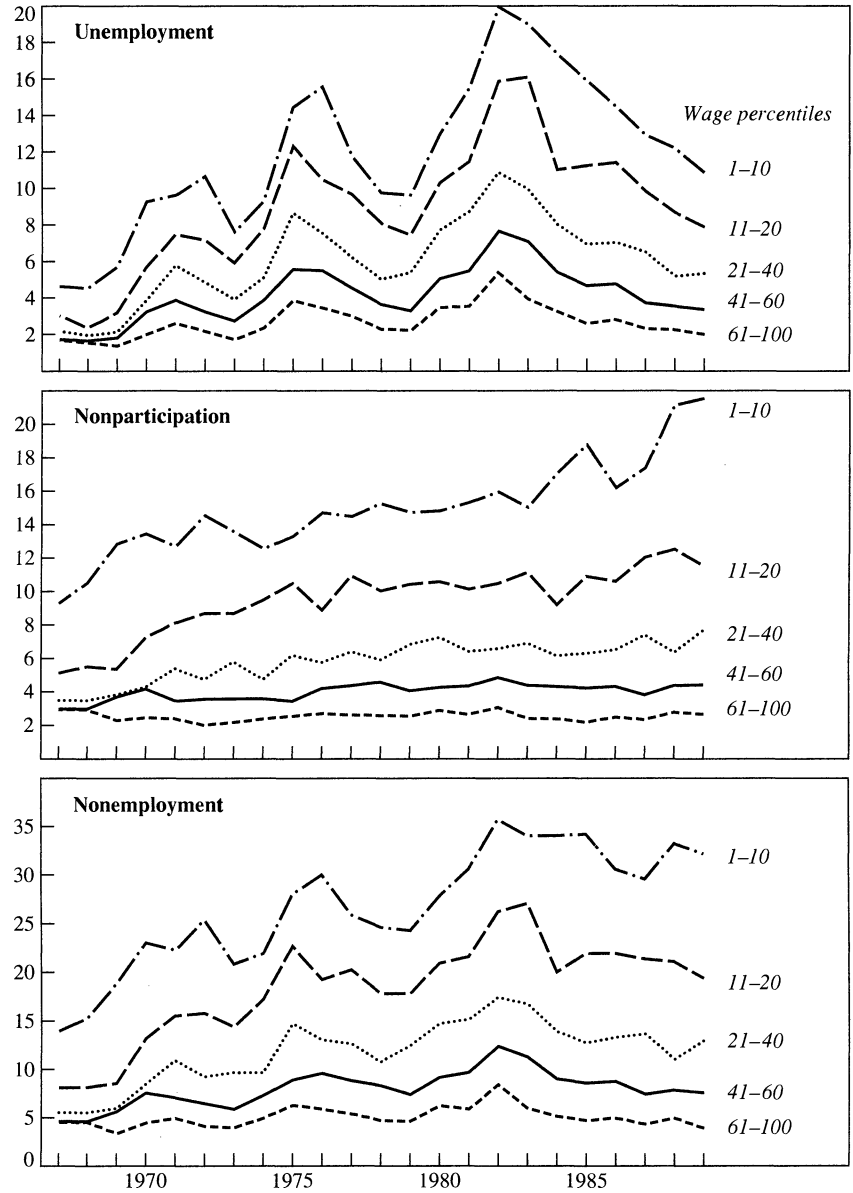
Figure 5 shows the evolution of unemployment, nonparticipation, and nonemployment for selected intervals of the wage distribution. To make these calculations we divided workers into five groups according to wage percentile: 1–10, 11–20, 21–40, 41–60, and 61–100. We use this wage distribution to proxy for the distribution of marketable skills. In each of the three panels, the lowest line represents the series for workers with the highest wages. The other lines are perfectly rank ordered—the highest unemployment and nonparticipation rates are for the least skilled, and so on. This outcome was expected. More interesting is the clear fanning out of each series over time. These pronounced trends toward greater inequality in the distributions of unemployment and nonparticipation imply that nearly all of the long-term increase in these two jobless rates falls on less skilled individuals.

Table 5 quantifies these trends. It reports the within-group changes in unemployment, nonparticipation, and nonemployment rates between the economic peaks of 1967–69 and 1987–89. For the least skilled workers, the nonemployment rate rose by nearly 16 percentage points between 1967–69 and 1987–89, the equivalent of 8 weeks a year. This increase had roughly equal parts of increasing unemployment (7.1 percentage points) and nonparticipation (9.2 points). In fact, although the long-term increase in nonemployment is unequally distributed across skill groups, the component increases in unemployment and nonparticipation are remarkably similar within each group. Finally, notice that for the top 40 percent of wage earners the nonemployment rate increased by a negligible 0.1 percentage point. In other words, unemployment and labor force participation are virtually unchanged for workers above the center of the wage distribution. Thus, to understand why joblessness has risen, we must explain why it has risen only among less skilled persons.

Changes in the Relative Demand for Skills

These long-term patterns of joblessness suggest conformable changes in labor demand favoring more skilled workers. Figure 6 summarizes the evolution of relative hourly wages among the five skill cate-

Figure 5. Unemployment, Nonparticipation, and Nonemployment Rates by Percentiles of the Wage Distribution, 1967–89



Source: Authors' calculations from the March CPS. The lines represent average percentages of each calendar year spent in unemployment, nonparticipation, and nonemployment by persons in the indicated percentile range of the wage distribution.

Table 5. Changes in Nonemployment by Percentiles of the Wage Distribution, 1967–69 to 1987–89

Percentage points

Wage percentiles	*Change in unemployment*	*Change in nonparticipation*	*Change in nonemployment*
1–10	7.08	9.23	16.30
11–20	5.57	6.59	12.56
21–40	3.13	3.46	6.60
41–60	1.45	0.92	2.36
61–100	0.37	−0.29	0.09
1–100	2.33	2.38	4.71

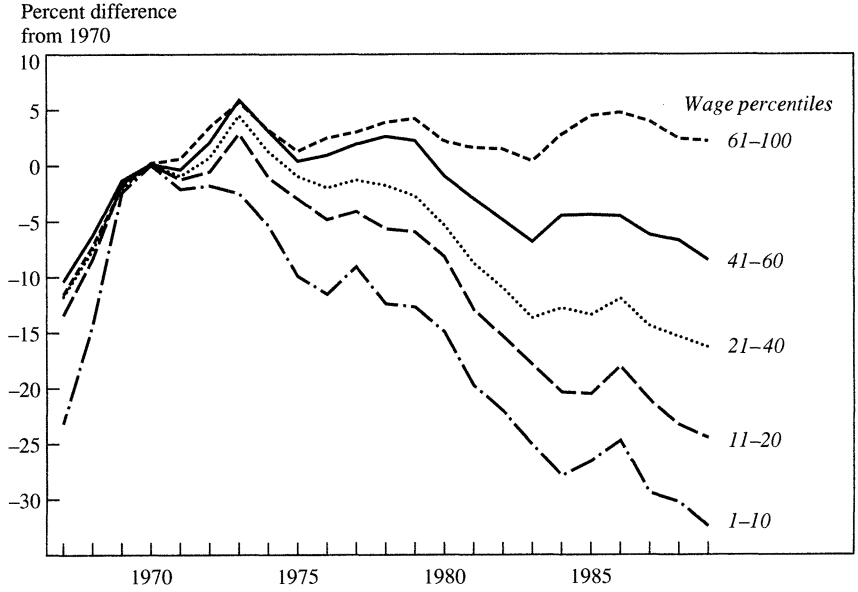
Source: Authors' calculations from March CPS. The table reports percentage point changes in the proportion of the year spent in each state between 1967–69 and 1987–89.

gories used in figure 5. The figure shows the experience-adjusted distribution of log weekly wages for each year of our data, relative to the distribution in 1970. Its clear message is that wage inequality has steadily increased since the early 1970s. For workers in the bottom decile of the wage distribution, real wages fell by more than 30 percent between 1970 and the late 1980s. These are the individuals who showed the largest secular increases in unemployment and nonparticipation. By contrast, the real wages of persons in the top 40 percent of the skill distribution had stable real wages over the period. And these are the individuals who showed stable unemployment and participation rates. Taken together, the evidence suggests that nonneutral changes in the long-run demand for labor, coupled with wages that are flexible in the long run, may be the major factor in explaining changing jobless rates.

Alternative Explanations for the Rising Natural Rate

Students of the business cycle will not be surprised that when unemployment rises, it rises more for less skilled persons. For example, in a typical recession, changes in unemployment rates are higher among persons in low-wage occupations and for individuals with less experience and education, the main observable indicators of skills.

Figure 6. Real Hourly Wages Relative to 1970 by Percentiles of the Wage Distribution, 1967–89



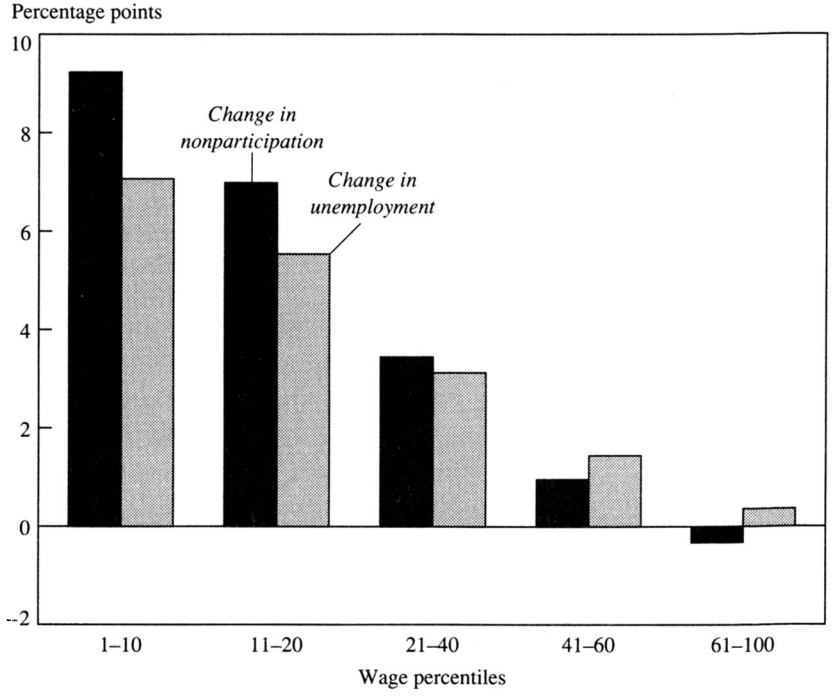
Source: Authors' calculations from March CPS. The figure shows the evolution of relative hourly earnings, measured by the difference of the annual average of log weekly wages and the 1970 average of log weekly wages for the indicated percentiles of the wage distribution. See the text for a description of methods.

Declining Aggregate Demand

Figure 5 shows that this low wage–high unemployment pattern holds for our skill categories: in each of the recessions of 1971, 1975, and 1982, unemployment rose by more for persons in the lower deciles of the wage distribution. Thus a Keynesian explanation for our findings would be deficient aggregate demand tied to inflexible wages, whereas non-Keynesians might argue that short-run labor supply elasticities are higher for less skilled persons. In either case, the secular increase in joblessness resembles the change that would occur in a typical recession—in which aggregate labor demand falls—and recessions are known to have nonneutral effects on various skill groups.

