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ABSTRACT

Last Hired, First Fired? Black-White Unemployment and the Business Cycle*

Past studies have tested the claim that blacks are the last hired during periods of economic growth and the first fired in recessions by examining the movement of relative unemployment rates over the business cycle. Any conclusion drawn from this type of analysis must be viewed as tentative because the cyclical movements in the underlying transitions into and out of unemployment are not examined. Using Current Population Survey data matched across adjacent months from 1989 to 2004, this paper provides the first detailed examination of labor market transitions for prime-age black and white men to test the last-hired, first-fired hypothesis. Considerable evidence is presented that blacks are the first fired as the business cycle weakens. However, no evidence is found that blacks are the last hired. Instead, blacks appear to be initially hired from the ranks of the unemployed early in the business cycle and later are drawn from non-participation. The narrowing of the racial unemployment gap near the peak of the business cycle is driven by a reduction in the rate of job loss for blacks rather than increases in hiring.

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1. Introduction

The unemployment rate among African-Americans in the United States has been roughly double that of whites for several decades. In the period from 1972 to 2004, the average rate of unemployment among black males was 12.4 percent versus 5.4 for whites. The ratio of these two rates, 2.3, is consistent with the observation that unemployment among blacks typically doubles that of whites.[1] The stability of this unemployment ratio has been noted (Welch, 1990 and Smith, Vanski, and Holt 1974) as an anomaly that stands in contrast to measured increases in relative black wages observed in the past three decades (Welch 2003, Couch and Daly 2002, 2005).[2] Many have conjectured that the relative constancy of the difference in black and white unemployment is due to minorities being the last hired and first fired over the business cycle (Harrington 1962, Freeman 1973, Barrett and Morgenstern 1974, Browne 1997, and Bradbury 2000).

In Richard Freeman's (1973) classic study of racial patterns of labor market status from 1947 to 1972, he found that the level of employment for blacks was more volatile than for whites with respect to business cycle conditions. He also found that rates of unemployment for blacks and whites had very similar proportionate responses to changes in the business cycle. Thus, when the economy weakens the black unemployment rate rises more than for whites in percentage points. Freeman (1973, p. 77) concluded that these two findings support, "the widely asserted last in, first out pattern of black employment over the cycle."[3]

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[1] The 2 to 1 ratio of black to white unemployment rates began in the 1950s and was small or nonexistent from 1880 to 1940 (Fairlie and Sundstrom 1997,1999).
[2] In 2004, median weekly earnings of black workers had risen to 80 percent of those of whites (U.S. Bureau of Labor Statistics, 2004).
[3] Freeman (1973) also noted that focusing on the relationship between the black-white ratio in unemployment rates and the business cycle can be misleading. For example, a constant black-white unemployment rate ratio moving from an economic expansion to a recession when both unemployment

The last hired, first fired hypothesis relates fundamentally to the idea that transitions of blacks into employment should be pro-cyclical: as the economy grows the rate of transition into employment should progressively rise relative to whites becoming most pronounced at the end of the expansion. Similarly, the rate at which blacks become unemployed should be countercyclical: as the economy worsens, the rate of transition into unemployment should rise relative to that for whites and be most pronounced during the worst economic conditions.

The racial differences in rates of transition across different labor market states examined in this paper are fundamentally related to the well-being of individuals. If the average member of a minority group always faces a larger chance of being laid off and those odds increase whenever the economy slows, then undeniably, their situation has worsened. Concerns about the potential impact of discrimination on individual lives as well as its role in reducing economic efficiency each provide motivations for this study.

Importantly, past studies of the relationship between the business cycle and the relative employment status of blacks, including Freeman's study, have primarily examined the movement of static measures relative to demand (Clark and Summers 1981, Bound and Freeman 1991, Freeman 1991, Freeman and Rodgers 1999, Hoynes 1999, Bradbury 2000, Hines, Hoynes, and Krueger 2001, Holzer and Offner 2001, and Borjas 2006). However, changes over time in the level of a static measure of labor force status, such as the unemployment rate, do not reveal the underlying sources of the fluctuations which are fundamentally caused by changes in transitions rates into and out of the state.

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rates are rising implies that a much higher percentage of blacks than whites lose their jobs. In contrast, a constant black-white difference in unemployment rates implies that the same percentage of blacks and whites lose their jobs (see Freeman 1973 and Bradley 2000 for more discussion). Thus, we focus here on differences in unemployment rates instead of the ratio.

Badgett (1994) first studied this issue in her examination of the transitions of black and white men and women between employment and unemployment. The focus of that study was on the differential impact of Affirmative Action and Equal Employment Opportunity laws passed in the 1960s on labor market participation of impacted groups. She made use of published monthly data to calculate transition rates by focusing on those unemployed less than a month and employed formulas that relate these transitions to steady state stocks to examine racial differentials in unemployment rates. There, she finds, as we do here, that differential rates of firing are most important in determining the racial unemployment gap over time because it is more variable than rates of hiring.

Here, we extend the analysis of Badgett (1994) by examining detailed labor market transitions for black and white men over the business cycle using matched monthly observations for individuals from Current Population Survey (CPS) data from 1989 to 2004. As the observations are matched, detailed information on the individuals is attached to the data set so that the relationship between those characteristics and the resulting transitions can be estimated. To our knowledge, the only other previous research that explores differences in employment transitions and relates these to movements of steady state stocks of labor force aggregates over time other than the study of Badgett (1994) focused on gender and age (see Blanchard and Diamond 1990 and Abraham and Shimer 2001).

This analysis of monthly transitions across labor force states allows for a direct test of whether blacks are the last hired when business conditions are good but are the first fired in a downturn.[4] Estimates from the matched CPS data are consistent with the idea that blacks are the first fired, but not with the common assertion that they are the last hired. During growth periods, businesses appear to look first among unemployed blacks for workers and subsequently hire from among non-participants.[5] Thus, the widespread interpretation of the widening of racial differences in unemployment rates during recessions and the narrowing of differences during growth periods as being due to blacks being last hired and first fired is only partially correct.

2. Previous Research

Numerous studies have been conducted in the past three decades that examine the movement of labor force aggregates in response to business cycle conditions (Freeman 1973, Clark and Summers 1981, Bound and Freeman 1991, Freeman 1991, Freeman and Rodgers 1999, Hoynes 1999, Bradbury 2000, Hines, Hoynes, and Krueger 2001, Holzer and Offner 2001, and Borjas 2006). These studies agree that employment and unemployment of blacks is more sensitive to business cycle conditions than for whites and that this is particularly true among youths.

Rather than focusing on group rates, several studies have examined the relative importance of the duration of unemployment as opposed to incidence in explaining its level. Barrett and Morgenstern (1974) find that high rates of job turnover are primarily responsible for the relatively high unemployment among blacks and young workers; however, both Clark and Summers (1979) and Baker (1992) conclude that at least half of the cyclical sensitivity of unemployment rates is due to changes in duration of spells.

[4] The term "first fired" is used loosely here to refer to all types of job loss. For key results in the paper, alternative estimates are provided that screen on reason for unemployment in order to try and eliminate voluntary job leavers.
[5] Blanchard and Diamond (1990) find a similar pattern for other disadvantaged groups.

In addition to these papers on the relative role of duration, others have investigated underlying determinants of spell length. Lynch (1989) estimates duration models for the hazard of re-entering employment from periods of unemployment and finds that labor market conditions and human capital are most strongly associated with those transitions. Holzer (1986) examines durations for black and white youths and finds that more than 40 percent of the racial gap may be attributed to differences in reservation wages. The groups have similar reservation wages when unemployed but blacks face lower offers. The gap between wage expectations and offers increases the length of unemployment spells.

General approaches to estimating flows of workers across labor force states and their relation to aggregate stocks have also been developed (Smith, Vanski, and Holt 1974, Blanchard and Diamond 1990 and Abraham and Shimer 2001). Smith, Vanski, and Holt (1974) constructed a forecasting model based on disaggregated transition probabilities that demonstrated blacks, women, and youths are more likely than prime age white males to react to poor labor markets by dropping out of the labor force. Blanchard and Diamond consider disaggregated transitions across the three major labor force states for various age and sex groups although they do not consider blacks. Based on the patterns observed, they argue that as businesses rehire, they first look at those who are unemployed (primary workers) who have a stronger attachment to working and later those from the ranks of non-participants (secondary workers). Again, this emphasizes the importance of considering nonparticipation. Abraham and Shimer (2001) provide a similar analysis to that of Blanchard and Diamond and convert the underlying transition rates across labor force states into stocks of the variables. Badgett (1994) also looks at transition rates across labor force states and relates them to aggregate stocks for black and white men and women in the period from 1970 to 1990, reporting that firing appears much more variable over time than adjustments in hiring rates. We make use of a similar approach to these studies in relating observed transition rates in our sample into relative levels of unemployment over the business cycle.

Badgett (1994), Blanchard and Diamond (1990) and Abraham and Shimer (2001) are important in explaining the cycling of individuals among jobs over the business cycle. A related literature has asked about how much of the cycling is due to elimination of existing jobs or creation of new ones (Davis and Haltiwanger 1982 and 1999). The work of Davis and Haltiwanger is based on employer data that enables them to gauge changes in positions added and eliminated over time. In both of these literatures, the conclusion is drawn that increases in unemployment during recessions are primarily due to increases in firings or job destruction rather than large cyclical changes in rates of hiring or job creation.

