# New Estimates of the Natural Rate of Unemployment

Stuart E. Weiner

R educing inflation is one of the principal goals of monetary policy. In assessing the outlook for inflation, policymakers try to gauge the amount of slack in the economy. As long as the economy's resources are not pushed beyond capacity levels, inflation tends to remain under control.

In labor markets, capacity is measured by the "natural rate of unemployment." A theoretical concept, the natural rate is defined as that rate of unemployment at which there is no tendency for inflation to change. When the demand for workers is so strong that the actual unemployment rate falls below the natural rate, inflation increases. While the natural rate of unemployment is inherently difficult to estimate, many analysts believe it currently is about 5 3/4 percent. Thus, with today's actual unemployment rate nearly a full percentage point higher, there would appear to be little immediate risk of a surge in inflation.

The natural rate of unemployment is influenced by many demographic and structural forces. By most estimates, the natural rate has been trending downward over the past decade as the share of young, inexperienced workers in the

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labor force has declined and the growing number of women in the labor force have gained experience and tenure. And there is some reason to expect this downward trend to continue in the future. Baby-boom workers continue to mature, and women continue to be further assimilated into the labor force. At the same time, there are possible offsetting demographic forces. The share of young workers is expected to stabilize, and the work force will become racially more diverse. In addition, a number of structural forces could boost the natural rate of unemployment, including defense industry cutbacks, higher white-collar unemployment, and a growing gap between high-tech job requirements and low-tech worker skills.

This article presents new estimates of the natural rate of unemployment that incorporate these demographic and structural forces. The first section provides an overview of the natural rate concept and discusses the various demographic and structural forces at work in the 1980s and 1990s. The second section incorporates these forces into estimates of the natural rate. The estimates suggest that the natural rate of unemployment is currently near 6 1/4 percent and could move even higher depending on the extent and persistence of structural disruptions. Thus, the near-term inflation risk may be higher than generally perceived.

## OVERVIEW

The natural rate of unemployment is a key concept in macroeconomic theory and policy. It represents the lowest possible unemployment rate that is consistent with stable inflation. Because the natural rate reflects imperfections in labor markets, it is not immutable and will change in response to labor market developments. Several demographic and structural forces have been impacting labor markets in recent years.

### The natural rate

When the economy is at the natural rate of unemployment, inflation tends to be constant from one year to the next. Individuals come to expect this inflation rate and base their decisions on it. For example, as labor contracts expire and new ones are negotiated, workers and firms will find it unnecessary to adjust wages.

Any attempt to use monetary or fiscal policy to reduce unemployment below the natural rate ultimately results in higher inflation. Under such a scenario, aggregate demand increases, prices rise, but wages initially lag behind. As a result, firms have an incentive to hire more workers to produce more output and the unemployment rate declines. The decline in unemployment is temporary, however, because workers eventually demand higher wages. The increase in inflation, in contrast, is permanent.

There is nothing "natural" about the natural rate of unemployment. The term is a misnomer.[1] For example, it is misleading to think of the natural rate as full-employment unemployment. It is equally misleading to think of it as optimal unemployment. Indeed, the relatively high level of the natural rate reflects several labor market imperfections.

One set of imperfections involves worker-job mismatches. Job vacancies may exist but go unfilled because available workers lack the required skills. Alternatively, workers may have the required skills but live in the wrong locations. Or they may have the required skills and live in the right locations but are unaware of the vacancies due to poor information flows.

A second set of imperfections might be termed institutional barriers. Included are various laws and social practices that prevent labor markets from operating as efficiently as possible. Three examples are minimum wage laws, overly restrictive regulations, and racial and sexual discrimination.

A third, final set of labor market imperfections involves workers' preferences. The disincentives associated with various public transfer programs comprise one subset. An individual receiving unemployment compensation or welfare payments may have little incentive to search for or accept a job paying only a marginally higher income.[2] Excessive wage demands constitute a second subset. When workers' real wage demands exceed productivity gains, firms may have an incentive to substitute away from labor.