We will not take a position on what is behind the change during recessions. But whatever drives cyclical unemployment, it is different from what has been determining the long-run changes in jobless time that we

Figure 7. The Distribution of Long-run Changes in Unemployment and Nonparticipation by Percentiles of the Wage Distribution



Source: Authors' calculations from March CPS. The figure shows the distribution of percentage point changes in nonparticipation and unemployment rates between 1967–69 and 1987–89 for the indicated wage intervals.

observe. We have three reasons for this view. First, as noted earlier, it is difficult to argue that inflexible wages are important in the long run, especially since figure 6 demonstrates substantial wage flexibility among the affected skill groups. To attach a non–market clearing interpretation to these data, one must argue that the sharp decline in the wages of low-skilled workers was not enough to clear the market. Second, high-frequency fluctuations in nonemployment are entirely accounted for by changes in unemployment. Our interest is in low-frequency changes, for which the distributions of rising unemployment and nonparticipation are nearly identical (see figure 7). This feature of the data suggests that long-term changes in nonparticipation and unemployment should have a unified explanation, although in the short run they clearly do not.

Finally, although the least skilled workers have had the worst em-

ployment experience, both cyclically and secularly, the overall distribution of unemployment and nonparticipation has been much more unequal over the long run than over the typical cycle. This is demonstrated in figure 8. The figure compares the distributions of cyclical changes in unemployment and nonemployment with the distributions of the secular changes in these variables. We define the secular change to be the difference between 1967–69 and 1987–89. To calculate the distribution of cyclical changes, we average the changes in joblessness that occurred in the recessions of 1971, 1975, and 1982 for wage deciles in the figure. Each bar in the figure is expressed relative to the mean sample change. For example, workers in the lowest decile of the wage distribution experienced a long-term increase in unemployment that was more than three times greater than the mean sample increase, but their cyclical changes were only two times greater than the average cyclical change in unemployment.

Thus, high-frequency fluctuations in unemployment and nonemployment have been more equally distributed than low-frequency ones. Overall, the skill distribution of risking long-run unemployment is much steeper than the cyclical distribution. This pattern is even more apparent for nonemployment—also shown in figure 8—because there is no cyclical component to nonparticipation. In our view, this and related evidence on the behavior of wages undermine any explanation of rising joblessness that treats cyclical and secular changes as similar phenomena.

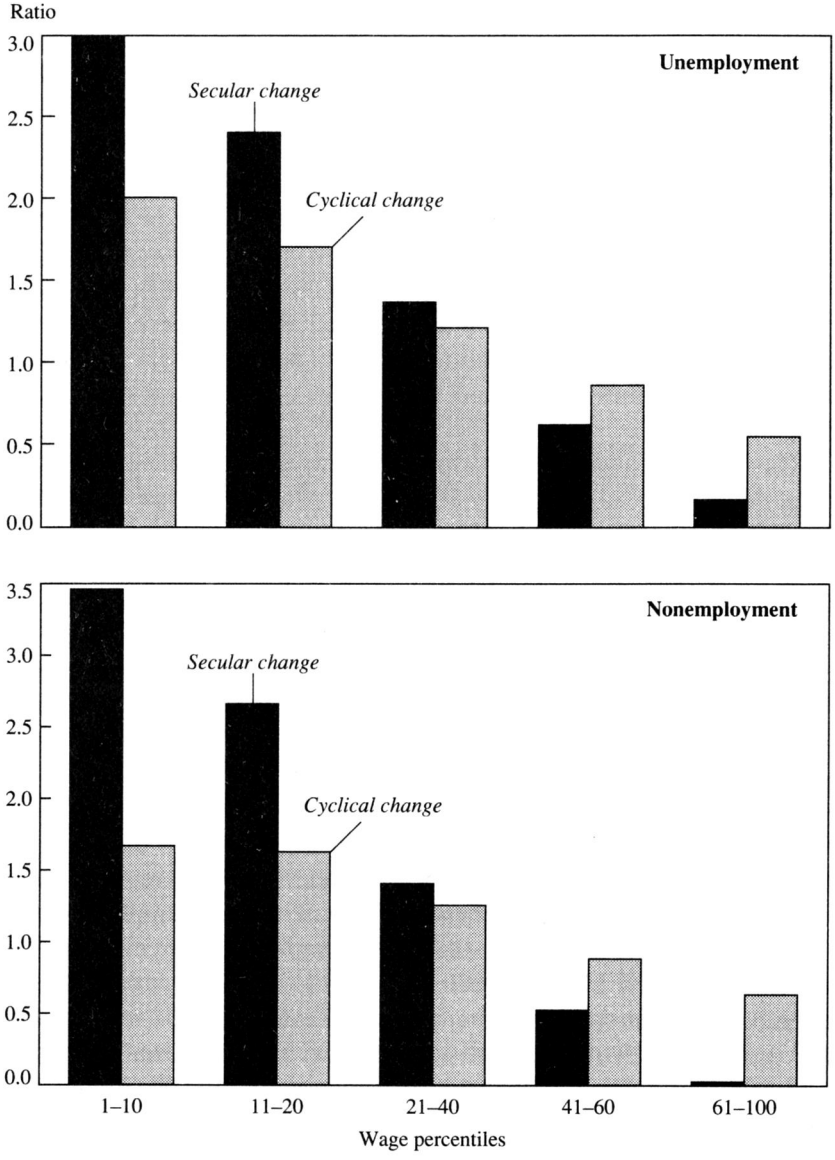
Increased Sectoral Mobility

An alternative explanation for rising unemployment is based on its role in reallocating workers among activities. Shocks to relative labor demand across sectors may require more reallocative unemployment in some periods than in others, so the natural rate of unemployment varies. In this vein, David Lilien suggested that cyclical and secular changes in unemployment may reflect the increased pace of labor reallocation among sectors.[29] Note that to be consistent with our evidence on the duration of unemployment, it must be true that sectoral mobility is accomplished through extraordinarily long spells.

Evidence from an earlier study by Murphy and Topel casts doubt on

29. Lilien (1982).

Figure 8. The Distribution of Secular and Cyclical Changes in Unemployment and Nonemployment by Percentiles of the Wage Distribution



Source: Authors' calculations from March CPS. The cyclical change refers to the average change in unemployment or nonemployment during the recessions of 1970–71, 1975, and 1982. The secular change is over the period 1967–69 to 1987–89. Changes for each wage group are expressed relative to the mean change for the entire population.

Table 6. Sectoral Mobility and Its Effect on Unemployment, Selected Intervals, 1975–87
Percent

	1975	*1976–81*	*1982*	*1983–87*
Workers who change industry	7.6	9.3	7.8	8.3
Share of unemployment due to movers	23.9	28.1	23.5	26.3

Source: Authors' calculations from March CPS. Industry changers are defined as persons who report that industry affiliation in the survey week is different from the industry affiliation of the longest-held job in the previous calendar year.

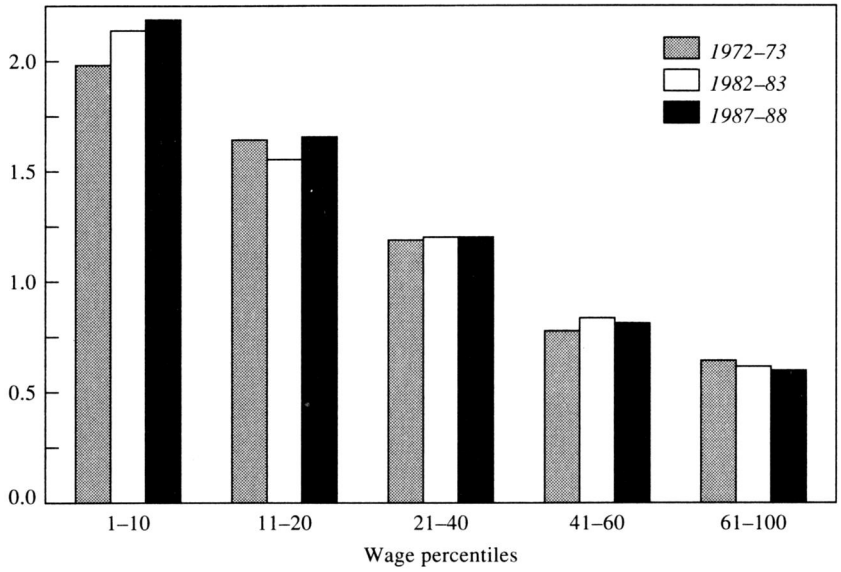
the sectoral mobility hypothesis.[30] That study showed that the pace of sectoral mobility of workers had actually declined during the period when unemployment was rising and that sectoral mobility rates are procyclical. It also found that workers who changed industry account for a minor and virtually constant amount of unemployment. Persons who remain in an industry account for most of the change in unemployment during the 1970s and 1980s. Table 6 shows rates of sectoral mobility and the portion of unemployment accounted for by industry "movers" during the post-1975 period. Estimated sectoral mobility is lowest in the recessions of 1975 and 1982, and it is slightly lower in the 1980s than in the 1970s. The share of movers in total unemployment is also lower in periods of high unemployment.

We extend this evidence by examining the distribution of sectoral mobility among skill categories of workers. Basically, we ask whether groups that have experienced rising unemployment also experienced greater mobility among sectors and whether sectoral movers account for an important component of unemployment. To implement this idea, we exploit a special feature of the CPS data. After 1969, respondents in the March CPS are asked questions that identify their current two-digit industry. They are also asked if their principal employer during the previous calendar year was different from their current one. We measure the sectoral mobility rate as the proportion of workers who have moved to a different two-digit industry.

Figure 9 compares the skill distributions of sectoral mobility for the 1972–73 period, the recession of 1982–83, and the 1987–88 period. In each period, less skilled individuals—who are more likely to be unemployed—account for a disproportionate share of overall sectoral mobility. More interesting, the distributions are virtually identical across the

30. Murphy and Topel (1987).

Figure 9. Relative Industrial Mobility Rates by Percentiles of the Wage Distribution: 1972–73, 1982–83, and 1987–88



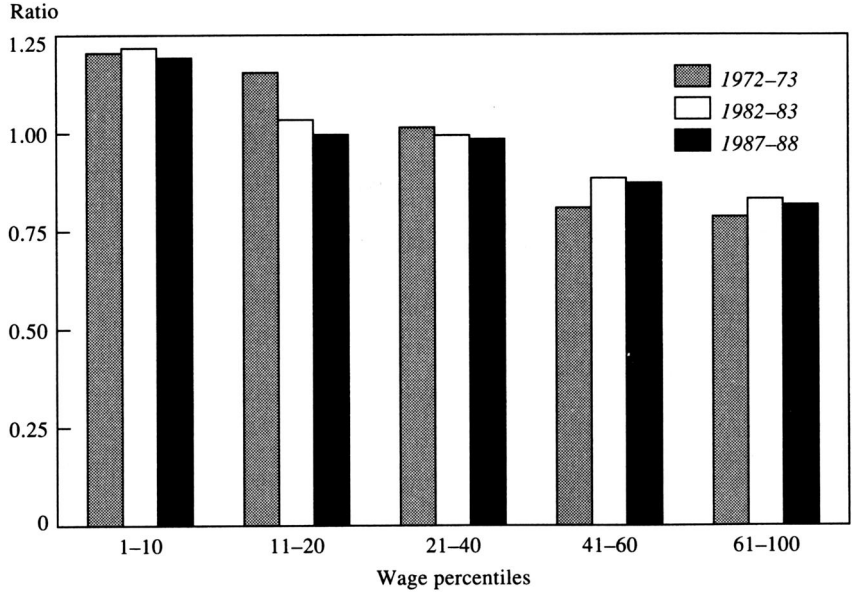
Source: Authors' calculations from March CPS. See table 6 for definition of industrial mobility. Estimates are expressed relative to the average mobility rate for all percentiles for the specified time period. Data after 1988 and before 1972 are not comparable to other years.

three periods. There is no evidence that less skilled individuals, who account for a larger share of changes in unemployment, have greater relative mobility during high unemployment periods. This evidence is reinforced in figure 10, which shows the relative share of total unemployment by skill category that is accounted for by those who changed industries. If sectoral mobility of the unemployed is a determinant of rising unemployment, the share of unemployment accounted for by less skilled movers should rise when unemployment increases. It does not. Overall, we have been unable to find any evidence to support the sectoral mobility theory of a changing natural rate.