Prior research has primarily focused on examinations of the relative movement of unemployment and the role of duration in determining aggregate rates. More general developments in modeling the relationship of underlying transitions to aggregate rates of unemployment have also provided fundamental insights into the operation of the labor market. In this paper, the movement of blacks relative to whites between employment, unemployment, and nonparticipation over the business cycle is examined. This dynamic approach is used to explore whether blacks indeed are the last hired and first fired over the business cycle.

Beyond an examination of transitions between employment and unemployment, a thorough exploration of the last hired, first fired hypothesis also requires the consideration of movements to and from non-participation in the labor force. This is because past research (Smith et al. 1974 and Blanchard and Diamond 1990) indicates that black and white men differ in their tendencies to enter and exit the labor force at different points in the business cycle. If blacks have a greater probability of exiting the labor force when they move out of paid employment, excluding those making transitions into non-participation from the analysis may understate the racial difference in entry rates into unemployment.

3. The Last Hired, First Fired Hypothesis

Before examining the data, it is important to consider some of the factors that relate racial differences in unemployment and employment to the business cycle. Conceptually, when one examines a cross-group difference that occurs in a labor market, the phenomenon is usually divided into components that can be attributed to factors related to productivity versus those that arise from unobservable sources such as discrimination. Consider these forces in turn and their likely impact over the business cycle.

First, while differences in observed characteristics have narrowed in the past several decades, white attainment in important dimensions such as education continues to exceed that of blacks. This suggests that whites would presumably be positioned more highly in hiring queues as growth begins in a business cycle and would thus enjoy greater protection from layoffs due to their seniority when downturns begin. This would lead to late transitions into employment for minorities during periods of growth but more rapid job loss during recessions. As economic growth begins, one would expect employment growth among minorities to lag that of whites. Thus, simple considerations of marginal worker productivity could generate the asserted pattern of blacks being the last-hired and first-fired.

An additional consideration is how discrimination in labor markets is likely to interact with productivity related factors. In situations of widespread unemployment, it has been plausibly argued that there is less pressure on employers who have a taste for discrimination to hire minority workers because there is a greater availability of whites who are likely to have desired skills.[6] Similarly, beyond layoffs based on observable characteristics, at the margin, a discriminating employer can lay off equally qualified blacks and not face economic costs for doing so during slack business conditions. During periods of tight labor markets, a discriminating employer would face economic costs associated with a refusal to hire qualified blacks. Thus, tastes for discrimination can be more readily exercised without an employer bearing significant costs in a slack market than a tight one.[7]

These considerations suggest that one would expect to observe greater measured discrimination during economic downturns and less near the peak of a business cycle. As discrimination is seldom directly observed in labor market data, larger residual errors in predicting cross-group differentials during troughs of a business cycle would be consistent with cyclical discrimination. Larger residuals, however, would also be

[6] The fundamental idea that discrimination is associated with a willingness to bear a cost for this taste is due to Becker (1957). See also Schulman (1986) for an adaptation of these concepts to a business cycle context.

[7] Black (1995) considers the impact of employer discrimination in hiring on the black-white wage distribution and employment in a game theoretic model. He shows in a model which does not account for business cycle factors that employer discrimination can result in economic costs to minority workers.

consistent with other unobserved factors such as tenure and educational quality being more important determinants of employment during recessions.[8]

4. Trends and Cyclicality of Black-White Labor Market Status

Before turning to a detailed examination of micro-level data, the macroeconomic relationship between black and white unemployment and business cycle conditions is examined. Beyond establishing context for this paper, it is helpful to discuss and update the estimates provided in Freeman (1973) which are often cited as evidence that blacks are the last hired and the first fired over the business cycle. Similar estimates can be found in Freeman and Rodgers (1999), Hoynes (1999), Bradbury (2000), Hines, Hoynes, and Krueger (2001), and Holzer and Offner (2001).

Using annual data from 1947-1972, Freeman (1973) explored the last in, first out hypothesis by estimating separate regressions for labor market outcomes that include a simple trend variable and deviation of real GNP from its mean by race. For log unemployment rates, he finds similar coefficient estimates on log real GNP deviations for black and white men implying that the two groups experience the same proportionate response to the cycle. Freeman then notes that, "when the economy weakens, the unemployment rate of blacks - always higher than that of whites - rises by a larger number of percentage points and results in a larger relative decline in employment (Freeman 1973, p. 77)." He concludes that these estimates support the last hired, first fired pattern of black employment over the cycle.[9]

[8] A deficit of this analysis is that a direct measure of tenure is not available in the monthly CPS data. Rather than using a variable for potential experience constructed as age less education minus 5, we include age, age-squared and education as separate regressors in the analysis.
[9] As noted above, Freeman (1973) argues that the focus should be on how the black-white gap measured in percentage points responds to economic conditions instead of how the black-white ratio in unemployment rates responds.

Following Freeman, the estimates are updated using annual observations of unemployment rates and real GNP from the *Economic Report of the President* (2005) for the period from 1972-2004. The results and Freeman's original parameter estimates are reported in Table 1. The regressions are in logs and include a constant, a time trend (Time) to control for secular changes in underlying rates, and a term measuring the deviation of real gross domestic product (DGNP) from its trend over the period. Separate estimates are reported for black and white men. Based on these estimates, the proportionate responsiveness of blacks and whites to business cycle conditions are not statistically distinguishable from each other. Following Freeman's argument, the substantially higher unemployment rates among blacks than whites (roughly double) and the equal proportionate response across the business cycle would appear to continue to lead to a faster increase in black unemployment rates in percentage points and larger relative decline in employment when economic conditions worsen.[10]

Although these findings are consistent with the last in, first out hypothesis they are also consistent with other possible explanations. For example, increasing black relative to white unemployment rates as economic conditions worsen is consistent with a reduced rate of hiring of blacks rather than an increased rate of being laid off or fired. Alternatively, as the economy expands and the racial unemployment gap falls, all workers may experience the same likelihood of finding jobs, but blacks may experience a declining probability of job loss. Both of these hypothetical patterns would contradict the last in, first out hypothesis. Clearly, an aggregate analysis of the relationship between black and white unemployment rates and business cycle conditions allows for only a

[10] Assume that black unemployment is 10 percent and white unemployment is 5 percent. A one percent decline in DGNP results in a rise in the black unemployment rate of 0.79 percentage points compared to a rise of 0.46 percentage points in the white unemployment rate.

tentative conclusion regarding the underlying determinants. Estimates of the racial differences in labor market transitions are needed to fully test the hypothesis.

5. Data

In order to examine the underlying transition rates, individual level data from matched monthly Current Population Surveys (CPS) from 1989 to 2004 are used. The survey is conducted by the U.S. Census Bureau and the Bureau of Labor Statistics and includes interviews of approximately 50,000 households and more than 130,000 people each month. It contains detailed information on employment and demographic characteristics.

Although the CPS is primarily used as a cross-sectional dataset, it is possible to follow individuals for four consecutive months by linking surveys. Households in the CPS are interviewed over four consecutive months when they enter the sample. Then, they exit the survey for eight months. Afterwards, they re-enter the sample and are interviewed for another consecutive four month period. This rotation pattern of the CPS makes it possible to match information on individuals across three consecutive pairs of months. To accomplish these data matches in practice, a procedure similar to the one described in Madrian and Lefgren (2000) for matching the CPS March Annual Demographic Files is used.

One basic question about the validity of this analysis is how successful the matching technique is in aligning information on individuals from one period to the next. Match rates for all months used in the analysis are reported in Appendix A, Figure 1. Overall, the matching procedure works very well except for the seam in the data from May through August of 1995 when matching was not possible. For white men, since

1994 the match rate has generally been between 95 and 96 percent. In earlier years, the match rate was roughly 92 percent. Although match rates are lower for blacks, they are still extremely high. Since 1994, black match rates were generally between 92 and 93 percent. In earlier years, the match rate was generally between 87 and 88 percent.

The matching procedure links data from the current month to the next. A broad variety of variables from the current period are retained in the analysis file along with information on labor force status in both months. The linking of data across months makes it possible to create indicators for labor market transitions from one period to the next. Labor force status in each period is divided into the categories of employed, unemployed, and non-participation. We make use of the standard Bureau of Labor Statistics classifications of labor force status (employed, unemployed, not in the labor force) in the analysis taken from the monthly labor force recode variable. Correspondingly, transitions across each of these states from one month to the next are examined. Black and white, non-Latino men ages 25-55 are included in the analytical sample. The use of this sample avoids modeling issues that would otherwise arise due to transitions associated with school enrollment, retirement, and child bearing.[11]

5.1. Business Cycle Measure

The monthly frequency of the CPS data allows for fairly precise measurement of the state of expansion and contraction of the economy. One problem with monthly data is that many macroeconomic indicators of economic activity such as GDP are not

[11] The use of an older sample also reduces the importance of misreported labor force states within the CPS itself. Prior researchers have shown that most response errors occur among younger workers. Thus, the focus on older workers reduces misreporting as a source of concern. A discussion of measurement issues related to labor force status in the CPS can be found in Summers (1979).

available at that frequency.[12] To construct a variable correlated with demand, a state level variable of the deviation of aggregate unemployment from the national Natural Rate of Unemployment (NRU) is constructed.[13]

Calculation of the NRU requires the estimation of an expectations augmented Phillips Curve. For those estimations, monthly data from 1979 through 2004 are used. The NRU is estimated to be 5.28.[14] Using this value, the business cycle control variable is calculated as the deviation of the state unemployment rate for all workers from the NRU. This variable captures state demand relative to a national measure of full employment.