While all unemployment at the natural rate inherently reflects imperfections in labor markets, some of this unemployment is nevertheless beneficial. This component, the frictional component, represents normal turnover and job search, two key ingredients in a dynamic economy. But an unemployment rate in the vicinity of 5 3/4 percent—where many estimates of the natural rate currently cluster—clearly exceeds this frictional level. At a natural rate this high, valuable human resources are wasted and valuable output is lost.[3] Unfortunately, demographic and structural forces are unlikely to lower the natural rate in coming years.

### Demographic forces

Shifts in the composition of the labor force have a powerful effect on the natural rate of

unemployment. As groups with relatively high unemployment rates become more prominent in the work force, the overall unemployment rate consistent with constant inflation rises. For example, most analysts believe the natural rate rose in the 1960s and 1970s as a growing share of women and youths entered the labor market.

Since 1980, however, demographic trends on balance have been favorable due primarily to a sharp decline in the share of youths in the labor force. In 1980, young people aged 16 to 24 accounted for nearly 24 percent of the labor force (Table 1). By 1992, their share had fallen to 16 percent. Because young workers traditionally have higher unemployment rates than older workers, the decline in their relative share would be expected to lower the natural rate.

Why do youths have higher unemployment rates than older workers? Part of the reason is that their frictional unemployment rates tend to be higher. Young workers are more likely to be entering the labor force for the first time and, as such, may want to take some time to explore their employment opportunities. But young people may also be more vulnerable to some of the underlying labor market imperfections. Newly entering youths, for example, are more likely to face minimum wage barriers. And because they have not had an opportunity to receive on-the-job training, they are more likely to face skill mismatch problems.

At the same time the labor force has been aging, its racial composition has been changing. In 1980, nonwhites accounted for 12.5 percent of the work force. By 1992, their share had risen to 14.5 percent. Because nonwhites traditionally have higher unemployment rates than whites, the increase in their relative share would serve to raise the natural rate. However, any increase would likely have been more than offset by the much sharper decline in the youth labor force share.

The disparity between white and nonwhite unemployment rates remains something of a

*Table 1*

## Labor Force Shares

|  | 1980 | 1992 | 2000* |
|---|---|---|---|
| Men 25+ | 44.7 | 46.0 | 45.0 |
| Women 25+ | 31.6 | 37.9 | 39.5 |
| Youths 16-24 | 23.6 | 16.1 | 15.6 |
| White | 87.5 | 85.5 | 84.2 |
| Nonwhite | 12.5 | 14.5 | 15.8 |

* Projected

Source: U.S. Department of Labor.

mystery (Weiner 1984; Stratton). Some of the difference can be attributed to differences in mean characteristics. For example, studies indicate that, at least for some sample groups, nonwhites on average tend to have less education, less experience, and lower skill levels, all of which could contribute to heightened worker-job mismatch. But differences in mean characteristics explain only a portion, in some cases a very small portion, of the disparity. Other factors must be at work. Possibilities include discrimination and differences in family background, quality of education, and job information networks.

Whatever their sources, white-nonwhite unemployment rate differentials are unlikely to disappear in coming years. And they are likely to have a greater negative impact on the natural rate. According to U.S. Department of Labor projections, the share of nonwhites in the labor force will rise 1.3 percentage points by the end of the decade.[4] At the same time, the share of youths will essentially stabilize, falling only 0.5 percentage point. Thus, demographic trends will do little to lower the natural rate.

## Structural forces

The natural rate is not likely to be lowered by structural forces, either. Defined as factors that alter the natural rate of an existing set of workers (as opposed to demographic factors, which alter the set of workers themselves), structural forces have probably raised the natural rate in recent years. And they may continue to do so in the future.

One potential source of a rise in the natural rate is the changing industrial mix of U.S. jobs. From 1980 to 1992, the share of employment in goods-producing industries fell from 29 percent to 23 percent, continuing a long-term shift toward services. To the extent goods-producing employees have been displaced and possess skills that are not transferable, skill mismatch has increased. Especially vulnerable are adult men, who account for a disproportionate share of goods-producing employment.[5]

Similarly, a widening gap between high-tech job requirements and low-tech worker skills may be contributing to a higher natural rate. Firms in all industries are intensifying their automation and computerization efforts. Many are upgrading their job skill requirements and reducing their demand for low-skilled workers (Cappelli; Juhn and others). Unfortunately, there is little evidence that the overall quality of the U.S. work force is increasing commensurately. Recent reports on adult illiteracy, for example, are discouraging (National Center).