Female Participation and Other Income

Up to this point, we have ignored sources of income other than the hourly wage. Other sources, however, can be important for at least two reasons. First, since both the wages and the work of low-wage men have

Figure 10. Relative Shares of Unemployment Resulting from Industry Changers by Percentiles of the Wage Distribution: 1972–73, 1982–83, and 1987–88



Source: See table 6 and figure 9. The estimates show the share of unemployment due to industry changes in a percentile category relative to the share of unemployment due to industry changes in the population as a whole.

declined sharply, it is reasonable to ask how they survive. Second, increases in income from sources other than men's earnings could reduce their labor supply. Since female labor market participation and earnings rose dramatically during the period we study, it is plausible that male labor supply could fall because of optimizing behavior within households. It seems reasonable that these changes could have a disproportionate effect on low-wage men.

Table 7 documents trends in living arrangements, household income, and employment status for men. A key point in the table is that the distinguishing characteristic of jobless spells is their length, not whether they are called unemployment or nonparticipation. For example, in the 1967–69 period roughly three-fourths of men with short unemployment spells (less than 26 weeks) resided with their wives. That figure fell to 61 percent by 1989. The corresponding percentages for men with short spells of nonparticipation are nearly identical. By contrast, men with long jobless spells—either of unemployment or nonparticipation—are

Table 7. Living Arrangements and Household Income by Employment Status, Selected Intervals, 1967–89

Percent, unless otherwise noted

Male employment status	*Living with*	*Period*		
		1967–69	*1977–79*	*1987–89*
Full-year employed	Wife	86.1	79.4	72.4
	Other family	8.3	9.4	11.8
	Nonfamily	5.7	11.2	15.8
	Household income (1982 dollars)	29,142	33,274	37,213
Short-term unemployed	Wife	77.3	65.9	61.2
	Other family	16.0	18.8	20.3
	Nonfamily	6.7	15.3	18.6
	Household income (1982 dollars)	22,280	24,788	26,032
Short-term nonparticipants	Wife	77.8	67.6	61.4
	Other family	13.6	15.1	18.1
	Nonfamily	8.6	17.3	20.5
	Household income (1982 dollars)	24,986	28,288	30,787
Long-term unemployed	Wife	48.2	48.7	49.2
	Other family	41.3	35.9	33.0
	Nonfamily	10.5	15.4	17.8
	Household income (1982 dollars)	17,268	19,274	18,289
Long-term nonparticipants	Wife	46.7	43.5	41.0
	Other family	42.1	40.5	39.0
	Nonfamily	11.2	16.0	20.0
	Household income (1982 dollars)	16,432	17,500	17,534

Source: Authors' calculations from March CPS. The full-year employed worked for more than 50 weeks during the calendar year. The short-term unemployed worked more than 26 weeks and were unemployed most of their nonworking weeks. The long-term unemployed worked fewer than 26 weeks and were unemployed for most of their nonworking weeks. Short-term and long-term nonparticipants are classified like the short-term and long-term unemployed. Household income is deflated by the PCE deflator.

much less likely to live with a spouse; the data suggest that they rely on other family members for support.

Despite declining real wages, the table indicates that the household incomes and living arrangements of the long-term unemployed have been stable over time. As a group, they have not become poorer, though their real household incomes did not keep pace with the general popula-

tion. However, our previous evidence implies that there are many more of them today; the relative frequency of single, jobless men who rely on their families for support has risen through time.

Despite relatively stable incomes among the long-term unemployed, trends in nonwage income might favor low-wage households. For example, the labor supply of less skilled men might decline if women's increased labor force participation occurred mainly in low-wage households. Table 8 summarizes changes in female labor force participation and household incomes for illustrative portions of the male wage distribution. On average, men experienced zero real earnings growth between 1967–69 and 1987–89, a period when women's labor force participation increased by more than 21 percent and male income from other sources grew by nearly 84 percent. These changes could plausibly affect men's labor supply. Yet the table also shows that the largest changes in income and female participation occurred in the households of high-wage men. In 1967, women in high-wage households (those above the 60th percentile) were substantially *less* likely than others to participate in the labor market. Consequently, income from sources other than the male's earnings was lowest in these households. Over the next 20 years, the participation of women in high-wage households grew by more than 30 percent—more than in any other group. Accordingly, incomes grew more rapidly in high-wage households than in low-wage ones. By 1989, income from sources other than the male's earnings was highest in these households.[31]

These findings do not rule out supply shifts as a partial explanation for rising joblessness. The labor supply of low-wage men may be more responsive to the changes in female labor force participation and other income, and there may be other factors that affect work incentives for low-wage workers.[32] Indeed, the cross-sectional relationship between

31. In passing, we note that the patterns in table 8 imply that female earnings and participation have increased household income inequality, reinforcing the effects of rising wage inequality among men.

32. Several authors (Parsons, 1980; Bound, 1989; Bound and Waidmann, 1991) have studied the role of disability insurance (DI). Bound and Waidmann document the liberalization of DI that occurred in the early 1970s, as well as the retrenchment that followed. For workers aged 45 and above, they conclude that "earlier accommodation" of health problems, resulting from the availability of benefits, might explain as much as 80 percent of the decline in labor force participation among those aged 45–54 during the 1970s. These conclusions are consistent with our results, since availability of DI may be one of the fac-

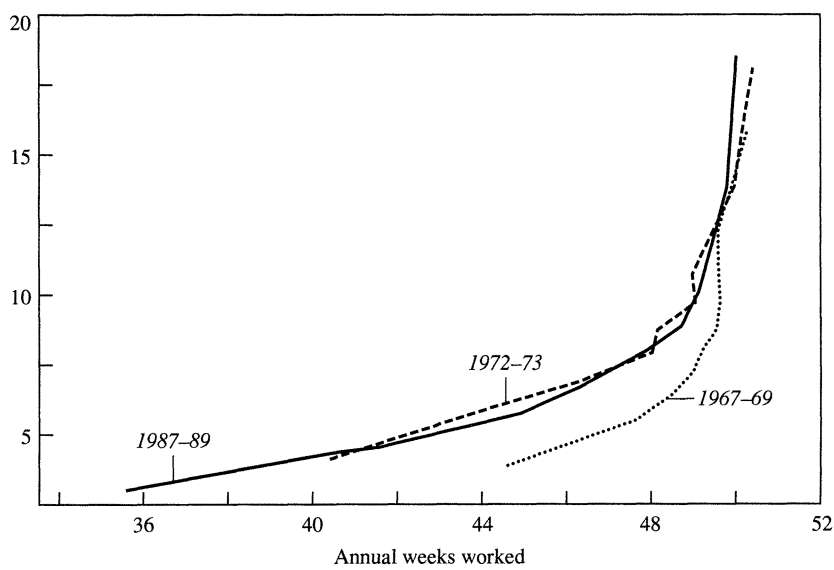
Table 8. Sources of Household Income by Percentiles of the Wage Distribution, Selected Intervals, 1967–89

1982 dollars, unless otherwise noted

Male wage percentiles	*Income source*	*Period*				*Percent change, 1967–69 to 1987–89*
		1967–69	*1972–73*	*1978–79*	*1987–89*	
1–10	Male earnings	7,098	6,868	6,577	5,336	−24.8
	Female workers per household	0.620	0.588	0.615	0.618	−0.3
	Other income	8,413	10,489	11,096	12,680	50.7
	Total income	15,511	17,357	17,673	18,016	16.2
21–40	Male earnings	15,611	15,258	13,746	13,460	−13.8
	Female workers per household	0.636	0.635	0.687	0.702	12.1
	Other income	7,842	9,639	11,464	13,317	69.8
	Total income	23,453	24,897	25,210	26,777	14.2
61–100	Male earnings	28,908	30,341	28,704	31,544	9.1
	Female workers per household	0.523	0.588	0.669	0.689	31.7
	Other income	6,943	8,547	10,401	14,481	108.6
	Total income	35,851	38,888	39,105	46,025	28.4
1–100	Male earnings	20,406	20,930	19,598	20,505	0.5
	Female workers per household	0.586	0.610	0.674	0.712	21.5
	Other income	7,492	9,243	10,914	13,757	83.6
	Total income	27,898	30,173	30,512	33,962	21.7

Source: Authors' calculations from March CPS. Female workers per household is the average number of adult women in a household who worked positive weeks in the calendar year. Other income is income from all sources except male earnings. Total income is total household income from all sources.

Figure 11. Empirical Relationship between Wages and Time Worked, 1967–69, 1972–73, and 1987–89



Source: Authors' calculations from March CPS. The figure shows average weeks worked and experience-adjusted wages for each decile of the wage distribution during the three indicated periods.

wages and work *did* shift during the period we analyze. Figure 11 plots the relationship between wages and weeks worked during three representative periods. In the late 1960s, workers at all but the lowest wage rates were tightly bunched around full-time work. Then, in the early 1970s, the low-wage end of this relationship shifted sharply to the left.[33] Since then, the cross-sectional relation between wages and work has been remarkably stable—the curves for 1972–73 and 1987–89 are nearly

tors that shifts the relationship between wages and work in figure 11, while also making labor supply more elastic. An explanation based on DI is more problematic in the 1980s, however. We have shown that permanent withdrawal from the labor force became much more important during the 1980s, a period of tightened eligibility rules in DI programs and slight *declines* in reported disability.

33. This shift is implied by our earlier evidence that wages of less skilled workers were rising in the late 1960s, while their weeks worked were falling. The long-term decline in wages for these workers began in the early 1970s.

indistinguishable. Curves for other post-1970 periods are basically identical to those shown.

If we interpret the curves in figure 11 as representing individuals' labor supply, the supply curve has been relatively stable since the early 1970s, while wages and work among the less skilled have steadily declined. The next section builds on this point, treating the increase in nonemployment as a labor supply response to declining real wages.

Wage Flexibility and Nonemployment

This section tests the idea that the distribution of long-run changes in unemployment, nonparticipation, and nonemployment can be explained by conformable long-run changes in the returns to work. We are motivated by several pieces of evidence. First, figure 6 has shown that wages are clearly flexible in the longer run and that they have fallen substantially among less skilled workers. Second, figure 5 has shown that rising joblessness has been confined almost entirely to the lower skill groups. Third, figure 11 has shown that the relationship of wages to annual time worked has been stable since 1970, yet we know that both wages and weeks worked were falling over this period. Finally, we have seen that long-term changes in unemployment and nonparticipation are similarly distributed across skill groups and that unemployed and nonemployed persons are largely indistinguishable from each other.