One possible complaint regarding the use of a constant Natural Rate of Unemployment is that over time it is estimated imprecisely. A more recent literature has developed procedures for estimating time varying Natural Rates which move over time. To test the robustness of key results in our paper, we provide alternative estimations employing a time varying Natural Rate which is allowed to readjust on a quarterly basis (Gordon 2008). We find that the racial differences in patterns of hiring and firing over the business cycle are virtually identical whether using the constant or time varying Natural Rate of Unemployment in the calculation of our business cycle measure.

6. Unemployment Transitions

The analysis of whether blacks are last hired and first fired now turns to racial patterns in labor force transitions. First, differences in transitions between employment

[12] Similarly, County Business Pattern data are only available at an annual frequency.
[13] In similar work which considers the aggregate flow of workers, Blanchard and Diamond (1990) control for demand in the framework of a Beveridge curve. Many others have simply used the unemployment rate. The choice between using the unemployment rate versus the NRU is inconsequential. In constructing the demand control, the NRU is subtracted from the state rate. Because the state level observations are all adjusted by the same constant, this only shifts the constant term in the regression estimates.
[14] The estimation procedure and results used in the calculation of the NRU are contained in Appendix B.

and unemployment will be examined before including transitions in and out of the labor force in the analysis. Accordingly, the first sample for analysis includes individuals that are in the labor force for any two consecutive months in the data.

Estimates of the unemployment rates of blacks and whites as well as transition probabilities between employment and unemployment are reported in Table 2. Over the entire period from 1989 to 2004, the black unemployment rate is 4.7 percentage points higher than for whites. More than 2 percent of employed black men are unemployed by the following month; whereas, only 1.1 percent of employed white men are unemployed by the following month. Unemployed blacks are also less likely to become reemployed by the following month than are unemployed whites. The monthly probability of becoming reemployed is 0.294 for black and 0.336 for white men.

Based on the magnitude of the racial differences in these two transition probabilities, the unemployment rate gap appears to be primarily due to the black-white difference in the chance of becoming unemployed. To assess this observation, a standard formula for an equilibrium stock in a two state model is used.[15] Applied to the case of the unemployment rate, the equation is written as (e/(e+x)), where e is the entry and x is the exit rate from unemployment. Using this formula, the black-white gap in unemployment rates can be decomposed into the portions due to differences in entry and exit rates.

For the observed rates of transition, the calculated "steady state" unemployment rates for black and white males are 6.96 and 3.17, a difference of 3.79 percentage

[15] Abraham and Shimer (2001) contains a discussion of the conversion of transition rates into steady state stocks. These formulas are also conceptually similar to those employed by Badgett (1994).

points.[16] If blacks exited employment at the same rate as whites, their predicted unemployment rate would fall to 3.6 percentage points. This shows that as much as 95 percent of the unemployment rate gap is due to the racial difference in entry rates.[17] Thus, the strikingly high rate of unemployment among black men is mostly due to their higher probability of losing work. Black men are also less likely to become reemployed than white men, but this contributes only slightly to the racial disparity in unemployment rates. This finding is similar to the pattern first reported for black and white males by Badgett (1994) for the period from 1970 to 1990.

Although the calculations shown thus far represent averages over time, differences in unemployment rates and transition probabilities vary over the business cycle. The movement of the seasonally adjusted aggregate unemployment rate and the underlying transitions are plotted in Figures 1 through 3. Figure 1 shows the unemployment rates of blacks and whites since 1989. The gap between the two series appears to remain roughly constant over the early 1990s before converging somewhat later during the economic expansion that characterized this period. The black-white gap appears to again be widening in the early 2000s.

Figures 2 and 3 contain entry and exit rates for unemployment by race. In figure 2, it can be seen that around the time of the 1990 to 1991 recession, the gap in entry rates is the greatest in the sample period. During the later growth period, the difference in the entry rates narrowed. It appears to hit a low as the business cycle neared its peak in the

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[16] We use the term "steady state" loosely here because unemployment entry and exit rates are not constant over the business cycle.

[17] If whites are assigned the black entry rate into unemployment, their steady state rate rises to 6.14 percent. The increase in the level of 2.98 percentage points represents 78.5 percent of the racial gap in steady state levels.

years 1999 and 2000. The peak itself occurred in 2001. Afterwards, the differential appears to grow.

Figure 3 shows the movement of exit rates during the sample period. There is not a large gap in the black and white series. Indeed, at some points in time, the black exit rate from unemployment appears to exceed that of whites. However, both series appear to be strongly associated with the business cycle.

6.1. Transitions from Employment to Unemployment

To more formally investigate these patterns, a regression framework is employed which controls for racial differences in individual and job characteristics. Table 3 reports estimates of linear probability models for employment to unemployment transitions.[18] The standard errors reported in the table are adjusted to account for the contribution of multiple observations from individuals to the data set.

Specification 1 reports estimates for the black dummy variable and the business cycle control from a model that also includes measures of age and its square, marital status, education, occupation, industry, and state and month fixed effects. The black-white differential in transition rates is 0.92 percentage points. The parameter for the business cycle control indicates that the probability of moving from employment to unemployment increases as demand weakens. Estimates without controls result in a slightly larger black dummy coefficient, which is consistent with those reported in previous studies indicating that only a small part of the black-white gap in unemployment rates is explained by education, occupation and other controls. Apparently, the focus on transitions does not improve the explanatory power of observable characteristics.

[18] Estimates of marginal effects from logit models provide similar estimates to the OLS results presented here.

Specification 2 includes the interaction between the black dummy and the business cycle variables along with the other regressors. The results show that black men have a 0.009 higher base probability of entering unemployment than white men. As the unemployment rate increases by 1 percentage point, all men are 0.16 percentage points more likely to enter unemployment. Black men appear to have a stronger cyclical response. The interaction term indicates that for each percentage point increase in unemployment, the transition rate for them rises by 0.109 more than for whites. Thus, their summed increase in the transition rate into unemployment for a one percentage point increase above the NRU is 0.27.

Using these estimates, at the height of a recession in which unemployment rates are 3 percentage points above the NRU (or 8.28 percent), black men are 1.2 percentage points more likely to lose their job than are whites. In a strong growth period in which unemployment rates reach one percentage point below the NRU (4.28 percent), blacks have a higher probability of moving from employment to unemployment than whites although the overall transition probability is substantially lower at 0.078 percentage points.

Specification 3 provides an examination of the influence of the control variables contained in model 2 on the parameter estimates. Comparing those two columns, one can see that the inclusion or exclusion of the control variables has little influence on the parameter estimates related to the role of race and the business cycle on the employment to unemployment transitions.

Another test of the first fired hypothesis is to examine whether the employment to unemployment transition probability among black men responds even stronger when the labor market is becoming slacker (i.e. rising unemployment). Specification 4 in table 3 includes an interaction between the unemployment rate, a dummy variable for whether it is a period of rising aggregate unemployment and the black dummy variable.[19] The relevant parameters are statistically insignificant and do not provide any evidence that the racial difference in responsiveness to business cycle conditions is different in periods of rising unemployment.

Specification 5 omits voluntary job leavers and those who are re-entrants to the labor market from the estimations.[20] Job leavers have a different motivation for making labor market transitions and the first fired hypothesis has generally been interpreted as including involuntary leavers. Re-entrants could also have been voluntary leavers. They are omitted because of this uncertainty regarding their origin although this may result in losing some observations of people who were fired, left the labor force, and subsequently resumed a job search. The exclusion of voluntary job leavers and re-entrants reduces the total sample size by less than one percent of the sample because those who are continuously employed are also included in the sample. The results for specification 5 are similar to comparable estimates for the full sample (specification 2).

Finally, specification (6) in table 3 relies on calculating the difference in the local unemployment rate and the natural rate with the time-varying version from the work of Gordon (2008). Both the magnitudes of the parameters as well as the patterns of significance are similar across these two specifications, confirming the basic robustness of the results presented in the table.

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[19] Falling unemployment rates occur during the periods 1/89-3/89, 7/92-4/00 and 7/03-12/03, and rising unemployment rates occur during the periods 4/89-6/92 and 5/00-6/03.

[20] The CPS includes questions on reason for unemployment. Voluntary job leavers are defined as those individuals who quit their jobs.

Figure 4 uses the parameter estimates from Table 3, specification 2 to simulate black and white employment to unemployment transition rates over a hypothetical business cycle. The transition rate gap clearly narrows as the labor market tightens and widens substantially as it becomes slack. This pattern is consistent with the first fired hypothesis.