A third, related structural force likely raising the natural rate of unemployment is "downsizing" by firms. Many U.S. companies have been aggressively trimming their work forces in recent years. Indeed, this phenomenon has become so widespread and so widely reported that the terms "business restructuring" and "white-collar unemployment" have entered the popular parlance. The reasons for this downsizing are many. In some cases, firms have come under stiffer foreign competition. In others, deregulation has in-

tensified competitive pressures. And in still others, the defense wind-down has had a major impact.

A common factor running throughout this downsizing is the interaction between rising labor costs and technological advances. Despite moderation in wage and salary increases, labor costs have remained high because of the escalating expense of employer-funded medical benefits. According to one study, the cost of labor has more than tripled relative to the cost of capital since the mid-1980s (Harper). As a result, firms have had an added incentive to take advantage of new, labor-saving technologies and to be conservative in adding new employees.[6]

Some or all of these structural forces are presumably reflected in the rise in permanent joblessness in recent years. Permanent job loss as a percent of total job loss has been trending upward since 1980 (Chart 1). It currently stands at a series high.[7]

## ESTIMATES

The natural rate of unemployment cannot be observed but must be estimated. This section presents estimates through the end of the decade. Demographic and structural forces are incorporated sequentially. As anticipated, the results point to the natural rate remaining at a high level.

## Estimation approach

A four-step procedure is followed in estimating the natural rate of unemployment. First, a statistical equation relating inflation to labor market slack—a so-called "Phillips curve"—is estimated. Labor market slack is measured by the unemployment rate of a reference group, married men. Second, the natural rate of unemployment for married men is calculated. This is accomplished by solving the estimated Phillips curve

Chart 1

**Permanent Job Loss as a Percent of Total Job Loss**

Percent
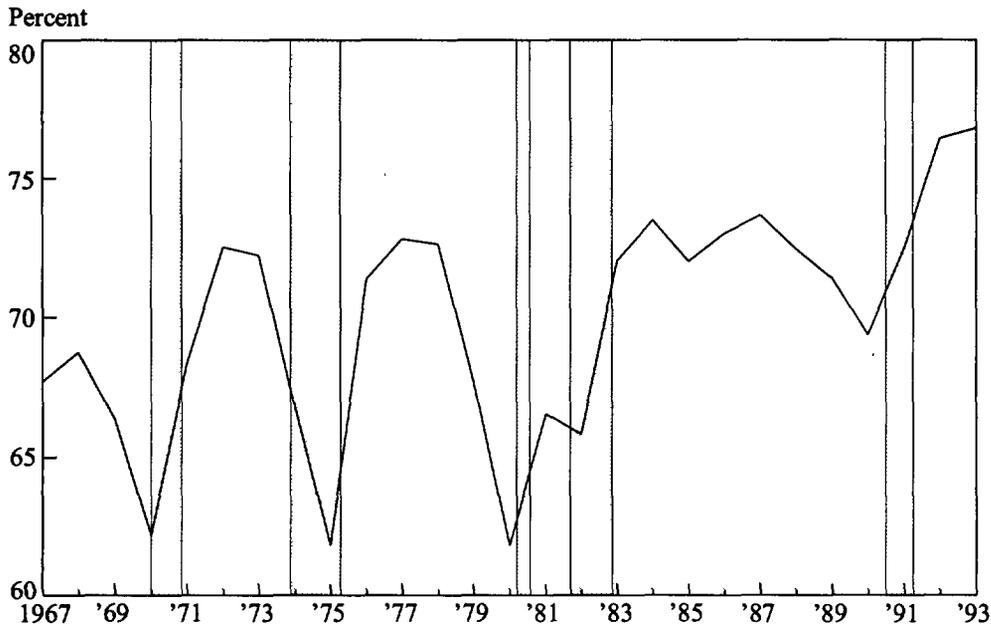


Note: Recessions are shaded. Data for 1993 are through September.
Source: U.S. Department of Labor.

for the unemployment rate for which inflation is not changing. Third, based on regressions relating the unemployment rate of married men to the unemployment rates of 20 different population groups disaggregated by age, sex, and race, the natural rates for these other groups are calculated. Fourth, these disaggregated natural rates are then weighted by labor force shares to construct an overall natural rate series.