The last point suggests that the most important variable in the long run may simply be nonworking time, rather than its components, unemployment and nonparticipation. Since our working hypothesis is that labor markets clear in the long run, we are testing the idea that labor supply responses to changing wages are large enough to explain rising joblessness among adult men. We will shortly return to the distinction between nonparticipation and unemployment, but for now we consider a simple labor supply model:

$$e_{it} = \beta_{i0} + \beta_{i1} w_{it} + v_{it}, \tag{5}$$

where $e_{it} = 1 - u_{it} - o_{it}$ is the percentage of year t spent working by persons in skill group i, w_{it} is the average log wage of that group, β_{i1} is a coefficient, and v_{it} is the residual. Our interest is in estimating the parameter β_{i1}, which represents the responsiveness of time worked to changes in wages for each group. Given estimates of this parameter, it is an ac-

Table 9. Estimated Partial Elasticities of Labor Supply by Percentiles of the Wage Distribution, 1970–89

Wage percentiles	*Cross-section estimates*	*Estimates from regional regressions*	
		OLS	*IV*
1–10	0.299	0.289	0.350
		(4.43)	(4.31)
11–20	0.232	0.251	0.252
		(4.83)	(4.53)
21–40	0.186	0.146	0.151
		(3.63)	(3.56)
41–60	0.139	0.058	0.064
		(1.53)	(1.60)
61–100	0.062	0.047	0.072
		(1.41)	(2.02)

Source: Authors' calculations from March CPS. In all regressions the dependent variable is the fraction of the year worked. IV estimates use region-specific linear, quadratic, and cubic trends as instruments for wages. Regional regressions include region- and time-specific dummy variables. Cross-section estimates represent the slope of a fitted quadratic relationship between log wages and the percentage of the year worked, evaluated at the mean log wage with each interval of the wage distribution. The numbers in parenthesis are *t*-statistics.

counting exercise to determine the proportion of long-term changes in nonwork that is accounted for by stable labor supply responses.

Table 9 shows estimates of β_{i1} derived three ways. The cross-section estimates are based on the assumption that the relationship between wages and time worked was stable over the entire post-1970 period, as argued above. We simply fit a quadratic to the cross-sectional labor supply function; the table reports the average estimated partial elasticities for each interval of the wage distribution.[34] As implied by the preceding figures, partial elasticities of labor supply are much higher among low-wage workers. In itself this is not surprising: variation in employment is caused by changes in weeks worked, and high-wage individuals are more likely to work a full year.

The implied long-run elasticities of labor supply from this exercise are large compared with those reported in the labor supply literature.[35] For example, the point estimate of 0.299 for men in the lowest decile of the

34. That is, we fit a regression of the form $e_i = \alpha_0 + \alpha_1 w_i + \alpha_2 w_i^2 + \epsilon_i$ to cell data on average time worked (e_i) and log wages (w_i) for separate intervals of the wage distribution (i) in the post-1970 period. Then, $\hat{\beta}_{i1} = \hat{\alpha}_1 + 2\hat{\alpha}_2 w_i$. More sophisticated methods do not affect the results.

35. See Pencavel (1986) for a survey of the male labor supply literature. A consensus estimate of the uncompensated elasticity of labor supply from that literature might be 0.1, with a compensated elasticity of about zero.

wage distribution implies an uncompensated supply elasticity of 0.40 (evaluated at the mean employment rate), though estimated elasticities are substantially lower at higher wages.

There are four main reasons why our estimates exceed those in the labor supply literature. First, we allocate wage levels for nonworkers using the distribution of observed wages among those who work few weeks. All labor supply studies that we are aware of either delete nonworkers completely or impute wages from working individuals with similar characteristics.[36] Our evidence indicates that nonworkers are mainly less skilled and that their wages have fallen over time. Second, our data indicate that labor supply elasticities have increased since the late 1960s, when many of the survey data used in labor supply studies were generated. Third, our corrections for errors in measured wages suggest that many low-wage workers who show few weeks worked are misclassified as high wage. As figure 4 showed, we attribute the backward-bending component of the cross-sectional labor supply curve to these errors; thus our corrections enhance the estimated responsiveness of labor supply. Finally, our estimates are based on the raw relationship between wages and work. We do not follow the traditional practice of controlling for education, marital status, or other observables that raise wages and are also associated with greater labor supply. In effect, we assume that more educated persons work more because they earn higher wages. Given the fact that wages and labor supply are measured with error, we think this approach increases the signal-to-noise ratio in estimating labor supply responses.

An alternative (and independent) source of information on labor supply responses to changing real wages is generated by the large differences in regional labor market performance that occurred in the 1970s and 1980s. The relatively smooth long-term changes in aggregate wages and employment mask large medium-frequency changes in these variables across regional labor markets.

Figure 12 documents these changes for six regional aggregates. In constructing the figure, we projected regional log wages and employment rates on fixed effects for each region and a vector of year dummies, meant to control for aggregate fluctuations. The figure plots the residuals

36. As Pencavel (1986) notes, these strategies yield similar results: "I know of no evidence . . . that documents grievous biases from a strategy of restricting estimation to the sample of workers. . . ." Ignoring nonworkers would make a difference in our analysis.

from these regressions for each region. Thus the figures show within-region changes in employment rates and wages that exclude economywide fluctuations in these variables. Any nonneutral effect of the business cycles across regions will show up in these series.

There are two noteworthy points about the figure. First, for low- to medium-frequency changes, regional wages and employment rates move together. For example, wages and employment in New England declined through the mid-1970s, but a sustained boom followed which generated both rising employment rates and rising wages. Between 1979 and 1989, relative wages in New England rose by 12 percent. At the other extreme, labor markets in the Southwest (West South Central) softened in the 1980s, leading to declining employment and falling wages. These regional figures clearly show very substantial long-run wage flexibility, supporting our earlier conclusions based on aggregate wage changes.

The second point about the figure is timing. Although wages and employment rates move together over the longer term, the turning points in the series do not coincide. For example, measured in terms of employment rates, New England's turnaround began after the 1975 recession, but relative wages did not start to climb until 1979. In the Midwest (North Central), employment rates fell sharply in the late 1970s and then stabilized in the 1980s. Wage rates fell more smoothly. Similar patterns emerge in the Middle Atlantic states and in the Southwest. In each case, it appears that changes in labor demand led to employment responses, which were then followed by changing wages over the longer term. Those who believe that wages do not adjust completely in the short run can find comfort in these data.

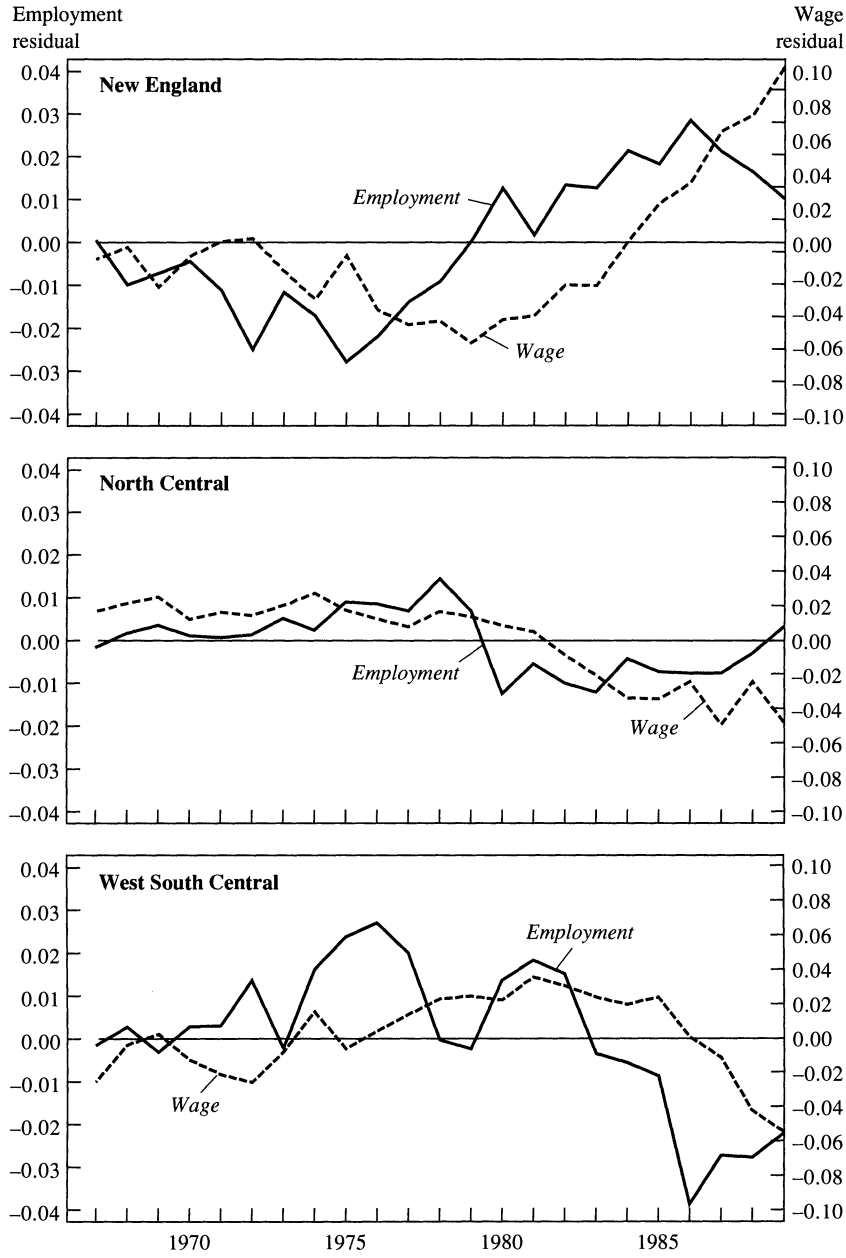
In light of these regional data, table 9 reports ordinary least squares (OLS) estimates of β_{i1} from models of the form