Overall, these estimates provide evidence that is consistent with the first fired hypothesis. Black men clearly respond more to changes in economic conditions in the economy than whites in terms of their probabilities of becoming unemployed. Worsened demand conditions in the economy results in a much larger increase in the movement of black men into unemployment than for whites. The estimates that include a dummy variable interaction for worsening business cycle conditions rules out the possibility of a much stronger response in periods of rising unemployment for blacks. Such a pattern would be inconsistent with employers laying off black men first in the face of worsening economic contractions.

The simulations displayed in Figure 4 also indicate that black men become less likely to lose their jobs relative to whites when the economy is growing. Black men are always more likely to lose their jobs than white men, but this differential becomes substantially smaller as the aggregate unemployment rate falls. This is an important finding because holding hiring constant, black-white differences in unemployment will decrease when the economy is strong because blacks are relatively less likely to lose their jobs.

6.2. Transitions from Unemployment to Employment

Table 4 reports linear regression estimates for the probability of exiting from unemployment.[21] Specification 1 reports estimates for the base equation which includes a race dummy along with the business cycle control. Specification 2 includes an interaction between the race dummy and the business cycle control. Results from these two models indicate that black men are less likely than whites to move from unemployment to employment even after controlling for education, occupation, industry and other individual characteristics.

The parameter estimates associated with the business cycle variable indicates that the workers in the sample have less of a chance of moving from unemployment to employment when demand conditions are weak. However, the parameter associated with the interaction between the business cycle control variable and the black dummy is small, positive and statistically insignificant. The sign of the estimate would suggest that black men might have relatively higher transition rates from unemployment into employment when demand conditions are relatively weak. However, the statistical insignificance of the parameter in this set of estimates indicates that black men do not differ from white men in their responsiveness to changes in the tightness of labor markets. This finding is important because it indicates, at a minimum, that blacks are not necessarily last hired. Instead, throughout the business cycle black men are less likely to be reemployed than whites. The racial difference in re-employment probabilities is similar at both peaks and troughs of the business cycle.

Specification 3 again excludes the controls for age, education, industry and occupation. By contrasting these results with those for specification 2, the influence of the covariates on the estimated transition probabilities can readily been seen. Again, the

[21] Estimates of marginal effects from logit estimations are similar to the OLS results presented here.

exclusion of age, education, industry and occupation from the equations has little impact on the reported parameter estimates.

Specification 4 includes interactions with periods of falling unemployment. As the parameters associated with those interactions are statistically insignificant, there is no evidence that black men have a different degree of responsiveness than white men to periods of falling unemployment. In these estimates, black men have a lower probability of moving from unemployment to employment which does not appear to be related to the business cycle.

Specification 5 considers the impact on the estimates of omitting voluntary job leavers and labor market re-entrants from the sample. Comparable results for the full sample (specification 2) are quantitatively and qualitatively similar.

Finally, specification (6) provides a set of estimates similar to those found in specification (2) except that the business cycle control is calculated using the time varying natural rate of unemployment taken from the work of Gordon (2008). Comparing those two sets of results both the magnitude and the patterns of significance are similar, providing evidence of robustness in the pattern of reported results.

Figure 5 contains a simulation of the transition rate from unemployment to employment using the estimated parameters from specification 2 in table 4. The pattern found in those estimates can be clearly observed in this graph. There is a cyclical pattern in the transition rates for both races. However, the transition rates for whites always exceed those of blacks and the series move parallel to each other over the simulated business cycle.

7. Transitions into and out of the Labor Force

A major concern is that focusing narrowly on employment to unemployment transitions does not capture the complete effects of worsening or improving labor markets. As the economy worsens one might expect a higher probability of movement from employment and unemployment to non-participation, and black and white men may differ in their likelihood of these responses to the business cycle. It might also be expected that during periods of tightening labor markets, more movements directly from non-participation to employment would be observed and that those transitions as well might differ by race.

As the scope of the analysis is shifted to movement into and out of the labor force, the sample is expanded to include all black and white men ages 25-55.[22] Table 5 contains transition probabilities between employment, unemployment, and nonparticipation over the entire sample period from 1989 to 2004 separately for whites and blacks as well as for the combined sample. Several interesting patterns emerge. First, a larger percentage of blacks move from employment to non-participation than whites. The average probability of moving from employment to NILF (not in the labor force) for blacks is 0.016, which is only slightly lower than the average probability of moving from employment to unemployment. Thus, excluding this transition from an analysis of black-white differences in labor force behavior over the business cycle is potentially an important omission.

For whites, from one month to the next, 1.1 percent of the sample moves from being employed to unemployed and a further 0.7 of a percent moves directly to non-participation. Because whites move from employment to non-participation at a much

[22] The analysis thus far excluded transitions either in or out of the labor force.

lower rate than blacks, focusing solely on employment to unemployment transitions understates the racial difference in entry into non-employment.

Black men are also substantially more likely than whites to move from unemployment to non-participation the following month. In a typical month, nearly 16 percent of unemployed black men move from unemployment to non-participation. In contrast, 11 percent of white men move from unemployment to non-participation monthly. This racial differential is important because it indicates that the white-black gap in non-employment to employment transitions will be overstated if those that exit the labor force are excluded from the analysis.

Blacks are also more likely to move from non-participation to unemployment. The difference in the probability for blacks and whites to make this transition each month is 2.8 percentage points each month. Overall, more churning between non-participation and unemployment occurs for black than white men.

The large percentage of black and white men moving from employment directly into non-participation could alter or reinforce the evidence presented thus far regarding the first fired hypothesis. Further, the earlier examination in this paper of transitions into employment which omitted those entering from non-participation may be altered by expanding the analysis. To determine if black and white men respond differently to the business cycle in these transitions, regressions are estimated for the probability of making a transition between all three labor force states. Table 6 reports estimates for specifications that include the black dummy variable, the controls, the unemployment rate and a black unemployment rate interaction.[23] This model is the same as specification 2 in tables 4 and 5.

7.1. Transitions from Employment

This section contains a discussion of estimates for transitions out of employment contained in table 6. These transitions are related to the proposition that blacks are the first fired as business cycle conditions worsen. The estimates are obtained from linear probability models of the transitions from employment to unemployment and employment to non-participation.[24]

The coefficients in the employment to unemployment transition regression are similar to those reported in Table 3 where non-participation was not considered as a possibility and indicate that the black transition rate is more sensitive to the business cycle than that of whites.[25] In contrast, there is no evidence of a differential response in employment to non-participation transitions between blacks and whites to changes in business cycle conditions. The main similarity between the two transition regressions is that the black coefficient is large, positive and statistically significant. Blacks have an elevated probability relative to whites of moving out of employment, and the probability of moving into unemployment has a strong cyclical component.

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[23] A parallel set of estimates screening out voluntary leavers and labor market re-entrants are available on request. They are not included in the text as they differed little from those presented in table 6. Similarly, a set of estimates which employ the time varying natural rate in the construction of the business cycle measure are also available upon request. The magnitude and patterns of significance of parameters are similar to those reported in the specification discussed in the text.

[24] We estimated multinomial logit models (MNL) for these transitions and the transitions from unemployment and from non-participation and found similar results. Although independence from irrelevant alertnatives (IIA) tests for all of the transitions generally do not reject, we investigated estimating nested logit models (NLM) that would relax this assumption. Unfortunately, we could not find choice based attributes or instruments that would allow us to identify NLMs.

[25] The sample size and estimates are slightly different because in this specification the possibility of transitioning from employment to NILF is coded as a zero.

These results essentially confirm the previous finding that the movement of black men from employment to unemployment is more responsive to the business cycle than for white men. Examining movement from employment to non-participation, there appears to be no relationship with the business cycle. Transitions to non-participation may be driven by factors independent of business cycle conditions such as the receipt of unearned income. Most importantly, the lack of a differential response for employment to non-participation transitions does not overturn the finding that blacks are at an increasing risk of losing their job when the labor market is weakening. Overall, the evidence is consistent with blacks being first fired.

Again, a specification is estimated that includes a variable for whether the unemployment rate is rising that is interacted with the black dummy and the business cycle control (reported in the Emp Unemp column of Table 7). The purpose is to see if movements in the transition rates are symmetric. There is no evidence of a differential response in periods of rising unemployment.

7.2. Transitions to Employment and Additional Transitions

Turning to the unemployment to employment transition estimates, which are reported in column 3 of Tables 6 and 7, the signs of the parameters and the pattern of statistical significance are similar to when only two labor force states were considered. The one important exception is that the coefficient on the black unemployment rate interaction is now larger and statistically significant (at the 10 and 5 percent levels in tables 6 and 7 respectively). Importantly, the coefficient estimate remains positive indicating that the black-white gap in reemployment *decreases* in the face of rising unemployment. This means that blacks have a higher rate of transition from unemployment into employment when business cycle conditions are poor. This finding is consistent with blacks being the *first* hired from the ranks of the unemployed as the economy moves through a trough and begins to grow while business cycle conditions are poor.

In contrast to these results, the transition rate from non-participation to employment for blacks decreases relative to the rate for whites when unemployment rates are rising. This finding is consistent with blacks being hired from the ranks of those out of the labor force during strong economic periods. For example, if the unemployment rate increases by 1 percentage point, the black transition rate from non-participation to employment increases by 0.3 percentage points relative to that of whites. Estimates from Table 7, however, do not provide evidence of any additional differential response during periods of rising aggregate unemployment.