Details of the estimation technique are provided in Appendix A. Two points are worth noting. First, in estimating a Phillips curve, it is desirable to have a measure of labor market slack that is consistent over time. The overall unemployment rate is not consistent—it is too sensitive to changes in the composition of the labor force. Hence, this study follows Blanchard

(1984) and Kahn and Weiner (1990) in using the unemployment rate of married men.[8] Second, it is important to recognize that all natural rate estimates are subject to statistical imprecision. Prudence suggests that any given estimate be viewed as the midpoint of a range of reasonable estimates.

### Demographically adjusted estimates

The first set of estimates controls for demographic changes. Plotted in Chart 2, these estimates indicate that the natural rate is currently 5.9 percent.

This demographically adjusted series is derived from a single Phillips curve estimated over

Chart 2
## Natural Rate of Unemployment
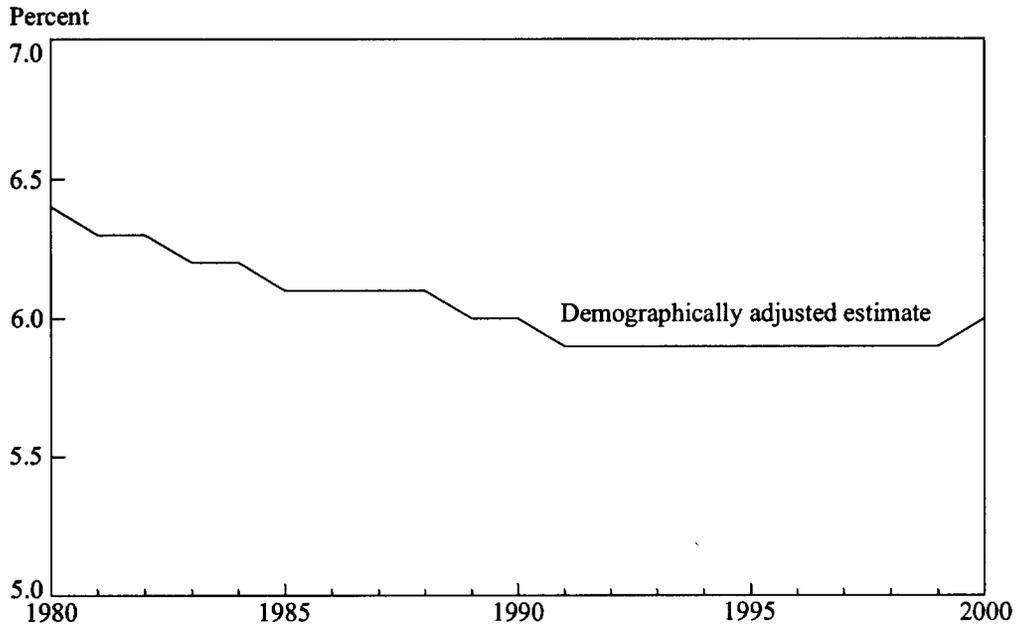
Percent



Source: Derived by author; see text.

the period from 1961:Q2 to 1993:Q2.[9] The 20 disaggregated unemployment rate regressions are estimated over the same period. The underlying natural rate for married men is calculated to be 3.5 percent.

The natural rate movements in Chart 2 are consistent with the qualitative discussion of the previous section. The natural rate drifted downward through the 1980s and early 1990s as the share of young people in the labor force declined sharply. With the projected leveling-off of the youth share and the continued rise in the nonwhite share, the natural rate is expected to remain at current levels for next few years before rising slightly toward the end of the decade.