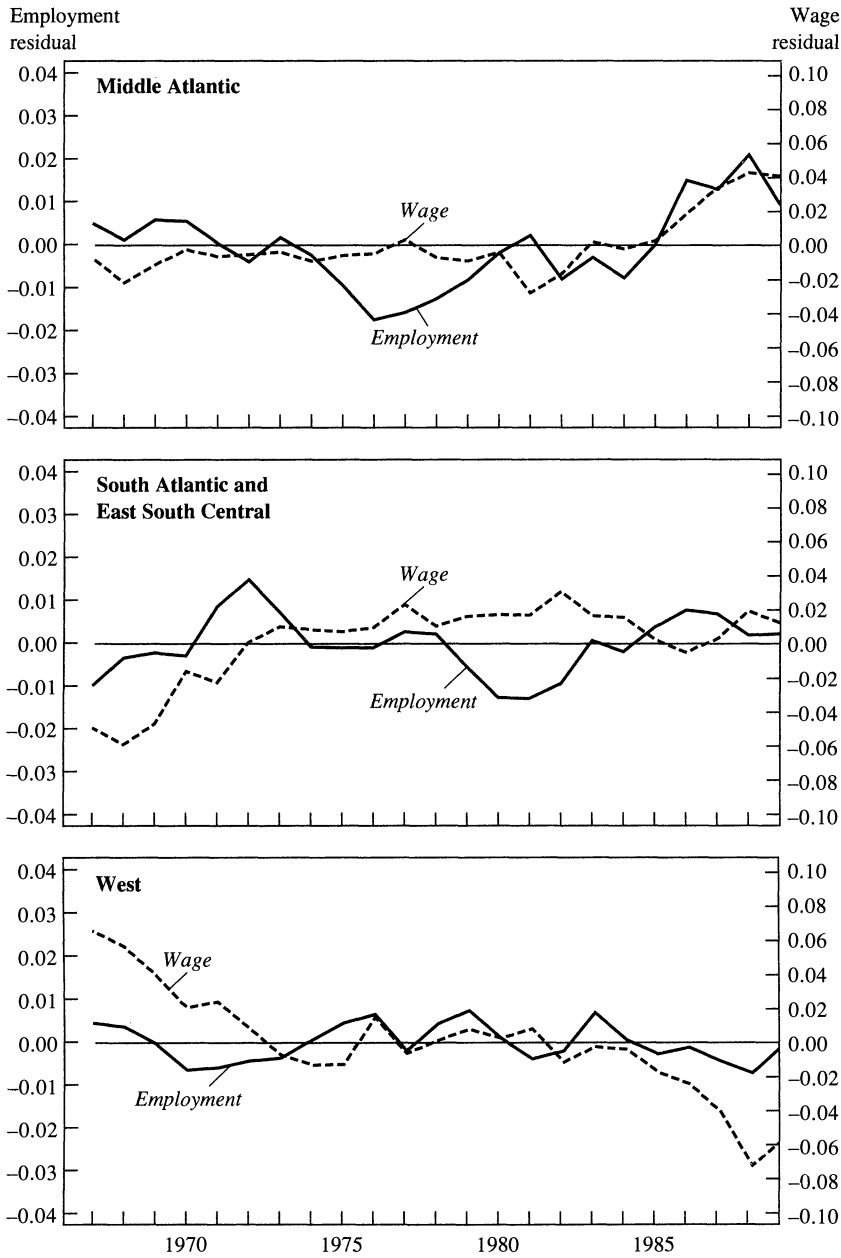
$$e_{irt} = \beta_{ir} + A_{it} + \beta_{i1} w_{irt} + v_{irt}, \tag{6}$$

where e_{irt} is the employment rate of persons in skill group i, region r, and year t; β_{ir} is a fixed region effect for persons in skill group i; and the A_{it} are year effects that control for the effect of aggregate fluctuations.

Notice that the experiment underlying the estimation of β_{i1} in equation 6 differs from our method of deriving these effects from the cross-sectional relationship of wages and work. As in equation 5, we assume that fluctuations in wages and time worked are driven by demand. But

Figure 12. Regional Variations in Relative Wages and Employment Rates, 1967–89





Source: Authors' calculations from March CPS. The figures show the residuals of log wages and employment rates from regressions that control for fixed region effects and aggregate time effects.

since equation 6 controls both regional and time effects for each skill group, we estimate labor supply responses from *relative* wage fluctuations across regions. In effect, we ask whether a region-specific decline in the relative wage of skill group *i* causes a conformable region-specific change in the relative labor supply of that group.

The surprising result is that the labor supply responses estimated from regional data are nearly identical to those estimated from the cross-sectional relationship between wages and time worked. The estimated partial elasticity for the lowest skill category is within 1 percentage point (0.289 versus 0.299) of the cross-sectional estimate, with correspondingly smaller responses at higher intervals of the wage distribution. As in the cross section, all of the estimated effects are positive.[37]

Despite this similarity, we were concerned that sampling error in measured wages—generated by relatively small regional samples—could seriously affect the regional estimates. As previous figures suggest, the wage changes that affect long-term changes in employment rates occur at fairly low frequency. Thus, table 9 also reports results using region-specific and skill group–specific trends as instruments for regional wages. Evidently, sampling error is not a major concern. The instrumental variables (IV) estimates are close to both the OLS estimates and the cross-sectional estimates.

The estimates in table 9 are derived from two conceptually distinct experiments, so their similarity is encouraging. Yet even if these estimates represent true labor supply responses to changing wages, it does not follow that observed increases in unemployment and nonparticipation are wage determined. We need to show how much of the overall decline in jobless time is consistent with a model of declining wages and stable labor supply.

Table 10 compares actual changes in nonemployment and its components to predicted changes derived from the estimates in table 9 for the nonemployed and from comparable regressions for the component groups. Labor supply estimates for the unemployed and for nonpartici-

37. Some readers may be concerned that our imputation procedures cause an upward bias in estimated labor supply responses, because nonworkers are imputed low wages. Thus, when the number of nonworkers rises, average wages may fall. To test for this effect we reestimated the model using only workers with positive weeks worked in the calculation of wages. The estimated partial elasticities for this procedure are, by wage interval, 0.264, 0.250, 0.144, 0.060, and 0.049. These are nearly identical to the estimates in table 9.

Table 10. Actual and Predicted Changes in Male Nonemployment Rates by Percentiles of the Wage Distribution, 1972–73 through 1987–89

Percent

Type of worker and wage percentiles	*Actual change*	*Predicted change*		
		Cross-section	*OLS for regions*	*IV for regions*
Nonemployed				
0–10	9.3	10.3	8.5	8.8
11–20	4.9	6.2	6.1	5.7
21–40	3.2	2.7	2.6	3.3
41–60	0.8	0.7	0.6	1.5
61–100	0.2	0.1	0.1	0.1
Total	2.3	2.4	2.1	2.5
Unemployed				
0–10	2.7	6.5	4.8	3.8
11–20	1.6	3.5	3.3	2.5
21–40	1.2	1.6	1.5	1.5
41–60	0.2	0.6	0.5	0.7
61–100	0.0	0.1	0.1	0.1
Total	0.7	1.5	1.2	1.1
Nonparticipating				
0–10	6.5	3.8	3.7	5.0
11–20	3.3	2.7	2.9	3.2
21–40	2.0	1.1	1.1	1.8
41–60	0.6	0.1	0.1	0.8
61–100	0.2	0.0	0.0	1.1
Total	1.6	0.9	0.9	1.4

Source: See table 9. Predicted changes for nonemployment are generated by the models that are summarized in table 9. We performed identical calculations for unemployment and nonparticipation taken separately, but we do not report the underlying parameter estimates.

pants were derived by the same methods described above; we do not present the detailed estimates, however. Since our estimates of supply responses are based on the relationship of work to wages in the post-1970 period, we measure changes relative to the 1972–73 period, the first nonrecessionary years of the period. The ending period is 1987–89, the end of the most recent expansion. Our results are not substantially different for other periods.

Between 1972–73 and 1987–89, the actual nonemployment rate of prime-aged men rose by 2.3 percentage points. Using supply responses calculated from the cross-sectional relationship of wages and time worked, we predict a 2.4 percentage point increase in nonemployment from the decline in wages over this period. Using alternative estimates

derived from regional data, our predictions are 2.1 points (the OLS estimate) and 2.5 points (the IV estimate). In short, our overall predictions of rising joblessness are not wide of the mark.

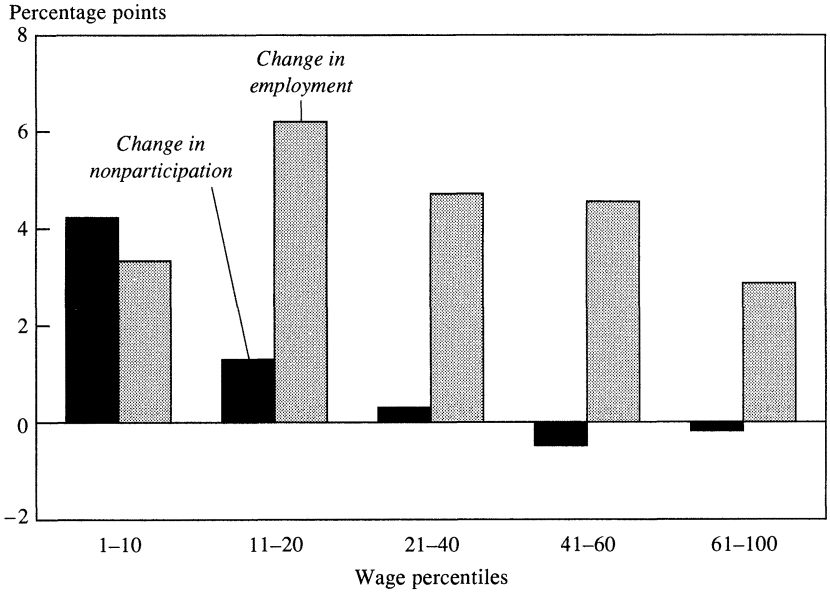
A more telling finding is that wage changes accurately predict the *distribution* of rising joblessness. All three models predict that the largest increase in the nonemployment rate will occur at the low end of the wage distribution—where wages declined the most and supply responses are largest—while predicted employment rates of highly skilled workers are unchanged.

Table 10 also shows corresponding results for unemployment and nonparticipation. The main finding here is that we slightly overpredict the long-run increase in the unemployment rate, and we underpredict the increase in nonparticipation. This pattern occurs in every skill group but is most pronounced among less skilled workers. Thus, long-run wage changes are useful in distinguishing work from nonwork, but the distinction between demand-induced changes in unemployment and nonparticipation is more elusive.

None of this implies that the distinction between unemployment and nonparticipation is meaningless or arbitrary. The unemployed are actively looking for work at some wage, and nonparticipants are not. But labor supply considerations imply that the incentive to be in these categories is affected by the returns to work, and our analysis shows that these returns have fallen dramatically. In this sense, the long-term change in nonemployment is a better indicator of overall labor market performance than either of its components.

There is still information to be gleaned from unemployment and nonparticipation, however. Our previous results indicated that cyclical fluctuations in labor demand had no effect on nonparticipation rates of prime-aged men, implying that discouraged-worker effects are unimportant in the short run. Figure 13 suggests the opposite conclusion for longer-run changes. For intervals of the wage distribution, the figure decomposes changes in unemployment rates into changes in nonparticipation and changes in employment. We gauge these changes over a five-year period of aggregate recovery, from the recession of 1982–83 to the end of our data in 1987–89. For workers in the lowest decile of the wage distribution, less than half of the 8 percentage point decline in the unemployment rate is accounted for by rising employment. Many of them

Figure 13. Changes in Nonparticipation and Employment Rates by Percentiles of the Wage Distribution, 1982–83 to 1987–89



Source: Authors' calculations from March CPS.

simply leave the labor market, suggesting the importance of longer-run discouraged-worker effects among the less skilled. By contrast, workers who command higher wages returned to work after the recession; their changes in nonparticipation are small.