Black men appear to have a differential response to the business cycle in transitions from non-participation to employment relative to white men. As labor markets become slack, blacks relative to whites are less likely to move from non-participation to employment. If one considers all movement into employment, this result appears to offset the positive relationship between the black-white gap in unemployment to employment transition rates and aggregate demand. Combining these two results leads to the following conclusion. Blacks are more likely to be hired from the ranks of the unemployed early in the business cycle. Later in the business cycle, blacks are more likely to be hired from being out of the labor force.

In the work of Blanchard and Diamond (1990) regarding gross flows of U.S. workers over the business cycle, they find evidence consistent with the idea that firms initially hire early in growth periods from the ranks of the unemployed. They refer to those who were among the unemployed as primary workers. After the primary workers have been hired, firms look to those who are non-participants. These are termed secondary workers. Our results for prime aged black males are consistent with their view of non-participants and the dynamics of the hiring process over the business cycle.

For the remaining transitions there is evidence of a stronger positive relationship between non-participation to unemployment transitions and the business cycle variable for blacks than whites. There is no evidence, however, of a differential response over the business cycle for transitions from unemployment to non-participation.

8. Explaining Racial Differences in Cyclical Responses

Thus far, the discussion has focused on racial differences in labor market transitions over the business cycle. A natural topic of interest is whether differences across races in the skills they bring to the labor market or their types of employment help explain these patterns. In the CPS data, information is available regarding the characteristics of the individuals in the sample as well as their occupations and the industries in which they are employed. In this section, the analytical sample is again restricted to those who are in the labor force in each month in order to examine the influence of individual and employment characteristics on these racially differential patterns in labor market transitions.

The approach taken here is to interact the business cycle variable with the education, industry, and occupation controls. As they are included in the estimations, their influence on the racial business cycle response can be observed. If the magnitude falls (rises), this would indicate that the factor increases (reduces) the racial differential in business cycle responsiveness.

Table 8 reports the estimates. The coefficient estimate on the black business cycle interaction falls after including the education or occupation interactions. This indicates that education and occupation contribute to the stronger cyclical responsiveness of blacks. The inclusion of industry interactions with the unemployment rate, however, increases the cyclical responsiveness of blacks. Thus, blacks are concentrated in industries that have relatively low job loss rates as the economy contracts. Overall, the inclusion of education, occupation and industry interactions decreases the black coefficient estimate for response to the business cycle from 0.00109 to 0.00099. Thus, the first fired story for blacks is only partially about blacks being concentrated in occupations that are cyclically sensitive and having education levels that leave them more vulnerable to the business cycle.

Table 9 reports estimates for a linear probability model of the transition from unemployment to employment that includes the new interaction terms. The inclusion of the education and occupation interactions results in a slightly larger coefficient estimate for the black response to business cycle conditions. The inclusion of the industry interaction results in a slightly smaller response of blacks to the business cycle. In all cases, however, the coefficient measuring the black response to the business cycle beyond that for all workers remains small, positive and statistically insignificant. This indicates that black men do not differ from white men in their responsiveness to changes in the tightness of labor markets. Thus, after controlling for the differential responsiveness of education levels, occupations and industries to the business cycle, there is no evidence that blacks are the last hired. They appear to have a lower relative probability than whites of being reemployed which does not vary with the state of the economy.

9. Residual Decompositions

In motivating the analysis, it was argued that systematic racial differences in the distribution of characteristics related to market productivity could result in blacks being the last hired and the first fired over the business cycle. It was also noted that discrimination would be expected to result in a systematic pattern of residual differences in the unemployment gap across blacks and whites over the business cycle. In this section, a residual decomposition of the black-white unemployment gap is calculated.

The aggregate steady state unemployment rate for a group equals the entry rate into unemployment divided by the sum of the entry and exit rates and accordingly it can be shown that the average black and white difference in the unemployment rate can be decomposed using the following formula.

$$\overline{U}^{B} - \overline{U}^{W} = \left[\frac{e^{B}}{e^{B} + x^{B}} - \frac{\hat{e}_{W}^{B}}{\hat{e}_{W}^{B} + \hat{x}_{W}^{B}}\right] + \left[\frac{\hat{e}_{W}^{B}}{\hat{e}_{W}^{B} + \hat{x}_{W}^{B}} - \frac{e^{W}}{e^{W} + x^{W}}\right],$$

where e^{B} and e^{W} respectively represent the entry rate of blacks and whites into unemployment, x^{B} and x^{W} respectively are the exit rates from unemployment for black and white males, $\hat{e}_{W}^{B}$ is the predicted rate of entry into unemployment for blacks using white parameters, and $\hat{x}_{W}^{B}$ is the predicted exit rate for blacks from unemployment using white parameters.

Here, the calculations are made using the two state model where transitions between employment and unemployment are examined. The term in the first pair of brackets is the estimated residual difference in unemployment. The term in the second set of brackets is the difference due to observables. Where parameter values are required in these calculations, they are taken from tables 3 and 4, specification 2.

Table 10 contains the results of the decomposition. The first column contains the average difference in unemployment rates. Using the steady state formula, this is calculated to be .040. The second column of the table shows the average predicted difference (.004) in black and white unemployment. The results indicate that if blacks had the same formulas for predicting labor force transitions as whites, using their group characteristics, there would be virtually no difference in unemployment across the groups. The third column shows the average residual (.036).

Because a systematic pattern of residuals would be consistent with the possibility that tastes for discrimination are exercised differently when labor demand is strong versus weak, the next two columns show the average residuals in years prior to business cycle peaks versus in the year of a trough and the following year. By this calculation, the residuals are larger in the troughs. The potential impact of discrimination on this difference can be seen by comparing the peak and trough figures. This difference is 1.1 percentage points. Using the standard errors associated with the average residual over the peak and trough years, a t-statistic for the 1.1 percentage point difference in the levels takes the value of 11.95. Thus, the differential pattern is statistically significant at any conventional level.

10. Conclusion

This paper considers the assertion that black men are last hired during periods of strong economic growth and the first fired during downturns using monthly panel data from matched Current Population Surveys from 1989 to 2004. The analysis systematically examines underlying transitions into and out of unemployment for blacks relative to whites rather than inferring relationships from movements in relative unemployment rates. In a sample of prime age labor force participants, the black-white gap in transition rates into unemployment widens considerably as economic conditions worsen. Although blacks also face a lower rate of becoming reemployed than whites, the relative difference does not change over the business cycle. Thus, the majority of the relative widening and narrowing of the black white unemployment gap over the business cycle is due to changes in firing behavior. The observed patterns are consistent with the hypothesis that blacks are the first fired when the economy weakens but are not supportive of the argument that blacks are the last hired during periods of growth.

The results presented in the paper which point to cyclical changes in the rate of movement from employment to unemployment as the dominant factor in explaining aggregate labor force patterns are also consistent with existing research that does not address black/white differences. Both the literature regarding gross flows of workers across labor force states (Blanchard and Diamond 1990 and Abraham and Shimer 2001) and examinations of job creation and destruction (Davis and Haltiwanger 1992 and 1999) reach the same conclusion for overall patterns. Badgett (1994) found similar patterns for black and white males in earlier research examining the period from 1970 to 1990.

When the analysis is expanded to include non-participation, these basic patterns remain intact and additional insights into how blacks move through jobs over the business cycle emerge. When the economy is weak and begins to grow, the estimates presented in the paper indicate that blacks are disproportionately hired from the ranks of the unemployed. If this result were found only in a sample of those who were labor force participants, it would support the conclusion that blacks are first hired. However, as the growth continues, the rate at which blacks move from unemployment to employment declines and this is offset by an increase in movements from non-participation to employment as the business cycle becomes stronger. The insight gained from these estimates is that early in the business cycle, those blacks with a stronger attachment to the labor force (i.e. the unemployed) are the first hired. Blacks who are non-participants tend to be hired late in the business cycle when labor demand is particularly strong. A similar pattern has been documented among other groups by Blanchard and Diamond (1990).

The influence of personal characteristics and those of the occupation and industry of employment on the black and white transition rates is also investigated. Differences in the educational attainment and occupations of blacks and whites tend to make the gaps larger than they would be if these factors were equal across races. The industrial pattern of employment appears to buffer blacks against the influence of the business cycle on transitions between employment and unemployment.

A residual decomposition technique based on equations for equilibrium in a two state model was developed. Predicted and residual differences in the average black and white unemployment rates were calculated and examined at different points of the business cycle. Based on this method, the residual gap is found to be larger in troughs than at peaks. This is consistent with the idea that tastes for discrimination can be exercised more freely during slack periods for the labor market as doing so will be less costly. It is notable that throughout the study, observed characteristics such as age, education, occupation, and industry of employment explain little of observed labor market transitions.

Considerable evidence is presented in the paper that blacks are the first fired as the business cycle weakens. However, there is no evidence that blacks are the last hired. Instead, blacks are initially hired from the ranks of the unemployed early in the business cycle and later are drawn in from non-participation. These two impacts do not erase the difference in the rate of entry into employment that is observed between blacks and whites. Moreover, the difference in the rate of entry into employment between blacks and whites does not fluctuate over the business cycle. As the business cycle becomes stronger, the racial difference in unemployment declines primarily because the rate at which blacks move into unemployment declines.