The estimated natural rates of the various population groups are reported in the first col-

umn of Table 2. Again, the results are consistent with earlier discussion. Young workers have higher natural rates than older workers. Nonwhite workers have higher natural rates than white workers. And adult women on average have higher natural rates than adult men. These estimates are all reasonable and, as noted above, yield an overall estimate of 5.9 percent currently.[10] Such an estimate is completely in line with typical estimates of 5 3/4 percent or so.

This demographically adjusted series suffers from a potential shortcoming, however. It implicitly ignores structural changes. Because the Phillips curve and the unemployment rate regressions are estimated over the entire sample period, only one natural rate is estimated for each individual population group. As a result, changes

Table 2
## Natural Rate of Unemployment Estimates

| Population group | Demographically adjusted estimate | Fully adjusted third-period estimate |
|---|---|---|
| | (percent) | (percent) |
| White male | | |
| 16-19 | 15.2 | 15.8 |
| 20-24 | 8.6 | 9.0 |
| 25-54 | 3.7 | 4.5 |
| 55-64 | 3.5 | 3.7 |
| 65+ | 3.1 | 2.5 |
| Nonwhite male | | |
| 16-19 | 31.2 | 33.7 |
| 20-24 | 17.3 | 20.0 |
| 25-54 | 7.7 | 9.2 |
| 55-64 | 5.9 | 6.4 |
| 65+ | 6.2 | 5.7 |
| White female | | |
| 16-19 | 14.4 | 13.9 |
| 20-24 | 7.9 | 7.7 |
| 25-54 | 4.8 | 4.6 |
| 55-64 | 3.4 | 3.2 |
| 65+ | 3.3 | 2.9 |
| Nonwhite female | | |
| 16-19 | 34.1 | 32.5 |
| 20-24 | 19.3 | 20.0 |
| 25-54 | 8.7 | 9.2 |
| 55-64 | 4.4 | 4.4 |
| 65+ | 3.9 | 4.6 |
| *Addenda:* | | |
| Married men | 3.5 | 3.9 |
| Men 25+ | 4.2 | 4.9 |
| Women 25+ | 5.2 | 5.1 |
| Youth 16-24 | 11.4 | 11.7 |
| White | 5.1 | 5.3 |
| Nonwhite | 10.4 | 11.4 |
| Total | 5.9 | 6.2 |

Note: Nonaddenda and "Married men" estimates are independent of labor force shares; remaining Addenda estimates are computed using 1992 labor force shares.

Source: Derived by author; see text.

Chart 3

## Natural Rate of Unemployment
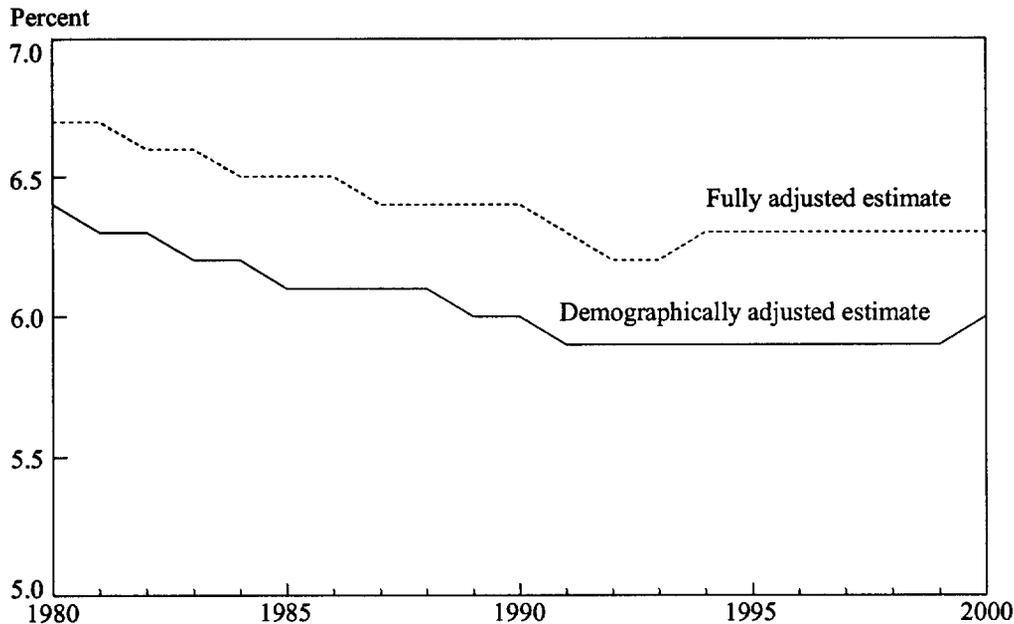


Source: Derived by author; see text.