The Extent of Wage Flexibility

Macroeconomic evidence on the extent and importance of wage flexibility is usually based on published data on average hourly wages or some other index of compensation. Even in studies that use microdata on individuals' wages, a common strategy is to form an aggregate wage index by dividing aggregate compensation by aggregate hours.[38] In ag-

38. See Kydland and Prescott (1988), for example.

gregate data, this wage index is simply total compensation of all employees divided by total hours worked during the year:

$$\overline{W}_A = \frac{\sum_j W_j H_j}{\sum_j H_j} = \sum_j W_j \frac{H_j}{H}, \tag{7}$$

where $H = \Sigma H_j$ is aggregate hours of all j workers. The implication of equation 7 is that average hourly compensation is a weighted average of individual wages in which persons who work more hours receive greater weight. One problem with this index is that changes in the distribution of hours worked cause changes in the calculated average wage even if individual wages do not change. Even when such composition changes do not occur, percent changes in equation 7 over time give greater weight to high-wage persons and to those who work more hours:

$$\frac{d\overline{W}_A}{\overline{W}_A} = \sum_j \frac{dW_j}{W_j} \cdot \frac{W_j}{W_A} \frac{H_j}{H}. \tag{8}$$

We can compare this index with some alternative measures of wages. According to figures 4 and 6, persons with high wages and hours are those with the smallest proportional changes in wages. Thus proportional changes in the aggregate wage will understate the percentage change in an average of *individual* wages given by

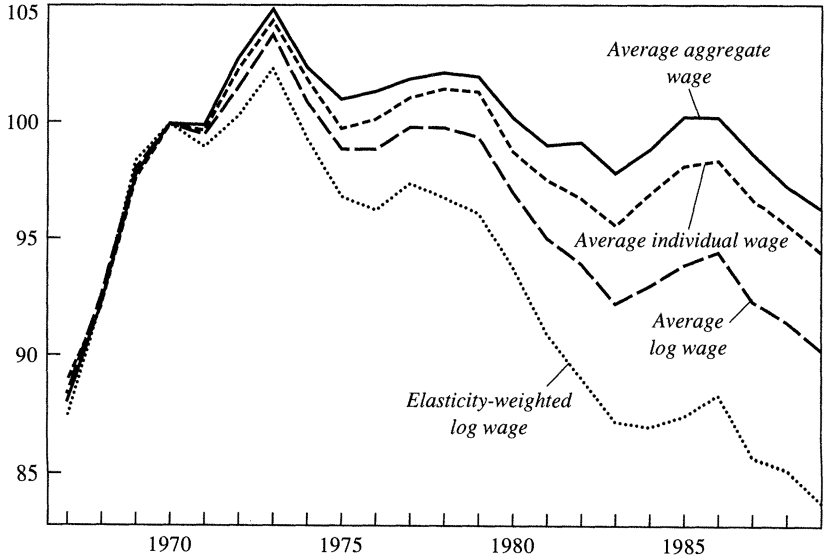
$$\frac{d\overline{W}_I}{\overline{W}_I} = \frac{1}{N} \sum_j \frac{dW_j}{W_j} \frac{W_j}{\overline{W}_I}. \tag{9}$$

Even equation 9 gives disproportionate weight to high-wage persons, for whom percentage changes in wages were smallest during the period of our data. By contrast, changes in the average of log wages provide an unweighted average of percentage changes in wages:

$$d(\log W) = \frac{1}{N} \sum_j \frac{dW_j}{W_j}. \tag{10}$$

The upper three curves in figure 14 show wage indexes calculated from average hourly wages, the average across individuals of hourly wages, and the average across individuals of log wages. As expected, the first method shows the least evidence of secular wage flexibility, and the third method shows the most. By 1989, average hourly wages based on equation 9—which gives greater weight to high-wage persons—were

Figure 14. Alternative Aggregate Wage Indexes, 1967–89
Index, 1970 = 100



Source: Authors' calculations from March CPS. See the text for a detailed description of the calculations. Each wage measure is expressed as an index, with 1970 = 100.

about 3 percent below their 1970 level. By contrast, the average of log wages—for which changes are equivalent to unweighted percentage changes in wages—had declined by about 9 percent. Since studies of aggregate labor supply try to isolate the work incentives facing the typical worker, this means that aggregate wage data substantially understate the amount of wage flexibility that has affected those incentives. They therefore overstate the elasticity of labor supply that is necessary to make wage and employment data conform to a market-clearing model. Notice that it is necessary to use microdata on individuals' wages to obtain this result.

Our previous results indicate that even the third method, calculating average log wages, may understate the extent of *relevant* wage flexibility. Since the labor supply functions that we estimated are clearly nonlinear, changes in average labor supply cannot be determined from changes in average log wages. Instead, the relevant aggregate index should weight individual wage changes by relative elasticities of labor supply. Then, low-wage workers—who are more sensitive to wage

changes—are given greater weight when calculating the aggregate index. We perform that calculation using the regional IV estimates shown in table 9. The result is the lowest curve in figure 14. It shows that the wage index relevant for gauging labor supply decisions fell by 18 percent between 1973 and 1989, with more than half of this decline concentrated in the years between 1977 and 1983.

To the extent that we have properly gauged labor supply, these results imply that the use of microdata is essential to study the role of wages and time series changes in labor supply. Usual methods, which use aggregate data on wages, miss the large changes in work incentives that have occurred since 1970.

Conclusions

Rising rates of joblessness during the recent past have presented a puzzle for students of labor market performance. Standard macroeconomic models, which have focused mainly on the cyclical behavior of wages and unemployment, are clearly inappropriate for the longer run, when wages are demonstrably flexible and labor markets are more likely to clear. And extensions of natural-rate theories that allow changes in the pace of labor reallocation to affect unemployment have little or no support in the data.

We have shown that virtually all of the trend toward rising male joblessness in the United States is accounted for by the rising unemployment and nonparticipation of less skilled persons. For this group, increases in nonemployed weeks are mainly attributable to an increase in the incidence of very long spells of nonwork. In a reduced-form sense, there is little doubt that rising unemployment and nonparticipation are demand driven. Since the mid-1970s, wages fell substantially within the skill categories in which employment declined, while groups with stable wages had relatively stable employment rates. We pressed further by asking whether these changes were consistent with a simple market-clearing structure of stable labor supply and changing demand. Early in the period we consider, it clearly is not. Wages and nonemployment increased together at the end of the 1960s, indicating that labor supply fell during this period. But since that time, changes in wages for less skilled

groups appear to determine changes in working time among prime-aged men.

In many interpretations, the natural rate of unemployment is a fixed number toward which the labor market tends to gravitate. Our results challenge that view. Like Phelps' interpretation, our results indicate that the natural rate varies with labor market conditions.[39] A long-run decline in the demand for various types of labor may increase the natural rate because the rewards to employment decline for marginal workers. Our results also imply that current unemployment rates have a far different meaning than comparable rates from the not-too-distant past. The composition of unemployment has shifted toward less skilled workers, who suffer comparatively long spells of joblessness and whose rewards from work have fallen sharply. In both these respects, they resemble the growing class of men who have simply withdrawn from the labor market.

Our analysis has focused on reduced demand as the factor changing the returns to work. Yet declines in the "quality" of workers over time could generate similar results. For example, if more recent cohorts have larger proportions of low-productivity workers, perhaps because of the declining quality of schools, then workers from these cohorts will face lower demand for their services. The wages they command will lower, and they will work less. Two pieces of evidence argue against this. First, average schooling levels have increased through time, suggesting higher productivity for more recent cohorts. Second, wage inequality and joblessness have increased *within* cohorts and at all experience levels. To attribute these changes to the declining quality of the work force, it is necessary for skills to depreciate within each cohort. We are not aware of any evidence suggesting that this occurred.

Even so, a decline in the demand for less skilled workers can affect the quality of the work force. Rising returns to skill—especially obvious in the returns to education during the 1980s—increase incentives for human capital investment. These incentives would raise the average productivity of the work force in the long run. On the other hand, our evidence shows that many workers with very low skills have either left the labor force completely or spent long periods without jobs. If joblessness

39. Phelps (1974).

itself generates declining market skills, either through depreciation of human capital or reduced on-the-job training, then the effects of reduced demand on work incentives will be reinforced.[40] As a result, even an increase in the demand for less skilled workers could not quickly reproduce the low jobless rates of the past. Past patterns of demand have altered the economy's stock of human capital, raising future natural rates of unemployment and nonparticipation.

40. Another possibility is that persistent joblessness encourages investment in "nonmarket" human capital, which would cause a shift in labor supply. Our evidence that the relationship of wages to time worked has been stable since the early 1970s casts doubt on this effect.

Comments and Discussion

Janet L. Yellen:[1] The authors have written an excellent paper. Chinhui Juhn, Kevin Murphy, and Robert Topel use 23 years of records from the Current Population Survey to compile a detailed portrait of nonwork among men who are not in school and who have 1 to 30 years of work experience. The data reveal a large secular increase in nonwork, which takes two forms—more time spent out of the labor force and more time spent unemployed. They show that most of the increase—both in unemployment and in nonparticipation—is concentrated in long spells. In data on work experience for the preceding calendar year, the increase in nonwork is largely accounted for by a growing number of people who did *no work at all*. The increase in nonwork occurred almost exclusively among the low skilled, whose wages simultaneously declined. The authors conclude that the movements in nonwork represent a labor supply response, which is summarized by their estimates of labor supply elasticities. The labor supply response summarized by these elasticities, however, is not consistent with the standard model of labor supply, in which changing wages marginally change the labor supply of everyone. By contrast, the authors document dramatic changes in the labor supply of a few coupled with no change in the labor supply of the vast majority of the population. The increase in nonparticipation, for example, is not caused by the majority of men enjoying, say, 2.7 rather than 2.3 weeks of vacation; instead, this trend is entirely due to an increasing number of prime-aged men who are "consuming leisure" for all 52 weeks of the year. While reading this paper, I found myself agreeing with the authors that the secular increase in nonwork is a labor supply response, but was

1. These comments were prepared jointly with George Akerlof. I wish to thank Jonathan Leonard for helpful discussions.

also puzzled as to why the response is so extreme and so concentrated among such a small minority. I wish that the authors had reported more detailed information, some of which is available in the Work Experience Survey, relating to such questions as: What is the nonwork these people do all day? How important are government transfers in enabling nonworkers to pay for what they eat? What are the alternative choices for nonworkers and their associated rewards?

My quibbles with the authors' methodology and findings are minor. I believe that they have described the corpse and provided a convincing autopsy. However, the murderer remains at large, although some of the less likely suspects (such as more rapid sectoral shifts) have been cleared of suspicion. An interpretation of these facts that goes beyond the bland statement that workers are moving along their supply curves is needed to form judgments about the significance of this phenomenon. Among the usual suspects are the following: the destruction of jobs providing rents to low-skilled workers, who wait for good work rather than accept the poor jobs that are available; the rising availability of disability insurance, and a greater willingness of low-skilled workers to withdraw from the labor force in order to establish eligibility; the increased earnings of spouses and other family members, which may permit men who are ill or have poor opportunities to remain out of work; and, perhaps, an increase in unreported income from illegal activities. These factors may jointly explain the increase in long-term unemployment as well as the declines in labor force participation among low-skilled men.