From a policy perspective, the prominent role of employment termination in determining the racial gap in unemployment rates should focus attention on measures which would improve minority employment retention particularly during downturns. Strengthening enforcement of existing employment discrimination statutes is one approach which may prove effective; however, policies aimed more generally at stabilizing employment over the business cycle such as short-time unemployment benefits similar to those available in many European countries might prove disproportionately effective in aiding retention of minority workers.

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Table 1
Regression Coefficients for Trend and Cyclic Changes in the Labor Market
By Race, 1972-2004

		1947-71				*1972-2004*		
	Race	Time	DGDP	R^2		Time	DGDP	R^2
Unemployment Rate	Black	-0.000 (.005)	-7.86 (1.08)	.71		-0.008 (0.003)	-7.90 (1.34)	.59
	White	-0.003 (.004)	-7.70 (0.79)	.81		-0.007 (0.002)	-9.24 (1.01)	.76

Sources: Estimates for 1947-1971 are from Table 1, p. 74 of Freeman (1973) and estimates for 1972-2004 are from Tables B-2 and B-43 of the Economic Report of the President (2005).

Table 2
Unemployment and Transition Rates by Race
Matched Current Population Surveys, 1989-2004

	White	N	Black	N	White/Black Difference
Unemployment Rate	3.5%	2,577,473	8.2%	248,388	-4.7%
Unemployment Entry Rate	1.1%	2,464,418	2.2%	223,472	-1.1%
Unemployment Exit Rate	33.6%	83,071	29.4%	16,791	4.2%

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS.

Table 3 Linear Regressions for Probability of Employment to Unemployment Transition Matched Current Population Surveys, 1989-2004						
	Specification					
	(1)	(2)	(3)	(4)	(5)	(6)
Black	0.00917	0.00890	0.00992	0.00888	0.00692	0.00921
	(0.00022)	(0.00022)	(0.00022)	(0.00023)	(0.00020)	(0.00038)
Undiff = Unemployment Rate - NRU	0.00176	0.00164	0.00166	0.00159	0.00146	0.00159
	(0.00006)	(0.00006)	(0.00006)	(0.00007)	(0.00005)	(0.00007)
Undiff * black		0.00109	0.00118	0.00092	0.00086	0.00094
		(0.00015)	(0.00015)	(0.00020)	(0.00013)	(0.00027)
Undiff * period of rising unemployment				0.00012		
				(0.00010)		
Undiff * period of rising unemployment * black				0.00040		
				(0.00030)		
Mean of dependent variable	0.01208	0.01208	0.01208	0.01208	0.00964	0.01208
Sample size	2,687,890	2,687,890	2,687,890	2,687,890	2,681,427	2,687,890

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS. Standard errors are adjusted for multiple observations per individual. (3) All specifications include a constant, age, age squared, marital status, education, occupation and industry, and state and month fixed effects except Specification (3) which excludes age, education, occupation and industry. (4) Specification (5) omits from the estimations those who were job leavers or re-entrants. (5) Specification (6) calculates the undiff variable using a time varying natural rate described in the text.

Table 4
Linear Regressions for Probability of Unemployment to Employment Transitions
Matched Current Population Surveys, 1989-2004

	Specification					
	(1)	(2)	(3)	(4)	(5)	(6)
Black	-0.04818	-0.05062	-0.04822	-0.05026	-0.04376	-0.04873
	(0.00382)	(0.00420)	(0.00415)	(0.00420)	(0.00497)	(0.00529)
Undiff = Unemployment rate – NRU	-0.03512 (0.00118)	-0.03581 (0.00127)	-0.03461 (0.00125)	-0.03613 (0.00165)	-0.03506 (0.00146)	-0.03794 (0.00161)
Undiff * black		0.00341	0.00186	0.00007	0.00371	0.00327
		(0.00241)	(0.00243)	(0.00339)	(0.00281)	(0.00323)
Undiff * period of falling unemployment				0.00062 (0.00194)		
Undiff * period of falling unemployment * black				0.00602 (0.00430)		
Mean of dependent variable	0.32719	0.32719	0.32719	0.32719	0.32227	0.32719
Sample size	99,862	99,862	99,862	99,862	75,113	99,862

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS. Standard errors are adjusted for multiple observations per individual. (3) All specifications also include a constant, age, age squared, marital status, education, occupation and industry, and state and month fixed effects except Specification (3) which excludes age, education, occupation and industry. (4) Specification (5) omits from the estimations those who were job leavers or re-entrants. (5) Specification (6) calculates the undiff variable using a time varying natural rate described in the text.

Table 5
Monthly Transition Probabilities
Current Population Survey 1989-2004

Status This Month		Status Next Month		
		Males 25-55		
	Employed	Unemployed	NILF	
Employed	.982	.012	.007	
Unemployed	.287	.597	.112	
NILF	.104	.059	.837	
		Black Males 25-55		
	Employed	Unemployed	NILF	
Employed	.963	.021	.016	
Unemployed	.242	.599	.160	
NILF	.093	.082	.825	
		White Males 25-55		
	Employed	Unemployed	NILF	
Employed	.986	.011	.007	
Unemployed	.297	.597	.106	
NILF	.106	.054	.840	

Note: Calculated by authors using matched monthly Current Population Survey Basic files from 1989:1 through 2003:12.

Table 6
Estimated Transitions Across Labor Force Status
Matched CPS Data: 1989-2004

	Transition					
Regressor	Emp Unemp	Emp NILF	Unemp Emp	Unemp NILF	NILF Emp	NILF Unemp
Black = 1	0.009*	0.009*	-0.061*	0.055*	0.0004	0.018*
Undiff	0.002*	-0.0002*	-0.028*	-0.012*	-0.003*	0.007*
Undiff*Black	0.001*	-0.0001	0.005**	-0.001	-0.003*	0.003*
N	2711846	2711846	113602	113602	226462	226462
R^2	0.0088	0.0057	0.0300	0.0253	0.0235	0.0178

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS. Standard errors are adjusted for multiple observations per individual. (3) All equations also include a constant, age, age squared, marital status, education, occupation and industry, and state and month fixed effects. (4) * indicates statistical significance at the .05 level. ** indicates statistical significance at the .10 level. (5) The column headings indicate the labor market transition being considered from the current month to the next. (6) The Undiff variable is the unemployment rate minus the NRU.

Table 7
Estimated Transitions Across Labor Force Status
Matched CPS Data: 1989-2004

		Transition					
Regressor		Emp Unemp	Emp NILF	Unemp Emp	Unemp NILF	NILF Emp	NILF Unemp
Black = 1		0.009*	0.009*	-0.061*	0.055*	0.0003	0.018*
Undiff		0.002*	-0.0001*	-0.028*	-0.011*	-0.002*	0.007*
Undiff*Black		0.001*	0.00003	0.007*	-0.001	-0.004*	0.002
Undiff*Rising		0.0001	-0.0002*	0.0002	-0.004*	-0.001	-0.001
Unemployment							
Undiff*Rising		0.0004	-0.0004	-0.005	0.002	0.002	0.001
Unemp*Black							
N		2711846	2711846	113602	113602	226462	226462
R^2		0.0088	0.0057	0.0300	0.0254	0.0235	0.0178

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS. Standard errors are adjusted for multiple observations per individual. (3) All equations also include a constant, age, age squared, marital status, education, occupation and industry, and state and month fixed effects. (4) * indicates statistical significance at the .05 level. ** indicates statistical significance at the .10 level. (5) The column headings indicate the labor market transition being considered from the current month to the next. (6) The Undiff variable is the unemployment rate minus the NRU.

Table 8
Additional Linear Regressions for Employment to Unemployment Transition
Matched Current Population Surveys, 1989-2004

	Specification			
	(1)	(2)	(3)	(4)
Black	0.00895	0.00896	0.00884	0.00890
	(0.00037)	(0.00037)	(0.00036)	(0.00037)
Undiff = Unemployment rate – NRU	0.00348	0.00092	0.00122	0.00202
	(0.00029)	(0.00010)	(0.00011)	(0.00031)
Undiff * black	0.00079	0.00074	0.00133	0.00099
	(0.00025)	(0.00025)	(0.00025)	(0.00025)
Undiff * education dummies	Yes	No	No	Yes
Undiff * occupation dummies	No	Yes	No	Yes
Undiff * industry dummies	No	No	Yes	Yes
Mean of dependent variable	0.01208	0.01208	0.01208	0.01208
Sample size	2,687,890	2,687,890	2,687,890	2,687,890

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS. Standard errors are adjusted for multiple observations per individual. (3) All equations also include a constant, age, age squared, marital status, education, occupation and industry, and state and month fixed effects.

Table 9
Additional Linear Regressions for Unemployment to Employment Transitions
Matched Current Population Surveys, 1989-2004

	Specification			
	(1)	(2)	(3)	(4)
Black	-0.05116	-0.05126	-0.05050	-0.05136
	(0.00579)	(0.00580)	(0.00579)	(0.00582)
Undiff = Unemployment rate - NRU	-0.03729	-0.03124	-0.03352	-0.03063
	(0.00276)	(0.00293)	(0.00258)	(0.00425)
Undiff * black	0.00404	0.00433	0.00307	0.00435
	(0.00306)	(0.00305)	(0.00305)	(0.00310)
Undiff *education indicators	Yes	No	No	Yes
Undiff * occupation indicators	No	Yes	No	Yes
Undiff * industry indicators	No	No	Yes	Yes
Mean of dependent variable	0.32719	0.32719	0.32719	0.32719
Sample size	99,862	99,862	99,862	99,862

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS. Standard errors are adjusted for multiple observations per individual. (3) All equations also include a constant, age, age squared, marital status, education, occupation and industry, and state and month fixed effects.