in the overall natural rate reflect only changes in labor force shares. In effect, any structural changes are assumed to offset each other. Fortunately, the estimation procedure can be generalized to accommodate possible structural shifts.

### Fully adjusted estimates

The second set of estimates controls for structural changes as well as demographic changes. Plotted in Chart 3, these fully adjusted estimates indicate that the natural rate currently is 6.2 percent.

This fully adjusted series is derived from the same Phillips curve as used above with one important difference: dummy variables are in-

cluded to test for structural change over the three periods 1961:Q2-1972:Q4, 1973:Q1-1979:Q4, and 1980:Q1-1993:Q2. Similarly, the disaggregated unemployment rate regressions are run separately over each of the periods. The periods were chosen, in the case of the Phillips curve, to examine the effect on the married male natural rate of the oil shocks and productivity decline in the 1970s and any additional structural changes in the 1980s and 1990s and, in the case of the unemployment regressions, to test for changing relationships among the married male unemployment rate and the unemployment rates of the 20 population groups.[11]

The results strongly support the view that the natural rate is sensitive to structural forces. Formal tests indicate that, statistically, the second-

period and third-period Phillips curves are indistinguishable from each other but together are different from the first-period Phillips curve.[12] Accordingly, the natural rate for married men is calculated to be 3.0 percent in 1961-72 and 3.9 percent in 1973-93. Formal tests of the disaggregated unemployment rate regressions generally indicate that all three periods are distinguishable.[13] As a result, each of the 20 age/sex/race groups is computed to have different natural rates in each of the three periods.

Two features stand out in Chart 3. First, like the demographics-only estimates, the fully adjusted estimates drift lower in the 1980s and early 1990s on favorable demographic trends and then level off. Second, the fully adjusted estimates are a quarter percentage point above the demographics-only estimates, suggesting the continuing influence of one or more negative structural forces. The full series is presented in Appendix B.

The second column of Table 2 provides disaggregated detail on the fully adjusted, third-period estimates (1980:Q1-1993:Q2). As with the demographically adjusted estimates in the first column, young workers have higher natural rates than older workers, nonwhite workers have higher natural rates than white workers, and adult women on average have higher natural rates than adult men. Important differences emerge, however, in comparing the fully adjusted and demographically adjusted estimates.

In particular, male/female patterns diverge across the two sets of estimates. For nearly all male groups, the fully adjusted estimates are higher than the demographics-alone estimates. For example, for prime-aged (25-54) white men, the estimated rates are 4.5 percent, fully adjusted, versus 3.7 percent, demographically adjusted. Similar increases are recorded by prime-aged nonwhite men (9.2 versus 7.7 percent) and by total men aged 25+ (4.9 versus 4.2 percent). A majority of female groups, in contrast, have *lower* natural rates when recent structural forces are taken into account. For example, for total

women aged 25+, the estimate declines from 5.2 to 5.1 percent. This divergent pattern suggests that men have borne the brunt of 1980-93 structural change.[14]

The fully adjusted estimates appear quite reasonable. On the basis of the discussion in the first section of the paper, one would expect both demographic and structural forces to be influencing the natural rate. The fully adjusted estimates bear this out.

As a further check on the reasonableness of the fully adjusted estimates, one can compare the estimates with actual unemployment rates over a period of inflation stability. According to natural rate theory, natural rates of unemployment will prevail when inflation is unchanged from one year to the next. The years 1987 through 1989 apparently were such a period: by many measures, inflation was essentially unchanged.[15] Table 3 compares fully adjusted third-period estimates to actual unemployment rates over the 1986-88 period—the comparison period is lagged one year, from 1987-89 to 1986-88, to account for the historical lag between changes in labor market slack and changes in inflation. The numbers line up very closely, providing support for the accuracy of the fully adjusted estimates.