The authors document that the increase in joblessness of the past two decades takes two forms: more spells of long-term unemployment and more long spells of nonparticipation. They argue that, because of their similarity, these two forms of nonwork can be aggregated in estimating a labor supply curve. There is reason, however, to question this aggregation. Individuals with long-term unemployment spells appear to be desirous of work. They typically have some work experience during the year; for example, the numbers in the authors' table 3 show that 75.6 percent of the increase in long-term unemployment (more than 26 weeks) from 1967–69 to 1987–89 occurred among those who had some employment (at least 1 week) during the year. According to the Work Experience Survey, inability to find work is the major reason for part-year employment. For example, the Work Experience Survey of 1988 shows that 62.8 percent of nonretired males who were older than 16,

were out of school, and had minimal weeks of employment (only 1–13 weeks) considered inability to find work the major reason for part-year employment. By contrast, 94.4 percent of the increase in nonparticipation in spells of more than 26 weeks occurred among individuals who did no work at all during the year. Although the authors emphasize that an increasing share of these full-year nonparticipants are discouraged workers, a considerable majority are ill or disabled. Sixty-nine percent of full-year nonworkers aged 16 and older who were neither in school nor retired (including not only nonparticipants but those with some unemployment) gave illness or disability as the major reason for nonwork in the 1988 Work Experience Survey. Thus, contrary to the authors' conclusions regarding the similarity of the unemployed and nonparticipants, there is reason to believe that the two are distinct populations.

A simple explanation of the increase in long-term unemployment centers on the disappearance of rent-paying jobs. Lawrence Summers has hypothesized that many of the long-term unemployed are individuals who were displaced from "good jobs" that paid high rents.[2] An earlier paper by Murphy and Topel showed the extent to which new entrants to the labor force are more likely now than in the past to go into service-sector jobs, which have relatively low pay, rather than into manufacturing jobs, with relatively high pay.[3] Why should the decline in the number of rent-paying jobs in manufacturing as well as in other industries cause an increase in unemployment? When there is wage dispersion, so that both good and bad jobs are available for workers with given skills, some workers will choose to remain unemployed, searching for good, rent-paying jobs, rather than work at the poor jobs that are readily available. Conceivably, the long-term unemployed would accept bad jobs if they were convinced that no good ones would ever appear; but as long as there is hope of obtaining a good job, as occurs when there is some turnover in rent-paying jobs, they may prefer to wait. A decline in the availability of such rent-paying jobs, as has occurred in the period covered by the authors' data, tends to increase long-term unemployment because people have to wait longer to get good jobs, which are rationed. This view of long-term unemployment is consistent with the authors' finding that long-term unemployment declines in booming regions where wages

2. Summers (1986).
3. Murphy and Topel (1987).

are rising. Using similar regional data Summers found little relationship between changes in regional unemployment rates and regional employment growth but found a strong negative relation between regional unemployment and employment growth in high-wage industries (that is, in those industries that pay Krueger-Summers–Dickens-Katz wage premiums). In contrast to the authors' view that labor markets for low-skilled workers are clearing, this explanation of higher long-term unemployment combines market-clearing and non–market clearing aspects. The long-term unemployed are searching for work for which they are qualified. In this interpretation, unemployment is a response to wage dispersion rather than to wage levels, contrary to the authors' labor supply function, in which labor supply depends *only* on wage levels.

Now let me turn to the reasons for the increase in nonparticipation. The evidence in the authors' table 2 suggests that the rise in long-term nonparticipation among preretirement males is associated with illness and disability. Indeed I was surprised that the authors pay so little attention to the conventional wisdom[4] that the increased availability of disability benefits is responsible for the secular increase in the labor force nonparticipation of prime-aged males that is documented in this paper. The receipt of disability benefits requires virtually complete withdrawal from the labor force. An individual is only considered disabled if he or she is unable "to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or which has lasted or can be expected to last for a continuous period of not less than 12 months."[5] A worker who earns more than $300 per month is presumed to be capable of substantial gainful activity. In addition, SSI (Supplemental Security Income) beneficiaries have a cap on their income of $4,416 a year.

A wealth of evidence points to the increase in payments for illness and disability as the cause for increased nonparticipation in the labor force. These payments explain how those who do no work are able to eat. Over the past 25 years there have been vast increases in the scale of income support programs for the ill and the disabled. For example, between 1966 and 1989 the number of workers under age 50 who received disability on OASDI (Old Age Survivors and Disability Income)

4. See, for example, Leonard (1979) and Parsons (1980).
5. *Social Security Bulletin*, July 1989, p. 11.

Table 1. Average Number of Weeks Spent by Prime-Aged Males in 52-Week Spells of Nonemployment, by Reason

				Reason for not working			
Period	*Authors' total*[a]	*Period*	*New total*[b]	*Illness or disability*	*Taking care of home*	*Unable to find work*	*Other reason*
1967–69	0.91	1968	1.08	0.91	0.00	0.07	0.10
1977–78	1.79	1978	2.08	1.50	0.06	0.25	0.27
1987–89	2.36	1988	2.78	1.75	0.12	0.60	0.31

Source: Bureau of Labor Statistics (1970, tables D-2 and A-1), Bureau of Labor Statistics (1980, tables D-2 and A-1), and unpublished data from the Work Experience Survey of the Population in 1988 (Department of Labor).

a. The column shows the average number of weeks spent in 52-week spells of nonwork per male in the authors' sample, calculated from table 3 in their paper.

b. The column shows the average number of weeks spent in 52-week spells of nonwork per male aged 25–54, for men who were not in school and not retired.

increased from 213,000 to 745,000. This increase of more than 500,000 accounts for almost half of the rise in the time spent out of the labor force documented in tables 1 and 3 of the paper. The 2.39 percent increase in the rate of nonparticipation implies that the number of nonparticipants (at any given time) has increased by roughly 1.2 million. In addition to OASDI, there are other programs that provide support to the ill and disabled. SSI provided income for 523,000 disabled males under age 54 in May 1986. Of these, an estimated 160,000 also collected OASDI and hence should not be double counted. The total number of individuals who received SSI as result of disability rose by 138 percent in the 15 years from 1974 to 1989. In addition to disability payments under OASDI and SSI, payments in compensation for lost income under State and Federal Workers' Compensation increased 13-fold (in nominal terms) from $1.214 billion in 1965 to $16.461 billion in 1986. As Donald Parsons and Jonathan Leonard have both argued, the close time series relation between the extent of disability support and the rate of nonparticipation by prime-aged males strongly suggests a causal relationship. Moreover, Parsons showed that the recipients of such support were primarily low-skilled individuals.

Furthermore, individual responses to questions in the Work Experience Survey are consistent with the view that a large fraction of labor force withdrawal is due to illness or disability. My table 1 presents a decomposition of the reasons for nonwork of prime-aged males (who were out of school and nonretired) who did no work in the previous calendar year. The numbers show the average number of weeks not worked *per prime-aged male* that resulted from 52-week nonwork spells by reason.

Data are presented for three years. For their sample, the authors found that the average number of weeks of nonwork in 52-week spells had increased from 0.905 in 1967–69 to 1.788 in 1977–78 and to 2.364 in 1987–89. (Juhn, Murphy, and Topel's numbers, which can be calculated from their table 3, are shown in the second column of my table.) For my slightly different sample, of 25- to 54-year-old males, I found a similar increase, from 1.08 weeks in 1968 to 2.08 weeks in 1978 to 2.78 weeks in 1988. Of the 1.7 week increase between 1968 and 1988, 49.4 percent was accounted for by increases in illness and disability; 31.2 percent by increased inability to find work; 7.1 percent by increased taking care of the home; and 12.4 percent was due to other reasons. This table supports the authors' contention that in the 1980s less of the increase in nonparticipation is explained by disability than was explained in the 1970s, presumably because of the tightened eligibility rules for disability insurance. Indeed these differences between the 1970s and 1980s support the view that nonparticipation is affected by disability incentives. Thus the increased availability of disability payments over the whole period, in all likelihood, accounts for a significant part of the increase in nonparticipation.

In sum, the reported reasons for increases in nonwork in the Work Experience Survey support the conventional view that a variety of transfer programs underlie the increased nonparticipation of younger men. The authors point to the finding in their table 2 that the fraction of nonparticipants who could not find work had increased over time; they fail to remark that about half of the increase in nonparticipation was due to increasing numbers of those reported ill or disabled.

Does all of this agree with the authors' interpretation that the increase in nonwork is a labor supply response to declining wages? I have no quarrel with the idea that "illness" is an occupation—for many, an occupation of necessity, but for others an occupation of choice when other opportunities are quite poor. Thus I would not be surprised to find that when wages get worse (as they did for low-skilled people over the past 20 years), many people, who may have serious medical problems, become not just sick but sick of work. Nor is it surprising that when times get better, so that opportunities improve, as they did in the Massachusetts miracle, fewer people took this option. This provides a reasonable interpretation of the authors' "labor supply curve." It also explains their remarkable finding that all of the increase in nonparticipation is concen-

trated in 52-week spells. However, the jury is still out on the question of whether the increase in disability reflects shifts of the labor supply curve of disabled individuals or movements along their labor supply curves. The beginning of the authors' sample period coincided with a considerable loosening of the eligibility requirements for disability including looser definitions of disability.[6] Finally, the authors' table 8 shows that among the bottom decile of men, the labor force participation of spouses has not increased significantly. But income from other sources, from increased transfer payments or perhaps higher earnings of female family members, has increased by 50 percent. This increased income from other sources may have allowed men the luxury of being out of the labor force when sick or disabled or of being among the long-term unemployed when displaced from rent-paying jobs.

My major technical quibble concerns the authors' estimates of labor supply elasticities, which are higher than those usually obtained. My previous comments suggest that these elasticities are biased upward. Consider the cross-section estimates: I have argued that low-wage people are disproportionately sick people; these individuals work less than others in part because they are less healthy, not only because they have lower wages. The regional regressions may overstate labor supply elasticities for a different reason: as times get better, not only do wages change, but good jobs, which attract people into work, also become more plentiful. This reduction in rationing, as well as the increase in wages, may account for the cross-regional employment responses observed by the authors.

Martin Neil Baily: This is a first-rate paper. The story that Chinhui Juhn, Kevin Murphy, and Robert Topel tell is a very convincing one. The demand for low-skilled workers has declined, thereby lowering the relative wage of this population group. The workers at the bottom of the skill distribution have responded by reducing their labor supply. In many cases this has meant dropping out of the labor force altogether. The data do not fit the alternative hypothesis that labor supply alone has shifted. For example, if the driving force behind the change in the natural rate of unemployment had been an increase in the availability of

6. Bound (1989, p. 482).

transfers, the relative wage of the people at the bottom would have risen as their supply was reduced. Yet we have seen a decrease.

If one worked hard enough, it might be possible to explain the observed pattern on the basis of a decline in labor quality at the lowest end of skill distribution. This could simultaneously lower the relative wage of this group and lower its labor force participation. But this alternative is not convincing because the widening of the wage distribution has occurred not just at its lower end or in the distribution for young people. It affects other quintiles and cohorts. Within any demographic group, one sees the same patterns. Thus, it is very hard to tell a coherent story that does not involve some substantial shift in labor demand.

Having said that I think the overall story is convincing, let me at least voice some reservations about the details. First, I was troubled by the authors' assumption that skill can be measured by percentile of the wage distribution. There are, after all, independent measures of skill, education, and experience. The price of the skill and the skill itself are different things, and I would like to have seen these factors separated out or the authors give a little more justification for their procedure.

Second, figure 6 shows that during the early period, from 1967 to 1970, workers in the bottom decile actually improved their relative position by quite a bit. This means that if low-skilled workers had been forming expectations in the mid-1960s about the wages they could expect, either by being in the work force themselves or by being in school and looking at the labor market experience of older siblings, they would have found their actual wages from 1970 to around 1974 higher than expected. Yet figure 5 shows that the pattern of employment deteriorates quite rapidly starting in 1967. This discrepancy suggests that something was raising nonemployment rates for this group *before* any deterioration of the relative wage.