Table 10

Residual Gaps at Peaks and Troughs of the Business Cycle
1989 to 2004

	All Years:	All Years:	All Years:	Peak Years	Trough Years
Unemployment Gap:					
	Average:	Predicted:	Residual:	Residual:	Residual:
Two Transitions:					
Steady State Model:	.040	.004	.036	.033	.044
Standard Error:				5.9E-18	.00092

Notes: The entries are averages over individual years. Peak years refer to the last complete year prior to a business cycle peak and in the sample includes 1989 and 2000. The average over trough years included the trough itself and the following year. The years included in that average are 1991, 1992, 2001, and 2002.

Figure 1: Monthly Unemployment Rates by Race (Men - Ages 25-55)
Current Population Survey, 1989-2003

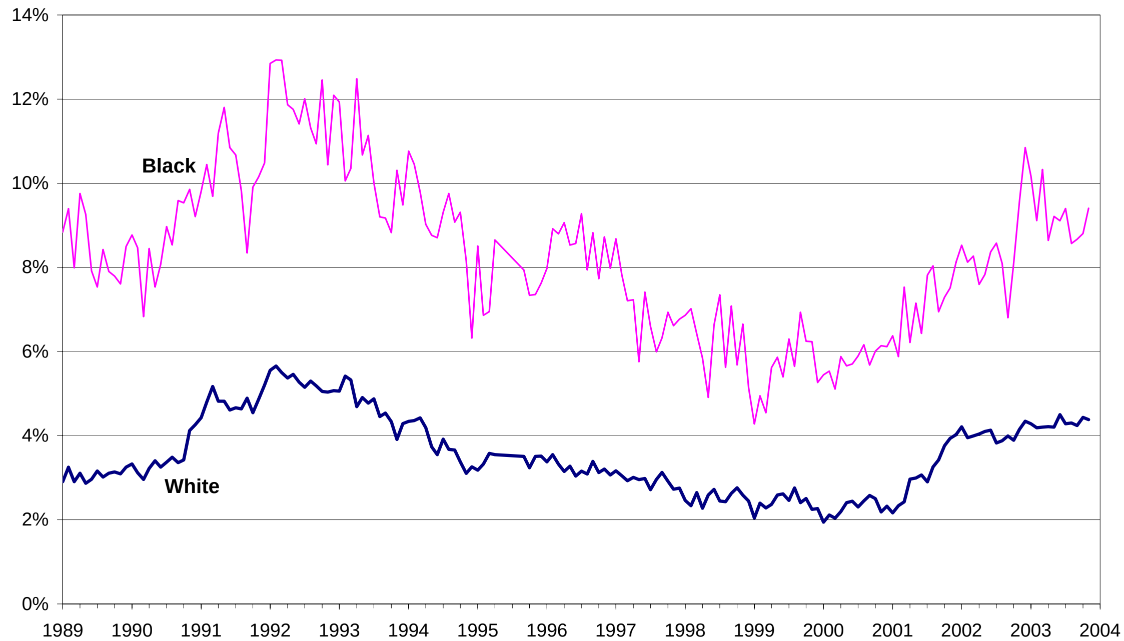


Figure 2: Monthly Unemployment Entry Rates by Race (Men - Ages 25-55)
Current Population Survey, 1989-2003

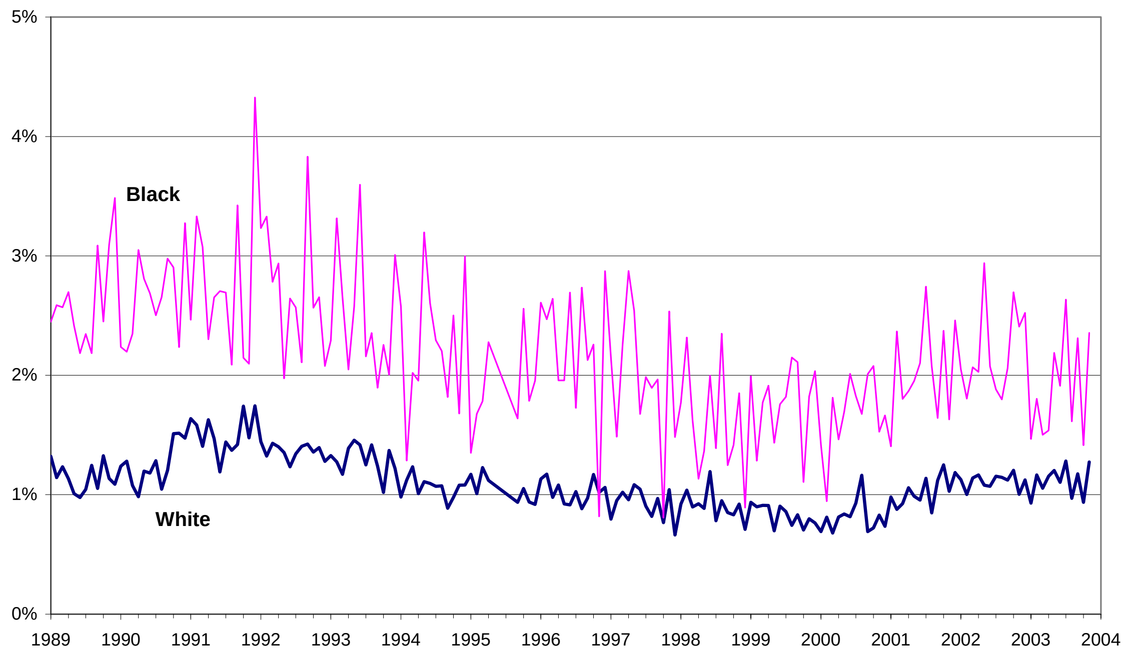


Figure 3: Monthly Unemployment Exit Rates by Race (Men - Ages 25-55)
Current Population Survey, 1989-2003