## Prospects

What are the prospects for the natural rate over the remainder of the decade? The fully adjusted estimates for 1994 to 2000 are constructed on the assumption that third-period group rates remain in place. In other words, they assume that net structural forces over the next several years will be unchanged from the average 1980-93 experience. Available evidence supports this view. But this view could also prove overly optimistic.

Estimation of recent "rolling Phillips curves"—Phillips curves estimated over successive ten-year periods ending with the 1983:Q3-

*Table 3*
## Natural and Actual Unemployment Rates

| Population group | Fully adjusted third-period estimate | Actual 1986-88 average unemployment rate |
|---|---|---|
| | (percent) | (percent) |
| White male | | |
| 16-19 | 15.8 | 15.3 |
| 20-24 | 9.0 | 8.4 |
| 25-54 | 4.5 | 4.4 |
| 55-64 | 3.7 | 3.5 |
| 65+ | 2.5 | 2.6 |
| Nonwhite male | | |
| 16-19 | 33.7 | 32.8 |
| 20-24 | 20.0 | 19.4 |
| 25-54 | 9.2 | 9.0 |
| 55-64 | 6.4 | 6.6 |
| 65+ | 5.7 | 4.7 |
| White female | | |
| 16-19 | 13.9 | 13.5 |
| 20-24 | 7.7 | 7.4 |
| 25-54 | 4.6 | 4.4 |
| 55-64 | 3.2 | 3.0 |
| 65+ | 2.9 | 2.5 |
| Nonwhite female | | |
| 16-19 | 32.5 | 32.1 |
| 20-24 | 20.0 | 20.4 |
| 25-54 | 9.2 | 9.1 |
| 55-64 | 4.4 | 4.6 |
| 65+ | 4.6 | 4.2 |
| *Addenda:* | | |
| Married men | 3.9 | 3.8 |
| Men 25+ | 4.9 | 4.8 |
| Women 25+ | 5.0 | 4.9 |
| Youth 16-24 | 12.6 | 12.2 |
| White | 5.5 | 5.4 |
| Nonwhite | 11.8 | 11.7 |
| Total | 6.4 | 6.2 |

Note: Nonaddenda and "Married men" estimates are independent of labor force shares; remaining Addenda estimates are computed using average 1986-1988 labor force shares.

Source: Author's derivations; U.S. Department of Labor.

1993:Q2 period—detect no change in the natural rate of married men.[16] This is reassuring because it suggests that structural forces have been stable. However, even the latest regression is dominated by 1980s data, so a more recent shift cannot be ruled out.

Certainly on qualitative grounds one might expect the natural rate to move higher than indicated by the fully adjusted estimates. The list of structural forces potentially raising the natural rate is daunting. The list includes factors already cited: continued defense cutbacks, continued white-collar displacement, continued skill mismatch.[17] In addition, structural forces in some instances will interact with demographic forces to exacerbate labor market problems. The U.S. Department of Labor, for example, has noted that, while the fastest growing occupations in coming years will be those occupations that historically have required relatively higher levels of education, the composition of the labor force will be shifting toward groups that typically have attained lower levels of education (Kutscher). An overall natural rate of 6 1/2 percent or higher

does not seem out of the question.[18]

At present, however, the fully adjusted series represents the best available estimates of the natural rate of unemployment. At 6.2 to 6.3 percent the next several years, these estimates are, from a societal standpoint, quite high enough.

## CONCLUSION

This article has presented estimates suggesting that the natural rate of unemployment currently is near 6 1/4 percent. Estimates could go even higher in future years depending on the impact of structural change.

An important implication is that the near-term risk of higher inflation may be larger than generally perceived. If the natural rate is near 6 1/4 percent, limited slack remains in labor markets, and wage and salary pressures may soon begin to build. As a result, policymakers will need to carefully monitor labor costs in the period ahead.