Third, it would have been helpful for the authors to have spelled out a more complete supply and demand framework, even if they could not estimate all of the structural parameters. They conclude that the rise in nonemployment resulted from a shift in demand, but important changes on the labor supply side should also have been accounted for. For example, major demographic shifts have occurred. The baby boom caused a temporary surge of entrants into the labor market. These workers presumably compete with people at the lower end of the wage distribution

who may be much older. Moreover, the influx of women into the work force during this period may have worsened the competitive position of low-skilled workers.

Their analysis does not say much about the cross elasticities of demand for workers with different skill levels. At first glance, there is a case for including the relative wages of other types of workers in an equation explaining the demand for some particular type of worker. Even on the supply side, I think there might be a case for including relative wages as a determinant of labor supply. I have a vested interest in their method, because in 1977 James Tobin and I estimated a Phillips curve—a form of labor supply—that suggested relative wages might be a relevant variable.

This same issue takes me to the authors' labor supply schedule (the bottom panel of figure 4). If one considered what labor supply would have looked like 50 years ago, or what it would look like in Southeast Asia or in Latin America today, one would not expect the people at the bottom of that wage distribution to be reducing their labor supply. In fact, hours of work were higher 50 years ago, even for very low-wage workers. One reason might be that relative wages are an important determinant of labor supply. In a society where people can earn 20 times what the lowest-paid worker earns, a low-skilled worker might think twice about taking the menial low-wage jobs. An alternative variable that could explain why today's labor supply schedule is in a very different position from the schedule of 50 years ago was suggested by Janet Yellen and by other discussants, namely that alternative sources of income are available to low-wage workers.

Juhn, Murphy, and Topel discuss the macroeconomy, and in the end I agree with them that deficient aggregate demand is not a convincing explanation for the rise in nonemployment. Nonetheless, I suspect that other observers of the labor market may be less convinced. If instead of talking about the natural rate of unemployment, one were to use the NAIRU, the nonaccelerating inflation rate of unemployment, then an increase in the NAIRU could come about because of some change in the inflationary environment. Inflationary shocks, supply shocks, or energy price shocks might cause a higher NAIRU than expected. The tests that the authors give, although useful, were not as transparent to me as they might have been. Some sort of Okun's law relation might have been

helpful. One could pose the question: What would unemployment rates have been if GNP had been higher relative to some measure of potential GNP?

The authors' discussion of wage flexibility struck me as a little deceptive. There is a difference between the wage flexibility for a given job and the wage flexibility within a cohort of workers. In discussions of wage stickiness in the macroeconomic context, wages for a job are normally considered. The issue is a short-run phenomenon: when aggregate demand falls, or demand in a particular sector falls, then the wages of those individual jobs are not very flexible. In fact, recent work, particularly by Larry Summers and various coauthors, has shown that relative wages within an industry are extraordinarily persistent.

This form of wage flexibility differs markedly from the wage flexibility associated with the willingness of entering cohorts or existing cohorts to accept the available jobs at the going wages. And the authors have shown that there is considerable cohort flexibility, since the wage distribution has widened so much. But, in a way, the findings of this paper suggest limits to that flexibility, too. The authors' own labor supply schedule, which is very flat at the bottom, points to little flexibility at the lower end of the distribution. Workers are willing to accept low wages down to a certain point, but beyond that they reduce their labor supply.

Another issue that I thought could have been mentioned was wage gradients—the extent to which low-wage jobs have higher rates of wage growth. In 1973, a big debate was spawned by Martin Feldstein, who commented on the high natural rate of unemployment in the U.S. economy up to that point. Much of the evidence he used involved a comparison of the relatively unfavorable U.S. labor market conditions with the relatively favorable conditions in Europe. He cited the minimum wage as a major reason why the United States had high unemployment and high nonparticipation among teenagers.

The argument that Feldstein made was forceful. He said that the minimum wage prevented low-skilled workers from taking very low-wage jobs with prospects for advancement. If this argument had been correct, allowing wages at the bottom of the distribution to fall would actually have increased the amount of employment and would have decreased the amount of unemployment. The real minimum wage in the United States has been falling, at least until the past couple years, as a result of rising prices and a stable nominal minimum wage. So a greater opportu-

nity existed for low-skilled workers to take jobs that had on-the-job training, thereby enhancing their skills and moving up the wage distribution. That has not worked out.

My final comments concern adjustments or responses to the relative wage changes that have been documented in this paper. In an efficient market with flexible workers and flexible technology, one would have expected adjustments on both the demand and supply side of the labor market that would have ameliorated the wage inequality and the rise in nonemployment. One reason given for the decline in the demand for low-skilled workers is that there has been technological change favoring skilled workers. However, the direction of technological change is not immutable. Employers must realize that low-skilled workers have become very cheap in our economy, a realization that could have induced endogenous change, such as new easy-to-operate machines or software that economized on the need for skills. The fact that retailers now have cash registers with pictures of the products, or with laser scanners to enter data, is an example of exactly this phenomenon. But clearly this response has not been fast enough to prevent the relative wage changes.

In addition, and perhaps more important, one would expect utility-maximizing individuals to make different decisions concerning their skill accumulation in response to the changing rewards for skills. Again, some of that has been happening. Enrollments in various kinds of colleges and schools have been rising as people have decided that skills are needed to earn a decent standard of living. But again, that adjustment has not happened at the appropriate rate.

The weakness of the response of low-skilled workers to the decline of their relative wages suggests possible pathologies at the lower end of the labor market. Why is it that an appropriate upgrading of skills has not taken place? Breakups of families, drugs, and crime are among the factors that come up in conversation. It would be interesting to know more about the people who are reducing their labor supply or dropping out of the work force completely. To the normal reader of *Time* and *Newsweek*, this paper reads as though it were written in a vacuum: Who are these people? What are they doing? And how does it relate to any of the prominent social problems in this country?

One issue that comes to mind is immigration. I remember Mike Piore at a Brookings conference in 1980 warning of a pattern within the labor market in which first-generation migrants are willing to accept low-wage

menial jobs because those jobs are much better than the ones they had left behind. This pattern applies to emigrants from low-wage countries and to migrants from rural areas in the United States to urban areas. However, the next generation—the children of those workers—are not willing to accept the same menial jobs. They have become socialized to American expectations. Watching television may not just erode the brain, it may also socialize individuals to a certain view of what a living standard should be and what their role should be in society. So preferences shift with the generations, affecting the willingness of different generations to participate in the labor force.

Because the typical pattern of immigration has been changing, the problems that Piore described may well have become worse and may be contributing to the flatness of the labor supply schedule at its lower end. In the 1950s and 1960s immigrants came from Europe and many had skill levels that were as high as or higher than average. By contrast, in the 1970s and the 1980s immigrants have had lower skills than the average population. Faced with the evidence in this paper, it may be time to think about the wisdom of current immigration policy.

Juhn, Murphy, and Topel have painted a convincing and rather disturbing picture of recent trends in the U.S. labor market. Changes in technology or changes in product demand have left low-skilled workers holding the short end of the stick. Rather than upgrading their skills, these workers have reduced their labor supply. There is a serious mismatch between the skills of the work force and the skills needed for well-paying jobs.

General Discussion

Franco Modigliani wondered what the relationship is between the authors' concept of the natural rate and the usual definition, which is the unemployment rate below which inflation starts increasing. According to the usual definition the natural rate might actually have declined during the 1980s. Gary Burtless provided an alternative to Janet Yellen's view that the concentration of labor supply response in a relatively small group of individuals was evidence of involuntary unemployment. According to Burtless not all labor supply decisions should be viewed as marginal adjustments of hours worked in response to changes in the

wage rate. Deciding to retire a bit earlier is also a marginal decision. Yet in a Current Population Survey that only looks at one year of people's lives, this will look like a large nonmarginal change by a small number of people.

Burtless also commented on the role of transfers in explaining the long spells of unemployment. If transfers were responsible for the reported change in labor supply, they should have gotten gradually more generous over the period. However, this is not what happened in important categories of transfers. The disability insurance program, after being greatly liberalized between the mid-1960s and the mid-1970s, was then dramatically scaled back. Old age insurance and social security benefits were scaled back starting in 1979 and again in 1983. Similar things happened to unemployment benefits during the 1980s. Robert Topel agreed that availability of transfer income of various kinds could account for a supply shift. He judged that such a shift occurred by the early 1970s and that most of the observed movement after that reflected demand shifting along a fairly stable supply schedule. Robert Hall noted that the data can be interpreted in two main ways: one, suggested by the authors, is that technological change has shifted the composition of demand away from lower-skilled workers; another, presented by Hall in his comments on the Cutler and Katz paper in this volume, is that the quality of labor supplied by lower-wage workers has changed. Hall noted that the technology-bias story requires a low elasticity of substitution between skill groups to generate such a large change in relative wages. A priori he found this unlikely and mentioned the very high substitution found across age groups as evidence to the contrary. More contrary evidence is that the very large increase in the labor supply of women was accompanied not by a decrease but by a dramatic increase in the relative wages of women.

Hall emphasized that the postwar period can be divided into a long period of steady, fairly rapid growth in overall productivity and real wages for all income groups ending in 1970, followed by a period of general real wage stagnation, with a dramatic decline in real wages in the lower deciles. This suggested the need to explain why the early 1970s is the turning point, both with respect to wage patterns across skill groups and the evolution of real wages and productivity in general. Hall acknowledged that the divergence of wages across income groups within different cohorts is difficult to explain as the effect of television or

changes in the educational system affecting the development of skills, presumably among only the youngest cohorts. But he also found it implausible that technology simultaneously slowed in general and changed in a way that favored high-skilled workers. Richard Cooper, observing that almost all the discussion had focused on factors specific to U.S. industry and U.S. labor markets, noted that the slowdown in productivity after the early 1970s was a worldwide phenomenon, suggesting its explanation is likely to be worldwide, such as the baby boom or the increase in world oil prices. Hall mentioned the efficiency wage theory as still another explanation of the decline in the relative wages of the low paid. According to that theory, the more nonwork alternatives there are at the lowest end of the wage distribution, the less disciplinary effect is provided by a given wage level. Thus the growth of nonwork alternatives would not only make labor supply more elastic but would also reduce the effective quality of work.

Christopher Sims noted that most of the discussion assumed that the individuals in a given wage decile were essentially the same over time. He wondered whether the objective characteristics of the workers in various wage categories, such as age, race, and education, were constant across time. William Brainard noted that because the skills and attitudes of workers are not accounted for in the authors' methodology the relationships cannot be thought of as conventional labor supply schedules, which describe the labor supplied by an individual or group with fixed characteristics as wages vary. Sims also wondered whether individuals tended to stay in the same wage category through time. This would be relevant in the assessment of Yellen's story about people queuing up for good jobs. Topel suggested that Yellen's argument that people have to wait longer to find a good job does not appear consistent with the fact that one cannot explain very much of the change in income inequality by shifting shares of employment between high- and low-wage industries. He noted that an increase in the variance of wages could also be due to a change in the distribution of good and bad jobs within industries. Blinder noted that if it is primarily the workers with the lowest wages who are pulled out of the work force, this should push up average wages, which is not what happened in this period.

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