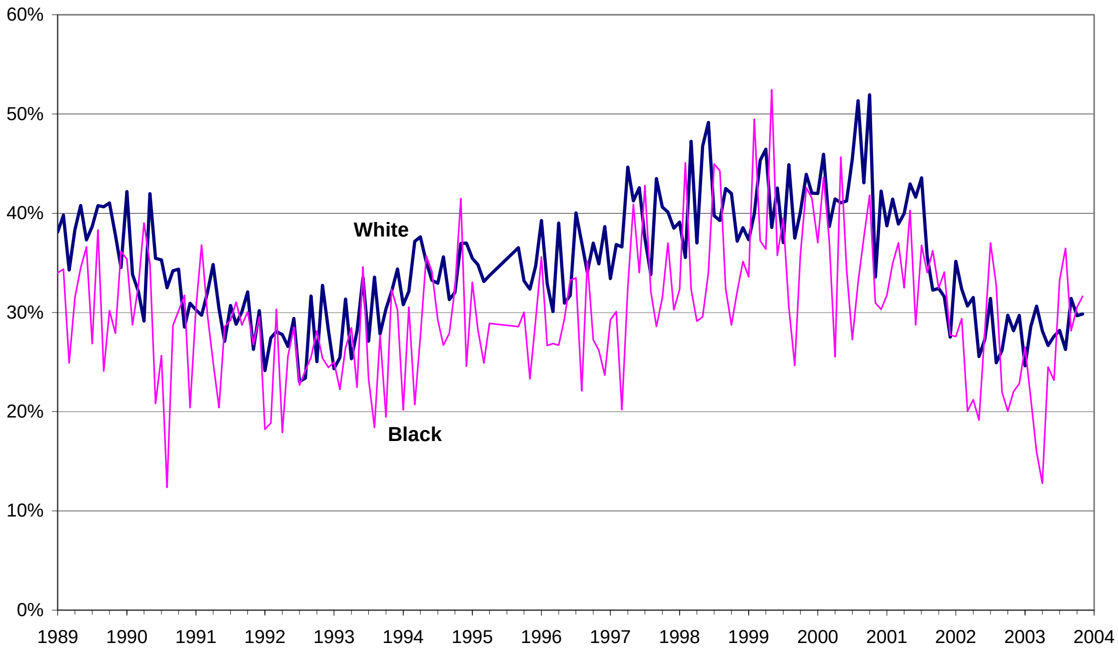


Figure 4
Simulated Employment to Unemployment Transition Rates

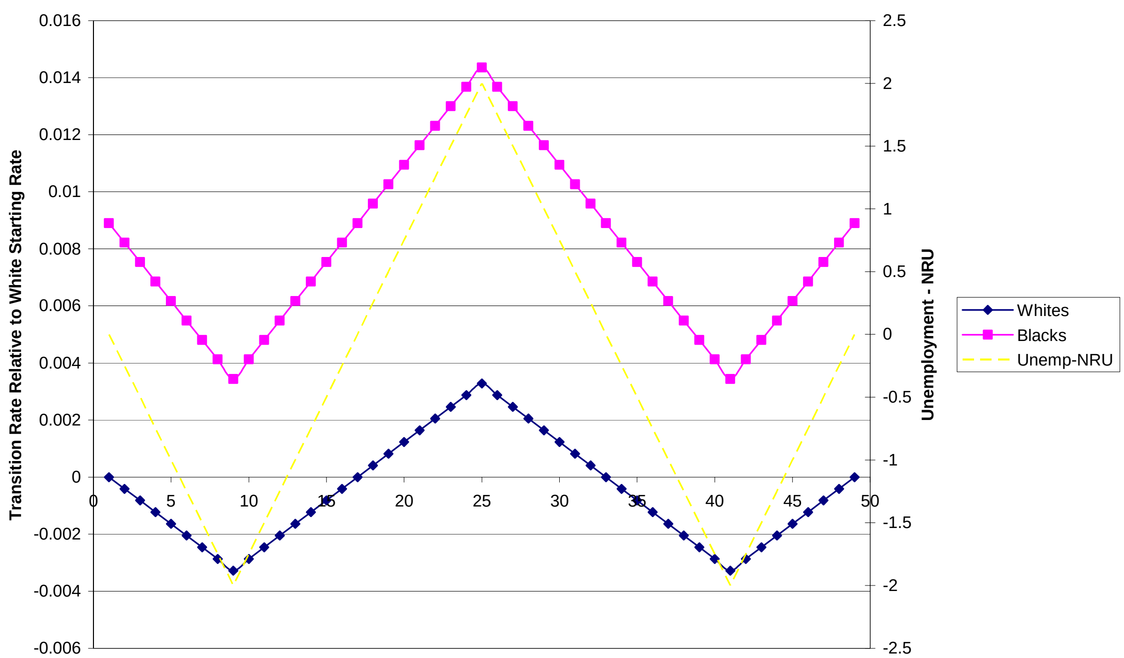
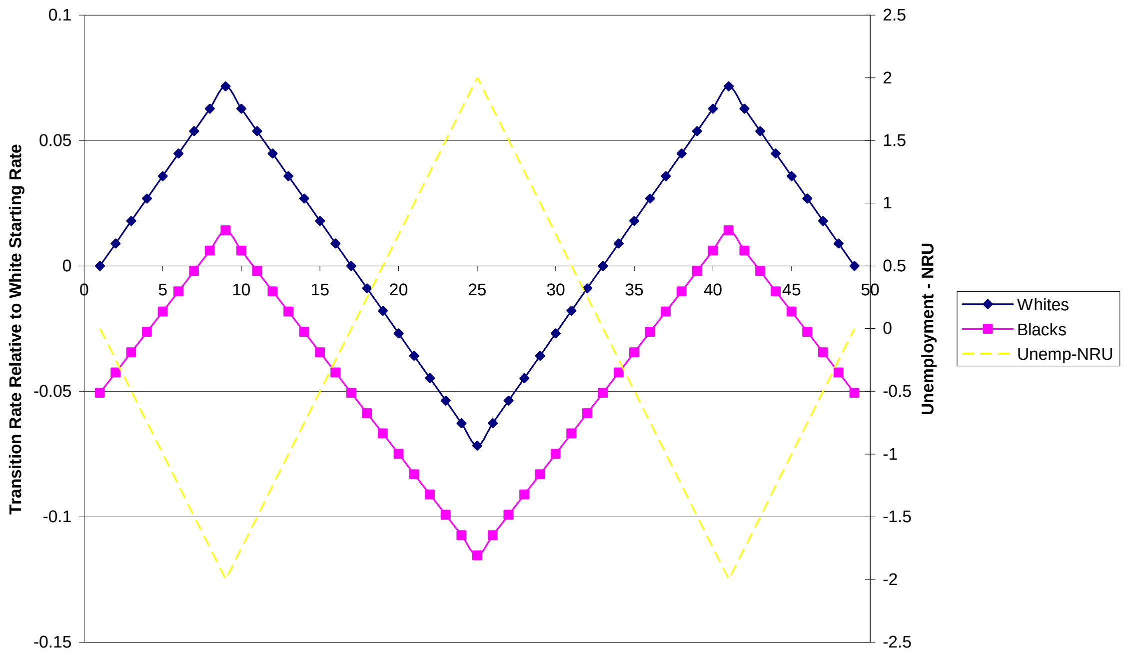
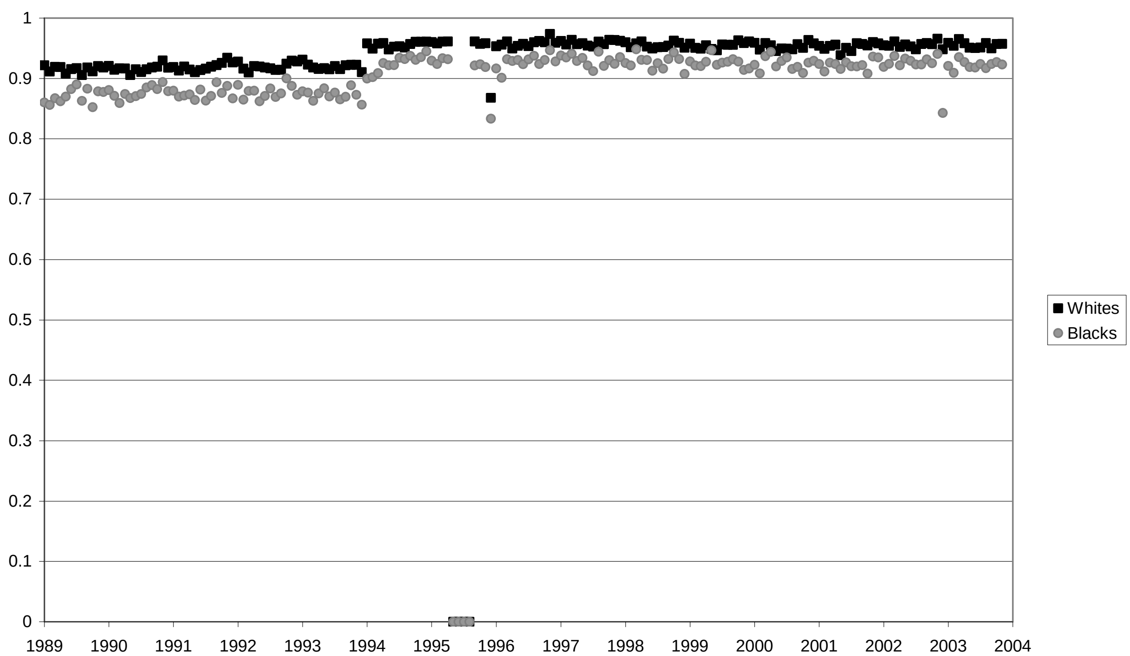


Figure 5
Simulated Unemployment to Employment Transition Rates



Appendix A

Figure 1 - Match Rates for Monthly Current Population Survey (1989-2004)



Appendix Table 1
Means of Analysis Variables
Matched CPS Data: 1989-2004

	Employment to Unemployment Transition Sample	Unemployment to Employment Transition Sample
Black	11.1%	21.9%
Undiff=Unemployment rate - NRU	0.2151	0.7602
Undiff*black	0.0266	0.1527
Undiff*period of rising unemployment	0.1546	0.3591
Undiff*period of rising unemp.*black	0.0173	0.0722
Age	39.4	37.9
Age squared	1620.1	1506.0
Married	70.4%	49.8%
Divorced	11.8%	19.1%
High school graduate	33.3%	40.9%
More than high school	26.6%	24.3%
College graduate	32.3%	17.0%
Professional	32.3%	15.8%
Services	14.7%	21.1%
Production	32.9%	47.3%
Missing occupation	0.0%	0.4%
Agriculture	14.9%	27.0%
Manufacturing	22.6%	21.8%
Transportation	11.1%	8.4%
Services industry	29.1%	22.1%
Sample size	2,687,890	99,862

Notes: (1) The sample consists of males ages 25-55. (2) All estimates are calculated using sample weights provided by the CPS.

Appendix B
Expectations Augmented Phillips Curve and NRU Estimation
Dependent Variable is Differenced Annualized Monthly Rate of Inflation
1978-2004

Variable		Parameter	Std. Error	t-stat	
Constant		0.01379	0.070	.20	
Inflation		-0.00261	0.011	-.24	
N	312				
R-Squared	.01				

An empirical approach to estimation of an Expectations Augmented Phillips Curve and the derivation of the associated Natural Rate of Unemployment is detailed in Woolridge (2003, p. 371). A linear form of the curve is written as:

$$inf_t - inf^e_{t-1} = \beta_1(unem_t - \mu_0).$$

μ_0 is the natural rate of unemployment. Using the observed inflation rate last period as the expectation for the future, this becomes,

$$inf_t - inf_{t-1} = \beta_1(unem_t - \mu_0).$$

This can be rewritten as:

$$inf_t - inf_{t-1} = \beta_0 + \beta_1 unem_t + \varepsilon_t.$$

In this formulation, $\beta_0 = -\beta_1 \mu_0$, so $\mu_0 = \beta_0 / -\beta_1$. From the above estimations, $\mu_0 = .01379/.00261 = 5.28$.